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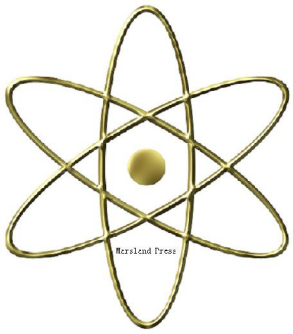

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CONTENTS

	[*]yy_abd_elfattah@yahoo.co **Abstract:** A method of predicting the area effect of absorbent surface with finite dimensions is introduced using least square fitting method. The measured value of sound absorption coefficient for any area of the absorbing material can be corrected to be like that of the absorption of standardized area. This is obtained from the estimated equations at each frequency. In order to obtain these corrections, some experiments are carried out in a reverberation room using different absorber materials with different areas such as carpet, sponge, foam and polyisoprene. **[**M.G. El-Shaarawy, Mohamed Abd-elbasseer, Abd-elfattah A. Mahmoud, and Rabab. S. youssif. **Estimation and Determination Correction for the Area Effect of the Sound Absorber Material.** Nature and Science 2011;9(4):9-14]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Estimation; Determination; Correction; Area Effect; Sound Absorber Material		
3	**The Effect of Climatic Factors on the Production and Quality of Castor Oil** Abolfazl Alirezalu[1 *], Nasrin Farhadi[1], Habib Shirzad[2], Saeid hazarti[3] 1- Department of Horticulture, Agricultural faculty, Tarbiat Modares University, Tehran, Iran[1] 2- Department of Horticulture, Agricultural faculty, Urmia University, Iran[2] 3- Department of Agronomy, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran[3] a.alirezalu@gmail.com, saeid.hazrati@yahoo.com **Abstract:** The versatile application of castor oil in different pharmaceutical, chemical, sanitary, cosmetic, biodiesel, and recently in food industry because of its unique physicochemical properties has led castor oil to be the focus of abundant research projects. In this research, the impact of 10 different climatic conditions in Iran on the castor oil production by castor bean (*Ricinus communis* L.) from the standpoints of the quality, oil content and physicochemical properties of castor oil was investigated. With the analyzed oil samples, oil content, moisture content, refractive index, chlorophyll content, saponification value, iodine value, acid value, and peroxide value were respectively determined as 35%-56%, 0.3%-1.2%, 1.404-1.430, 0.02-0.4 mg Phenophytin/ kg Oil, 164-179 mg KOH/g Oil, 75-86 g I_2/100 g Oil, 0.2-0.9 mg NaOH/g Oil, 0-0.5 meq O2/Kg Oil. Castor oils from various regions were significantly (p<0.05) different from the viewpoint of oil content, moisture content, chlorophyll content, acid value, peroxide value, saponification value, and iodine value, but indicated no considerable difference (p>0.05) in their refractive indices. The plants grown under climatic conditions of Nur Abad region were of the highest level of oil content (56%) indicating the most favorable meteorological and soil physicochemical conditions in the area. From the standpoint of oil stability and quality, the oil from Marand, Urmia and Nazarlu were of proper conditions. The present research is the first report on the quality, oil content, and physicochemical properties of castor oil extracted from castor beans harvested in different regions in Iran. [Abolfazl Alirezalu, Nasrin Farhadi, Habib Shirzad, Saeid hazarti. The Effect of Climatic Factors on the Production and Quality of Castor Oil Nature and Science 2011;9(4):15-19]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key Words:** Climatic Factors, Castor bean, Oil, Production, *Ricinus communis*	Full Text	3
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	(n=11), gagging up foamy mucous (n=3) and exercise intolerance (n=17). Seventeen cats underwent chest radiography. Six cases showed no patterns neither bronchial nor interstitial, nine cases showed bronchial pattern, one case suffer from severe interstitial pattern and one case showed pneumothorax in addition to bronchial pattern. A predominant esinophilic sample was collected from only 4 cats by transtracheal lavage. There were minimal changes in differential white cell counts, except significant esinophilia. Therapeutic plan was directed initially to control asthmatic attack either by conventional medication by injection or nebulization by bronchodilators. Then the pet maintained on oral form of conventional medication or spacer, respectively. The building stone in the present study was avoidance of putative aeroallergens. On the basis of the data of the present cases, it would appear that the diagnosis of feline asthma depends largely on the clinical presentation and radiographic findings. The present study concluded that nebulization and inhalation therapy were more effective and rapid therapy than conventional medication. (n=number). **[**Wael, M. Kelany And Haithem, A. M., Farghali. **Nebulization And Inhalation Therapy Versus Conventional Medication Of Feline Asthma.** Nature and Science 2011;9(4):20-27]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Nebulization, inhalation, conventional, radiography, feline, asthma.		
5	**Effect of Cadmium Pollution on Neuromorphology and Function of brain in Mice Offspring** [*1]Hussein A. Kaoud and [2]Mohey M. Mekawy [1]Department of Veterinary Hygiene and Environmental Pollution, Faculty of Veterinary Medicine, Cairo University, Egypt [2] Department of Toxicology and Forensic Medicine, Faculty of Veterinary Medicine, Cairo University, Egypt. [*]ka-oud@link.net **Abstract:** Cadmium chloride ($CdCl_2$) was given to Swiss-Webster pregnant female mice at the concentrations of (50mg/L) and (100mg/L) (w/v) respectively, in their drinking water. Treatment started few days before pregnancy and it continued until delivery and weaning the offspring. After the weaning period (22 days), all male offspring were isolated and subjected to "Standard Opponent" test at the age of 25 days. The results of this test showed a significant and dose-dependent increase in the non-social behavior, such results showed a significant decline in the social behavior including naso-genital and naso-nasal contact, number of fights, rear, wall rear and displacement activities of the Cd exposed groups. Brain impairments due to the neurotoxic effect of Cd treated groups were indicated by histopathological investigation and neurochemichal analysis. The present prenatal Cd effects in the male offspring are possibly via in utero exposure and/or via mother's milk. **[**Hussein A. Kaoud and Mohey M. Mekawy. **Effect of Cadmium Pollution on Neuromorphology and Function of brain in Mice Offspring.** Nature and Science 2011;9(4):28-35]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key Words:** Cadmium; Prenatal exposure; Brain impairment; Mice offspring; Behaviour.	Full Text	5
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	[a]lorrainetafadzwa@yahoo.com; [b] johnmupenzi@gmail.com; [c] liuyf@cug.edu.cn, [d]lilh@ms.xjb.ac.cn **Abstract:** Water scarcity and how it can be availed for general purposes is highlighted in this paper in relation to watershed management. An overview of different African countries is done and the major problems identified to be causing water scarcity were land degradation, population and mismanagement of resources. Researches carried out in different countries however highlights that land management, water management and participation of locals as components of watershed management can be used in water productivity. In most parts of Africa rain water harvesting in conjunction with good conservation methods has gain popularity as a way to avail water for different purposes. [Tafadzwa, L.M., Liu Y., Mupenzi, J.P. and Lanhai, L. **Improving water availability through Watershed Management in Africa** Nature and Science 2011;9(4):51-56]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key word:** Watershed Management, Water Productivity, Land and Water Management and Human Participation		
10	**Use of dielectric properties in quality measurement of agricultural products** Mahmoud Soltani[1*], Reza Alimardaniand[1], Mahmoud Omid[1] 1. Department of Agricultural Machinery Engineering, Faculty of Agricultural Engineering and Technology, University of Tehran, Karaj, Iran mahmoodsoltani39@yahoo.com **Abstract:** A number of applications for capacitive sensor in agriculture have been used by different researchers over the past years. They measured the dielectric constant and loss factor of material which correlates well with certain quality factors of the products such as moisture content and ripeness. This paper presents an overview of various utilizations of dielectric properties in precision agriculture. [Mahmoud Soltani, Reza Alimardaniand, Mahmoud Omid. **Use of dielectric properties in quality measurement of agricultural products.** Nature and Science 2011;9(4):57-61]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Dielectric properties, Quality, Frequency.	Full Text	10
11	**The Influence of Soil Moisture Stress on Growth, Water Relation and Fruit Quality of *Hibisicus sabdariffa* L. Grown Within Different Soil Types.** [1]Soha E. khalil and [2]Atef A.S. Abdel-Kader [1]Department of Water Relation and Field Irrigation, National Research Centre, Dokki, Cairo, Egypt [2]Department of Medicinal and Aromatic Research, Horticulture Research Institute, Giza, Cairo, Egypt Corresponding author: soha_khalil2001@yahoo.com **Abstract:** Two pot experiments were carried out during two successive seasons 2008 and 2009. The experiments aimed to study the effect of different soil moisture stress levels (70%, 50% and 30% depletion of the available soil water) on vegetative growth, Yield, essential oil, N, P, K, protein and anthocyanins contents of *Hibiscus subdariffa* L. grown within three soil types (clay, sandy and sandy clay loam soils). All growth and yield attributes ,as well as, oil % were significantly increased under the moderate soil moisture level combined with sandy soil. Increasing soil moisture level caused an increase in RWC %, N, P, K, protein % and anthocyanins content, combined with mixed soil in case of RWC%, N, P, K, and protein % and combined with sandy soil in case of anthocyanins content. While opposite trend obtained for osmotic pressure. **[**Soha E. khalil and Atef A.S. Abdel-Kader. **The Influence of Soil Moisture Stress on Growth, Water Relation and Fruit Quality of *Hibisicus sabdariffa* L. Grown Within Different Soil Types.** Nature and Science 2011;9(4):62-74]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key words**: Water relation, *Hibiscus subdariffa* L., Different soil types, Growth, Yield, Seed quality	Full Text	11
12	Some social factors Related to level of Environmental health Awareness in Rural Egypt **Ayman Ibrahim Elkhfif** Department of Agricultural Economics - National Research Center **Abstract:** The research aimed to identify the impact of some social factors in age, educational level, family size, the degree of cultural openness- communication, and economic level to the level of environmental health awareness of the respondents. In addition to identifying the most important	Full Text	12

	invoke Einstein's general theory of relativity. However, there are severe consequences: (i) the velocity of the rest frame as observed in the moving frame is not equal to the velocity of the moving frame as observed in the rest frame; (ii) furthermore, the one-way light signal speed is not a universal constant any more, but has to be assumed different in the moving frame. This leads to the definition of the rest frame to be a preferred frame, where the assumption of an isotropic light signal speed still holds. The light signal speed in the moving frame is then anisotropic and dependent on the frame velocity. Several applications are discussed in comparison to Einstein's original theory of special relativity: Light aberration effect, length contraction, time dilation, Maxwell's equations, the electric Lorentz force, the relativistic law of motion, the electromagnetic wave equation, and the relativistic Doppler frequency shift of electromagnetic radiation. It is pointed out that, in the moving frame, it must be distinguished between the light signal speed (ray velocity) and the phase velocity of light. Another issue is the fact that the interpretation of Maxwell's equations in the moving frame is not unequivocal. - However, despite of reasonable and interesting results, the final judgement of the theory will only be possible when reliable evaluations of one-way light signal speed measurements are available. [Wolfgang Gaudig. **A New Approach to Special Relativity and its Consequences.** Nature and Science 2011;9(4):89-111]. (ISSN: 1545-0740). http://www.sciencepub.net		
15	**Using of Distance Education in adult education** Sharareh Khodamoradi [1] and Mohammad Abedi[2] [1] Department of Agricultural Extension Education, Science and Research Branch, Islamic Azad University, Tehran, Iran [2]Department of Agricultural Management, Islamic Azad University, Qaemshahr Branch, Iran *Corresponding author: abedi114@yahoo.com **Abstract:** Distance education courses vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn. The contract between teacher and learner, whether in a traditional classroom or distance education, requires that the student be taught, assessed, given guidance and, where appropriate, prepared for examinations that may or may not be conducted by the institution. This must be accomplished by two-way communication. **[**Sharareh Khodamoradi and Mohammad Abedi. **Using of Distance Education in adult education.** Nature and Science 2011;9(4):112-117]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Distance Education, adult education	Full Text	15
16	**Different techniques in Participatory Rural Appraisal (PRA)** Sharareh Khodamoradi [1] and Mohammad Abedi[2] [1] Department of Agricultural Extension Education, Science and Research Branch, Islamic Azad University, Tehran, Iran [2]Department of Agricultural Management, Islamic Azad University, Qaemshahr Branch, Iran *Corresponding author: abedi114@yahoo.com **Abstract:** RRA is a social science approach that emerged in the late 1970s. The basic idea of RRA is to rather quickly collect, analyse and evaluate information on rural conditions and local knowledge. This information is generated in close co-operation with the local population in rural areas. Therefore, the	Full Text	16

	research methods had to be adjusted to local conditions, i.e. they had to meet the communication needs of illiterate people or people who are not used to communicating in scientific terms. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA is intended to enable local communities to conduct their own analysis and to plan and take action . PRA involves project staff learning together with villagers about the village. The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation. Participatory Rural Appraisal (PRA) is considered one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-up approach, and from blueprint to the learning process. **[**Sharareh Khodamoradi and Mohammad Abedi. **Different techniques in Participatory Rural Appraisal (PRA) .**Nature and Science 2011;9(4):118-124]. (ISSN: 1545-0740). http://www.sciencepub.net/nature **Keywords:** Participatory Rural Appraisal (PRA)		
17	**Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA): Complementary methods in rural research** Sharareh Khodamoradi [1] and Mohammad Abedi[2] [1] Department of Agricultural Extension Education, Science and Research Branch, Islamic Azad University, Tehran, Iran [2]Department of Agricultural Management, Islamic Azad University, Qaemshahr Branch, Iran *Corresponding author: abedi114@yahoo.com **Abstract:** Promising potentials include farmers' own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Changes in personal behavior and attitudes, and in organizational cultures, are implied. PRA parallels and resonates with paradigm shifts in the social and natural sciences, business management, and development thinking, supporting decentralization, local diversity, and personal responsibility. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA evolved from Rapid Rural Appraisal (RRA). In recognition of the fact that the community to which development projects are supposed to serve is not involved in the process and the subsequent flaws implicit in designing and implementing such projects, development practitioners and thinkers started to investigate ways for effective community participation in the overall process. This led to a series of information collection techniques used to collect and analyze data in rural areas, nown as Rapid Rural Appraisal (RRA), which was developed in the 1970s and 1980s. **[**Sharareh Khodamoradi and Mohammad Abedi. **Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA): Complementary methods in rural research.** Nature and Science 2011;9(4):125-129]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Participatory Rural Appraisal (PRA), Rapid Rural Appraisal (RRA), rural research	Full Text	17
18	**Rural development through information and communication technologies (ICT)** Sharareh Khodamoradi[1] and Mohammad Abedi[2] [1]Department of Agricultural Extension Education, Science and Research Branch, Islamic Azad University, Tehran, Iran [2]Department of Agricultural Management, Islamic Azad University, Qaemshahr Branch, Iran *Corresponding author: abedi114@yahoo.com **Abstract:** The concept of development of the rural, today, is not just project initiatives and governance;	Full Text	18

	it is much more beyond that. This paper uncovers a whole plethora of ICT emergence as a technology of the new millennium. Against the backdrop of the ongoing ICT boom, this paper makes an attempt towards studying its applications and usage planning process and policy making for the rural communities focusing on how it helps in aligning the key factors and reduce the problems of alienation, fragmentation and dislocation of knowledge. Review of literature shows that intervention of information and communication technologies (ICT) in rural development initiatives are capable of development, but are not successful. Lack of community participation, absence of an integrated approach and non-inclusion of traditional knowledge systems (TKS) in the project designs are the major impediments. We therefore suggest a systems-based approach in the design of e-Governance projects, and brief some future directions. Sustained development using rural informatics is possible, only if ICT interventions are able to respond to the local needs and re-adjust as per the prevailing knowledge (Traditional Knowledge Systems- TKS) of the rural areas. **[**Sharareh Khodamoradi and Mohammad Abedi. **Rural development through information and communication technologies (ICT).** Nature and Science 2011;9(4):130-133]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** information and communication technologies (ICT), rural development		
19	**Comparative Study Between Low Dose Bupivacaine With Fentanyl & Bupivacaine Alone For Cesarean Section.** Farouk G. [1], El- Sokkary M. [*2] [1] Department of anesthesia – Al- Azhar University [2] Department of Obstetrics and Gynecology – Ain Shams University mageleel2000@gmail.com **Abstract: Objective:** The aim of the present study is to evaluate the efficacy of reducing the bupivacaine dose with addition of fentanyl in spinal anesthesia for cesarean section**. Patients and Methods:** This prospective study was done during a period started from January 2008 to Decemeber 2009. It was conducted on 40 patients in the age group of 20-35 years. They were divided randomly into two groups having 20 patients in each, group B received 2ml intrathecal hyperbaric bupivacain 0.5% (10mg) & group BF received 1.5ml (7.5mg) hyperbaric bupivacain 0.5% plus 25 µg fentanyl. The efficacy of anesthesia, patient satisfaction and neonatal affection were assessed. **Results*:*** Adequate sensory blockade (T6 or higher) was obtained in 75% of all cases. Two cases need general anesthesia & were excluded from the research. Two patients in groups BF need IV nalbuphine supplementation after delivery of the baby. Hypotension occurs in 80% of patients in group B & in 40% of patients in group BF. This difference in incidence of hypotension is significant. Number of ephedrine treatment & total dose of ephedrine were all significantly lower in group BF but the difference was not significant. There were no significant differences in quality of anesthesia between the tow groups. **Conclusion*:*** lowering bubivacaine dose to 1.5 ml instead of 2.0 ml (usual dose for cesarean section) and adding 25ug fentanyl is associated with a significant decrease in the incidence of hypotension and the number and total dose of ephedrine used. **[**Farouk G., El- Sokkary M. **Comparative Study Between Low Dose Bupivacaine With Fentanyl & Bupivacaine Alone For Cesarean Section.** Nature and Science 2011;9(4):134-137]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key Wards;** Bupivacaine - Fentanyl - Cesarean Section	Full Text	19
20	**Autocrine growth regulation of keloid and normal human dermal fibroblasts** Abd-Al-Aziz H. Abd-Al-Aziz[1], El sayed M.E. Mahdy[2], Hanaa A. Amer[3], Wafaa G. Shoshah [2] and Omyma M. EL Shishtawy [2] 1. Ain Shams University, Plastic Surgery Department, Egypt. 2. Helwan University, Chemistry Department, Egypt.	Full Text	20

	3. Ain Shams University, Clinical Pathology Department, Egypt. ahanafy57@yahoo.com, elsayedmahdy@ymail.com, hanaahmedamer@yahoo.com, wafaashousha@yahoo.com, omyma_mohamed_sayed@yahoo.com. **Abstract**: Dermal fibroblasts were examined for autocrine control. Four experiments were done on each keloid and normal human dermal fibroblasts to study the effects of fibroblasts conditioned medium at 25% & 50% concentration on passage two (P2) cultured fibroblast. In each experiment, growth was quantitated by cell count, protein and Deoxyribonucleic acid (DNA) assays. The conditioned medium in our experimental models resulted in increase in the cell yields in the conditioned medium groups. There was definite increase in the cell population with the 25% and 50% conditioned medium over the experimental time period with both normal skin and keloid fibroblasts. The amount of protein & DNA per million cells is increased in cultured keloid fibroblasts and decreased with cultured normal dermal fibroblasts. The study showed that the autoscreation of culture keloid fibroblasts contain both mitogenic and metabolic signals that increase the cell count, protein and DNA content per million cells. **[**Abd-Al-Aziz H. Abd-Al-Aziz, El sayed M.E. Mahdy, Hanaa A. Amer, Wafaa G. Shoshah and Omyma M. EL Shishtawy. **Autocrine growth regulation of keloid and normal human dermal fibroblasts.** Nature and Science 2011;9(4):138-143]. (ISSN: 1545-0740). http://www.sciencepub.net. **Key words**: autocrine control; keloid fibroblasts; normal human dermal fibroblasts; cell count; protein assays; DNA assays		
21	**A study of Some Social Factors Affecting the Societal Belonging to the Rural Youth** Ayman Ibrahim light[1] and Ashraf Mohammed Yunis Ahmad[2] [1] Department of Agricultural Economics - National Research Center - Dokki - Egypt [2] center Agribusiness Management, Research and Training - Higher Institute for Cooperation on Agriculture - Shubra - Cairo – Egypt **Abstract:** the research aimed are to determine the degree of affiliation of respondents from upscale youth of their community, as well as determine the relationship between the degree of affiliation of respondents to their community and all of the social factors under study. Also, determine the contribution of independent factors of the subject of study combined in the interpretation of the overall contrast between the subjects in the degree of belonging to their community. The research was conducted on a sample of rural youth, located in the age (20-35 years), an estimated 200 persons from the Sahel Aljawabr village, alshouhda Markz (district), Monofia Governorate. Data was collected through personal interviews with the subjects by questionnaire designed for this purpose. The researcher has been used in the tabulation and analysis of data tables exclusively numerical, percentages, and simple correlation coefficient of Pearson to determine the significant relationship between the factors independent of the subject of study and the affiliation of respondents to their community. Moreover the use of "T" and "F" tests to identify the significant differences between some of the independent factors and belonging to the local community also used relational analysis of the multi-model (progressive) Step Wise to determine the contribution of these factors in the interpretation of the overall contrast between the subjects in the degree of this association. The main results are: (1) Rural Youth has a somewhat high degree of belonging to a combined local and stand with it, and has the desire for advancement and development subject to the availability of appropriate conditions for it. (2) Significant relationship between the level of affiliation to the community and the following independent variables: the profession of the respondents, exposure to mass communication, family size, type of family, family cohesion, the state of housing, and the problems experienced by rural youth. (3) Proved to be a not significant relationship between the level of affiliation to the community and the following independent variables: age, type and level of education, marital status of respondents, the presence of children of respondents, and the social situation of young rural families of the subjects. (4) Some of the independent factors contribute to the interpretation of the overall contrast between the respondents in terms of their belonging to their community by 48.1%, and the most important of these	Full Text	21

	factors, exposure to mass communication, and family size, and family cohesion. [Ayman Ibrahim light and Ashraf Mohammed Yunis Ahmad. A study of Some Social Factors Affecting the Societal Belonging to the Rural Youth. Nature and Science 2011;9(4):144-155]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Social Factors Societal Belonging, Rural Youth		
22	**Using degree- day unit accumulation to predict potato tubeworm incidence under climate change conditions in Egypt** Abolmaaty S.M[1*]; Khalil. A.A[1]; and Amna M. H. Maklad [2] The Central laboratory for Agriculture Climate, Agriculture Research Center, Dokki, Giza, Egypt. [2] Plant Protection Research Institute, ARC, Ministry of Agric., Dokki, Egypt *maaty2020@yahoo.com **Abstract:** The potato tuber worm, *Phthorimaea operculella Zeller*, is a serious pest of potato, *Solanum tuberosum L.*, in subtropical and tropical production systems around the world. Knowledge of the temperature-dependent population growth potential is crucial for understanding population dynamics and implementing pest control strategies in different agro-ecological zones. Potato tuber moth is considered among the most important potato insect pests in Egypt. The aim of this study was to predict degree day's unit and annual generation peaks for tuber worm under current and expected future climate by using the relationship between the accumulated thermal heat units expressed as degree-days unit (DDU) and the population fluctuations. It is evaluated how temperature influences the annual generation in two distinct locations in Egypt using the climate change data output from the HadCM3 model for A1 scenario proposed by the Intergovernmental Panel on Climate Change. Our results indicated that population of the tuber worm at Ismailia gave the highest number of generations as compared with EL Beheira location under current climate. Generation numbers of tuber worm under climate change conditions increased especially in Ismailia location. However, the expected generation numbers of the tuber worm in 2050 and 2100 are expected to be 9-11 and 10-12 generations per year, respectively. **[**Abolmaaty S.M; Khalil. A.A; and Amna M. H. Maklad. **Using degree- day unit accumulation to predict potato tubeworm incidence under climate change conditions in Egypt.** Nature and Science 2011;9(4):156-160]. (ISSN: 1545-0740). http://www.sciencepub.net. **Keywords:** Potato tuber worm, Climate change, Degree day unit, Generations, *Phthorimaea operculella Zeller*, threshold temperature	Full Text	22

The Potential Effect of Flaxseed on Female Postmenopausal Rats

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Abstract: Phytoestrogens are plant compounds with estrogen-like biological activity. Phytoestrogen intake plays a role in preventing the development of some chronic diseases attributed to ovarian hormone deficiency. Flaxseed is a dietary source of phytoestrogen which contain lignans. The current work is conducted to study the effects of supplementation of flaxseed mixed with basal daily diet (B.D.) on protection of cardiovascular system and alleviation of osteoporosis in female postmenopausal rats. Fifty female postmenopausal rats were classified to 5 groups (n=10); one group served as control without addition of flaxseed, three groups were assigned to consume 3 different doses of flaxseed mixed with B.D.(10,15& 20g/kg.b.wt.) and last group was orally received ovestin beside B.D. for 3months. Serum lipid profile, alkaline phosphatase (Alp), Ca^{++} and phosphorous (P) were assessment. Estradiol level and bone mineral density (BMD) were measured. The obtained results showed significant decrease in total cholesterol, triglycerides and LDL-cholesterol with an elevation in HDL-cholesterol particularly at 10 and 15 g flaxseed/kg.b.wt. Elevation effect was seen in total cholesterol, triglycerides and HDL-cholesterol with reduction in LDL-cholesterol when ovestin was administrated to postmenopausal female rats. An improvement in bone-turnover as a result of mixed flaxseed to B.D. indicated by elevation in Alp and reduction in urinary excretion of ca and p particularly when 10g flaxseed added to normal diet. Very slightly beneficial effect found in BMD of femur different parts when flaxseed was mixed with B.D. Conclusion; 10-15g flaxseed/kg b.wt may be an effective alternative therapy to alleviate postmenopausal symptoms and may protect cardiovascular system by altering lipid profile favorably, also may improve bone-turnover with reduction in bone-fracture risk. Supplementation of flaxseed for more than three months may improve BMD.

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Key words: Osteoporosis, Hormonal replacement therapy, cardiovascular diseases, Phytoestrogen, Flaxseed, Lignans.

1. Introduction:

Ovaries gradually produce estrogen in the period up to menopause, then its blood level decline as a result (Lerner, 2006). The declining levels of estrogen can cause distressing symptoms with increased incidence of osteoporosis, cardiovascular disease (Coelingh etal., 2008).

Administration of estrogen to replace its falling level can alleviate the distressing symptoms and this called hormonal replacement therapy (HRT). Several studies have shown that estrogen replacement therapy (ERT) maintains skeletal mass and protect cardiovascular system in postmenopausal women (Delmas, 2002). Although hormonal replacement therapy is an effective treatment in alleviating distressing symptoms but women are unwilling to initiate this treatment due to long term ERT has been associated with increased risk factor of breast and uterine cancer and contraindication (Radhakrishnan etal., 2009).

Estriol is one of the estrogen that has lower risk than other estrogen of causing cancer (Jirapino etal., 2003). Ovestin tablets contain the active gradient estriol which is naturally occurring form of estrogen (Rochon etal., 2007). Because a high risk of cancer as a result of (ERT), many studied have been performed recently to investigate that natural phytoestrogens act as safe treatment (Luine etal., 2006).

Phytoestrogen are non-steroidal plant compounds found in many fruits, vegetables, grains and seeds (Arjmandi, 2001). Lignans are structurally related to estrogen. The strong resemblance between lignan and estrogen inable lignan to compete with estrogen against estrogen receptors site, so dietary lignans may block the estrogen receptors sites, displacing harmful excessive estrogen as harmless flushes from the body as waste (Stephen, 2006). Lignans have estrogenic and estrogenic activity. If there is little estrogen in the body as postmenopausal women, lignans may act like weak estrogen but when natural estrogen is abundant, lignans may reduce estrogen's effects by displacing it from the body (Carreau etal., 2008).

Flaxseed is a rich source of mammalian phytoestrogen lignans. Mammalian lignans (enterolectone and enterodiol) are formed by the action of colon normal flora (Stephen etal., 2003).

Lignans may also possess antioxidant activity

as scavenging free radical oxygen that are formed as a result of aging and improve antioxidant status (Stephene, 2006). High intake of Lignan may not be safe for women with a history of estrogen-sensitive cancer (Arjmandi, 2001). Osteoporosis is a reduction in bone mass as a result of lowering level estrogen during menopausal period (Coelingh etal., 2008). Some studies reported that lignans may alleviate age-related bone loss and decrease bone fracture (Tsuang etal., 2008) and may reduces cardiovascular disease (Cassidy and Hooper, 2006).

2. Materials and Methods:

Female menopausal albino rats (250-300 g) at the average age ranging from 16-19 months were purchased from National Research Center, Dokki, Giza, Egypt. Rats were allowed to climate for one week prior to the initiation of experiment. Rats were maintained at balanced diet (B.D.) and tap water that allowed ad libitum.

Chemical and Natural treatment

Ovestin was obtained from Sedico Pharmaceutical Co. 6 October City-Egypt dissolved in water and adjusted for daily gavages injection of 12µg/kg.b.wt for three months.

Flaxseed was supplies from Agriculture Research Center, Giza, Egypt. It was prepared at 3 different doses 10,15&20 g/kg b.wt for 3 months. Fifty female menopausal rats were divided into five groups (n=10) according to their dietary supplementation.

Group I: Received balanced diet only served as control.
Group II: Received 10 g /kg.b.wt flaxseed mixed with balanced diet.
Group III: Received 15 g /kg.b.wt flaxseed mixed with balanced diet.
Group IV: Received 20 g /kg.b.wt flaxseed mixed with balanced diet.
Group V: Received 12 µg/Kg.b.wt Ovestin by gavages beside balanced diet.

Animals were sacrificed and blood samples were collected by cardiac puncture, blood centrifuged and obtained serum was kept frozen till analysis:

Biochemical and hormonal analysis:

Serum total cholesterol, high density lipoproteins (HDL) and low density lipoproteins (LDL) were determined according to (stein, 1987) and Triglyceride was evaluated according to (Young, 1990), serum alkaline phosphatase by (Moss, 1982), inorganic phosphorous according to (Tietz, 1990), serum calcium by (Kozera, 1984), all these parameters were estimated by enzymatic colorimetric method and measured by spectrophotometer. The estradiol hormone was determined by radioimmunoassay according to (Bergquist et al.., 1983).

Bone mineral density (BMD) was determined by DEXA-Norland XR-46 version 3.9.6 in National Research Center.

Statistical analysis:

The data was subjected to one-way ANOVA and the differences between means at 0.05 probability level were determined by Duncan's new multiple range test (Dytham, 1999).

3. Results:

As shown in table (1); Supplementation of whole flaxseed with daily diet at concentration 10 and 15 g/kg body weight (Gr II and III) for 3months significantly decreased ($P<0.05$) the levels of S. cholesterol, triglycerides and low density lipoprotein -cholesterol (LDL-cholesterol), where as high density lipoprotein (HDL-cholesterol) significantly increased ($P<0.05$) when compared with postmenopausal rats not treated with flaxseed (GrI). In addition; supplementation with 20 g/kg. b.wt flaxseed for 3 months (GrIV) showed slightly significant decrease ($P<0.05$) in S. cholesterol but still around the level of control postmenopausal rats where as S. triglycerides level were significantly elevated ($P<0.05$) with elevation of HDL and reduction in LDL were observed when compared with post menopausal female rats (GrI). Orally administration with 12µg/kg ovestin for 3 months (GrV) significantly elevated ($P<0.05$) cholesterol and triglycerides but in contrary elevated HDL with reduction in LDL where observed when compared with untreated postmenopausal rats.

As shown in table (2); Postmenopausal rats without treatment with flaxseed revealed a significantly decrease ($P<0.05$) in S. alkaline phosphatase activity (ALp), Ca^{++} and inorganic phosphorous but treatment with whole flaxseed at different concentration for 3 months reduced bone loss and this indicated by significantly increase ($P<0.05$) in S. ALp activity and Ca^{++} particularly treatment with 10g/kg.b.wt flaxseed where as treatment with 15 and 20 g/kg significantly ($P<0.05$) increases S. ALp without elevation in S. Ca^{++}. No significant change observed in the level of S. Ca^{++} when postmenopausal rats supplied with 15 and 20 g/kgb.wt flaxseed compared with control. Orally treated with ovestin significantly ($P<0.05$) decreased ALp activity with non significant alteration in Ca^{++} and phosphorous (indicated no improvement in bone loss).

Table (1): Effect of flaxseed and ovestin on Cholesterol, Triglycerides, HDL and LDL levels in postmenopausal female rats.

Parameters / Groups	Cholesterol (mg/dl)	Triglycerides (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
Control (GrI)	78±1.6^{b}	76±2.1^{b}	21.2±1.0^{c}	41.6±1.3^{a}
Flaxseed 10g/kg (GrII)	55±1.4^{e}	56.7±2.0^{d}	23.7±0.8^{c}	19.9±0.9^{c}
Flaxseed 15g/kg (GrIII)	64±1.9^{d}	66±2.0^{c}	29.4±1.3^{b}	22.7±1.3^{cb}
Flaxseed 20g/kg (GrIV)	72±1.3^{c}	93±2.6^{a}	28.6±1.2^{b}	24.1±1.3^{b}
Ovestin 12µg/kg (GrV)	94±1.7^{a}	99.6±3.2^{a}	51.3±1.5^{a}	24.5±1.1^{b}

Data are means of 10 replicates± standard error. Means in the same raw have the same litter are not significantly different at 0.05.

Table (2): Effect of flaxseed and ovestin on Alkaline Phosphatase, Calcium ions and Inorganic Phosphorus levels in postmenopausal female rats.

Parameters / Groups	Alkaline phosphatase U/L	Calcium ions mg/dl	Inorganic phosphorus mg/dl
Control (GrI)	290±20.6^{c}	12.7±0.5^{bc}	8.4±0.5^{ab}
Flaxseed 10g/kg (GrII)	677±30^{a}	17.5±0.9^{a}	8.3±0.2^{ab}
Flaxseed 15g/kg (GrIII)	317±18.4^{c}	12.3±0.6^{bc}	9.2±0.5^{a}
Flaxseed 20g/kg (GrIV)	466±25^{b}	11.8±0.5^{c}	7.5±0.3^{b}
Ovestin 12µg/kg (GrV)	203±11^{d}	13.9±0.3^{b}	8.5±0.5^{ab}

Data are means of 10 replicates± standard error. Means in the same raw have the same litter are not significantly different at 0.05.

Fig (1) showed daily treatment with whole flaxseed at different concentration for 3month was significantly elevated (P<0.05) estrogen level particularly at 10&15g/kg.b.wt whereas orally treatment with ovestin as a hormonal replacement therapy resulted in a high significant (P<0.05) elevation of estradiol level when compared with postmenopausal rats.

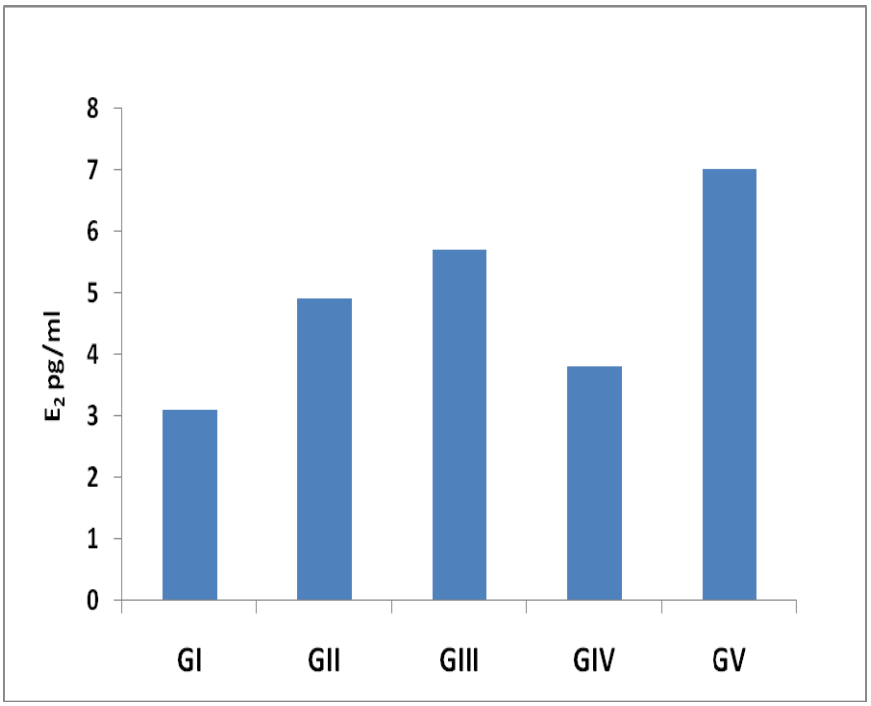
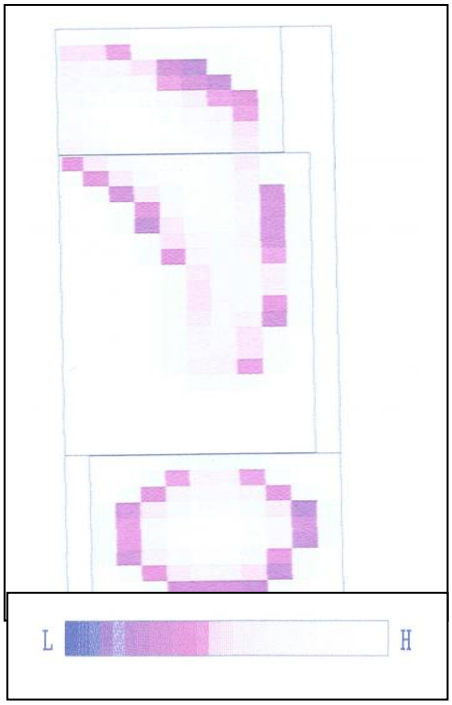
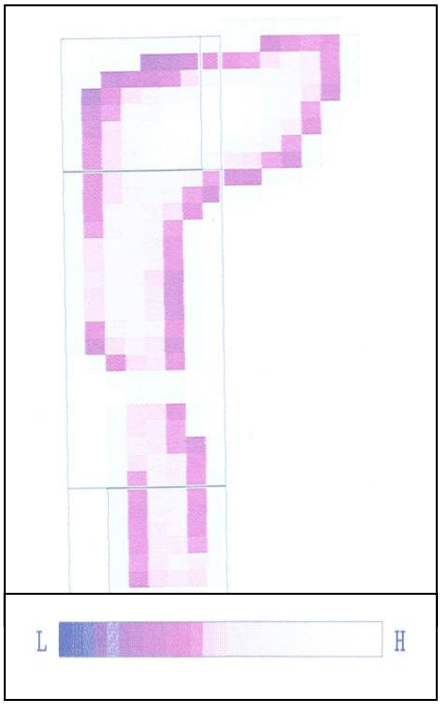


Fig (1): Effect of flaxseed and ovestin on serum Estradiol levels in postmenopausal female rats.

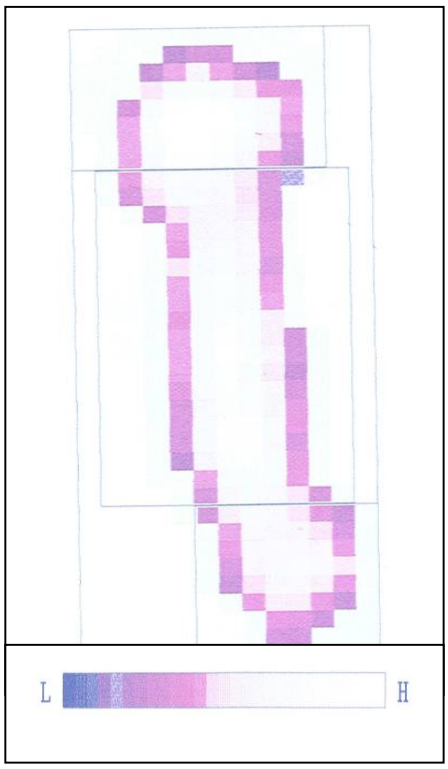
(GrI)

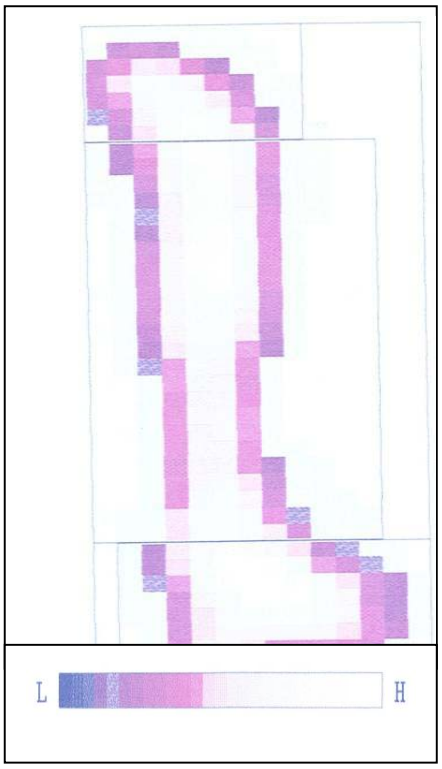




(GrI)

(GrII)





(GrIII)

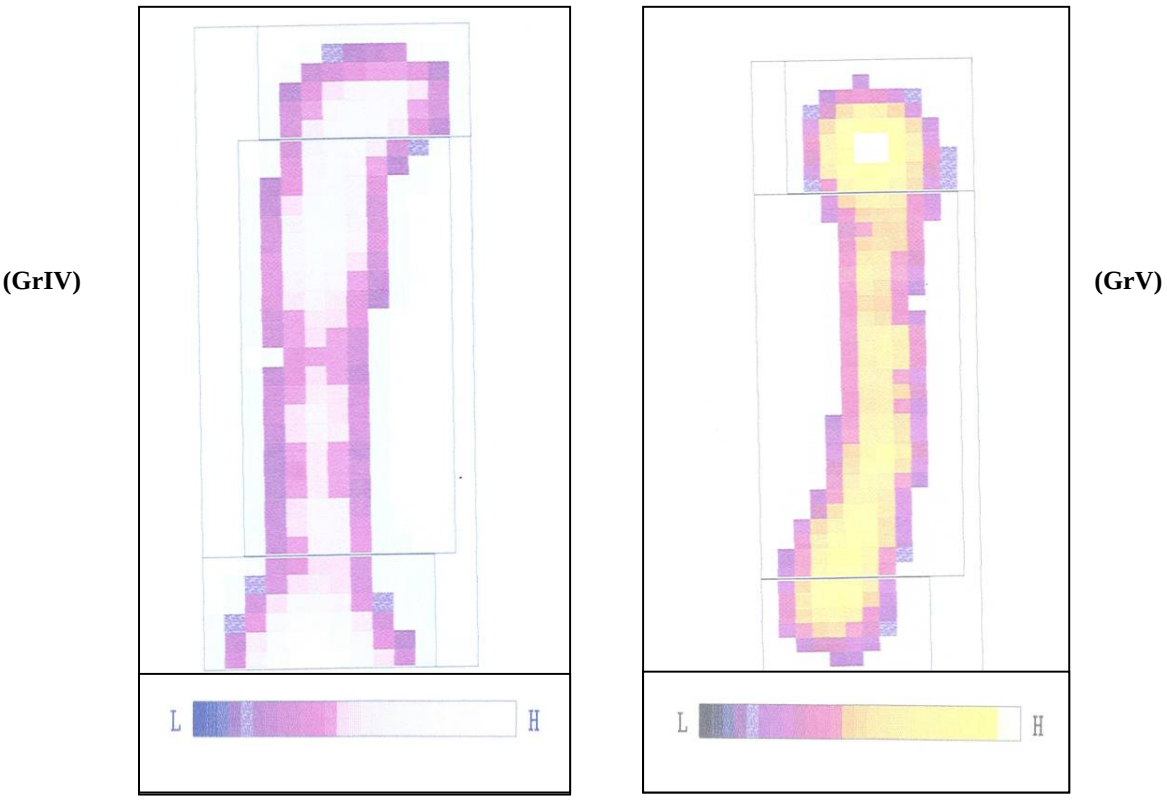


Fig (2): Effect of flaxseed and ovestin on BMD (g/cm^3) of femur different parts in different groups postmenopausal female rats.

Table (3): Effect of flaxseed and ovestin on BMD (g/cm^3) of femur different parts in postmenopausal female rats.

Parameters / Groups	Total	Proximal	Distant	Middle
Control (GrI)	0.112±0.002^{a}	0.113±0.002^{a}	0.109±0.002^{a}	0.109±0.002^{ab}
Flaxseed 10g/kg (GrII)	0.100±0.002^{b}	0.102±0.001^{a}	0.088±0.001^{c}	0.100±0.001^{bc}
Flaxseed 15g/kg (GrIII)	0.101±0.003^{b}	0.099±0.002^{a}	0.110±0.002^{a}	0.103±0.001^{ab}
Flaxseed 20g/kg (GrIV)	0.094±0.001^{c}	0.083±0.101^{a}	0.099±0.004^{b}	0.093±0.003^{c}
Ovestin 12µg/kg (GrV)	0.109±0.001^{a}	0.111±0.002^{a}	0.116±0.005^{a}	0.111±0.006^{a}

Data are means of 10 replicates± standard error. Means in the same raw have the same litter are not significantly different at 0.05.

As shown in table (3); dietary with whole flaxseed with daily diet for 3 months at different concentration (10, 15, and 20 g/kg.b.wt) showed slightly significant change ($p<0.05$) but without observed alteration in BMD g/cm^3 when compared with base line (GrI). Orally gavages with ovestin not improve BMD of femur in different parts of postmenopausal female rats when compared with untreated control group.

4. Discussion:

Flaxseed is a very rich source of lignan that had potential effect in reduction of total cholesterol and LDL-cholesterol without inducing hyper -triglyceridemia, so, lignan were found to have advantage in cardiovascular health (Radhakrishnan etal., 2009). The effect of dietary flaxseed as phytoestrogen on protection of cardiovascular system and biochemical markers of bone remodeling in postmenopausal were evaluated. In the present study there was reduction in total and LDL-cholesterol after supplementation of flaxseed to the basal diet of postmenopausal rats for 3months and these may be contributed to improve cardiovascular system. Flaxseed had hypocholesterolemic effect that could be reduced total cholesterol and low density lipoprotein

(LDL-cholesterol). Bloedon and Szapary, (2004) and Owen etal., (2004) demonstrated that cholesterol lowering effect of diet high in phytoestrogen as flaxseed may be due to their ability to increase LDL-receptor activity. The hypocholesteromic effect of flaxseed can be attributed to its α-Linolenic acid and fiber component (Edralin etal., 2002). Dekleyn etal., (2002) reported that dietary intake of phytoestrogen were associated with b.d. improve in metabolic cardiovascular risk profile in postmenopausal women. These results were coinciding with the data of the present study.

Also the present work revealed that, the addition of flaxseed had potential effect on lipid profile by reduction in total cholesterol, triglycerides and LDL-cholesterol beside elevation of HDL-cholesterol. The level of total cholesterol was significantly reduced as a result of addition of flaxseed to the basal diet of postmenopausal rats. These results were in agreement with Pellizzon etal., (2007) who found that supplementation of phytoestrogen to the normal diet reduced plasma cholesterol level and this may attributed to increase in bile acids formation. Because flaxseed had very high content of α-linolenic acid (Omega-3fatty acids) and fiber component as mentioned before.

Data obtained from the current study were in contrary to the results of Lee and Prasad, (2003) who stated that lipid profile still elevated even after treatment, so flaxseed does not produce any alteration in serum lipid profile. The ineffectiveness of flaxseed was associated with its ineffectiveness in altering the levels of oxidation stress. Edraline etal., (2002) observed that consumption of 40gm flaxseed for 3months resulted in significant decrease in both total and LDL-cholesterol but HDL were lowered with reduction in APoA-1 and Apo-B which were in contrary to the result of the present study. Elevation of HDL-cholesterol in the present study may be attributed to that flaxseed activate apolipoprotein incorporate in HDL biosynthesis.

Orally administration of ovestin to the postmenopausal rats in this work showed significant elevation in total cholesterol, triglycerides and HDL-cholesterol where a reduction in LDL-cholesterol was observed. These results were disagreed with Arjmandi, (2001) who reported the hormonal replacement therapy (HRT) is the most effective treatment in reduction of cardiovascular disease. The result of treatment with HRT in the present work may be attributed to that ovestin not contain α-linolenic acid and fiber which had potential effect in protection of cardiovascular system.

The current study showed that, the addition of flaxseed to daily diet of postmenopausal rats significantly elevated both Ca^{++} and P and this may be due to reduction in their urinary excretion and increase their absorption. These findings providence evidence that dietary supplementation with flaxseed can prevent bone loss in postmenopausal rats so phytoestrogen intake play a role in preventing some chronic disease as age-related bone loss (Branca, 2003, Dodin etal., 2005 and Tsuang etal., 2008). Declining of estrogen level as a result of postmenopausal period resulted in a greater bone turnover which were manifested by increase in alkaline phosphatase activity (ALp) and reduction in both Ca^{++} and phosphorous (P) levels as a marker for bone resorption (Lofman etal., 2005 and Maclaughlin etal., 2006).The results of those studies that mentioned before were similar to the results of the present study of postmenopausal rats. The protective effect of estrogen on bone tissue of premenopausal women is believed to be due primarily to their antiresorptive action (Arjmandi, 2001 and Riggs etal., 2002). Hadjidakis and androulokis, (2006) reported that ovarian hormone deficiency as a result of post menopausal or overiectomized female rats reduce Ca^{++} and P absorption and increase urinary excretion which were coincide with the results of the present work.

Boulbaroud and Arfaoui (2008) demonstrated that significant elevation in (Alp) activity with elevation in urinary Ca and P excretions were observed in postmenopausal rats. Also studied the supplementation of flaxseed did not improve Ca^{++} and P levels while a decreased urinary excretion of Ca^{++} and p were noted which were disagreed with the present work.

In the present investigation estradiol hormone level was increased when rats supplemented with flaxseed. This result in agreement with Brook etal., (2004) who reported that supplementation with flaxseed improve the decline level of estrogen in postmenopausal women to great extent.

Furthermore data obtained illustrated that a very slightly alteration in BMD femurs were observed after addition of flaxseed to basal diet of postmenopausal rats. These results of BMD femurs different parts in postmenopausal rats supplemented with flaxseed were in agreement with Dodin etal., (2005) and Boulbaroud and Arfaoui (2008) who proved that administration of flaxseed at different concentration did not appear to have a beneficial effect on BMD. On the other hand Arjmandi, (2001) reported that addition of phytoestrogen to postmenopausal women may enhance the effectiveness of Ca^{++} leading to increase bone mineral density (BMD). Also data revealed no improvement in BMD were observed when postmenopausal rats orally gavage with ovestin as a hormonal replacement. These results disagreement with Coelingh etal., (2008) who found that the oral bioavailability of sterol in ovariectomized rats increased bone mineral density and increased bone strength.

The free radicals generated in bone environment enhance osteoclast formation and bone resorption but supplementation with flaxseed reduce the rapid rate of bone loss by enhancing antioxidant status which may agreed with the manifestation of the present work. Also, addition of phytoestrogen to the daily diet of postmenopausal rats decreased the rate of bone resorption may be due to α-linolenic acid inhibiting the biosynthesis of prostaglandin and decreasing oxygen-free radicals (reduction in bone resorption) (Lofman etal., 2005).

5. Conclusion:

10-15g/kg.b.wt of flaxseed supplemented to postmenopausal rats were equivalent to 30-40g/kg.b.wt to human daily diet as phytoestrogen for 90 days which may be effective to have potential role in improvement of lipid profile with decrease risk of cardiovascular diseases and reduction of bone turnover. Daily supplementation with flaxseed for more than 3 months may improve BMD.

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Estimation and Determination Correction for the Area Effect of the Sound Absorber Material

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Abstract: A method of predicting the area effect of absorbent surface with finite dimensions is introduced using least square fitting method. The measured value of sound absorption coefficient for any area of the absorbing material can be corrected to be like that of the absorption of standardized area. This is obtained from the estimated equations at each frequency. In order to obtain these corrections, some experiments are carried out in a reverberation room using different absorber materials with different areas such as carpet, sponge, foam and polyisoprene (rubber).

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1. Introduction:

The sound absorption properties of materials is an essential tool of noise control specialists, whether choosing materials for the insulation of buildings and ductwork, designing theatres and concert halls, planning roadway noise barriers or controlling source noise[(1)].

There are currently two main methods of performing absorption type measurements - impedance tube testing using the standing wave ratio or two-microphone method and reverberation room testing. The sound absorption of material depends on frequency and the angle of sound incidence. In application relating to building acoustics and industrial noise control sound may arrive at any angle i.e. random incidence; in most cases reflections and reverberation will result in sound incidence in all angles simultaneously. So that determination the sound absorption coefficient in reverberation room gives the actual and reliable value.

In random incidence, sound absorption coefficient increases when the dimensions of an absorbent surface become as small as the dimension of wavelength. This phenomenon is usually referred to as area effect, and it becomes evident when the absorption coefficient is large. This phenomenon occurs due to edge effect, which includes diffraction or scattering at the edge of the absorbent surface [(2)]. Kimihiro Sakagami and others [(3)] explained that the edge effect is considered if the absorber is rather small.

The reflection coefficient decreases when the angle of incidence on the material surface increases, consequently the absorption coefficient increases [(4)]. As the surface area of material is larger, it has more probability to be exposed to sound waves of larger angle. So that when the material is larger in surface area, it must have higher sound absorption, but the opposite behavior is done i.e. the larger the surface area the smaller the absorption coefficient. This contrast is due to the edge effect of the material [(5)], which indicates that this effect is more effective than the incidence angle effect.

ISO 354[(6)] is used to determine the absorption coefficient of material in reverberation room makes a condition to the standardized area of material to be measured between $10m^2$ and $12m^2$ for room of volume less than $200m^3$, and if the volume is greater than $200m^3$ the standardized area will be increased by factor of $(V/200m^3)^{2/3}$, This condition causes a restricted application in practice. In this paper estimated equations of the area effect and corrections between the non scandalized areas and the standardized area by using a least squares fit method are introduced.

In the present study, different materials with different areas were measured in reverberation room. We measured absorption coefficient of foam, rubber, carpet and sponge. The purpose is to make the measured value of sound absorption coefficient for any area of the absorbing material corrected to be like that of the absorption of standardized area. This is obtained from the estimated equations at each frequency.

2. Experimental Work:

In order to verify the effectiveness of an introduced method, four materials of different areas are used to determine the sound absorption coefficient (α%), and the following table gives their properties:

material	Density (kg/m^3)	Thickness (m)	Area (m^2)
carpet	154	0.004	2,4,6,8,10,12 and 14
foam	16	0.050	2,4,6,8,10,12 and 14
sponge	14	0.011	2,4,6,8,10,12 and 14
polyisoprene	100	0.005	2,4,6,8,10,12 and 14

Using loud speaker, which is omni-power sound source type 4296 B&K, power amplifier type 2716 B&K and sound analyzer type 2260 B&K, these materials are measured in the reverberation room in the national institute for standards (NIS). The reverberation room used for the measurements has a volume of $160m^3$. Set up, instrumentation and method of measurements are carried out according to ISO 354[(6)]. All the measurements are carried over the interested frequency range from 125 Hz to 5000 Hz. In this method, the effect of the sample on time rate of the sound decay in the room at each frequency is observed and compared with that of time rate of sound decay of room without the sample at the same frequency. From these comparative tests, the absorption coefficient is calculated for the sample at a specified frequency, according to the following equation, the random incidence sound absorption coefficient was determined [(6)]:

$$\alpha = \left(\frac{A_2 - A_1}{S} \right), \qquad (1)$$

Where: S is the area of specimen, m^2; A_2 is the equivalent absorption area of specimen, m^2; A_1 is the equivalent absorption area of the reverberation room without the specimen, m^2;

$$A_2 = \frac{55.3V}{c\,T_2} - 4Vm_2, \qquad (2)$$

$$A_1 = \frac{55.3V}{c\,T_1} - 4Vm_1, \qquad (3)$$

Where: V is the volume of reverberation room, m^3; T_2 and T_1 are the accordingly reverberation time in the reverberation room with specimen and without specimen; m_1 and m_2 are the power attenuation coefficient in m^{-1} calculated according to ISO 9613-1 [(7)], using the climatic condition that have been present in the reverberation room with and without the test specimen; c_2 and c_1 are the sound speed in air in the reverberation room with and without the test specimen.

$$m = \frac{\alpha_c}{10 \lg (e)},$$

Where: α_c is the attenuation coefficient in decibels per meter for atmospheric condition.

3. 3- Results and Discussion:

3.1) Absorption coefficient vs area and the estimated equation

Figures 1a, 1b, 1c and 1d show the results of the measured absorption coefficient in reverberation room with different areas. These figures show approximately that at all frequencies, the sound absorption coefficient decrease as the sample areas increase, and stated that at the smallest sample area of $2m^2$, most of the results for the absorption coefficient at higher frequencies exceed unity, which is theoretically not correct. This is due to the so-called edge effect [3, 8-10]; tables 1a, 1b, 1c and 1d show the estimated absorption coefficient equations which are extracted from the measured absorption coefficient data of the different areas at each frequency. Where the R–squared (R^2) value is an indicator from 0 to1 that reveals how closely the estimated values for the trend line correspond to your actual data.

3.2) Absorption area corrections

- Since our room volume is less than 200 m^3, according to ISO 354[6] the standardized area of material to be measured must be between $10m^2$ and $12m^2$. We considered the area of $11m^2$ is the standardized area. The correction which is given to the measured sound absorption coefficient for materials of non standardized area is the deviation between absorption coefficient value calculated from the estimated equations of standardized area and that obtained from the measured absorption coefficient value of non standardized area.
- Fig.2a shows that at low frequencies from 125Hz to 630Hz, the absorption coefficients of carpet material for all areas approximately, do not need corrections to be added to their measured values, except the absorption of area $2m^2$ which needs correction for absorption over all the frequency range. At higher frequencies, and with larger area $14m^2$, 12 m^2 and 10 m^2, this figure indicates that these areas rather do not need corrections for absorption. While the absorption of smaller areas needs this. And for smaller areas, the measured absorption needs corrections over all frequencies.
- Fig.2b shows that, like the carpet the absorption of area $2m^2$ needs correction for absorption over all the frequency range. While larger areas $14m^2$, 12 m^2 and $10m^2$, approximately do not need corrections.
- Fig. 2c gives the same behavior of Fig.2b for foam. But the correction curve of $8m^2$ does not need corrections at lower frequencies.
- Fig. 2d gives the same behavior of Fig.2c for sponge material.

1. a) carpet material

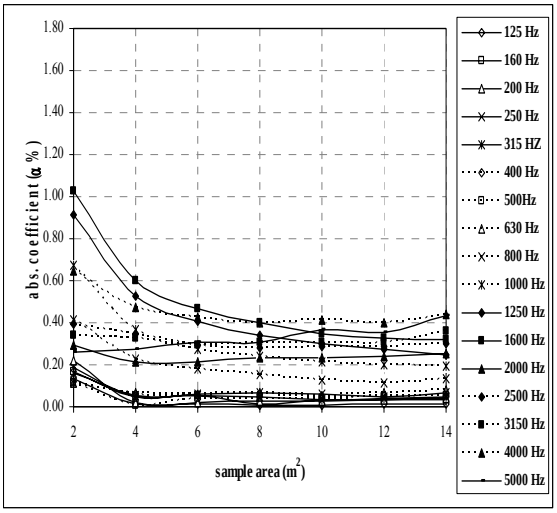

Fig.1a: variation of the measured absorption coefficients of carpet material with the area

1. b) foam material

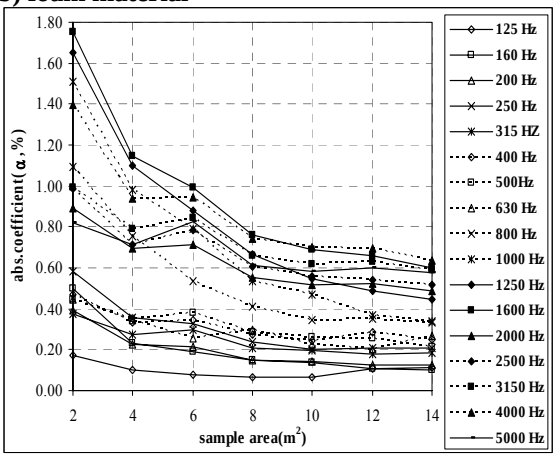

Fig.1b variation of the measured absorption coefficients of foam material with the area

f (Hz)	R^2	Estimated equation
125	0.7469	$\alpha = 0.0019S^2 - 0.0367S + 0.17$
160	0.8146	$\alpha = 0.002S^2 - 0.0391S + 0.2106$
200	0.6979	$\alpha = 0.0032S^2 - 0.0599S + 0.2816$
250	0.6726	$\alpha = 0.002\ S^2 - 0.0387S + 0.226$
315	0.8257	$\alpha = 0.0017S^2 - 0.0349S + 0.2018$
400	0.7859	$\alpha = 0.0009S^2 - 0.0185S + 0.1405$
500	0.4275	$\alpha = 0.0013S^2 - 0.0226S + 0.1259$
630	0.8034	$\alpha = 0.0011S^2 - 0.02S + 0.1424$
800	00.952	$\alpha = 0.3827S^{-0.6499}$
1000	0.9701	$\alpha = 0.9494S^{-0.6409}$
1250	0.9938	$\alpha = 1.3771S^{-0.6617}$
1600	0.9803	$\alpha = 1.4624S^{-0.6093}$
2000	0.5764	$\alpha = 0.0014S^2 - 0.0223S + 0.3107$
2500	0.9654	$\alpha = 0.0018S^2 - 0.0353S + 0.4526$
3150	0.8420	$\alpha = 0.0014S^2 - 0.0229S + 0.3877$
4000	0.9284	$\alpha = 0.0039S^2 - 0.0764S + 0.7567$
5000	0.9368	$\alpha = 0.2335S^{0.0408S}$

Table(1a): R-squared and estimated equations of carpet material; where α is estimated absorption coefficient and S is the area

f Hz)	R^2	Estimated equation
125	0.9065	$\alpha = 0.0021S^2 - 0.0374S + 0.2278$
160	0.9843	$\alpha = 0.8033S^{-0.802}$
200	0.9706	$\alpha = 0.5675S^{-0.6009}$
250	0.9551	$\alpha = 0.0042S^2 - 0.0949S + 0.7236$
315	0.9087	$\alpha = -0.0998Ln(S) + 0.4354$
400	0.8771	$\alpha = 0.0022S^2 - 0.0503S + 0.5419$
500	0.9252	$\alpha = 0.4791e^{-0.0567S}$
630	0.8895	$\alpha = 0.0028S^2 - 0.0595S + 0.5468$
800	0.9905	$\alpha = 0.0085S^2 - 0.1953S + 1.4253$
1000	0.9848	$\alpha = -0.61Ln(S) + 1.8784$
1250	0.9914	$\alpha = 2.8039S^{-0.6948}$
1600	000.99	$\alpha = 2.5371S^{-0.5535}$
2000	0.9391	$\alpha = -0.2078Ln(S) + 1.0224$
2500	0.9111	$\alpha = 1.2259S^{-0.3268}$
3150	0.8972	$\alpha = 0.0026S^2 - 0.0725S + 1.1058$
4000	00.919	$\alpha = 0.0067S^2 - 0.1605S + 1.6145$
5000	0.7193	$\alpha = 0.8558e^{-0.0311S}$.

Table (1b): R-squared and estimated equations of foam material; where α is estimated absorption coefficient and S is the area

1. c) sponge material

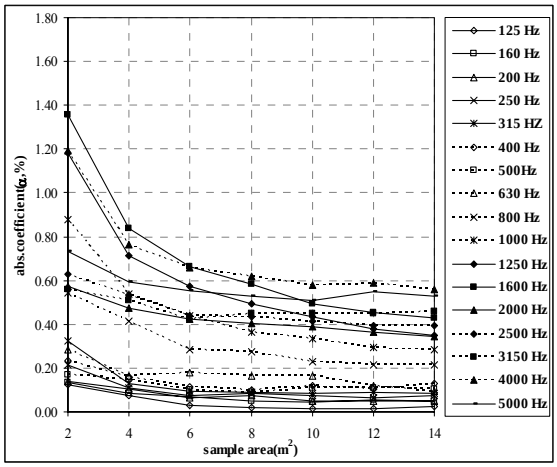

Fig.1c: variation of the measured absorption coefficients of sponge material with the area

f (Hz)	R^2	Estimated equation
125	00.982	$\alpha = 0.0016S^2 - 0.0336S + 0.1825$
160	0.9503	$\alpha = 0.0011S^2 - 0.024S + 0.1735$
200	0.9257	$\alpha = 0.0009S^2 - 0.0211S + 0.174$
250	00.869	$\alpha = 0.002S^2 - 0.0403S + 0.2656$
315	0.8442	$\alpha = 0.0034S^2 - 0.0685S + 0.4048$
400	0.9334	$\alpha = 0.0021Sx^2 - 0.0419S + 0.3006$
500	0.8464	$\alpha = 0.0011S^2 - 0.0225S + 0.2089$
630	0.8429	$\alpha = -0.0783Ln(S) + 0.3167$
800	0.9768	$\alpha = 0.0034S^2 - 0.0809S + 0.683$
1000	0.9925	$\alpha = 1.2609S^{-0.5819}$
1250	0.9965	$\alpha = 1.7548S^{-0.6154}$
1600	00.995	$\alpha = 1.9751S^{-0.5933}$
2000	0.9913	$\alpha = 0.6749S^{-0.25}$
2500	0.9706	$\alpha = 0.0025S^2 - 0.0578S + 0.7261$
3150	00.831	$\alpha = 0.002S^2 - 0.038S + 0.6196$
4000	0.9187	$\alpha = 1.3915S^{-0.3717}$
5000	0.9193	$\alpha = 0.003S^2 - 0.0611S + 0.8227$

Table (1c): R-squared and estimated equations of sponge material; where α is estimated absorption coefficient and S is the area

1. d) polyisoprene material

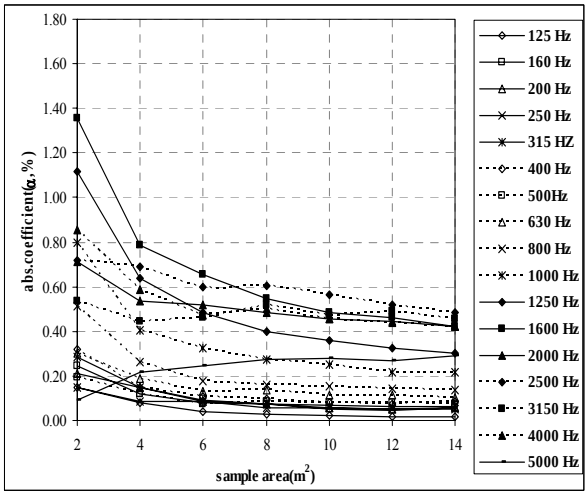

Fig.1d: variation of the measured absorption coefficients of polyisoprene material with the area

f (Hz)	R^2	Estimated equation
125	0.988	$\alpha = 0.3334S^{-1.1421}$
160	0.9472	$\alpha = 0.3958S^{-0.8264}$
200	0.9904	$\alpha = 0.0019S2 - 0.0424S + 0.2878$
250	0.9571	$\alpha = 0.1982S^{-0.5344}$
315	00.946	$\alpha = 0.4382S^{-0.7942}$
400	0.9345	$\alpha = 0.4526S^{-0.7209}$
500	0.9464	$\alpha = 0.0016S^2 - 0.033S + 0.2379$
630	0.9401	$\alpha = 0.4003S-0.5319$
800	0.9646	$\alpha = 0.7085S^{-0.6726}$
1000	0.9902	$\alpha = 1.123S^{-0.6588}$
1250	0.9855	$\alpha = 1.6713S-^{0.6672}$
1600	0.964	$\alpha = 1.9067S-^{0.585}$
2000	0.9668	$\alpha = 0.8164S^{-0.2535}$
2500	0.165	$\alpha = 0.7646e^{-0.0325S}$
3150	0.9126	$\alpha = -0.0204Ln(S) + 0.5212$
4000	0.9076	$\alpha = 1.0011S^{-0.3454}$
5000	00.988	$\alpha = -0.0022S^2 + 0.049S + 0.0244$

Table (1d): R-squared and estimated equations of polyisoprene material; where α is estimated absorption coefficient and S is the area

2.a) carpet material

Table (2a): estimated absorption of standardized area (11m^2) and the correction of different carpet material areas

f (Hz)	Estimated absorption. of standardized area (11m^2)	Absorption correction of 14m^2	Absorption correction of 12m^2	Absorption correction of 10m^2	Absorption correction of 8m^2	Absorption correction of 6m^2	Absorption correction of 4m^2	Absorption correction of 2m^2
125	-0.004	0.017	0.014	0.014	0.009	0.017	0.015	0.136
160	0.023	0.010	0.008	0.014	-0.006	0.028	0.025	0.141
200	0.010	0.032	0.027	0.017	0.020	0.008	0.012	0.213
250	0.042	0.026	0.004	0.015	0.022	0.020	0.005	0.148
315	0.024	0.024	0.015	0.011	0.022	0.033	0.030	0.137
400	0.046	0.006	0.010	0.002	0.016	0.008	0.017	0.074
500	0.035	0.017	0.011	0.004	0.006	0.005	-0.027	0.079
630	0.056	0.022	0.009	-0.005	0.011	0.004	0.009	0.061
800	0.050	0.030	0.043	0.072	0.102	0.149	0.332	0.050
1000	0.204	-0.013	-0.003	0.009	0.036	0.068	0.162	0.467
1250	0.282	-0.037	-0.008	0.021	0.058	0.123	0.245	0.632
1600	0.339	-0.017	-0.016	0.006	0.060	0.128	0.261	0.686
2000	0.235	0.018	0.006	-0.001	-0.001	-0.023	-0.020	0.057
2500	0.282	0.018	0.005	0.004	0.000	0.008	0.063	0.108
3150	0.305	0.053	0.002	-0.001	0.000	-0.012	0.024	0.037
4000	0.388	0.050	0.012	0.024	0.011	0.039	0.088	0.258
5000	0.366	0.067	-0.010	-0.001	-0.058	-0.057	-0.095	-0.109

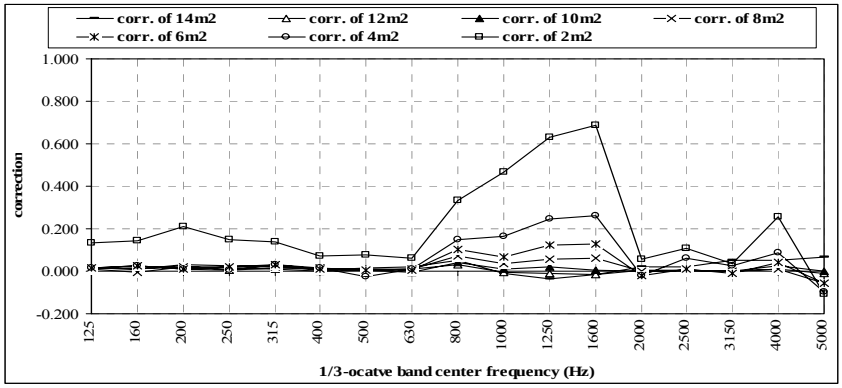

Fig.2a: absorption correction surface area for carpet material

2.b) foam material

Table (2b): estimated absorption of standardized area (11m^2) and the correction of different foam material areas

f (Hz)	Estimated absorption. of standardized area (11m^2)	Absorption correction of 14m^2	Absorption correction of 12m^2	Absorption correction of 10m^2	Absorption correction of 8m^2	Absorption correction of 6m^2	Absorption correction of 4m^2	Absorption correction of 2m^2
125	0.08	0.03	0.02	-0.01	-0.02	0.00	0.02	0.09
160	0.11	-0.01	0.00	0.02	0.04	0.08	0.12	0.39
200	0.08	0.04	0.05	0.06	0.07	0.14	0.15	0.32
250	0.19	0.02	0.02	0.01	0.05	0.14	0.16	0.39
315	0.19	0.00	-0.01	0.01	0.02	0.11	0.08	0.18
400	0.26	-0.01	0.03	-0.01	0.02	0.09	0.08	0.21
500	0.24	-0.03	0.01	0.02	0.04	0.14	0.11	0.20
630	0.24	0.03	-0.03	-0.01	0.06	0.02	0.11	0.21
800	0.31	0.03	0.04	0.04	0.11	0.23	0.45	0.79
1000	0.36	-0.03	0.01	0.11	0.17	0.43	0.62	1.15
1250	0.50	-0.06	-0.01	0.05	0.17	0.38	0.60	1.15
1600	0.64	-0.04	0.02	0.04	0.12	0.35	0.50	1.11
2000	0.51	-0.02	0.02	0.01	0.05	0.21	0.19	0.39
2500	0.54	-0.03	0.00	0.02	0.06	0.24	0.17	0.44
3150	0.61	-0.02	0.02	0.01	0.05	0.24	0.18	0.38
4000	0.65	-0.02	0.04	0.05	0.09	0.29	0.28	0.74
5000	0.59	-0.01	0.01	-0.01	0.02	0.23	0.12	0.23

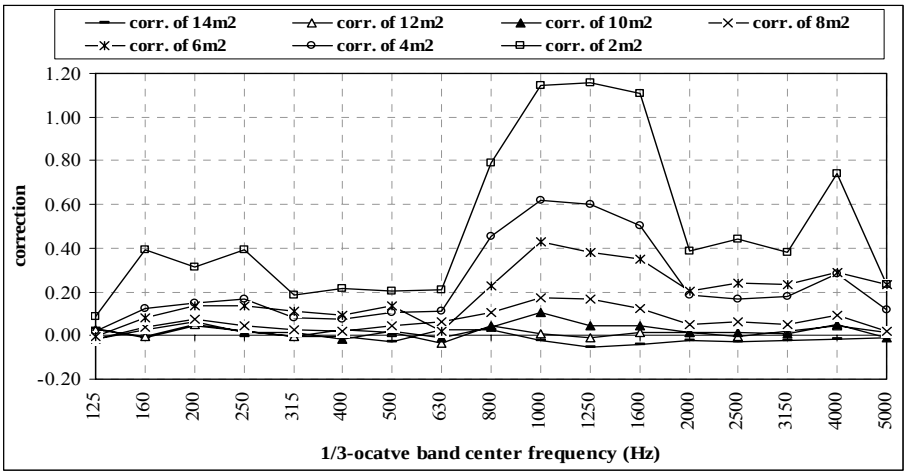

Fig.2b: absorption correction surface area for foam material

2.c) sponge material

Table (2c): estimated absorption of standardized area (11m^2) and the correction of different sponge material areas

f (Hz)	Estimated absorption. of standardized area (11m^2)	Absorption correction of 14m^2	Absorption correction of 12m^2	Absorption correction of 10m^2	Absorption correction of 8m^2	Absorption correction of 6m^2	Absorption correction of 4m^2	Absorption correction of 2m^2
125	0.01	0.02	0.01	0.01	0.01	0.02	0.07	0.12
160	0.04	0.01	0.01	0.00	0.01	0.03	0.04	0.09
200	0.05	0.00	0.00	0.00	0.03	0.01	0.05	0.09
250	0.06	0.01	0.00	0.01	0.02	0.01	0.05	0.15
315	0.06	0.02	0.03	0.02	0.03	0.03	0.07	0.26
400	0.09	0.03	0.01	0.03	0.01	0.02	0.06	0.14
500	0.09	0.01	0.01	0.01	-0.01	0.01	0.05	0.07
630	0.13	-0.03	-0.01	0.03	0.04	0.05	0.04	0.15
800	0.20	0.01	0.01	0.03	0.07	0.08	0.21	0.34
1000	0.31	-0.03	-0.02	0.02	0.05	0.13	0.23	0.57
1250	0.40	-0.05	-0.02	0.03	0.09	0.17	0.31	0.78
1600	0.48	-0.05	-0.02	0.02	0.11	0.19	0.36	0.88
2000	0.37	-0.03	-0.01	0.02	0.03	0.05	0.10	0.20
2500	0.39	0.00	0.00	0.02	0.04	0.05	0.14	0.24
3150	0.44	0.02	0.00	0.01	0.01	-0.02	0.07	0.11
4000	0.57	-0.01	0.02	0.01	0.05	0.09	0.19	0.62
5000	0.51	0.01	0.03	0.00	0.02	0.04	0.08	0.22

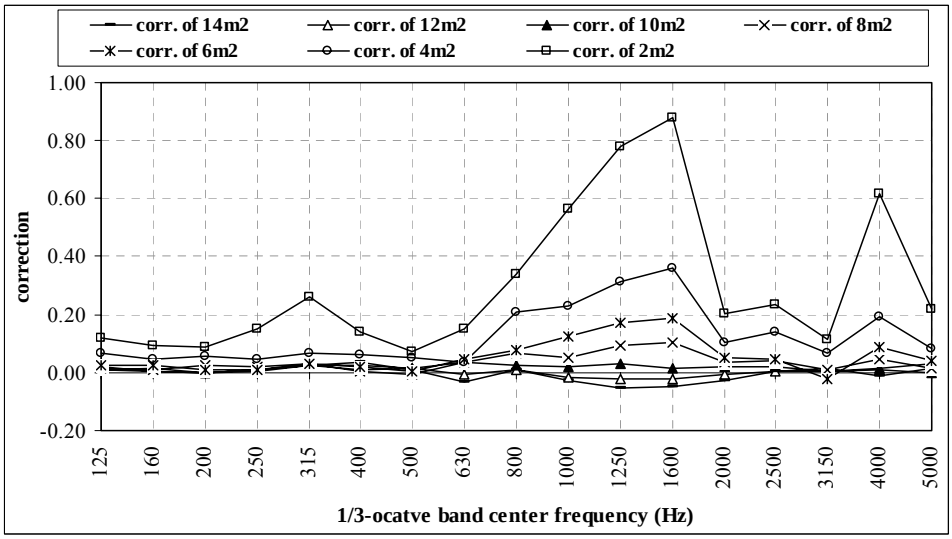

Fig.2c: absorption correction surface area for sponge material

2.d) polyisoprene material

Table (2d): estimated absorption of standardized area (11m^2) and the correction of different polyisoprene material areas

f (Hz)	Estimated absorption. of standardized area (11m^2)	Absorption correction of 14m^2	Absorption correction of 12m^2	Absorption correction of 10m^2	Absorption correction of 8m^2	Absorption correction of 6m^2	Absorption correction of 4m^2	Absorption correction of 2m^2
125	0.02	0.00	0.00	0.01	0.01	0.02	0.06	0.13
160	0.05	0.01	0.00	0.00	0.02	0.03	0.07	0.20
200	0.05	0.01	0.00	0.00	0.02	0.04	0.10	0.16
250	0.05	0.00	0.00	0.01	0.01	0.03	0.03	0.09
315	0.08	-0.01	-0.01	-0.01	0.00	0.01	0.07	0.21
400	0.08	0.01	0.00	0.01	0.02	0.03	0.07	0.24
500	0.07	0.00	0.01	0.01	0.01	0.00	0.05	0.12
630	0.11	0.00	0.01	0.01	0.03	0.02	0.08	0.19
800	0.13	0.00	0.01	0.02	0.03	0.05	0.13	0.38
1000	0.22	0.00	0.00	0.03	0.05	0.10	0.18	0.58
1250	0.32	-0.01	0.01	0.04	0.08	0.16	0.32	0.80
1600	0.45	-0.02	0.02	0.04	0.10	0.21	0.34	0.91
2000	0.43	-0.01	0.01	0.02	0.05	0.09	0.10	0.28
2500	0.52	-0.04	0.00	0.04	0.08	0.08	0.17	0.20
3150	0.47	-0.01	0.02	0.00	0.05	-0.01	-0.03	0.07
4000	0.42	0.00	0.01	0.03	0.08	0.05	0.16	0.43
5000	0.30	0.00	-0.03	-0.01	-0.02	-0.05	-0.08	-0.21

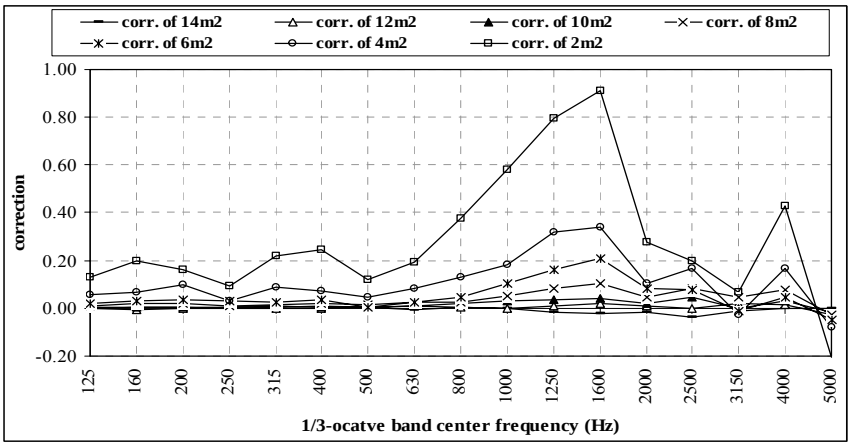

Fig.2d: absorption correction surface area for polyisoprene material

4- Conclusion

Estimated equation at each frequency for the area effect is introduced and the deviation of the measured absorption coefficient from the estimated absorption coefficient of standardized absorber area is corrected.

As it was expected, the variation of absorption coefficient with the area directed to be increased at smaller areas [(2)], see figures 1a, 1b, 1c and 1d.

All materials need corrections for the measured absorption coefficient at area of 2m^2, over all the range of interested frequency, due to its edge effect

Rather All materials do not need corrections for the measured absorption coefficient at areas around the standardized areas, which are larger areas, 14 m^2, 12 m^2 and 10 m^2. while the other areas need corrections especially at low frequencies.

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The Effect of Climatic Factors on the Production and Quality of Castor Oil

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Abstract: The versatile application of castor oil in different pharmaceutical, chemical, sanitary, cosmetic, biodiesel, and recently in food industry because of its unique physicochemical properties has led castor oil to be the focus of abundant research projects. In this research, the impact of 10 different climatic conditions in Iran on the castor oil production by castor bean (*Ricinus communis* L.) from the standpoints of the quality, oil content and physicochemical properties of castor oil was investigated. With the analyzed oil samples, oil content, moisture content, refractive index, chlorophyll content, saponification value, iodine value, acid value, and peroxide value were respectively determined as 35%-56%, 0.3%-1.2%, 1.404-1.430, 0.02-0.4 mg Phenophytin/ kg Oil, 164-179 mg KOH/g Oil, 75-86 g I_2/100 g Oil, 0.2-0.9 mg NaOH/g Oil, 0-0.5 meq O2/Kg Oil. Castor oils from various regions were significantly (p<0.05) different from the viewpoint of oil content, moisture content, chlorophyll content, acid value, peroxide value, saponification value, and iodine value, but indicated no considerable difference (p>0.05) in their refractive indices. The plants grown under climatic conditions of Nur Abad region were of the highest level of oil content (56%) indicating the most favorable meteorological and soil physicochemical conditions in the area. From the standpoint of oil stability and quality, the oil from Marand, Urmia and Nazarlu were of proper conditions. The present research is the first report on the quality, oil content, and physicochemical properties of castor oil extracted from castor beans harvested in different regions in Iran.
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Key Words: Climatic Factors, Castor bean, Oil, Production, *Ricinus communis*

1. Introduction

Castor bean (*Ricinus communis*) is a species that belonging to the Euphorbiaceae family. In tropical climates the castor bean is a perennial plant grows to heights of 10 to 12 meters and in temperate climates it is an annual, with height of one to three meters are more common (Weibel, 1948). Castor seeds contain a variable percentage of 40-60% oil averaging 50%, which is quite high when compared to any other oil seeds available (Brigham, 1967). Worldwide castor production was about 1.4 million metric tons during the year 2009 with an average yield of about 956 kg ha^{-1} (FAO, 2009).

Ricinoleic acid (12-hydroxy-9-octadecenoic acid), is the major component of castor oil, and contained about 89% of the total fatty acid complement, allowing castor oil to be miscible with methanol and ethanol, giving it an advantage in trans-esterification to biodiesel. Presence of hydroxyl groups and double bonds makes the oil suitable for many chemical reactions and modifications (Ogunniyi, 2006). Castor beans are traditionally processed into oil by single or double-pressing, or by pressing followed by batch solvent-extraction (D'Aquin *et al*., 1960). Because the amount of castor seeds oil is high, so the most common method for extraction of oil is cold press extraction and extraction solvent is next. Considering that quality of cold press oil extraction is high and better protect its natural properties and is free of chemicals (Anderson, 1996), Therefore is used its castor oil as the most valuable materials, anti-flushing, purgative and laxative in medicine. On the other hand oil from solvent extraction used in pharmaceutical, cosmetics and health industries and biodiesel fuels in the more developed countries. Medicinal effects Castor bean is because Phytochemical compounds such as flavonoids, alkaloids and tannin (Ilavarasan *et al*., 2006).

Physicochemical properties of oil can be directly affected by a combination of fatty acids, triacyl Glycerol and oil content that can, different depending on seed varieties and some other factors such as

weather conditions and soil type (Ogunniyi, 2006). Generally climate composed from collection of edaphic and climate factors that should noted them impact on growth, development, yield and rate of medicinal plants active substance. The most important environmental factors that affect on medicinal plant quantity and quality of active substance are including light, temperature, rainfall, latitude, soil characteristics, Altitude and nutrition (Omidbaigi, 2009).

Because of the importance of medicinal castor bean plant and its oil in pharmaceutical, cosmetics and hygienic industries, nowadays in food science and needs of our country future to this crop should be done many studies on this Valuable plant. For this purpose, a study was carry out on castor oil Physicochemical properties to find best location weather conditions of Iran.

2. Materials and methods

2.1. Samples

For this research Seeds of medicinal castor bean plants were planted in 10 regions of different climates in spring 2008. All 10 sites (North and West of Tehran province, Shabestar, Nazarlu, Sarbangholi, Marand and Urmia in Azarbayjan and Nur Abad, Masiri and Mangudarz in Fars province) had different weather and soil types. In the laboratory after separate of impurities, grain was dried until moisture 8% and finally they were ground for oil extraction. This research was carry out in completely randomized design with 3 replications for each test.

2.2. Oil extraction

After removal of the seed coat, the seeds (50g) of Castor bean were crushed and extracted in a Soxhlet apparatus fitted with a 1-L round-bottomed flask and a condenser. The extraction was carried out on a water bath for 6 h with 0.40 L of n-hexane. The solvent was removed under vacuum in a rotary evaporator (EYELA, N.N. Series, Rikakikai Co. Ltd., Tokyo, Japan) (Azadmard-Damirchi *et al*., 2005).

2.3. Chemical analysis

2.3.1. Determination of acid value

For Determine the acid value of oil was used according to AOCS procedure and cd 3d-40 number and the results were reported based on Oleic acid percentage.

2.3.2. Determination of peroxide value

For Determine the peroxide value of oil was used according to AOCS procedure and cd 8-53 number and the results were reported based on meq O_2/Kg Oil.

2.3.3. Determination of saponification value

For Determine the Saponification value of oil was used according to AOCS procedure and cd-3-35 number and the results were reported based on mg KOH/g Oil.

2.3.4. Determination of iodine value

Iodine value was calculated according to Hanos method and results were reported on based g I_2/100 g Oil (Weaver and Daniel, 2003).

2.4. Physical properties

2.4.1. Determination of castor oil rate

After oil extraction, oil rate was calculated for each region (Uquiche *et al*., 2008).

2.4.2. Determination of moisture content of the oil

Amount of moisture of oil content was calculated according to AOCS procedure and 925.09 numbers.

2.4.3. Determination of chlorophyll content

Chlorophyll content of castor oil samples were measured using the Spectrophotometers method (Pokoprny *et al*., 1995).

2.4.4. Determination of refractive index

For Determine the refractive index of castor oil was used from refractometer set in temperature 25°C (Hoseini, 1994).

2.5. Statistical analysis

The data were objected to analysis of variance (ANOVA) using SAS program and differences among treatments were tested with Duncan test (Level of significance $p<0.05$).

3. Results and discussion

3.1. Chemical properties

Table 1 shows the chemical properties of the castor bean oil that obtained from samples collected from the Iran various regions. Results of this study showed a significant effect of climate on acid value, peroxide value, iodine value ($p<0.01$) as well as saponification value ($p<0.05$).

Acid value range was 0.29-0.88 (table 1) which was lower than values determined in other studies due to high concentration of hydroxyl groups in

castor oil which can react with free fatty acid during the storage and reduce the acid value through hydrogen binds.

Peroxide value range was 0.00-0.50 (Table 1). Peroxide value is an index for the concentration of oxidation substrate. Peroxide value and acid value are qualitative parameters for oils quality.

Saponification value in samples varied between 164.50-178.53 (table 1) which was lower than values determined in other studies (Ogunniyi, 2006). It can be due to several reasons like climate, physicochemical properties of soil and the changes in oil bonds during storage, which increase the long chain fatty acid in oil (Liauw *et al*., 2008).

Iodine value range was 75.75-85.62 (table 1) which was lower than values determined in other studies (Ogunniyi, 2006; Akpan *et al*., 2006). Oil extracted from seeds harvested in Shabestar, had the lowest iodine value and therefore the highest oxidative stability. Since Iodine value of castor oil is lower than other oils, it is used for coating and lubricating.

3.2. Physical properties

Results from analysis of variance showed that climate had significant effects on oil content and oil moisture (p<0.01) and chlorophyll content (p<0.05) in oil extracted from seeds of castor, however refractive index was not significantly affected by climate. Physical properties of castor bean oil are shown in Table 2.

The comparison of means show that in Nur Abad and Mangodarz, seeds had the highest oil content and in Shabestar and Urmia they had the lowest. Studies showed that oil function like seed function is depended to the plant variety, climate and the interaction between these two factors. They reported the oil function range between 47-53% in different regions (Koutroubas *et al.,* 1999). Others reported castor oil content range between 40-60% (Weiss, 2000).

The oil moisture range in this study was 0.3-1.14%. Among different regions, Urmia has the least value and the highest value was determined in the north of Tehran. This parameter is important to determine the purity and shelf life of the oil. These results are compatible with existing data.

Refractive index in different regions varied between 1.404-1.426 which was concurrent to other studies. Slight differences between studies may be due to differences in study condition, planting and harvesting conditions and conservation of the oil (Akpan *et al.,* 2006).

Chlorophyll content range in this study was 0.02- 0.40. Seeds that were harvested from the north of Tehran had the least chlorophyll in their oil and the highest chlorophyll was in the plants harvested from Masiri region. The chlorophyll value shows the region geographical longitude, seed maturation condition and extraction procedure condition.

4. Consolation

According to the physicochemical properties of castor oil extracted from seeds harvested in different regions, we can conclude that Urmia, Nazarlu and Marand have the highest quality oils

Table 1. Chemical properties of the castor bean oil

Region	A.V[1]	P.V[2]	S.V[3]	I.V[4]
North of Tehran	0.41d	0.50a	164.50c	83.67ab
West of Tehran	0.50c	0.01c	174.12ab	85.62a
Shabestar	0.29f	0.00c	171.03abc	75.75c
Nazarlu	0.60b	0.00c	178.53a	85.14a
Sarbangholi	0.30f	0.00c	168.22bc	83.72ab
Marand	0.59b	0.00c	167.62bc	81.85ab
Urmia	0.41ed	0.00c	177.62a	85.09a
Nur Abad	0.88a	0.00c	167.66bc	78.79bc
Masiri	0.29f	0.45b	168.37bc	80.60ab
Mangudarz	0.39e	0.00c	172.06abc	81.07ab
SEM	0.005	0.012	2.54	1.51

* Means having different superscripts within the column are significantly different at p<0.05. 1. Acid Value (mg NaOH/g Oil) 2. Peroxide Value (meq O_2/Kg Oil) 3. Saponification Value (mg KOH/g Oil) 4. Iodine Value (g I_2/100 g Oil)

Table 2. Physical properties of the castor bean oil

Region	O.C[1]	M.C[2]	R.I[3]	C.C[4]
North of Tehran	42.0d	1.14a	1.415a	0.40a
West of Tehran	51.6b	0.47f	1.426a	0.19abcd
Shabestar	35.3e	0.49e	1.404a	0.39a
Nazarlu	45.3c	0.38g	1.424a	0.18abcd
Sarbangholi	43.3d	0.40g	1.417a	0.30abc
Marand	51.0b	0.69c	1.412a	0.17abcd
Urmia	36.3e	0.35h	1.423a	0.16bcd
Nur Abad	56.2a	0.46f	1.405a	0.12cd
Masiri	43.1d	0.60d	1.409a	0.02d
Mangudarz	52.8b	1.00b	1.412a	0.36ab
SEM	0.55	0.008	0.008	0.068

* Means having different superscripts within the column are significantly different at $p<0.05$. 1. Oil Content (%) 2. Moisture Content (%) 3. efractive Index (25) 4. Chlorophyll Content (mg pheophytin/kg oil)

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Nebulization And Inhalation Therapy Versus Conventional Medication Of Feline Asthma

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Abstract: Feline asthma syndrome is a life threatening clinical condition characterized by chronic inflammation of the small passageways of the lungs. Although allergens are the prime suspect in the cause of feline asthma, the actual cause is unproven and the condition is believed to be a result of type I immediate hypersensitivity reaction to inhaled allergens. Twenty two diseased and five apparently healthy cats were thoroughly investigated in the present study. The most common clinical presentation was recurrent bouts of coughing (n=13), Cyanosed mucous membranes (n= 7), open-mouth breath (n=7), Squatting with shoulder hunched, neck extended and rapid breathing or gasping for breath (n=11), gagging up foamy mucous (n=3) and exercise intolerance (n=17). Seventeen cats underwent chest radiography. Six cases showed no patterns neither bronchial nor interstitial, nine cases showed bronchial pattern, one case suffer from severe interstitial pattern and one case showed pneumothorax in addition to bronchial pattern. A predominant esinophilic sample was collected from only 4 cats by transtracheal lavage. There were minimal changes in differential white cell counts, except significant esinophilia. Therapeutic plan was directed initially to control asthmatic attack either by conventional medication by injection or nebulization by bronchodilators. Then the pet maintained on oral form of conventional medication or spacer, respectively. The building stone in the present study was avoidance of putative aeroallergens. On the basis of the data of the present cases, it would appear that the diagnosis of feline asthma depends largely on the clinical presentation and radiographic findings. The present study concluded that nebulization and inhalation therapy were more effective and rapid therapy than conventional medication. (n=number).

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Keywords: Nebulization, inhalation, conventional, radiography, feline, asthma.

1. Introduction:

Feline asthma is a chronic inflammation of small lung passageways (Dye et al., 1996; Johnson, 2000; Drowling, 2001; Gardner, 2005; Cohn et al., 2010). Asthma has been referred to in the literature by a variety of terms including eosinophilic bronchitis, allergic bronchitis, feline bronchitis, feline bronchial asthma, Allergic airway disease, feline chronic obstructive pulmonary disease (Dye and Moise, 1992; Padrid, 2000 and Gardner, 2005). Feline asthma is very similar to humane asthma (Padrid et al., 1995; Gardner, 2005).When an asthma attack occurs, these passageways thicken and constrict, making it very difficult for a cat to breath (Padrid, 2000a). This often leads to respiratory distress, which can become grave in matter of minutes. The lungs may also begin to discharge mucus into the airways, leading to fits of coughing and wheezing (Dye, 1992).

The prevalence of lower airway diseases in the adult cat populations has been estimated to be approximately 1%. Although any breed may be affected, Siamese cats appear to be over-represented (Moise, 1989; Padrid, 1996, Adamama-Moraitou et al., 2004; Hibbert, 2010). Feline asthma has been recognized as a clinical entity for over 100 years and is a common cause of coughing and dyspnoea. Asthma has been defined as a disorder of the lower airways that causes airflow limitation, which may resolve spontaneously or in response to medical treatment (Padrid, 2009). Asthma is thought to be due to a type I hypersensitivity reaction to inhaled allergens. It is characterized by eosinophilic airway inflammation, spontaneous bronchconstriction and airway remodeling. Young to middle aged cats are most commonly affected (Corcoran et al., 1995; Adamama-Moraitou et al., 2004).

An asthmatic attack can range from mild to severe. In mild cases the cat may suffer bouts of coughing, wheezing and labored breathing that come and go, (can sometimes be mistaken for trying to fetch up a hairball). With a severe attack, the cat will have extreme respiratory problems that can, in some, be life threatening (Corcoran, et al., 1995 and Padrid, 2000b). So, any coughing cat needs veterinary evaluation (Gardner, 2005). Clinical signs of asthma in cats included bouts of coughing, wheezing, persistent cough, Squatting with shoulder hunched, neck extended, rapid breathing or gasping for breath,

gagging up foamy mucus, open mouth breath, blue lips and gums, labored breath after exertion, overall weakness and lethargy (Dye et al., 1996; Gardner, 2005 and Reinero et al., 2009). Heartworm test should be done if the cat lives in an area endemic for heart worm diseases (Leib and Monoroe, 1997).

The most common radiographic feature identified is a bronchial pattern, characterized by bronchial wall thickening and mineralization (doughnuts and tramlines). Hyper-inflation of the lung fields and flattening of the diaphragm may be identified, due to air trapping. Interstitial and focal alveolar patterns may also be seen, hypothesized to be due to airway obstruction by mucus plugs, causing local atelectasis; the right middle lung lobe is most frequently affected. Gas within the esophagus and gastro-intestinal tract may be seen, as a consequence of aerophagia. Pneumothorax may occasionally be identified; however is a rare complication of feline asthma (Cooper et al., 2003). It is very important to remember that up to 16% of affected cats may have no or only very subtle radiographic changes (d'Anjou et al., 2007).

Unfortunately, feline asthma is a chronic progressive disease that cannot be fully cured. Medications can reduce the symptoms of asthma a great deal, but may not be able to eliminate coughing fully. In recent years, veterinarians have found that the most effective therapy for feline asthma may be to use inhalers such as human asthmatics use. A mask and spacer system, called AeroKat®, has been invented to enable cats to use inhalers or puffers. This system is similar to the mask and spacer system used to treat babies and small children (Kirschvink et al., 2006; Cohn et al., 2010 and Hibbert, 2010).

2. Materials and Methods

A total number of 22 clinically affected and 5 apparently healthy cats were admitted to the Vet. Clinic of surgery, anesthesiology and radiology department, faculty of veterinary medicine, Cairo University; and private Vet. clinics in Giza governorate. History, clinical presentation, physical examination, complete blood count and radiographic examination were used to confirm clinically affected cats with feline asthma. All cats were thoroughly investigated including age, gender, breed, respiratory rate/ min, pulse rate/ min, rectal temperature (˚C), lymph nodes, mucous membranes and physical examination by percussion and auscultation of chest according to Kelly (1984).

Blood samples were collected from anterior median artery. Complete blood count (CBC) was performed for all blood samples with standard techniques described by Feldman et al. (2000). The CBC included red blood cells (RBCs) count, hemoglobin (Hb) concentration, packed cell volume (PCV), red cell indices (mean corpuscular hemoglobin concentration (MCHC), Mean Corpuscular Volume (MCV) as well as total (TLC) and differential leukocyte count (DLC).

Chest radiographs:

Seventeen cats underwent chest radiography, they were not sedated and a ventro-dorsal and a right lateral view were performed. A scoring system according to (Foster et al., 2004 and Kirschvink et al., 2006) ranging for the total combined score from 0 to 6 aimed to evaluate separately bronchial pattern (0: absence of signs, 1: mild [first generation of bronchi visible], 2: moderate [second generation visible], 3: severe [third generation visible]) and interstitial pattern (0: absence of signs, 1: mild [mild interstitial framework visible], 2: moderate [interstitial framework distinguishable from a bronchial pattern], 3: severe [clearly apparent interstitial pattern]). The five other cats with normal radiographic findings were used as a control group.

The clinically affected cats were divided into 2 groups according to therapeutic approach. Firstly, Cats presented in severe asthma required emergency treatment. All stressful procedures such as restrain for injections or radiographs should be avoided until the cat is stable. The first group consisted of 10 clinically affected cats treated traditionally (conventional medication) using initially a single dose of injectable corticosteroids and bronchodilators then maintained on tablet form of corticosteroids and bronchodilators. The second group consisted of 12 clinically affected cats managed by nebulization initially and maintained on inhalers using spacer. The 2 groups managed as follow:

I) The first group consisted of 10 clinically affected cats treated traditionally (conventional medication). Initial emergency treatment consisted of 0.5 ml/ kg Bwt of Minophylline® ampoules (Aminophylline as injectable bronchodilators, 125mg/ 5ml/ ampoule, by Alex pharmaceutical company) and 0.25 ml/ Kg Bwt of dexamethasone® ampoule (dexamethasone sodium phosphate as injectable corticosteroid, 8 mg / ampoule/ 2ml, by Memphis pharmaceutical company). Then cases maintained on a third of tablet/ 5 kg Bwt of Quibron® once at night (unhydrous theophylline, as tablet form of bronchodilators, 300 mg/ Tablet Bristol- Mayer Squibb) and tablet/ 5 kg Bwt / 12 hrs of Prednisolone® tablet (prednisolone, 5mg/ tablet by Adco pharmaceutical company). The dose decreased gradually after clinical improvement. This application was described by Leib & Monoroe (1997).

II) The second group consisted of 12 clinically affected cats managed by nebulization

(using FLO or aerosol delivery system, Piston Compressor system for aerosol therapy made in Italy by CA- MI) initially and maintained on inhalers using spacer (Averro-spacer or valved holding chamber with pediatric mask for use with metered dose inhalers; Made in Egypt by AVERROES Pharma) in addition of oral one third of a tablet/ 5 kg Bwt of Quibron® once at night (unhydrous theophylline, as tablet form of bronchodilators, 300 mg/ Tablet Bristol- Mayer Squibb). 0.5 ml of Farcolin® solution (Salbutamol soln. 0.5 mg/ ml by Pharco) mixed with 1.5 ml of Saline® soln. (0.9 % Nacl soln., by Otsuka) then used in nebulizer. Cats maintained on 7 puffs of Clenil compositum® as inhaler (Salbutamol 100 µg and Beclomethasone dipropionate 50 µg / dose; 200 doses by Cheisi). The doses decreased gradually according to clinical improvement. This method was described by Gardner (2005) and Cohn (2010). Clinical improvement detected by monitoring of clinical status, physical examination and radiographic examination.

History of parasitic control and vaccination was collected. All cats were dosed one tablet for each 4 kg Bwt of Drontal (20mg Praziquantel and 230 mg Pyrantel Embonate made in Germany by Bayer Healthcare) as broad spectrum anthelmintic. Also cats were vaccinated against Chlamydia psitacci, Feline Parvo virus, Feline calici virus and Feline Rhinotracheitis virus (vaccine of Schering pharmaceutical company).

Fecal examination is simple, quick, inexpensive and one of the most important diagnostic procedures to exclude parasitic infestation of lungs and intestines. Examination of a fresh fecal saline smear was yield a diagnosis in some cases. Several drops of saline can be applied to fresh thin fecal smear, a coverslip added, the slide examined microscopically according to Leib & Monoro**e** (1997).

Transtracheal lavage in cats was performed by Transtracheal approach. Transtracheal techniques were performed by clipping and shaving of hair over triangular area of cricothyroid ligament. The skin prepared aseptically using Betadine® antiseptic solution (Povidone iodine by Mundi pharmaceutical company). Stabilization of trachea was done by one hand then needle of jugular catheter (18 guge needle) was inserted by other hand. The needle was advanced slightly into tracheal lumen. Twelve ml syring attached to the catheter containing 2-4ml of sterile saline was injected and aspirated quickly back into the syringe at time of cough. Adequate amounts of fluid (1-2 ml) should be aspirated for cytological evaluation. Direct smears examined on microscope slides for cytological evaluation according to Padrid et al. (1991); Leib & Monoroe (1997).

Statistical analysis was performed by statistical Package for Social Sciences (SPSS). Mean and standard deviation are descriptive values for quantitative data. ANOVA (Analysis Of Variance) was used for testing means of more than two groups by computer program according to the method described by Irwan (1996).

3. Results:

1-Apparently healthy cats:

Apparently healthy cats were 5 cats of age ranged from 6 months to 12.7 years old (2 females and 3 males) without any apparent clinical signs of feline asthma and of normal laboratory data and normal X-ray. The breeds of apparently healthy cats were 3 Persian cats and 2 Siamese cats.

2-Clinically affected cats:

This group was consisted of 22 clinically affected cats of age ranged from 5 months to 7.8 years old (14 females and 6 males). The breeds of the affected cats in the present study were 13 Persian cats, 7 Siamese cats and one Himalayan cat. The investigated cats revealed significant changes of respiratory, pulse rates and cyanosed mucous membranes in 7 cats. There was a panorama of clinical presentation including open-mouth breath with lateral recumbency in some cats (n= 7), bouts of coughing or persistent cough (n= 13), Squatting with shoulder hunched, neck extended and rapid breathing or gasping for breath (n= 11), gagging up foamy mucus (n= 3), overall weakness or exercise intolerance (n=17), retching and vomiting occur in 3 cases at the end of a coughing episode (figures 1A, 2A, 3A).

Physical examination of cats with bronchial disease was yield normal results between episodes (n= 5), although most cats have expiratory wheezes (n=14) on thoracic auscultation. In severe cases no breath sounds may be heard (n=7). There were significant ($P < 0.01$) changes in respiratory and pulse rates (table 1)

On the basis of our findings, age, gender and breed of cats with feline asthma were not significantly different from those of cats without feline asthma or control cases.

Chest Radiographs

According to Foster et al., 2004 and Kirschvink et al., 2006 scoring system, the seventeen radiographic examined cats were classified as in table (3).

Table (1): General clinical examinations of apparently healthy and clinically asthmatic cats (Mean ± SE)

Parameters	Clinically healthy cats	Clinically asthmatic cats
1-Respiratory rate (No./min)	32.6 ± 1.21	57.90 ± 2.69**
2- Pulse rate (No. / min)	93.00 ± 1.76	162.73± 6.21**
3- Rectal temperature (° C)	38.52 ± 0.10	38.35± 0.09
4- Mucous membranes	Very faint rosy red	Cyanosis in 7 cats and pallor mm in 15 cats
5- Superficial lymph nodes	Free	Free

** There were significant increase of respiratory and pulse rates in clinically asthmatic cats. (P <0.01)

Table (2): Hematological studies Complete blood count was normal except significant esinophilia.

Parameters	Unit	Control cats	Asthmatic cats
RBCs count	X 10^6/µL	6.43 ± .0.10	5.11 ± 0.23**
PCV	%	40.80 ± 0.32	39.38 ± 0.39
Hb concentration	g/dl	12.45 ± 0.12	11.06 ± 0.32*
MCV	Fl	63.47 ± 0.83	75.29 ± 3.05
MCHC	g/dl	30.52 ± 0.21	28.04 ± 0.55*
TLC	X 10^3/µL	8.72 ± 0.06	9.45 ± 0.43
Neutophils	X 10^3/µL	5.46 ± 0.07	5.60 ± 0.24
Lymphocytes	X 10^3/µL	2.30 ± 0.03	2.36 ± 0.13
Monocytes	X 10^3/µL	0.52 ± 0.02	0.45 ± 0.05
Esinophils	X 10^3/µL	0.44 ± 0.03	1.05 ± 0.06**

* = P < 0.05 ** = P < 0.01

Table (3): Classification of the seventeen radiographic examined cats according to Foster et al., (2004) and Kirschvink et al., 2006 scoring system:

The score		Description of the pattern	number
Bronchial pattern	0	absence of signs	6
	1	mild [first generation of bronchi visible]	-
	2	moderate [second generation visible]	2
	3	severe [third generation visible]	7
Interstitial pattern	0	absence of signs	6
	1	mild [mild interstitial framework visible]	-
	2	moderate [interstitial framework distinguishable from a bronchial pattern	-
	3	severe [clearly apparent interstitial pattern]).	1

From this table we can see that six cases showed no signs neither bronchial nor interstitial. While nine cases showed bronchial pattern (two moderate and seven severe, Fig. 1B). In the other hand there was one case suffer from severe interstitial pattern (Fig. 2B). One case showed pneumothorax in addition to bronchial pattern (Fig. 3B).

Therapeutic Approach:

Improved cases in nebulization and inhalation therapy represented 83% but dead cases represented about 17%. While improved cases in conventional medication represented 50% and dead cases were 50%.(fig. 4 A & B)

Cases	Nebulization and inhalation therapy		Conventional medication	
	Improved cases	Dead cases	Improved cases	Dead cases
Number and Days	10 cases out of 12 improved within 10-17 days	2 cases within first 2 days of therapy	5 cases within 12-24 days	5 cases dead within first week of treatment

Fecal examination revealed negative samples except 2 samples contained Eimeria oocysts. Transtracheal lavage revealed large numbers of esinophils.

Fig (1): (A) Three years and six months old Siamese queen showed marked respiratory distress and squatting position with shoulder hunched and extended head and neck to catch its breath. (B) Right lateral view plain x-ray film of the same case showed bronchial pattern mainly in the right middle lung lobe (White arrow).

Fig (2): (A) Two years and two months old apathic Himalayan tom cat displayed gasping of air. (B) Right lateral view plain x-ray film of the same case showed bronchial wall thickening and mineralization (doughnuts and tramlines), local atelectasis and clearly apparent interstitial pattern.

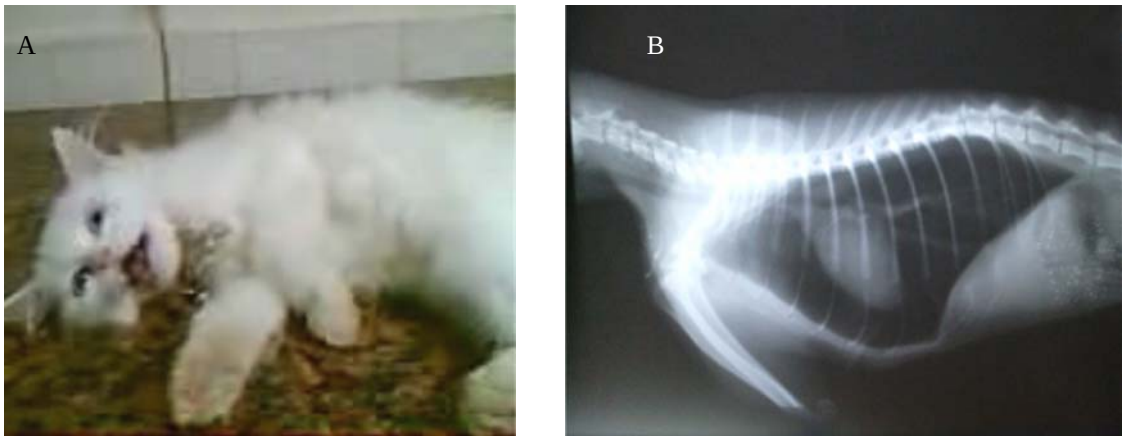

Fig (3): (A) Six months female Persian kitten showed open mouth breath with overall weakness (lateral recumbency). (B) Right lateral view plain x-ray film of the same case showed bronchial wall thickening and hyper-inflation of the lung fields (pneumothorax).

Fig (4): (A) The same Himalayan tom cat in Fig. 2 initially treated (emergencely) by nebulization using saline® and bronchodilator (Farcolin®). (B) Then maintained on spacer using bronchodilator and corticosteroid (Clenil compositum® spray).

4. Discussion

Feline asthma syndrome is a life threatening condition (Corcoran et al., 1995; dye et al., 1996). When the cat has asthma, the small passageways of the lungs were thickened, and collapsed when the cat inhales, making it difficult for the pet to catch its breath. In severe cases, there were coughing, exercise intolerance, open-mouth breath and cyanosis of mucous membranes. In these cases, large numbers of bronchioles plug mucus and smooth muscle that surrounds these tubes go into spasm restricting breathing (Corcoran et al., 1995; Johnson, 2000 and Padrid, 2000a). Cats during acute asthma attack have very hard time breathing. They assume a praying position and concentrate on obtaining the air they need in deliberate breaths. These breaths are deep, labored and abdominal.

Intrathoracic airway obstruction may be due to bronchial smooth muscle hypertrophy, increased mucus production, bronchial inflammation and edema, leading to bronchoconstriction. Bronchial obstruction prevents movement of air out of the lower airways during expiration, which can lead to air trapping and subsequent emphysema and pneumothorax (rare) (Leib & Mnoroe, 1997 and Padrid, 2000a). Pneumothorax was recorded in one case in the present study which parallel to the results of Cooper et al. (2003) who reported pneumothorax as a complication of feline asthma in 5 cats out of 421 cases (1.2 %). These changes are associated with severe clinical manifestations that often do not respond to treatment

Other cats have only a mild cough or high pitched wheeze that comes and goes. From the was present study, it is estimated that very low percent of cases of feline asthma were recorded in Persian cats which is the common breed reared in Egypt. Padrid (1996), Gardner (2005) and Hibbert (2010) concluded that feline asthma represents one percent of feline diseases although this percent could be increasing. The incidence of the disease is highest in Siamese cats.

Episodes of asthma are triggered by inhalation of allergens in the air or by stress. Some common allergens are grass and tree pollens, smoke, fumes, Cigarettes, mold, polish, dust mites, dust, potpourri, paint, carpeting, feather pillows, aerosols of various sorts such as perfumes, deodorants and flea spray. Heat, cold and exertion can all trigger an attack (Dye, 1992; Padrid et al., 1995; Adamama-Moraito et al.; 2004 and Padrid, 2009). Food can cause allergic reactions in cats even if the food has been fed for years. Sensitivity to the food ingredients may last forever and must be omitted from the diet permanently. Common food ingredients that cause asthma symptoms included wheat, milk, gluten, tuna and the preservatives added to cat food.

In the present study, feline asthma confirmed by the marked clinical presentation specially in severe cases. The asthmatic cat is bought by little restrain to X-ray tray to avoid stress which may be the end of life of severely asthmatic cat. As it may result in the release of stress hormones which in turn led to bronchoconstiction which aggravate the case.

Frequently, radiographs may demonstrate diffuse prominent bronchial markings consistent with inflammatory airways. Radiographic signs of increased lung lucency and flattening and caudal displacement of the diaphragm represent hyperinflation and suggest air trapping. It is worth recalling that the feline heart sits in the mid thorax because of the presence of inflated lungs on either side. When a lung lobe collapses and the lung volume decreases, the heart may shift its position within the thorax to take over this new space. Thus, a mediastinal shift is evidence of atelectasis rather than

consolidation. In more extreme cases, you may appreciate fluffy ill defined heavy interstitial infiltrates in multiple lung lobes. The cause of these changes in cats with lower airway disease is apparently due to multiple small areas of atelectasis in multiple lung lobes resulting from multiple diffuse small mucus plugs.

Feline asthma must be differentiated from other diseases of the same clinical manifestations. Firstly, the present study rule out cardiac cough by physical examination and absence of cardiac murmurs or gallop rhythm. Pleural diseases also differentiated by absence of muffled respiratory or cardiac sounds. Although bronchial asthma is confirmed by the results of a complete blood counts, fecal floatation, thoracic radiography. Esinophilia is identified in approximately 20% of cats with bronchial disease. Stool analysis was used to exclude Paragonimiasis and Aleurostrongylosis (Corcoran et al., 1995; Dye, 1996; Foster, 2004 and d'Anjou et al., 2007)

Saline can be used to wash cells from deep within the lungs for a microscopic examination (transtracheal wash). The presence of large numbers of esinophil white blood cells is characteristic of the disease. Stool analysis excluded parasitic agents that cause esinophilia. So, the present study denoted hypersensitivity reaction (mostly immediate type I). These findings were in parallel with the results of significant esinophilia in the present hematological studies. We must capture the incriminated aeroallergens as the etiology of asthma.

From the present data, clinical improvement in nebulization and inhalation therapy was more obvious in cases with severe asthmatic attacks. As Salbutamol and Beclomethasone dipropionate directed into the target organ and exerted its action rapidly. It was resulted in the solution of rigid asthma except in 2 cases. Only 2 dead cats attributed to marked bronchial obstruction which prevent air movement (Leib & Monoroe, 1997; and Foster et al., 2004). While conventional medication could solve 50% of mild to moderate cases. But it failed to treat 50% of severe cases of feline asthma as bronchial asthma cannot be cured by injectable and tablet form due to severe bronchoconstriction.

Feline asthma in our study was confirmed and differentiated with other diseases of the same manifestations by clinical presentation, findings of thorough clinical examination, x-ray, complete blood count and transtracheal lavage. From the present study, nebulization and inhalation therapy is more rapid, effective and cheapest than conventional medication. The percent of cure in nebulization and inhalation therapy was 83% while in conventional medication was 50%. Although nebulization and inhalation therapy was more effective, the conventional medication was easier in application. This is because a short period is required to restraint asthmatic cats for injection or oral medication while nebulization and inhalation therapy needs more time (Gardner,2005; Kirschvink et al., 2006; Padrid, 2006; Reinero et al., 2009; Cohn et al., 2010 and Hibbert, 2010).

5. Conclusion:

Allergens are the main culprits in feline bronchial disease. The present panorama of diagnostic approach depends mainly on clinical presentation and radiographic examination. The present study concluded that nebulization and inhalation therapy were more effective and rapid therapy than conventional medication as it is directed to the target organ.

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Effect of Cadmium Pollution on Neuromorphology and Function of brain in Mice Offspring

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Abstract: Cadmium chloride ($CdCl_2$) was given to Swiss-Webster pregnant female mice at the concentrations of (50mg/L) and (100mg/L) (w/v) respectively, in their drinking water. Treatment started few days before pregnancy and it continued until delivery the offspring. After the weaning (22 days of age), all male offspring were isolated and subjected to "Standard Opponent" test at the age of 25 days. The results of this test showed a significant and dose-dependent increase in the non-social behavior, such results showed a significant decline in the social behavior including naso-genital and naso-nasal contact, number of fights, rear, wall rear and displacement activities of the Cd exposed groups. Brain impairments due to the neurotoxic effect of Cd treated groups were indicated by histopathological investigation and neurochemichal analysis. **Effect of Cadmium Pollution on Neuromorphology and Function of brain in Mice Offspring.** Nature and Science 2011; 9(4):28-35]. (ISSN: 1545-0740). http://www.sciencepub.net.

Key Words: Cadmium; Prenatal exposure; Brain impairment; Mice offspring; Behaviour.

1. Introduction:

Prenatal exposure to neurotoxicants may affect brain development and function. Neurotoxic agents present in the environment and especially in the food chain may reach the brain of the fetus or the newborn during critical periods of brain development. These agents may affect cerebral function and development resulting in long-lasting or permanent deficits in cerebral function that can be reflected at different ages (youngness, adulthood or elderly) as alterations in motor function or coordination and/or altered intellectual function with alterations in learning ability and/or memory. These neurological alterations would be consequence of alterations in the function of one or more of brain [1].

Heavy metals discharged as waste products from different industries are considered a major source of environmental pollution. Cadmium (Cd) which is one of these pollutants has taken considerable attention for its great different toxic effects on living individuals. Cadmium toxicity is increasing in incidence today for several reasons. One of the primary reasons is zinc deficiency in many commonly eaten foods. Zinc, which is protective against cadmium, is becoming increasingly deficient in the soil and consequently in food. Food processing and eating of refined food further reduces zinc intake.

Exposure to cadmium is also increasing due to its use as in iron coating, steel and copper. It is also used in copper alloys, stabilizers in rubber and plastics, cigarette papers, fungicides and in many other products. Often these industries cause water, air and food pollution with this metal [2]. Cadmium used in industry finds its way into many water supplies. In addition, soft water is more dangerous since the calcium in hard water has a protective effect. Old galvanized pipes and new plastic (PVC) pipes are sources of cadmium in our drinking water. Cadmium is unique among other metals because of its toxicity at a very low dosage and long biologic half life and its low rate of excretion from the body [3]. It is listed by the U.S. Environmental Protection Agency as one of 126 priority pollutants.

Neurotoxicity appears in a variety of neurochemical and behavioral changes [4, 5]. This neurotoxicity was still not regarded to certain specific reason; Cd may exhibit several effects on neural level concerning neurochemical mediators [4, 6] Assembly of cell membrane proteins and phospholipids may also be affected under Cd toxicity [7, 8].

The aim of our present study was to asses the impact of cadmium -exposure present in the environment on some brain functions in mice off spring with special reference to neurobehavioral effects.

2. Materials and Methods

Experimental animals

Adult male and female Swiss-Webster mice were used (n=50, BW 25±5 g), the animals housed in opaque plastic cages (three females with one male in each cage) in the Animal House Unit in Faculty of Veterinary Medicine, Cairo University. Animals were kept under reversed lighting conditions with white light on from 22.30 to 10.30 hours local time. The ambient temperature was regulated between 18 and 22 ° C. On pregnancy (appearance of vaginal plug was considered as day one of pregnancy), the males were removed from the cages and the females were subjected to the experiment. Treatment started few days before pregnancy and it continued until delivery. Food (Standard Diet) and water were available adlibitum.

Cadmium administration

Cadmium chloride (analytical grade, Riedel de Haen, Germany) was dissolved in deionized distilled water in the concentrations of (50 mg/L) and (100 mg/L) (w/v). Cadmium concentrations formed the sole drinking fluid source for the experimental group of dams during the prenatal period of the experiment. The drinking fluid containing cadmium concentrations were changed with fresh preparations every five days. The control groups were received deionized distilled water only. All pregnant mice were housed individually.

After weaning at the age of 22 days, 25 male offspring from each treatment category and control group were subjected to the tests at the age of 25 days Puberty is around day 25-30 in mice, estrogen has been shown to affect non-reproductive behaviors in humans and rodents, including anxiety, fear, and activity levels [9],therefore "Standard opponent" tests were carried out on male offspring.

"Standard Opponent" Test

"Standard opponent" tests under dim red lighting (ca. 8 lux) as described by Brain *et al*., 1989, [10] . The docile and age-matched male "standard opponents" were rendered anosmic by applying 25µl of 4% zinc sulphate solution to the nasal tract under ether anesthesia for three days prior to encounters [11]. The anosmic 'standard opponent' intruders were introduced in the home cages of 'test animals' and the "standard opponent" test of each 'test animal' was observed visually for 500 seconds. The opponents were used only once and the selected "elements" of behavior were studied [12].

Biochemical Analysis

All the mice were weighed and sacrificed by cervical decapitation. Brains were cut into two sagittal pieces with surgical scalpel, and tissues of at least five animals were pooled to prepare enough samples for biochemical estimation. Samples were then diluted tenfold and the homogenate was spun at 10,000 rpm for 15 min and the supernatant was used for enzymatic assay. Biochemical estimation by standard methods was conducted for AchE and BchE [13], MDA [14] and ascorbic acid [15] in brain tissues of control and Cd-treated animals.

Cadmium Determination

Each sample was represented by one gram of tissues dissected from the brain of at least five animals were pooled to prepare enough samples for determination of Cd in brain tissues. The samples then placed in a clean screw-capped tube and digested according to the method described by Finerty et al.,1999,[16]. The obtained solutions were then analyzed by using Air/ Acetylene Flame Atomic Absorption Spectrophotometer (UNICAM 696 AA Spectrometer) for determination of cadmium levels in examined samples.

Histopathological examination

Histopathological examination in brain of control and Cd-treated animals. Tissue specimens from brain of all experimental mice were collected and fixed in neutral buffered formalin, processed by conventional method, embedded in paraffin, sectioned at 4-5 µm and stained by Haematoxylin and Eosin [17].

Statistical Analysis

Data of "Standard opponent" tests were compared within the experimental groups by ANOVA test and Mann- Whitney U test [18].

3. Results

"Standard Opponent" Test

Results of the various treatments are shown in Tables 1 and 2. The behavioral data (mean ± SE) in the "Standard Opponent" test of male offspring are given in (Tables 1 and 2). Almost all of the elements of behavior were affected by prenatal $CdCl_2$- exposure and these effects were statistically significant in a dose-dependent manner. The non-social and social behavior of the exposed offspring were significantly and dose-dependently affected showing an increase in the former and a decrease in the later, respectively. The elements of social behavior including attack, numbers of fights, naso-nasal and naso-genital contacts, wall rears and rears were decreased significantly in a dose-dependent manner. The latencies to threat and attack were also increased significantly and dose-

dependently. Overall, the results indicate that the social behavior is significantly decreased due to the prenatal $CdCl_2$-exposure in a dose- dependent manner. Conversely, the nonsocial behavior and its elements like wall rears and rears, in young male adult offspring were increased significantly and dose- dependently.

Table 1 . Effect of the prenatal cadmium exposure on the social behavior of male laboratory mice offspring, (Number of seconds allocated to behaviors like)

Parameter	Nonsocial Investigation	Social Investigation	Defense	Threat	Attack	Displacement
Group						
Control	114.7±11.02	228.3±6.44	4.2±0.9	8.4± 1.20	120.4±11.0	24.9±4.20
W/v (50mg/L)	290.31±11*	136.8±12**	5.9±0.5	10.98±1.2	35.88±3.6*	18.7±1.3
W/v (100mg/L)	364.1±**	110.4±5.2 **	3.5±1.8	13.4±2.2	4.0± .82**	6.5±0.68*

*and ** statistically significant at $P < 0.05$, and $P < 0.01$ respectively from the control by Mann-Whitney U-test. LD_{50}=110 mg/kg BW oral (cadmium chloride) WHO (1992). The average daily intake of cadmium was estimated to be 4487 µg/kg BW and 8974 for the groups receiving 50 and 100 mg/kg, respectively)

- *WHO (1992) and Agency for Toxic Substances and Disease Registry (1999)*

Acetylcholinestrase and Butyrylcholinesterase

Activities of AchE and BchE (Acetylcholinestrase and Butyrylcholinesterase) showed a concentration-dependent decrease in all the tissues studied, Tables 3.

Excessive intake of Cd in drinking water significantly reduces AchE and BchE activity in the brain tissues.

MDA

The significant decrease in free radical scavenging enzymes and a concomitant increase in lipid peroxidation (MDA) in brain tissues suggest an increase in oxidative stress after excessive Cd intake. Such increase in free radicals in neuronal cell bodies could be correlated with loss of neurons in brain and synaptic structures in neuromuscular junctions.

The impairments due to the neurotoxic effect of Cd in brain of mice treated with high dose (100 mg /L) were indicated by the histopathological investigation. The impairments included congestion of blood vessels, necrosis of neurons (Fig.A), neuronphagia (Fig.B) and focal gliosis (Fig.C) as well as haemorrhage in Virchow space. Moreover, in hippocampus the pyramidal cells appeared atrophied and necrosed (Fig. D).

Ascorbic acid

A parallel increase in ascorbic acid content, Table 3, an important antioxidant in brain after Cd intake, is difficult to explain. An increase in ascorbic acid content suggests its role in amelioration of stress.

Concentrations of cadmium in the brain tissues

The concentrations of cadmium in the brain tissues of Cd-exposed groups were 10 µg/g and 65 µg/g of (50mg/L) and (100mg/L) (w/v) respectively, in their drinking water ($P < 0.05$ vs. control). While, the mean concentration of Cd in the brain tissues of control group was 2 µg/g.

Table 2. Effect of the prenatal cadmium exposure on the number of various acts and postures of social behavior of male mouse offspring in a 'standard opponent test'. [Mean number and latency (mean±SE) of acts and postures]

Parameter / Group	Latency to Threat (sec)	Latency to Attack(sec)	Number of fights	Number of Naso-Nasal	Number of Naso-Genital	Wall contact	Rears contact
Control	20	96	20	28	29	23	11
W/v (50mg/L)	90*	140*	8 *	19 *	18*	10 *	7*
W/v % (100mg/L)	260**	280**	2 **	10**	8**	4**	2**

* and ** statistically significant at $P<0.05$, and $P<0.01$ respectively from the control by Mann-Whitney U-test.

Table 3. Effects of Cd in drinking water on various parameters in the brain tissues of Mice

Group / Parameter	Control	50 mg/L (A)	100 mg/L (B)
AchE (ΔOD)	0.10± 0.01	0.059±0.02*	0.024±0.006**
BchE (ΔOD)	0.09± 0.007	0.018±0.013*	0.028±0.026**
MDA (nmoles/mL)	1.95± 0.42	1.31±0.38*	4.87±0.66**
Ascorbic acid (mg/100mL)	0.89± 0.32	1.73±0.19*	2.44±0.26**

P<0.01;. Comparison between: Control with A and **P<0.05; *Data represented as mean ±S.E. control with group B. AchE (ΔOD): Acetylcholinesterase Absorbance/min · mg protein. BchE Δ(ΔOD).

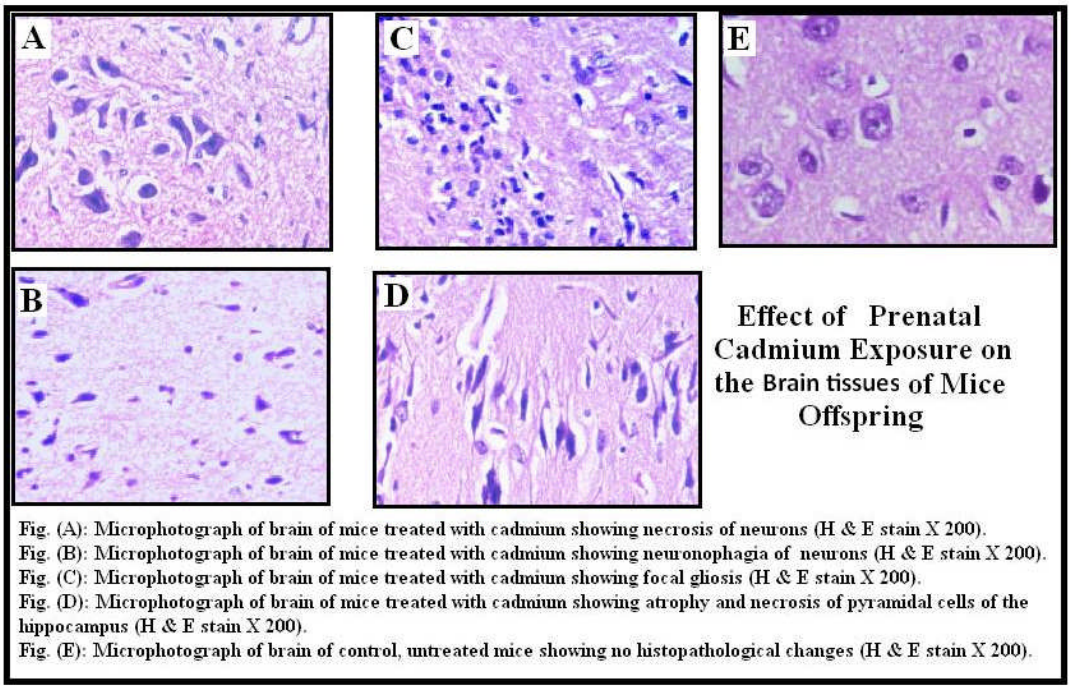

Fig. (A): Microphotograph of brain of mice treated with cadmium showing necrosis of neurons (H & E stain X 200).

Fig. (B): Microphotograph of brain of mice treated with cadmium showing neuronophagia of pyknotic neurons (H & E stain X 200).

Fig. (C): Microphotograph of brain of mice treated with cadmium showing focal gliosis (H & E stain X 200).

Fig. (D): Microphotograph of brain of mice treated with cadmium showing atrophy and necrosis of pyramidal cells of the hippocampus (H & E stain X 200).

Fig. (E): Microphotograph of brain of control, untreated mice showing no histopathological changes (H & E stain X 200

4. Discussion:

The present results clearly suggest that after the weaning period, various behavioural indices in young male offspring were affected in the "Standard Opponent" test. Thus, these results clearly emphasize that pre and postnatal cadmium exposure is extremely dangerous. A strong correlation exists between maternal and umbilical cord blood cadmium levels indicating prenatal transfer of cadmium from mother to developing fetus in utero [19]. Cadmium can enter into the brain parenchyma and neurons during the critical point of development [20] causing neurological alterations [21, 22]. Barannski, 2007, [23] described the toxic result of cadmium exposure in the form of morphological development, sensory motor reflexes, biochemical and behavioral outcomes in rodents. It is now well documented that significant quantities of compounds that are given to mothers during late pregnancies and during postnatal period, may be transmitted to the offspring in utero and /or via mother's milk during lactation [24-28,19]. It is known that a major portion of brain cells (70%) of the closely related rats are formed after birth [29]. Furthermore, it has been established that the hippocampus in the brain may be most vulnerable to the neurotoxicity of neurotoxic materials in the very rapid growth period. The hippocampus and the cerebral cortex are the key structures of memory formation [30-33], because the hippocampus is especially indispensable in the integration of spatial information.

There were significant differences in hippocampus and the Opponent" test, in mice which received high dose of Cd (100 mg / L) and untreated group (control). The Opponent" test has been associated with hippocampal activity and cholinergic activity neurotransmission (learning ability and motor activities) Many investigators have reported that hippocampus is one of the most vulnerable regions in the AD brain [34] and hippocampal lesions in general produce changes in rat's activity levels [35] and impairment in spatial memory [36]. So, we could be stated that, hippocambus is the main target of CNS due to Cd exposure. The impairments due to the

neurotoxic effect of Cd in brain of mice treated with high dose (100 mg /L) were indicated by histopathological investigation. Figures A-E, showed congestion of blood vessels, necrosis of neurons, neuronphagia, focal gliosis as well as the pyramidal cells appeared atrophied and necrosed especially in hippocampus (Fig.D).

Histological changes were observed in rat organs exposed to 8 mixtures of metals [37]. Cadmium causes hemorrhages in the autonomic ganglia with cell necroses and damage to nerve cells and nerve fibers. De Castro 1996,[4] observed changes of drinking behavior in rats exposed to acute Cd intoxication. There were significant decreases *(P< 0.05)* in the activity of acetylcholinestrase. (AchE) enzyme in the brain of Cd administered groups, Table 3. Antonio and Leret, 2000, [6] observed enzymatic changes in rats exposed to lead intoxication.

Acetylcholinestrase (AchE) is an enzyme that responsible for hydrolyzing and so deactivating acetylcholine in the body. It is a good indicator of sublethal toxicity by heavy metals [38]. Brain contains 2 forms of AchE, membrane bound forms constitute 90% of the enzyme and soluble form represents the rest 10% [39, 40]. Level of the soluble form considered a simple and sufficient indicator of relative change of AchE in the brain [41, 42] which measures the turnover of Ach activity [43]. Alterations in this enzyme level are indicative to impairment of cholinergic function [44]. Our results revealed significant inhibitory effect on AchE activity in brain tissue of mice offspring which is in accordance with previous investigations of [45- 47] in rats.

Cadmium inhibits release of acetylcholine, probably by interfering with calcium metabolism [37]. Cadmium can enter into the brain parenchyma and neurons [20] causing neurological alterations in human [21] and animal models [22]. This decrease could be due to loss of neuron cell bodies in the brain, loss of synaptic structures, or inhibition of enzyme activity. These effects could be corroborated with cognitive dysfunctions observed in experimental animals.

This study suggested that, exposure to cadmium present in the environment and especially in the food chain may reach the brain of the fetus or the newborn during critical periods of brain development and could be produced cumulative developmental abnormalities in the brain prenatally, which is expressed in the young adult male offspring in disturbed form of long lasting social behavioral outcomes and learning ability. It seems that the impairments of behaviors in relation to learning and memory are due to the disturbance of the hippocampal circuit and its vast connections through cortical and subcortical pathway.

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Rain water harvesting and Artificial Recharge in Africa: Review

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Abstract: The report tries to highlight the growing popularity of rainwater harvesting and artificial recharge in Africa in relation to increasing demands and exploration of groundwater. Several techniques are identified as methods for water harvesting and recharge but those associated with collection devices, catchment areas and conveyance systems are given more attention for example check dams and recharge pits. Scarcity of groundwater data and lack of awareness of groundwater phenomenon is still a hindrance to intensive artificial recharge projects.
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Key word: Groundwater, Rainwater harvesting and artificial recharge

1. Introduction

Water is a crucial resource with great implications for African development. The freshwater situation in Africa, however, is not encouraging. Of the estimated 800 million who live on the African continent, more than 300 million live in water-scarce environment (AU/NEPAD, 2006). Because of semi-arid and arid conditions, especially in southern Angola, Namibia, Botswana, western South Africa, and western Zimbabwe, all have lower recharge rates and hence tend to place a higher value on their water resources than the humid countries. In these areas, groundwater recharge may be limited and probably largely localized to line and point sources such as streambeds and dam basins, respectively (Xu and Beekman, 2003). In Southern African nations, especially in those within the arid and semi-arid areas, there is a greater need of and access to reliable source of water supply (ADELANA et al., 2008). North Africa is the most water-stressed region in Africa, and freshwater availability will become an even more important issue in the coming decades, it is also threatened with seawater intrusion, resulting from over-exploitation of groundwater resources in coastal areas (UNEP, 2008). As indicated figure 1(WHYMAP, 2008), North Africa has the highest groundwater mining activities indicated by the red circles.

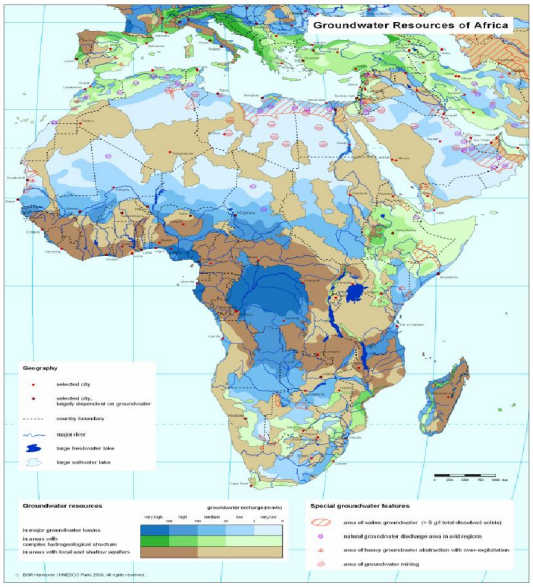

Figure1 Groundwater resources of Africa

Groundwater is of particular importance in Africa, where numerous countries rely on a combination of hand-dug wells and public boreholes for their drinking water. Although groundwater use is generally less visible than surface supplies, it increasingly provides the main source of agricultural irrigation in rural areas, as well as a vital safety net for dry-season food security (ADELANA et al., 2008). From the Groundwater Dependency data of Southern Africa countries shown in table 1, dependency is moderate to major in semi-arid and

arid countries (ADELANA et al., 2008). However, with increase in population and the need for development, the situation for groundwater dependency will continue to grow at an alarming rate.

Table 1 Situation of Groundwater dependency in Southern African countries

Member state	Rural	Urban	Agri	Industry	overall dependency
Angola	2	2	2	1	2
Botswana	3	2	3	3	3
DR Congo	1	1	1	1	1
Lesotho	2	2	1	1	1
Malawi	3	1	2	1	2
Mauritius	1	2	2	2	2
Mozambique	2	2	1	1	2
Namibia	3	3	3	3	3
Seychelles	2	2	1	1	1
South Africa	3	2	2	2	2
Swaziland	2	1	1	1	1
Tanzania	3	3	3	1	2
Zambia	2	2	1	2	2
Zimbabwe	2	2	1	2	2

Indication scale: 1= minor, 3 =moderate, 3 =major

Where there is no surface water, or where groundwater is inaccessible due to hard ground conditions, or where it is being over exploited recharge alternatives should be implemented. In a very simplified sense, if a society is threatened or subjected to water scarcity it should respond by attempting to get and store more water using simple, inexpensive and traditional concepts.

2. Methodology

This used the documentation method for getting all information regarding Rain water harvesting and Artificial Recharge in Africa.

3. Results and Discussions

3.1 Concepts of rainwater harvesting and artificial recharge

Rainwater harvesting is one of the most promising alternatives for supplying freshwater in the face of increasing water scarcity and escalating demand (Yongxin, 2006). There are two main techniques of rain water harvesting namely storage of runoff on surface for future use and recharge to groundwater and shallow aquifer (MacDonald and J Davies, 2000). As rainwater harvesting gains popularity among African countries so does artificial recharge as a way to counteract water shortages. Artificial recharge can be used for a number of reasons: integrated water management, seasonal storage and recovery of water, long-term storage or water banking, emergency storage or strategic water reserve, short term storage, enhancement of well field production, restoration of groundwater levels, compensation for over-draft, reduction of pumping cost, stoppage or reduction of the rate of land surface subsidence, and improvement of groundwater quality to agricultural or municipal standards (SAI, 2009). Other objectives of artificial recharge are to reduce land subsidence, to store water, to improve the quality of the water through soil-aquifer treatment or geo-purification, and to use the aquifer as water conveyance systems (Raju, et al., 1994). Artificial recharge to ground water is a process by which the ground water reservoir is augmented at a rate exceeding that obtaining under natural conditions of replenishment (Raju, et al., 1994). Artificial groundwater recharge systems are engineered systems where surface water is put on or in the ground for infiltration and subsequent movement to aquifers to augment groundwater resources (Moegiadi, 2000;Yahya , 2009.).

Table2 Properties of artificial groundwater recharge

Method of AGR	Conditions of use	Advantages	Disadvantages
Wells	a thick impervious Layer between Surface of the soil and aquifer	Inexpensive	Clogging up at infiltration surface
Dam	suitable Geomorphology	For low permeable-soil	Sediment accumulation High Evaporation
Spreading	available land High permeability	low maintenance cost	suspended sediments

Moegiadi (2000) described an artificial recharge system as any man-made scheme or facility that adds water to an aquifer. The author further stated that rain water harvesting is essential because:-

1. Surface water is inadequate to meet human demand that has to depend on ground water.

2. Due to rapid urbanization, infiltration of rain water into the sub-soil has decreased drastically and recharging of ground water has diminished.
3. Over - exploitation of ground water resource has resulted in decline in water levels.
4. To enhance availability of ground water at specific place and time.
5. To arrest sea water ingress.
6. To improve the water quality in aquifers.
7. To improve the vegetation cover.
8. To raise the water levels in wells and bore wells those are drying up.
9. To reduce power consumption.

Rainwater harvesting is a simple and low cost water supply technique that involves the capturing and storing of rainwater from roof and ground catchments for domestic, agricultural, industrial and environmental purposes (Yahiya, 2009). SAI (2009) described the different types of rainwater harvesting technique used in Africa for artificial recharge.

3.2 Gabion

A gabion which is a semi permeable barrier made of boulders in a mesh of steel wires and anchored to the stream bank, to slow but not stop, the flow of storm water in a small watercourse, so as to enhance water infiltration to groundwater and help prevent soil erosion.

3.3 Recharge pits and trenches

Recharge pits and trenches are constructed for recharging the shallow aquifers and / or avoiding runoff damages. Pits are generally 1 to 2 m wide and 2 to 3 m deep. Trenches are generally 0.5 to 1m wide and 1 to 1.5 m deep and 10 to 20 m long depending upon availability of water. Both are filled with boulders, gravels & coarse sand to filter and increase water infiltration and to minimizing evaporation. This is an ideal solution of water problem where there is an inadequate groundwater supply or surface resources are either lacking or insignificant (Moegiadi, 2000; Bancy et al., 2005; SAI, 2009). To improve the quality of groundwater through dilution since rainwater is bacteriologically safe and free from organic matters. When open well are dried up, it is possible to use them for recharging groundwater in diverting upstream runoff inside the well (SAI, 2009).

3.4 Check dams

Check dams which are small, temporary or permanent dams constructed across a drainage ditch, swale, or channel to lower the speed of concentrated flows for a certain design range of storm events. A check dam can be built from logs of wood, stone, pea gravel-filled sandbags or bricks and cement. Allow groundwater recharge and sediment to settle out (Raju, et al., 1994 ; Bancy et al., 2005; SAI, 2009). Surface runoff can also be used for recharging groundwater, which will positively impact on springs and shallow wells.

Table 3 Artificial recharge sites in Southern Africa

site	Operational status
Windhoek	newly
Polokwane	10 yrs old
Omdel	5yrs old
Atlantis	20yrs old
karkams	5yrs old
calvinia	Recently tested

It should be noted that artificial groundwater recharge is affected by quantity, quality and reliability and the sources are storm runoff, rainfall harvesting, river flows and water releases from dams (ADELANA et al., 2008). Factors to consider in all schemes of artificial recharges are also complex. These include quantity, quality and timing of available water for recharge, the department and storage capacity of aquifers, local hydrological conditions, native groundwater quality, and land availability (Bancy et al., 2005). The Rivers have more consistency than storm runoffs. Storm runoff is usually collected in an impoundment basin from which controlled release of water into recharge basin take place after settling of the bulk of the suspended solids. A perfect example is Omdel scheme located on Omaruru River Namibia. They are two physical characteristics which determine aquifer suitability for artificial recharge namely permeability and storage the later is South African secondary aquifers concern. These aquifers during the natural recharge period are normally full and only have space for recharge during dry periods (Murray and Tredoux, 1998).

It should also be noted that as vegetation cover increases so doe's rates of infiltration and this has an impact on recharging shallow aquifers. One promising technology for rural farming systems is rainwater harvesting which is the process of

interception and concentration of rainwater and runoff and its subsequent storage in the soil profile or in artificial reservoirs for crop production (UNESCO, 2006). Recharge is either natural that happen mainly via direct rainfall infiltration into permeable soils, but also from surface flow, or can be man-made (by contour ploughing, building bunds/dams, ponds, diversion channels, and wells to enhance recharge), or may be incidental (irrigation, wastewater disposal, leaky pipes in cities, or clearance of deep rooted vegetation).The benefit of surface tanks over sub-surface ones, which are partly or completely underground, is that water can be easily extracted through a tap just above the tank's base. This popularity was demonstrated in the Kusa area of Nyando District, Kenya, where Regional Land Management Unit (RELMA) was involved in a project to promote rainwater harvesting. In just six months, 113 above-ground tanks with capacities ranging from 3 m^3 to 23 m^3 for homes and 23 m^3 to 30 m^3 for institutions were constructed (Mati, 2001).

3.5 Pans and ponds

Pans and ponds are dug up to capture and store runoff from surfaces such as hillsides, roads, rocky areas and open rangelands. Pans have been used to harvest rainwater in many parts of East Africa. When well designed and with good sedimentation basins, pans can collect significant amounts of water for irrigating crops to augment rainfall. In a recent study by RELMA in Lare division of Nakuru district, Kenya, a 25 square kilometer area was randomly selected and using GIS technique the number and distribution of runoff ponds in the area were determined. A Quick bird image revealed 908 pond constructed by farmers in the location. This is the highest adoption of ponds RELMA has ever observed in Africa. The adoption of ponds has resulted in improved livelihoods of the communities through increased food and water security. It was concluded and recommended that ponds should be scaled up in areas of similar biophysical conditions.

3.6 Earth dams

Earth dams are perhaps the most widespread method of water harvesting, especially from river valleys. A dam can be constructed to collect water from less than 20 km2 for a steep catchment and 70 km2 for a flat one. In Tanzania, low earth dams called 'malambo' have been built, especially in Dodoma, Shinyanga and Pwani regions (Hatibu and Mahoo, 2000; Adelana and Xu, 2006).

3.7 Spate irrigation

Spate irrigation or diversion of flood flow from highlands into lowlands and 'wadis' has a long history in the Horn of Africa, and still forms the livelihood base for rural communities in arid parts of Eritrea and the upper rift valley in Ethiopia (Negasi, et al., 2000). An example of this is demonstrated at Lamza in Eritrea where vegetables are grown by irrigation, using water collected in a small dam of about 150,000 m^3(GHARP, 2009.).

RELMA has been promoting conservation agriculture in Sub Saharan Africa with notable successes in Zambia, Zimbabwe and Tanzania (Nyagumbo , 2000). Studies in Zambia demonstrated a network of centers' to diversify the use of animal-drawn implements to achieve conservation tillage (Adelana and Xu, 2008 ; Kaoma-Sprenkels, et al., 2000; Robins, et al.,2006; Adelana and Alan M, 2008.). In Zimbabwe, technologies such as no-till tied ridging are used. The ridges, made using animal traction, are about 20-25 cm in height and laid across the slope at 0.4-1% gradients. Other technologies include no-till strip cropping, where crops are grown in rows 3-9m wide, and pot-holing, infiltration pits (chimbatamvura) and fanya juu chini terraces. All these improve infiltration and reduce runoff though to a lesser extend it can also add to groundwater recharge. The USAID funded GHARP case studies projects in Ethiopia, Kenya, Uganda and Tanzania these revealed a number of promising and proven technologies. For example the projects implemented in Isinon, Kimalel and Wamani in Kajiado, Baringo and Laikipia districts respectively. These projects were promoted by partners in East Africa promoting rainwater harvesting these partners are Ethiopian Rainwater Harvesting Association (ERHA), Kenya Rainwater Association (KRA), Rainwater Association of Somalia (RAAS), Rainwater Harvesting Association of Tanzania (RHAT) and Uganda Rainwater Association (URWA).

4. Conclusions

Population increase in Africa will give rise to demand for more water through agriculture, livestock and domestic use and this will lead to a drastic increase in

groundwater exploration and development. Data are scarce and to a large extent have not been gathered with any rigour over the last two decades. The reasons behind this change are complex. It is clear that although groundwater supports social and economic development in Africa (particularly in rural areas). The resource is not properly understood. It recognized that major gaps exist in knowledge of groundwater resources in Africa and that there is a need for African groundwater scientists, managers and policy makers to determine best practices and reduce inequities in capacity. For further studies, there is still need for intensive research, awareness, data collection and filling knowledge gaps in Africa as far as groundwater is concerned.

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A review of theoretical and experimental factors affecting rural women's economic participation and employment

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Abstract: Macroeconomic view of employment of different aspects such as creating income, production and entrepreneurship, science and technology development, etc. is important, and gives the dignity, status and social position and a sense of confidence from the social viewpoint of man. Working and use of inherent forces, skills and knowledge and personal management to begin to work and to accomplish the activity, are not specific to particular groups**.** Around the world and in Iran, female employment, especially in rural area (which is a manifestation of participation) is not raised the issue of unemployment. Matter is the work with no reward. Because all the unpaid work is done that by women at home such as cleaning, laundry, nursery and social affairs, agriculture and livestock work and.... has come to account as non-economic work. While the visible part of economic can't continue to exist without goods and services of this invisible section of the economy.
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Keywords: Employment, rural women, economic participation

1- Introduction:

Rural women are among those major groups at society who previously were considered less by planners, due to specific reasons in the past. And this problem is more observable at developing countries. While, by looking at women's history of economic and social life, we can find that this great group, continuously have played basic role in forming economic condition of country. This great group consistent with men have had active role at areas of social-economic activities and always have had major part on economic production of society. Nowadays, supporting family supervisor women is adopted by universal society, as politic, economic a social concern and nearly all countries applied related approaches, and however these efforts have resulted in failure, in so many cases (Banihashem, 1999).

Poverty spreading in village is a global issue. According to the Fao finding about % 75 of world's poor people that are more than 1 milliard people are living in rural zone and more than % 70 of this poverty people are women. As the most of the people who are poor are living in village and are women is the reason for insufficiency of rural development programs.

One of the other basic barriers in development of rural women is their independent inaccessibility to get credits for investment in their job. Although their illiteracy is the big barrier to use of bank credits, but this view that women are dependent people that their husband should decide about their financial decisions is the other reason that rural women couldn't access to official credits. Maybe these barriers are the reason why rural women are happy about applying micro-credit thought in village. (Najafi, 2007).

Having investment (capital) independency enforce people to think about economic from different angles. He should study the ways for using capital, he must consult with authority and experienced people and he will investigate about relevant markets. Such things will help him to be authoritative & independent. But how rural women can get such independency? Are the women created inherently for housekeeping, parenting and working or is there any opportunity for rural women to show their skills in economic & social development?

It seems that experiences which are obtained from performing financial programs in some villages in the developing countries could answer clearly to such questions.

A glimpse to previous planning about rural development in the world shows that from 1950 many developing countries understood that the main reason for making their economic growth (development) slowly in their countries is the weakness of investment in the agriculture part. Although many countries by patterning from developed societies have proceeded to improve & develop their industrial agriculture part and by this action not only had irreparable damages to many traditional farmers but also the main problem (the lack

of capital sources) is also remained in the rural regions. (Rahimi, 2001).

experimental factors affecting women's employment

Based on theoretical and empirical studies, women in the labor market in terms of environmental, economic, social, cultural and political per country, depends on various factors that the most important factors can be briefly outlined as follows:

2-1 - economic development:

Women's participation in agricultural activities for is generally for families and receives no salary and has more self consumption aspects. But during the process of economic development outcomes below can be achieved which affects on women's participation in the labor market: (Tansel, 2002, 8; Mammen and et al., 2000, 142)

A – In agriculture, production for self consumption reduces and instead of it production for the market increase and new technologies and methods developed for the market development that ultimately led to increased agricultural incomes. With increasing income, women's participation in the labor market reduced and women's access to job opportunities are limited. Because those who go outside of the agricultural sector compete to find jobs and generally in this competition on women are outnumbering men and women are deprived of access to such jobs.

B - In the non-agricultural sector, participation of women in employment in the oven come early development is weak for two major reasons:

B -1 - due to low literacy levels, inadequate skills and expertise out in low and lower productivity of women, most employers prefer to hire men.

B-2 - duplicate the role of women in the field of work and family, particularly in one hand women in industry and services will force to stay away for long periods of home environment and on the other hand home responsibilities such as keeping kids, cooking and other home affairs significantly, they should inevitably have more presence in home . This dichotomy, deny these groups in the labor market. But the obstacles and problems regarding lack of participation of women in the labor market while increasing revenue and developing countries are lesser and thus participation rate of women in the labor market has increased. Therefore we can say that in the early stages of development, women participation rate in the labor market decreased to a minimum reached and then by increasing the degree of development, the share of women in the labor market has increased (Amiri, 2000).

2-2 - Size of government:

The size of government can affect the employment of women Kavalkanty and colleagues study the effects of government spending on women's participation in the labor market. Their research results show that the causal relationship between government spending and labor market participation of women in there. In other words, by increasing the government spending, women's participation in the labor market increases and vice versa. (Cavalcanti and et al, 2004)

2-3 - Distribution of household income and expenditure:

If the income distribution is worse in the country, women are forced to pay for household economic activities and therefore their employment rate increases. On the other hand, the financial position of households is effective on female employment in the labor market.Zareen and colleagues in their paper study the participation of women in Pakistan and show that the financial position of households, women's age, education and marital status on women's participation rate has positive effect. . (Zareen & et al., 2002; Del Boca & et al., 2000)

2-4 – Unemployment rate:

Any national unemployment rate increased due to reduced job opportunities for women, incentives per job is lower among women and therefore the share of women in employment decreases (Hashemi, 2000).

2-5 - government policies:

Government policies in the field of monetary, fiscal, foreign exchange and the direct and indirect traders affect in the share of women employment. Effect of each policy may be positive or negative. Also, Del Boca and colleagues in their paper show that various tax policies and administration of public policies affect on women's participation in the labor market. (Del Boca and et al., 2002)

2-6 - Number of children and fertility rate:

Fertility rates and increased number of children will be increased women responsibilities and thus negatively related to women's share of employment. Mincer (Mincer, 1995) studies the relationship between women's paid work hours and participation. His results show that household income effects on demand for women's work and, consequently, women's employment inversely is depending on wealth criteria. Moreover, he concluded that the number of children is effective on women's decisions for work offered.

2-7 - family environmental conditions and social and cultural factors:

According to The time allocation theory, participation or non participation of women in the outdoors, depends on the common surname utility function and family decisions also affect on the share of women employed outside the home. Moreover, social and cultural factors and traditions in each country affect on participation rate of women in the labor market.

Shah (1995) studied the Effect of social and economic variables on participation rate of women in the labor market in Pakistan. His results show that the women's participation is inverse with number of children and the

type of family relationship.

2-8 - knowledge:

If the knowledge of women increase, their accessibility to the industrial and service sector jobs will increase and a there is a positive relationship between knowledge and participation rates of women in the labor market. (Sultana & et al., 1999)**.**

2-9 - marital status:

women marriage and the general responsibility of the family cause to decrease their labor market participation rate and in contrast, the divorced or single people, have higher the labor market participation rate because they have enough time to work outdoors and need financing to fund its life. (Aly and et al., 2000)

Discussion and conclusion:

Supplying credits and analyzing credits approaches cause opportunity to activate poor men's working power , establishing field for sustainable production and income , prevent usurers and pre shoppers of agriculture productions to plunder poor rural men and finally empowering poor people especially women who can work but were deprived to have capital and work tools , and extension accordance to their activities such as needs assessment , identifying target group , organizing poor people , giving needed specialized and public training and … have important role on effectiveness and make effective activities of these credits .

Woroniuk و Schalkwyk (1998) at their conducted research believe that now, micro credits, micro finance sources and small business unites are most effective mechanism to decrease poverty.

Plitt and others, conducted research as they called it "do credits programs, can empower women "? Results showed that corporation at credits programs helps empowering women.

Goetz و Sengupta (2003), presented negative image of credits effects on empowering women. They concluded that most women have minimum control on their loans. And when repayment period is short, this shortage of control has devastating effects on women welfare.

Hashemi and others (2004) found that joining to Gramin Bank, has meaningful positive affects on controlling women, and helps to family income.

In researches that conducted by Nanda (2004) became clear that women participation in credits programs had positive affects on their demand about health care.

Fiona Steele and etal (2008) in researches that conducted as called " influences of credits programs on empowering women at Bangladesh , found that women who joined to credits programs , have participated in more educational programs and have married with more educated men and also they have saved more and they had more cash .

Ellen and her colleagues (2009) used approach called it "credits and education at Bolivia, Ghana, Honduras, Mali and Thailand". This approach looks for empowering women through financial services with education. In this approach, women get familiar with importance of credits through education and extension and also familiar with ways to access it through establishing different groups.

Shahnaj and chaudhury(2009) in research as "credits and its role on empowering women " concluded that there is meaningful relation between attending in credits programs and empowering women , at economical dimensions .

Ruhal amin and others (2010) found that those who joined credit funds had more ability rather than those who didn't.

Jameela (2010) presented that credit programs has shown lot of affects on empowering women so that has increased their social, politic and economic ability.

Thus it is obvious that credits programs and its educational and empowering programs can be affective on social, humane and economic development or rural society, if it be associated with proper and gradual practices and base on reciprocal communications principles and apply opinion of local society.

Maybe the main challenges that threaten credits associations , is lack of necessary emphasizes on social dimensions and on reinforcing their basics , that practically cause that this social foundations lose its efficiency soon and practically changed to unsuccessful institution .

In order to overcoming dominant consideration, experts believe that we should consider following in protection process of these social institutions.

- establishing and reinforcing through supporting without ant direct government involvement
- evaluating and constant modifying of financial management mechanisms
- improving organization effectiveness
- establishing constant relation and interaction with similar and equal systems.
- establishing local , regional and national networks
- establishing support and cover systems in order to decrease risk
- establishing balance and interaction with financial systems greater decision making include: capital market (local, regional, national) and governmental.

also following suggestions have been offered:

- helping to marketing and establishing many exhibitions for member's productions, credit programs, guiding and training them in line with group and workshop activity, can assist them on economic empowerment.

- since women have pointed to education deficiency as major barrier for empowering them , thus educating rural women at the field of exploiting different credits and channels of receiving credits , and also various educations , is so that lead to enabling them , that contain considerable importance.
- providing extension educations for men in order to believe economic role of their women , and give them chance of corporation on all economic , credits fields
- Since that base of credit association, forms base on People Corporation, so it's good chance to use these communities to expand extension-education activities. so it is better to consider special programs on different extensional filed such as agriculture , ranching , family health , housekeeping economy and other fields accordance to condition of region and rural women's needs .
- it is suggested that vast and exact programming happens at following fields:

  a- extending insurance, facilities for amenities

  b- educating women about awareness of their own individual and social rights

  c- persuading rural women about importance of participating at cooperatives and other educational institutes

  d- educating women about job management and income management

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3/4/2011

Improving water availability through Watershed Management in Africa: A review

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Abstract: Water scarcity and how it can be availed for general purposes is highlighted in this paper in relation to watershed management. An overview of different African countries is done and the major problems identified to be causing water scarcity were land degradation, population and mismanagement of resources. Researches carried out in different countries however highlights that land management, water management and participation of locals as components of watershed management can be used in water productivity. In most parts of Africa rain water harvesting in conjunction with good conservation methods has gain popularity as a way to avail water for different purposes.

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Key word: Watershed Management, Water Productivity, Land and Water Management and Human Participation

1. Introduction

People worldwide use more than half the available freshwater on the planet, in fact so large is the demand for freshwater that many rivers and streams are now drying up (Agnes, 2005). This stress is manifested in the seasonality of our streams and rivers giving rise to severe water shortages. Water problem has of late become of great concern to many African countries. At a conference attended by 1000 delegates in Addis Ababa, water experts said that Africa was facing a water crisis affecting 300 million people (Ruphael, 2004). For example Ghana is well endowed with perennial rivers and groundwater, although seasonal shortages are quite common (Kwame, 2005). In 1993 the Ruaha river (Rufiji basin) in Tanzania began drying up every year in the Ruaha National Park, and 10 years later this increased to zero-flow for almost for 4 months a year (Femke, 2005). During the past 2 decades and due to the decrease in the amount of river discharge and rainfall, coupled with repeated fires, the catchment areas of Mayas in Sudan have deteriorated drastically causing many of them to silt up to almost complete dryness (Salwa, et al., 1997). The great question behind this water shortages is what is the cause and how can this problem be rectified. Different countries in Africa have several causes and challenges but however it was seen that most of these causes and challenges were common. In Cross River State, Nigeria, for example, the main cause of water stress is the unsustainable use of watershed systems for farming, construction, settlement, gravel and sand extraction. Population increase means more people to work on the available land, while market demand means more land and trees cleared for farms or arts work (Laura, et al., 2006). This study intends to assess the level of the declining water quality and quantity that affecting both humans and livestock as it was one of the problems that were identified in many cases studies done in Ethiopia, Kenya and Tanzania (Lal, 2005; Winter, et al., 1998).

2. Interaction Groundwater and Surface water

In many situations, surface water bodies gain water and solutes from ground water systems and in others, the surface water body is a source of ground water recharge and causes changes in ground water quality. As a result, withdrawal of water from streams can deplete ground water or conversely, pumpage of

ground water can deplete water in streams, lakes or wetlands. Pollution of surface water can cause degradation of ground water quality and, conversely, pollution of ground water can degrade surface water. They are the locations at which ground water leaves the aquifer and flows to the surface. Ground water discharge occurs where the water table or potentiometric surface intersects the land surface. This is illustrated below.

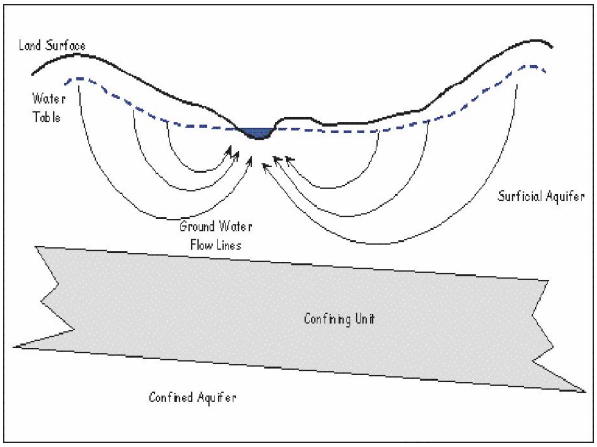

Figure 1 Discharge of groundwater to surface water.

Thus, effective land and water management requires a clear understanding of the linkages between ground water and surface water as it applies to any given hydrologic setting. Therefore to avail groundwater watershed management should also focus of surface water bodies.

3. Watershed management and Initiatives

3.1 Watershed Management Concepts

Concern about widespread soil degradation and scarce, poorly managed water resources has led to the spread of watershed management investments throughout Asia, Africa and Latin (Ffolliott, et al, 2000). Watershed management in its truest form is the conservation management of the soil, plant and water resources of a catchment to benefit humanity. It involves managing the land and human resources of the drainage in a manner that sustains adequate levels of water, soil, food and fiber production. Recognition of the importance of watersheds can be traced back to some of the earliest civilizations; ancient Chinese proverb which states that "Whoever rules the mountain also rules the river," and "Green mountains yield clean and steady water." (Salwa, et al., 1997; Winter, et al., 1998; Ffolliott, et al, 2000). Jain (2004) prefers to look at watershed management as having three main components which are land management, water management and biomass.

Interdisciplinary approaches to project design are needed that integrate the technical and human dimensions of watershed management. This requires an understanding of cultures and traditional land use practices. Socioeconomic research and participatory techniques need to be incorporated early in the conceptual design and planning stages of projects (Ffolliott, et al, 2000). How then can watershed management be used for improving water availability in Africa.

3.2 Land Management

Some forms of land use have a negative impact on the availability and quality of water resources (Jean-Marc and Santiago 2005; Hoff, 2006). Research shows that land use affects the infiltration of water into the soil, and any change in land use that compacts the soil or diminishes porosity will increase runoff and peak flow during rainfall events and, arguably, flooding. Accelerated erosion, produced by changes in the biotic and hydrologic components of natural drainages (watersheds), creates unprecedented large-scale siltation of developed lowlands (Salwa, et al., 1997; Winter, et al., 1998). Effective land management can improve the productivity of green water (mostly by reducing unproductive losses), which can contribute significantly to alleviating water scarcity in many regions in which renewable blue water is already fully exploited. So at local to regional scale, deforestation or irrigation in upland watersheds can significantly change downstream water availability. Ploughing and intensive hoeing should be replaced by ripping, direct planting or pitting. These conservation farming techniques, complemented by the breaking of hardpans, contribute to a better water infiltration and reduce losses of precious rainwater as runoff (Hoff, 2006; Johan and Kurt, 2005).

3.3 Water Management

Water characteristics like inflows (precipitation, surface water inflow, ground water inflow) water use (evaporation, evapo transpiration, irrigation, drinking water) outflows (surface water outflow, ground water out flow) storage (surface storage, ground water storage, root

zone storage) are the principal factors to be taken care of in sustainable water management**.** The broad interventions for water management can be rain water harvesting, ground water recharge, maintenance of water balance, preventing water pollution and economic use of water.

Rainwater harvesting forms the major component of water management. The rainwater collected can be recharged into the ground (Ffolliott, et al, 2000). Economic use of water and avoidance of affluence in use of water at individual and community levels may be the major concern for water management in the years to come. The green-blue water concept, which emphasizes precipitation as the key water resource to be managed, rather than river runoff or ground water only, can promote a better understanding of waterland interactions and eventually improved upland watershed management that is based on scientific evidence rather than popular believes (Hoff, 2006). Other opportunities are provided by upstream-downstream arrangements where the overall, basin-wide water productivity is increased through reallocations of water, e.g. from crops to higher value products. From this perspective, conservation farming is a form of water harvesting, where runoff is impeded and soil water is stored in the root zone of the crop. This means that conservation farming constitutes a very interesting approach to achieve improvements in water productivity, and "crop per drop" increases, in line with the newly launched global dialogue on water for food and environmental security (Johan and Kurt, 2005). In situations where basins are reaching "closure", i.e. the blue water resources are fully allocated, upstream measures such as soil conservation or rainwater harvesting, that reduce runoff, or improved water infrastructure with higher blue water withdrawals, can reduce downstream water availability (Salwa, et al., 1997; Ffolliott, et al, 2000; Hoff , 2006).

3.4 Biomass Management

Biomass management focuses more on the following: eco-preservation,biomass Regeneration, Forest Management & Conservation, Plant Protection & Social Forestry, Increased Productivity of Animals, Income & Employment Generation ; Activities, Coordination of Health & Sanitation Programs, Better Living Standards for People, Eco-friendly life style of people and Formation of a learning Community. Large-scale removal of forest lands by humans in the nineteenth and early part of the twentieth century's created significant changes in the hydrologic function of watersheds this resulted in downstream flooding occurring more frequently, with subsequent increases in loss of life and damage to infrastructure (Winter, et al., 1998; Jain, 2004). Gulley formation and low-quality water in the mid-altitude areas are associated with springs that are used commonly, but located on private land. Deforestation and cultivation of riparian areas are associated with privatization of riverine areas, together with ineffective enforcement of rules on the use of those areas (Brent, et al, 2005). Brent goes on to emphasize that lack of public infrastructure for water management is partially associated with the lack of public or collective land on which to locate water storage structures. Payments for environmental services also are a good ways of improving quality and quantity of water. The watershed services that would be sold are: 1. Soil/stream bank stabilization to ensure the quality of downstream water, and

2. Catchment forest conservation to improve the reliability of water flows. The author also goes on to highlight that at a later stage the biodiversity conservation, carbon sequestration services and aesthetics will also be sold as part of a bundle of ecological services.

3.5 Participatory

Furthermore, the role of local people and the importance of changing land use practices by those people are critical factors in achieving successful programs (Ffolliott, et al, 2000). Common sense tells us that to develop sustainable programs, land and water must be managed together and that an interdisciplinary approach is needed. In order fully to recognize human dimensions in water and land management, it is vital that the partners concerned, in intervention structures and in the village communities, are made aware and are convinced of the advantages of this approach, i.e. the mobilization of the rural communities and their greater involvement in development programs and projects (Jean , 2005).Without coincident local participation, top-down approaches alone often have inconsistent and unpredicted results, even though they may be technologically sound. Administrative and institutional structures should be developed that recognize watershed boundaries, without becoming overly complex (Ffolliott, et al, 2000). Flexibility in planning and management is

essential. Regional training and networking programs at all levels should be promoted, building upon existing networks. Long-term funding support for technical professionals, managers, and policy makers should receive the same attention as operational field projects (Ffolliott, et al, 2000). Participatory watershed management attempts at ensuring sustainability of the ecological, economic and social exchanges taking place in the watershed territory (Jain, 2004). The study tries to highlight some of the activities that can be done to improve watershed management as follows: Spring protection with Eucalyptus woodlots: Spring owners and spring users where eucalyptus is grown (Jean-Marc, 2005; Laura, et al., 2006)

- For springs with no trees or conservation structures: Owners of land around springs and spring users. Spring management
- Farmers who contributed to spring construction and farmers who did not contribute but may want to use springs in the future (negotiating use rights relative to maintenance responsibilities so that the interests of both groups are respected, i.e. new users contributing something for what they failed to contribute in labor/ materials/money during construction, but making this contribution affordable to them).Soil conservation
- Upslope farmers and downslope farmers, given that the former benefit least from soil conservation structures but can damage crops of downs lope farmers if they fail to conserve.
- Conserving farmers and non-conserving farmers, given the need to establish common drainage channels and avoid damaging each other's structures.
- Farmers with neighboring landholdings (who must negotiate the location of common waterways and contributions for gulley stabilization) (Laura, et al., 2006).

3.6 Initiatives towards water productivity

In Africa some of the methods for improving water availability through watershed management have been implemented and some are still ongoing. Also a lot of research has been done in different countries on this issue. Regional Land Management Unit (RELMA, 2005). highlights a GIS Overview project that researched on rain water harvesting in Africa and the case study covered ten countries Botswana, Ethiopia, Kenya, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Zambia and Zimbabwe. It highlighted that Africa has a huge untapped potential for rainwater harvesting. This information was intended for awareness creation. The adoption of pans, rooftop rain water harvesting, runoff harvesting and flood for water productivity in many parts of East Africa and Sourthen Africa, especially for livestock (Bancy, et al., 2005).The green water principle was entered in to South Africa's National Water Act from 1998, which levies streamflow reduction activities, such as forest plantations (Hoff , 2006). A Green Water Credit pilot project was implemented in eastern Africa, which depends for its water supply largely on the major water towers around Mt. Kenya. The area is undergoing rapid land use change –e.g. marijuana cultivation replacing thousands of hectares of forest cover. Deforestation in this area is generally associated with erosion and siltation of downstream reservoirs. It is an application of the green-blue water concept, integrating bio-physical and socio-economic aspects of upstream-downstream linkages (Hoff, 2006; Laura, et al., 2006). In 1998, Zimbabwe adopted a new water law that sought to reverse decades of discrimination in water allocation that had been built into previous water acts. The new law is designed to provide for more inclusive involvement of stakeholders in water management, greater efficiency in water use entitlements, water permits to replace water rights, catchment water use plans, and minimum allocations of water for the environment. Ghana has taken a similar approach, investing in large-scale water storage and a national system for water monitoring and management. Researches that brought about development of conceptual models have been done in different parts of Africa for example Nyando basin in western Kenya, the model was on catchment property rights, which was applied in an analysis of the effects of property rights on management and use of resources in the badly degraded basin. The analysis relates people's livelihoods to the evaporation and transpiration of water (green water), noting that the relatively poor are particularly dependent on green water for generation of income and subsistence food production (Jean-Marc, 2005). The study of detailed data collected throughout the catchment over the last ten years showed that land management had large effects on both groundwater recharge and surface runoff (Mugabe, 2005). The amount of runoff generated during storms is affected by cultivation, which increases infiltration and reduces runoff. In particular, high drainage was observed above contour bunds, along lines of surface water drainage and along storm drains. Experimental results from the research indicated that improved fallows can

increase infiltration and reduce soil loss significantly, with the amounts and the statistical significance depending on the soil type (Anja and Alain, 2005). For instance, farmers, primary school teachers and extension workers from Tanzania, Uganda, Kenya and Zambia visited market focused watershed management areas in Ethiopia. A lot of land management practices were learnt from these trips. For instance, on sloppy land, the management of water and runoff over many small farms is done through intricate negotiations to get farmers to cooperate in constructing drainage and conservation works (Azene and Gathiru, 2006; Division of Water Resources, 2007)

4. Conclusions

Economic stress still affect implementation of water productivity projects in most African countries. To ensure the availability and effective use of water resources, today's multiple arrangements should be rationalized - guided by the principles of equitable rights and sustainable and efficient water use. Therefore, there is an urgent need to take a critical look at the motives for watershed management, the beneficiaries, and methods used to reach specified objectives. However, some 'modern' approaches do not recognize the potential of using local knowledge in conservation and management of water resources including springs, riverbanks, marshes and swamps and it strongly emphasizes that weaknesses of river basin organizations should be addressed in line with best practices in Africa and elsewhere.

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Use of dielectric properties in quality measurement of agricultural products

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Abstract: A number of applications for capacitive sensor in agriculture have been used by different researchers over the past years. They measured the dielectric constant and loss factor of material which correlates well with certain quality factors of the products such as moisture content and ripeness. This paper presents an overview of various utilizations of dielectric properties in precision agriculture.

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Keywords: Dielectric properties, Quality, Frequency.

1. Introduction

Quality in agriculture is defined as the degree of excellence of a product or its suitability in a specific attributes. These characteristics include physical, mechanical and chemical properties, defects, nutritive values, storage time and ripeness level. Quality parameters of agricultural products are classified into the external properties such as size, color, shape and external defects, internal properties suck as sugar content, acidity, firmness and internal breakdowns.

Numerous methods of measuring quality and quality-related characteristics have been developed and tested. Recently, researches emphasize on developing non-destructive methods and sensors to qualify indices of agricultural products. One of these methods is dielectric measurements. In this method dielectric properties of products are measured and correlation between these properties and quality indices is investigated. In this paper some applications of dielectric properties in prediction of quality is reviewed.

2. Dielectric properties

The dielectric properties, or permittivity, indicate the interaction of material with electric fields. The dielectric properties of usual interest are the dielectric constant and the dielectric loss factor, the real and imaginary parts, respectively, of the relative complex permittivity, $\varepsilon = \varepsilon' - j\varepsilon'' = |\varepsilon| e^{-j\delta}$ where δ is the loss angle of the dielectric. "Permittivity" is understood to represent the relative complex permittivity. The permittivity relative to free space, or the absolute permittivity divided by the permittivity of free space, $\varepsilon_0 = 8.854 \times 10^{-12}$ F/m. Often, the loss tangent, $\tan \delta = \varepsilon''/\varepsilon'$, or dissipation factor, is also used as a descriptive dielectric parameter (Nelson & Trabelsi, 2002).

Dielectric properties can be measured by several methods which range from direct current to microwaves. Some of the most used devices and instruments to measure dielectric properties of food materials encompass the parallel plate capacitor, coaxial probe, waveguide, resonant structure, inductance, capacitance- resistance meter (LCR meter), impedance analyzer, and scalar and vector network analyzer (Ragni et al, 2006).

3. Application of dielectric properties

Afzal et al. (2010) estimated leaf moisture content by measuring the dielectric constant of leaves in five different types of crops. They used two semi-oval isolated copper plates and a Keithly 590 C-V Analyzer as the capacitance measuring instrument, which had the ability of measuring capacitance at two frequencies of 100 kHz and 1 MHz (Figure 1). They carried out experiments on five field crops of maize, sorghum, capsular bean, white bean and sunflower. According to their results, type, amount of ions and the leaf thickness affected the capacitance and produced the error in this method. They reported the coefficients of determination were higher at 100 kHz than at 1 MHz. They observed that the higher the leaf moisture, the more the data points scattered around the best-fit line, although the scattering was more uniform at 1 MHz.

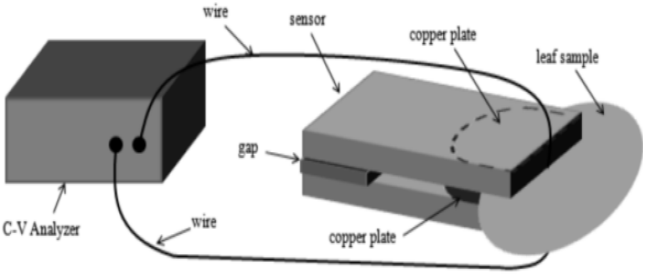

Figure 1. Schematic of the capacitance measuring system (Afzal et al., 2010).

Campbell et al. (2005) designed and developed a system based on capacitive sensor for monitoring bees passing through a tunnel. They used two types of capacitive sensors, parallel plates and ring electrodes. They used a 4 V p-p sinusoidal signal at 33 kHz and bridge circuit to measure variation of capacitance that produced in sensors as a result of bee passing. They reported the ring sensor was superior for this application, while the ring sensor provided the same information on bee activity as the parallel plate sensor. Some advantages of ring sensor were its smaller electrodes, which decreased the size and easy to precisely position during manufacturing producing more symmetric voltage pulses. The designed system was able to distinguish between entering and exiting bees and provide information on the size and velocity of each bee.

Li et al. (2003) measured moisture content of cookies using dielectric spectroscopy. They used concentric sensor head that designed for localized measurements. It had three electrically separated sensing electrodes that was used as a fringing field sensor or, when had combined with a driving plate, as a parallel-plate sensor. They used 6 volt, 10 Hz to 10 kHz frequency sweep signal and a divider circuit to measure the capacitance of sensor. They reported at the higher frequencies the sensitivity was increased, so they selected 10 kHz frequency to calibrate the system. They calibrated system based on a linear model, where the functional dependence of capacitance on moisture content was determined. The system allowed for both online moisture content sensing and moisture distribution profile imaging.

Ragni et al. (2006) used a sine wave radio frequency oscillator with parallel plate capacitor sample probe to predict the quality of egg during storage period. They noted the suggested models enabled to classify samples of shell eggs, while they were not useful to assess with accuracy a single egg.

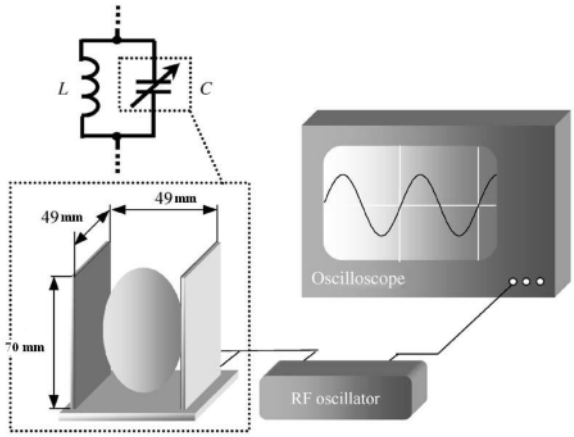

Figure 2. The system based on capacitive sensor that was used to predict the egg quality (Ragni et al., 2006).

Jarimopas et al. (2005) designed and developed an electronic device with a cylindrical capacitive sensor to measure the volume of selected fruits and vegetables. They reported the electronic device volume measurements of a calibration set of 30 samples correlated very well with those produced by the water displacement method. The R^2 values for watermelons, large cucumbers, wax gourds and guavas were 0.999, 0.957, 0.999, and 0.99, respectively.

Nelson et al. (2007) measured the dielectric constant and loss factor with an open-ended coaxial-line probe and an impedance analyzer on external surfaces and internal tissue of four cultivars of miniature watermelons provided new permittivity data over a range of maturities at frequencies from 10 MHz to 1.8 GHz at 24 ˚C. They reported both the dielectric constant and loss factor of internal tissues decreased monotonically with increasing frequency showing the dominance of ionic conduction at lower frequencies and dipolar losses at the higher frequencies. They divided the dielectric constant and loss factor, each by soluble solids content and correlated between these parameters. The R^2 was obtained as 0.932.

Mizukami et al. (2006) measured moisture content of tea leaves using electrical impedance and capacitance method. They measured electrical impedance, resistance, reactance and capacitance using four stainless steel electrodes and an inductance, capacitance and resistance (LCR) meter. The LCR meter operated at a generator voltage of 1V

and it scanned 100 points in a frequency range 10 Hz–10 MHz (Figure 3).

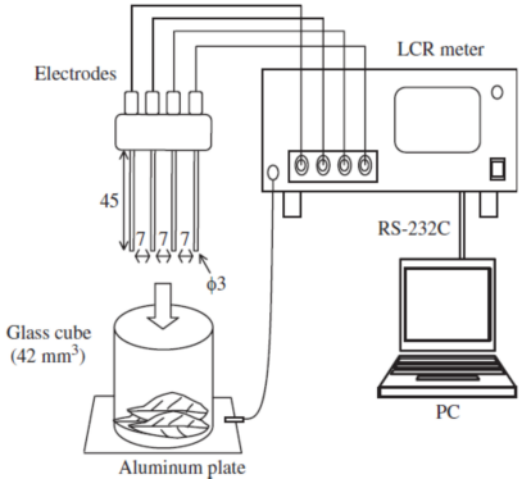

Figure 3. A schematic illustration of the measuring system (Mizukami et al., 2006).

They reported both electrical impedance and capacitance had an effect on the moisture content of the tea leaves at a frequency of 3 kHz. The approximation of impedance and capacitance was insufficient for moisture measurement because of the high levels of standard error and low levels of correlation coefficient in a moisture range from 1.2–80% wet basis. They developed a new equation, which simultaneously satisfied the two equations using impedance and capacitance. They obtained satisfying results.

Kato investigated the relationship between density and internal quality of watermelon. He proposed a new electrical method for density sorting of spherical fruits, which measured the volume of fruit by electric capacity and mass by electronic balance.

Bhatt et al. (2008) studied the electrical properties of wheat bread as functions of moisture content and storage time. They designed a system that estimated the moisture content in different zones of bread. They used multichannel ring electrodes to measure the electrical properties of various sections of beard. They reported the variations in capacitance as a function of moisture content at bread crust can be utilized not only to estimate the moisture content during storage but also help to understand the glass transition phenomenon at crust as a function of moisture content. They found resistance varied at bread crumb as an exponential equation with moisture content.

Figure 4. A devised system based on capacitive property for qualifying of watermelon (Kato, 1997).

Júnior (2008) designed a capacitive moisture meter for combines. They used an alternate voltage, a divisor voltage resistor and a capacitor as a sensor. They reported the best frequency that offered best sensitiveness to the measurement system calibration was 10 kHz. They calibrated the system for the corn in a range from 11% up to 27% of moisture.

Berbert et al. (2004) measured the dielectric properties of common bean seeds and estimated its moistue content. They proposed three models to predict the miosture content of seeds. They reported the resulting models could estimate common bean moisture content with standard errors of calibration in the range from 1.0 to 1.3 percentage points, and maximum errors from 1.9 to 3.5 percentage point's moisture.

Trabelsi et al. (2009) measured the dielectric properties of shelled peanuts to estimate the moisture content. They carried out the experiments at temperatures ranging from 1 to 38 ˚C and frequencies ranging from 8 to 14 GHz. They obtained best result at 10 GHz frequency and proposed that equation were able to predict the moisture content as functions of temprature and dielectric properties without knowledge of bulk density, also the calibration function showed the least variation with frequency.

Weidong (2007) designed and developed an on-line monitoring system to measure the moisture content of grain during drying process. They used a

cylindrical capacitive sensor to measure the dielectric constant of grain that varied when the moisture content had changed. They proposed a model and predicted the moisture content of wheat and corn. They reported the largest deviation between the measured value and standard value was less than 5% which was quite satisfied with most drying operations.

Rai et al. (2005) designed and developed a capacitive moisture meter for grain (wheat, paddy, sunflower, mustard and soybean). They used a rectangular parallel plates capacitor for measuring the moisture content. Their developed instrument was working satisfactorily for all practical purposes in the range of 5 - 25% of grain moisture with an accuracy of ±1%.

4. Conclusion

In this paper some applications of capacitive sensor are presented. A capacitive sensor has favorable characteristics such as Robustness (capacity to resist to mechanical vibrations and eventual mechanical shocks), high speed, resistance to the bad environmental conditions, easy operation and low cost, so it used in precision agriculture. The main use of capacitive sensor is measuring of moisture content. Recently, scientists and researchers tended to qualifying of fruits and vegetables by dielectric measurements, but further researches of dielectric properties are necessary to obtain satisfactory results of sensing quality factors.

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The Influence of Soil Moisture Stress on Growth, Water Relation and Fruit Quality of *Hibisicus sabdariffa* L. Grown Within Different Soil Types.

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Abstract: Two pot experiments were carried out during two successive seasons 2008 and 2009. The experiments aimed to study the effect of different soil moisture stress levels (70%, 50% and 30% depletion of the available soil water) on vegetative growth, Yield, essential oil, N, P, K, protein and anthocyanins contents of *Hibiscus subdariffa* L. grown within three soil types (clay, sandy and sandy clay loam soils). All growth and yield attributes, as well as oil % were significantly increased under the moderate soil moisture level combined with sandy soil. Increasing soil moisture level caused an increase in RWC %, N, P, K, protein % and anthocyanins content, combined with mixed soil in case of RWC%, N, P, K, and protein % and combined with sandy soil in case of anthocyanins content. While opposite trend obtained for osmotic pressure which revealed the highest significant increases under the lowest soil moisture level combined with clay soil.

[Soha E. khalil and Atef A.S. Abdel-Kader. **The Influence of Soil Moisture Stress on Growth, Water Relation and Fruit Quality of *Hibisicus sabdariffa* L. Grown Within Different Soil Types.** Nature and Science 2011;9(4):62-74]. (ISSN: 1545-0740). http://www.sciencepub.net.

Key words: Water relation, *Hibiscus subdariffa* L., Different soil types, Growth, Yield, Seed quality

1. Introduction

Roselle plant (*Hibisicus sabdariffa* L.) belongs to family *Malvaceae.* It is well known in Egypt with the name of "Karkaddeh", and is mainly cultivated for its sepals which contain anthocyanine, which are responsible primarily for red colour and were defined 3-glucoside and cyanidin 3- glucoside.

The sepals are the most important economic parts of the plant which is used in food (Jam and Jelly) and cosmetic industry as a source of natural colouring agents ,Raifa *et al*., (2005). Karkadeh is considered a very popular beverage and valuable medicinal plant due to its effect on lowering and/ or adjusting the blood pressure (anti-hypertension) without production of any side effects (Faraji and Tarkhani, 1999). Also has effect on stomach function, and can resist various infections of intestinal disease (Owolabi *et al.*, 1995). Obiefuna *et al.* (1994) added that *Hibisicus sabdariffa* flowers can be used to relax the pain muscles of uterus and intestine. It has highly antibacterial properties .As well as, considered cardiotonic. It is useful as laxatives (Hayat, 2007). Tanaka *et al*. (1993) also stated that protocatechuic acid (a simple phenolic compound) detected in *Hibisicus sabdariffa* could be used to fight pyrexia and liver disorders. Also, it has been demonstrated that this compound is an effective agent in reducing the carcinogenic action of di-ethylnitrosamine in the liver. Furthermore, Roselle seeds contain about 17% fixed oil which is similar in its properties to cotton seed oil (Metwally *et al*., 2002).

Water is imperative for plant growth and development. Water deficit stress, permanent or temporary, limits the growth and distribution of natural vegetation and the performance of cultivated plants more than any other environmental factor (Kramer, 1983). Although research and practices aimed at improving water stress resistance and water use efficiency have been carried out for many years. The mechanism involved is still not clear, Smith and Griffiths, (1993). Further understanding and manipulating plant water relations and water stress tolerance can significantly improve plant productivity, tuff grass management, and environmental quality (Soha *et al.*, 2010). Water stress is characterized by reduction of water content, turgor, total water potential, wilting, closure of stomata, and decrease in cell enlargement and growth. Severe water stress may result in arresting of photosynthesis, disturbance of metabolism, and finally dying (Mckersie and Leshem, 1994). In Egypt, there is a tendency for cultivation of more newly reclaimed desert areas in the front of population increment problem. Research on the response of plants to drought is therefore necessary for improving plant growth and crop production in these regions.

Different plant species vary enormously in their soil and nutritive requirements. This aspect had not received sufficient attention for most medicinal plants. The three important characteristics of soils are their physical, chemical and microbiological properties. The effects of soil on plant growth are greatly dependent on the relationship between air and water in the soil pores. Metwally *et al.* (1972) stated that soil pores play an important role not only on the soil aeration and water movement but also on the availability of plant nutrient and microbiological activities (Abou-Leila *et al.*, 1993).

Therefore, the main target of the present work is to improve agricultural and productivity of *Hibisicus sabdariffa* L. plant under different soil moisture levels and within different lands.

2. MATERIAL AND METHODS:

Treatments:

Water Treatments:

The following three water treatments were applied throughout the entire growth period of the crop:

W1= water stress maintained around 70% depletion of the available soil water and the soil water is maintained to field capacity when this depletion level is reached.

W2= water stress maintained around 50% depletion of the available soil water and the soil water is maintained to field capacity when this depletion level is reached.

W3= water level maintained around 30% depletion of the available soil water and the soil water is maintained to field capacity when this depletion level is reached.

Soil types:

The following three soil types were used during the experiment:

Table (1): The three soil types were used during the experiment

Tret.	Sand %	Silt %	Clay %	Soil texture	pH	E.C. dsm^{-1}	O.M %	Total N%	Total P%	Total K %	F.C. %
S1	17.75	22.10	60.15	Clay	7.8	1.42	1.25	13.73	5.38	81.8	30
S2	93.66	3.97	2.37	Sandy	8.49	2.30	0.05	3.85	2.29	49.2	16
S3	52.63	10.32	37.05	Sandy Clay loam	8.01	1.89	0.67	6.32	4.162	60.3	26.4

S1=Clay soil. S2=Sandy soil. S3=Sandy clay loam soil.

Planting and watering procedure:

Seeds of *Hipisicus sabdariff* L. (deep red sepals cultivar) provided from the Medicinal and Aromatic Research Station, Agricultural Research Centre, Ministry of Agriculture, Egypt. The experiment was carried out at the green house of National Research Centre, Dokki, Egypt, during the summer seasons of 2008 and 2009. The seeds were directly planted on 15th of April in earthenware pots 40 diameter and 40 cm height with perforated bottoms, and were filled with 10 kg of the three different soil types. Five seeds were planted in each pot and thinned down to two plants after emergency, the number of plants per pot was determined on the basis of the area of the pot at a recommended seed rate of 50 plant/ m^2 (Soub, 1984). Each pot was fertilized with 2g Calcium superphosphate (15.5% P_2O_5), 1.5g potassium sulphate (48% K_2O) and 1.5g ammonium sulphate (20.5 % N). Calcium superphosphate was added during the preparation of soil, while both amounts of potassium and ammonium sulphate were added to the plants as three sides dressing at monthly intervals starting one month from the planting. Such plants were equally irrigated with tap water for six weeks, before starting soil moisture treatments. All pots were weighted every 1 to 3 days on a beam balance. The pots were then irrigated to restore the soil to the appropriate moisture regime by adding a calculated amount of water. The general principal stated by Boutraa and Sanders (2001) was used for the water treatment application.

Design of the Experiments:

This experiment included 9 treatments which were the combination between three soil moisture levels (70, 50 and 30% depletion of the available soil water) and three soil types (clay, sandy and sandy clay loam soil), treatments were arranged in a split plot design with three replicates, different soil moisture levels were assigned at random in the main plots, while sub-plots were devoted too the different soil types.

Data Collection:

The following characters were either measured or computed on three Roselle plants: Plant height (cm), number of leaves/plant, number of branches /plant, root length (cm), leaf area (cm^2), fresh weight of total plant (g), dry weight of total plant (g), RWC% and osmotic pressure (Atm) were taken on 15th of September. Number of fruits/plant, fresh weight of sepals/plant, dry weight of sepals/plant, seeds wt/plant and chemical analysis were recorded on the first of December during maturity. The relative water content percent was measured also on fresh leaves according to Weatherly (1962). The determination of total soluble solids concentration in the cell sap of fresh plant was also estimated by using refracto-meter, the corresponding values of osmotic pressure (Atm) were then obtained from tables given by Gusev (1960). Proline content was determined on dry leaves according to Troll (1995). Total anthocyanin content in the dried sepals was determined by using of Fuleki and Francis (1968) and developed by Du and Francis (1973). N and K percentages were determined in dried sepals by using atomic absorption on spectrophotometer according to the method described by Bremner and Mulvaney (1982), Olsen and Sommers (1982) respectively. While P (%) was measured photometically according to the method described by Jackson (1970), and then the protein (%) was also calculated using the equation of Alsmeyer *et al.* (1974). Fixed oil percent in the seeds was determined according to A.O.A.C. method (1980).

Statistical analysis:

The collected data were subjected to statistical analysis of variance using the normal (F) test and the means separation were compared by using Least Significant Difference (LSD) at 5% level according to Snedecor and Cochran (1980).

3. Results and Discussion

3.1. Growth attributes:

Plant height, no of leaves, no of branches, root length, leaf area, fresh and dry weights of the whole plant were taken as indicator for the growth of Roselle plant. Data presented in Table 2 indicated that there was a significant effect due to the use of different soil moisture levels, where the lowest significant means of all growth characters observed under the lowest soil moisture level W1, except for number of branches. Also, all previously mentioned characters revealed significant increases under moderate W2 and the highest soil moisture W3 levels where the difference between the two moisture levels was insignificant in most cases, except for leaf area where the highest record observed under moderate soil moisture level W2. These results were in harmony with those reported by Abdel- Gawad *et al*. (1987); Wagner *et al.* (1989); Gad El-Rab *et al*. (1993); Abd El-Ati (2000); El-Tantawy and El-Beik (2007). The reduction in plant growth under low soil moisture condition may be due to that water stress caused losses in tissue water which reduced turgor pressure in the cell, thereby inhibited enlargement, division of cells and caused a reduction in the uptake of nutrient elements thus causing a disturbance in the physiological processes needed for plant growth, (Slatyer, 1969; Hsiao and Acevedo, 1974). The decrease in enlargement and division of cells led to decrease leaf area and hence the effective of photosynthetic surface and caused a reduction in CO_2 assimilation due to stomata close (Fisher and Hogan, 1965; Jain and Misra, 1970). Marchner (1995) reported also that water stress caused an increase in ABA/cytokine ratio, which in turn decreases plant growth; he also added that under sufficient water conditions, there were decrease in ABA and increase in cytokinin, GA and IAA reflecting good growth and dry matter content.

It can be also observed from the collected data that sandy soil increased all growth characters significantly compared with the other two media, followed by mixed soil which revealed insignificant difference with sandy soil in no. of leaves, leaf area and dry weight. While the lowest means observed in clay soil compared with the other two soil types. These results were on line with those obtained by Russell (1971) and Abou-Leila *et al.* (1993). This effect may be attributed to the physical properties of the soil, where sandy soil is porous and the ions absorption is easier while some of ions adhere on the clay soil particles. Plus root system may penetrates deeper and extending wider in sandy soil more than the other two soil types and make the plant established well in this kind of soil (Burman *et al.*, 1991; Uday *et al.*, 2001; and Azza *et al.*, 2010).

Concerning the effect of interaction between different soil moisture levels and different soil types, the data indicated that under the lowest soil moisture level W1 the highest records observed in mixed soil S3 except for root length compared with the other two soil types. This result may be due to that sandy soil does dry out very quickly specially under low water supply, while mixed soil hold moisture and nutrients well (Azza *et al*., 2010). Moreover, the data revealed that under the other two soil moisture levels (W2 and W3) the highest significant records obtained in sandy soil compared with the other two soil types. The

data also illustrated that the highest significant means in growth attributes observed under the combined effect of moderate water supply and sandy soil W2XS2 compared with the other treatments, followed by the combined effect of W3XS2 where the difference between the two interactions was insignificant in most cases. While the lowest means observed under the combined effect of the lowest water supply and clay soil W1XS1.

3.2. Water relations:

3.2.1. Osmotic pressure:

Data in Table 3 showed that osmotic pressure of Roselle leaves was significantly increased with increasing the extent of stress so as to reach their maximum values in Roselle leaves under the lowest soil moisture level W1. These results were in great accordance with those obtained by Kandil (1994); Badr (1998) and Abo El-Kheir (2000). Such increase in osmotic pressure with decreasing in soil moisture level may be due to increasing the quantity of electrolytes and non electrolytes to create a water potential gradient to facilitate inward water movement and positive turgor leading to tolerance (Abo El-Kheir, 2000).

Recent research revealed also that clay soil showed the highest significant increase in osmotic pressure values compared with the other two soil types, followed by sandy one where the lowest significant means obtained in mixed soil. These results could be due to that clay soil was heavy and difficult to work sticky when wet and very hard when dry. Also, some of ions adhere on the clay soil particles which may causes plants exposed to more osmotic stress than that in mixed and sandy media. Moreover, nutrients are easily washed through sandy soils than in mixed media. These explanations were in parallel with those obtained by El-Khalifa (2003); El-Sallami (2003); Mohmood (2005); Kathiravan *et al.* (2008); James and Michael (2009); and Azza *et al.* (2010). It can be observed also from the collected data that the highest significant mean in osmotic pressure values obtained in plants grown under 70% depletion of the available soil water combined with clay soil W1XS1. While, the lowest means observed plants grown under 30% depletion of the available soil water combined with mixed soil W3XS3.

3.2.2. Relative water content RWC %:

For the RWC % of Roselle leaves, results in Table 3 showed that during plant development, increasing stress caused an observed adverse action on relative water content. Plants subjected to the lowest soil moisture level W1 showed the lowest significant means of RWC %. Moreover, there was no significant difference between the moderate soil moisture level W2 and the highest soil moisture level W3. The present results agreed with those obtained by Tayagi *et al.*(2000);Choi *et al.*(2000); Phutela *et al.* (2000); Flexase *et al*. (2000); Garg *et al.*(2001); Sanchez-Blanco *et al.* (2006);Abdalla and El-Khoshiban (2007); Soha and Ezzat (2010). Such decrease in RWC % under the lowest soil moisture level may be attributed to decline in osmotic and water potentials with concomitant preliminary decrease in RWC %, also decreased water quantity caused decrease in relative turgidity is due to decreased photosynthesis as a consequence of stomata closure (Kramer, 1983); this caused reduced translocation and hence reduced turgor pressure.

Data in the same table revealed also that, plants grown in mixed soil recorded the highest significant values for the RWC % compared with the other two soil types, followed by sandy soil. This effect may be attributed to the physical properties of the soil, where mixed soil holds moisture and nutrients well plus free movement of water through it as a result of adequate pores which may reveal good growth and water status. These results were confirmed by El-Mesiry and Azza (2001); El-Sallami (2002); El-Khalifa (2003); Kathiravan *et al.* (2008).

Regarding the effect of interaction between different soil moisture levels and different soil types, the data indicated that plants grown under the lowest soil moisture level W1 revealed the lowest RWC % values in different soil types. Moreover, mixed soil revealed the highest significant means of RWC % under different soil moisture levels. While, the highest significant mean of RWC % obtained in plants grown under 30% depletion of the available soil water interacted with mixed soil W3XS3, and the lowest significant means obtained in plants grown under 70% depletion of the available soil water combined with clay soil W1XS1.

Table (2): Effect of different soil moisture levels, different soil types and their interactions on growth attributes of Roselle plant (Combined analysis of two seasons).

Charact. / Treatments		plant height cm	no of leaves	no of branches	root length cm	leaf area cm^2	fresh weight g	dry weight g
Effect of water stress								
W1		105.556	38.777	3.000	14.111	41.302	232.690	56.803
W2		129.222	77.111	3.889	28.744	67.786	304.226	61.049
W3		128.333	76.555	3.889	28.144	50.110	295.991	60.125
$LSD_{0.05}$		1.083	1.433	0.685	1.391	0.701	9.066	2.067
Effect of soil types								
S1		97.333	37.889	3.000	12.000	45.664	209.458	55.501
S2		134.222	77.222	4.778	31.889	56.777	318.581	61.762
S3		131.556	77.333	3.000	27.111	56.758	304.868	60.714
$LSD_{0.05}$		1.242	1.027	0.559	0.873	0.475	3.531	1.354
Effect of interaction between water stress and soil types								
W1	S1	95.000	24.000	3.000	11.000	30.028	191.681	51.185
	S2	103.333	42.000	3.000	20.333	45.527	219.221	59.256
	S3	118.333	50.333	3.000	11.000	48.351	287.168	59.967
W2	S1	98.333	45.000	3.000	12.333	66.408	218.654	57.948
	S2	145.667	95.333	5.667	38.333	69.299	353.892	63.881
	S3	143.667	91.333	3.000	35.667	67.652	340.132	61.318
W3	S1	98.667	44.667	3.000	12.667	40.554	218.040	57.369
	S2	145.667	94.333	5.667	37.000	55.504	341.492	62.149
	S3	140.667	90.333	3.000	34.667	54.270	328.442	60.857
$LSD_{0.05}$		2.152	1.779	0.968	1.512	0.823	6.115	2.346

W1 = 70% depletion of the available soil water. W2 = 50% depletion of the available soil water. W3 = 30% depletion of the available soil water. S1=clay soil. S2=sandy soil. S3=sandy clay loam soil.

Table (3): Effect of different soil moisture levels, different soil types and their interactions on water relations of Roselle plant (Combined analysis of two seasons).

Charact. / Treatments		Osmotic pressure (Atm)	RWC %
Effect of water stress			
W1		7.339	69.479
W2		6.596	81.305
W3		5.684	83.358
$LSD_{0.05}$		0.056	2.198
Effect of soil types			
S1		6.977	73.778
S2		6.423	77.860
S3		6.219	82.505
$LSD_{0.05}$		0.032	1.023
Effect of interaction between water stress and soil types			
W1	S1	8.030	64.675
	S2	7.020	71.214
	S3	6.967	72.548
W2	S1	7.020	77.306
	S2	6.637	80.157
	S3	6.130	86.453
W3	S1	5.880	79.352
	S2	5.613	82.209
	S3	5.560	88.514
$LSD_{0.05}$		0.056	1.773

W1 = 70% depletion of the available soil water. W2 = 50% depletion of the available soil water.
W3 = 30% depletion of the available soil water.S1=clay soil. S2=sandy soil. S3=sandy clay loam soil.

3.3. Yield attributes:

The data in Table 4 visualized that there was a significant effect due to the water stress, where the lowest significant means of the number of fruits/plant, fresh weight of sepals/plant, dry weight of sepals/plant and seeds weight/plant obtained under the lowest soil moisture level W1 compared with the other two levels. While, the highest significant means obtained by the moderate soil moisture level W2 followed by the highest one W3 where the difference between the two soil moisture levels was insignificant except for the seeds weight/plant. These results were in agreement with those obtained by Abdel- Gawad *et al*. (1987); Gad El-Rab *et al*. (1993); Elham and Ibrahim (2009). Such increase in yield values under moderate water supply may attribute to that this soil moisture level gave the plants its requirements of water, where water supply leads to the increase of the metabolism process and insufficient water can be deleterious for the yield and maturity (El-Telwany, 1987).

It was also evident from the data in the same table that sandy soil gave the highest significant means in weight of fruits/plant, fresh weight of sepals/plant, dry weight of sepals/plant and seeds weight/plant compared with the other two media followed by mixed media. These results were documented by researches done in this field e.g. Abou-Leila *et al.* (1993); El-Khalifa (2003)*;* Mohmood (2005). These results may be attributed to free movement of water through the soil particles as a result of adequate pores also this type of soil provided a continues system of air filled pores extending from the soil surface throughout the root zone, sandy soil also has high proportion of sand drain easily, so water logging is not a problem unless a "pan" or impervious layer has formed below the surface their open structure means that they are easy to work allowing earlier sowing and plating. Moreover, it is porous and the ions absorption is easier while some of ions adhere on the clay soil particles (Russel, 1971). The influence of various stress levels and various soil types on yield and yield attributes of Roselle plant indicated that mixed soil revealed highest means under the lowest soil moisture level W1, while under the other soil moisture levels W2 and W3 the highest significant means obtained in sandy soil. The data also visualized that the highest significant means of yield

component appeared in plants grown under the moderate soil moisture level combined with sandy soil W2XS2, while the lowest means obtained under the lowest soil moisture level combined with clay soil W1XS1.

Table (4): Effect of different soil moisture levels, different soil types and their interactions on yield attributes of Roselle plant (Combined analysis of two seasons).

Charact. / Treatments		no of fruits/plant	fresh wt of sepals/plant	dry wt of sepals/plant (g)	seeds wt/plant (g)
Effect of water stress					
W1		7.667	13.245	5.621	5.964
W2		16.333	36.173	8.474	18.566
W3		15.889	35.247	7.975	15.885
$LSD_{0.05}$		1.162	2.193	2.012	0.471
Effect of soil types					
S1		8.333	16.312	6.554	9.130
S2		16.777	37.123	8.157	17.208
S3		14.776	31.230	7.360	14.077
$LSD_{0.05}$		0.625	0.916	0.639	0.395
Effect of interaction between water stress and soil types					
W1	S1	5.667	8.899	4.259	5.410
	S2	8.333	14.607	5.832	6.107
	S3	9.000	16.229	6.772	6.376
W2	S1	9.667	20.433	8.067	10.476
	S2	21.333	48.993	9.649	24.824
	S3	18.000	39.095	7.708	20.398
W3	S1	9.667	19.603	7.336	11.505
	S2	20.667	47.770	8.990	20.693
	S3	17.333	38.368	7.601	15.458
$LSD_{0.05}$		1.082	1.586	1.107	0.684

W1 = 70% depletion of the available soil water. W2 = 50% depletion of the available soil water. W3 = 30% depletion of the available soil water. S1=clay soil. S2=sandy soil. S3=sandy clay loam soil.

3.4. Effect on some chemical constituents:

3.4.1. Mineral ions content:

It is evident from the data in Table 5 that minerals content of Roselle sepals were gradually decreased with decreasing the water supply. The decreased levels of each of N, P and K in response to stress were ascertained by the work of each of Razi and Sen (1996), Schier and McQuattie (2000);Bie *et al*. (2004); Koyro (2006); Wu and Xia (2006). Such reductions in the contents of these elements in different tissues were attributed primarily to soil water deficiency which markedly reduces the flow rates of elements in soil, their absorption by stressed root cells and also its ability to translocate through the different organs and tissues. This situation resulted in an interruption in the various metabolic pathways carried out by plants respiration, photosynthesis, biosynthesis of phospholipids, nucleic acids, plastids, enzymes..etc, disorders in both plasma membrane permeability and stomatal osmotic regulations, thus plants seized growth and eventually died (El-Telwany, 1987; Rodriguez *et al*., 1996; and Saxena and Nautiyal, 2001).

The maximum increases in N, P and K content of Roselle sepals obtained in mixed soil followed by sandy soil, while the lowest records obtained in clay media. In this respect, El-Gamal *et al.* (1983); Abou-Leila (1991a) ;Abou-Leila *et al.* (1993) recorded similar results. Such increase in N, P and K content of Roselle sepals in mixed soil may attributed to the presence of adequate supply of available nutrients in this type of soil, also sandy soil is porous and the ions absorption is easier while some of ions adhere on the clay soil particles (Abou-Leila *et al.*, 1993).

With regards to the effect of interaction between the studied factors the data revealed that the best values for N, P and K content of Roselle sepals obtained in plants grown under the highest soil moisture level combined with mixed soil W3XS3, followed by sandy soil under the same soil moisture level W3XS2 where the difference between the two treatments was insignificant except for N%, while the lowest means obtained under the lowest soil moisture level combined with clay media W1XS1 compared with the other treatments.

3.4.2. Protein percent:

Results in table 5 indicated also that protein % of Roselle sepals was significantly increased with increasing soil moisture level till reach their maximum value under the highest soil moisture level W3. This result was supported by several authors such as Singh *et al*. (1985); Hurkman and Tanaka (1987); King *et al*. (1988); Ben–Hayyim *et al*. (1989). The decrease in protein % under low soil moisture level may be due to that water stress causes a reduction in hydrostatic pressure and can cause an increase in accumulation of abscisic acid in plant tissues which resulted in the inhibition of protein synthesis (Chandler and Robertson, 1994).

Current study showed also that the maximum protein % mean obtained in mixed soil and with significant difference compared with the other two media, followed by sandy soil. While, the lowest significant means obtained in clay soil compared with the other soil types. These results were in great accordance with that recorded by El-Gamal *et al.* (1983); Abou-Leila (1991a); Abou-Leila *et al.* (1993). These results might be due to the presence of adequate supply of nitrogen and therefore uptake by plant in mixed soil compared with the other two media, which therefore resulted in the an increase in protein %.

Regarding the effect of interaction the data revealed that the highest significant means obtained under the combined effect of the highest soil moisture level and mixed soil W3XS3. While, the lowest means obtained under the combined effect of the lowest soil moisture level and clay soil W1XS1 compared with the other treatments.

3.4.3. **Oil Percent:**

It is clear from the data in table 5 that the highest oil % means obtained under the moderate soil moisture level W2 and with significant difference compared with the other two soil moisture levels. This result was in parallel with that obtained by Chanirar *et al.* (1989); El- Sabbagh (2003); Elham and Ibrahim (2009).

The data in the same table revealed also that sandy soil produced the highest significant means of oil % compared with the other soil media, followed by mixed soil. While the lowest means obtained in clay soil. Similar results were recorded by Penka (1978); Abou-Leila *et al*. (1994). This result may be due to that the formation and accumulation of essential oil were directly dependent upon perfect development and growth of the plant (Penka, 1978).

It is apparent from the same table also that under the lowest soil moisture level the best oil % records obtained in mixed soil, while in the other two soil moisture levels the best records obtained as a response to the combined effect of these two levels with sandy soil. The data also revealed that the highest record of oil % obtained in the combination effect of W2XS2 as compared with the other treatments.

3.4.4. Total anthocyanins:

It is evident from Table 5 that increasing soil moisture level caused significant increase in total anthocyanin content of Roselle sepals, where the maximum increase was recorded under the highest soil moisture level W3 and with significant difference compared with the other two soil moisture levels. While, the lowest anthocyanins mean obtained in plants grown under the lowest soil moisture level. These results were in harmony with Sidky *et al*. (1998); Metwally *et al*. (2002); Hayat (2007). Therefore, the shortage of water supply usually led to many disturbances in physiological characters of the plant, such as the reduction in leaf number and area or leaf yellowishing which followed by decrease in the quantity of the photocynthates which influenced the formation of coloring pigments such as chlorophyll and carotenoids. Consequently, the stimulation of anthocyanins under high water supply conditions resulted from the increase of soluble sugars which were transferred to the vegetative organs then to the developing fruits. In this connection, some workers found that there was a positive relationship between red pigmentation and soluble sugars, e.g., Filippov (1959); Downey (1971); Metwally *et al*. (2002); Hayat (2007).

As for the effect of soil type, the data in the same table cleared that the maximum anthocyanins record obtained in plants grown in sandy soil and with significant difference compared with the other two soil media, followed by mixed soil. While the lowest records obtained in clay soil. Such increase in anthocyanin content in sandy soil may due to the increase in photosynthate content as a result of increase in photosynthesis due to easier water uptake in this kind of soil which influenced the formation of coloring pigments.

Moreover, the maximum increases in anthocyanin means were more pronounced in response to the combination effect of the highest soil moisture level and sandy soil W3XS2 and with significant difference compared with the other treatments. While the lowest means obtained under the combined effect of the lowest soil moisture level and clay soil W1XS1.

Table (5): Effect of different soil moisture levels, different soil types and their interactions on fruit quality of Roselle plant (Combine analysis of two seasons).

Charact. / Treatments		N %	P %	K %	Protein%	Oil %	Antho Cyanine mg/100g
Effect of water stress							
W1		2.210	0.408	2.184	13.668	9.342	6.694
W2		2.299	0.431	2.411	14.370	18.936	6.992
W3		2.445	0.447	2.406	15.284	17.048	8.031
$LSD_{0.05}$		0.097	0.080	0.040	0.859	0.552	0.097
Effect of soil types							
S1		2.182	0.400	2.165	13.548	13.779	6.677
S2		2.311	0.443	2.387	14.442	16.062	7.820
S3		2.462	0.454	2.449	15.333	15.485	7.220
$LSD_{0.05}$		0.046	0.032	0.065	0.380	0.274	0.073
Effect of interaction between water stress and soil types							
W1	S1	2.056	0.357	2.048	12.585	8.404	6.115
	S2	2.207	0.421	2.209	13.796	9.176	7.114
	S3	2.367	0.447	2.295	14.623	10.448	6.854
W2	S1	2.162	0.410	2.201	13.509	17.313	6.483
	S2	2.322	0.439	2.477	14.508	20.252	7.500
	S3	2.415	0.444	2.557	15.094	19.244	6.993
W3	S1	2.328	0.433	2.248	14.550	15.620	7.433
	S2	2.403	0.444	2.475	15.021	18.760	8.847
	S3	2.605	0.465	2.496	16.281	16.765	7.813
$LSD_{0.05}$		0.080	0.056	0.113	0.659	0.474	0.126

W1 = 70% depletion of the available soil water. W2 = 50% depletion of the available soil water. W3 = 30% depletion of the available soil water.S1=clay soil. S2=sandy soil. S3=sandy loam soil.

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Some social factors Related to level of Environmental health Awareness in Rural Egypt

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Abstract: The research aimed to identify the impact of some social factors in age, educational level, family size, the degree of cultural openness- communication, and economic level to the level of environmental health awareness of the respondents. In addition to identifying the most important programs from which to create a clean environment conducive to increase productivity and per capita income, and then the advancement of society economically, and the achievement of social welfare for members of the rural community. The results showed that the mean scores for level of environmental health awareness by the respondents is estimated at 78.4 degrees of kidney estimated 1593 degrees, which reflects the low level of health behavior and health practices that can maintain the health of the individual and the environment. As it turns out; there is a significant correlation between the age Category, educational level, family size, level of education - communication (independent variables) and level of Environmental health awareness (dependent variable). Also found that about 62.7% of the respondents engaged in basic agriculture as a profession, while 37.3% engaged in work other than farming as a career major going about them at the side to work as an agricultural high school. The study recommended the need to work to raise the economic level and living standards of rural households, and interest in environmental health and dissemination of health education and environmental awareness among the population of the rural sector, as well as concern for the individual and the family environment and provide the necessary health to protect them from the face of dangers and diseases.

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Key words: health awareness, cultural openness - communication, Education standard, health Education, mass Information.

Introduction:

It adopts the well-being and prosperity of the country and its recovery economically and socially to the extent to which their people health, which depends upon its production and efficiency in various fields. The environment is the most important factors affecting the health and illness of the individual. The environment is not conducive to the spread of health and other communicable disease. It is also poverty, malnutrition, housing bad, fatigue overload, psychological crises, lack of awareness, and unhealthy behavior of the most important factors leading to the occurrence of disease and mortality. In spite of the multiplicity of the views of the expert's meeting and the economy and the environment on the problems of population and the extent of the reflection of population growth on the path sustainable development, but they agreed that the population problem and its relationship to consumption and production, environment and development can not be ignored or negative stance towards it (14-1994).

The environment is an integral and important component of the health program of the community. In fact, is a program of Environmental Health Sanitation of the most important factors that lead to low prevalence of disease and reduce health problems. The environment around which to live, affected by and affects the environmental factors in this area include the following: family environment and is in the size of their resources and capabilities, the home environment and is in housing, ventilation and safe drinking water and a means of disposal of human excreta and animal litter, community environment in which they live in rights, which are represented in the provision of services, transportation, and housing health.

Research problem: represent damage caused by the environmental pollution barrier in order to achieve comprehensive development continued, as a result of wasting the wealth of natural and human, which affect the national income. There is no doubt that the individual affects the environment in which they live and influenced by them. Statistics show that 56% of the population living in the Egyptian countryside, which suffers from many problems, is reflected on the individual and society (3-1994). The community is still rural and the Egyptian village suffering from social and economic problems and much health, although directing care for this sector. Some studies suggest as to the lack of programs, and services directed to the rural sector, which increased the problems of health and the environment in this important sector (9: 1994).

The research aims: The research aims to identify:
1 - Some social factors of the respondents in terms of age, educational level, family size, openness, cultural communication, the economic level of the respondents (independent variables)
2 - Level of health awareness - the environmental category of respondents in terms of the level of healthy behavior and good health practices to maintain the health of the environment (dependent variable) with regard to the state of health to housing and health habits of the respondents and their families.
3 - To study the correlation between the level of health awareness - in the category of environmental subjects and a group of independent variables.

Research method: the method involves research to clarify the concepts for each of the research variables, research, and research as well as assumptions that the research and finally a method of data collection and analysis of primary research.

First: the concepts of research:
Age of respondents:
There is a close relationship between age class of the rural population and the degree of health awareness to control environmental pollution in the environment. The age of senior farmers used to practice certain customs and traditions, which would damage health and the environment and cause pollution. It is intended that the variable in this category search age at the time of research estimate years to the nearest year.
Education Level:
There is a relationship between the degree of education and health awareness of rural families. The spread of literacy lead to the low level of health awareness and lack of attention to disease prevention or delay of treatment (9:1994). This means variable to know the educational status of quested at the time of search terms were illiterate or literate or of any stage of formal education, were expressed in numeric values.
The size of the family:
The family is the basic unit to be the structure of society, and measured the strength or weakness of society as a whole strongly or weakness of the family of its constituent. The family is the field, who practiced human society in which social relationships, a tree which is planted in each of its members, traditions and customs, ideals and behavior patterns different. Family size intended in this study means all individuals which have dependents and live Category social and economic one.
The degree of cultural openness - communication: means to communicate urban degree to an individual outside the social system (23:1969), include mass media such as radio, television, newspapers, magazines, flyers, brochures, health and used for the dissemination of culture and awareness of environmental health among the people and good practices to maintain the health of the individual and the environment. Moreover, one of the ways of health education, which also is including film and video cassette tapes. And intended openness cultural - communication over the exposure of respondents to the elements of culture, immaterial and material in terms of the extent to which respondents to the mass communication represented in radio and television, newspapers and magazines, as well as the degree of frequency of respondents in urban areas and the purpose of the frequency it has been the expression of this variable with numeric values.
Economic level - living conditions: The economic level as well as education and family size of the factors affecting the health problems (3:1994). And can be expressed in numeric values of this variable in terms of home ownership, fashionable home rations, which were acquired by Category in the home, the diversity of sources of income Category, Category average income compared with an average income of the rest of the family in the village.
Level of health awareness - Environmental: The variable's central, the ultimate objective of the research to discover factors associated with it and used as independent variables, to identify the level of behavior for good health, and health practices of the respondents to maintain the health of the environment with regard to the two-dimensional key representatives of the level of health awareness - environmental variable composite includes: health status of the dwelling, the prevailing habits, the behavior of healthy respondents and their families.
The health status of residence: Identify the health status of residence of respondents and their families and existing conditions unhealthy and practices leading to contamination of the environment within the home and attitudes in terms of availability of electricity, clean water, sanitation, ventilation home, housing density, the presence of the fold of cattle inside or outside the home, the degree of accumulation compost, ponds and marshes at the house. Prevailing customs and health behavior: It means the customs that are reflected in the behavior of the subjects and their families in some everyday situations, as well as identify the views of respondents and their attitudes to certain phrases related to personal behavior and environmental health. With regard to the habits of boys swimming and washing utensils in the canals, and behavior, who is under examination by the injury when a family member for any of the endemic or infectious diseases

or other. And to identify the causes that may be responsible for the spread of the disease in the villages, its affiliates, in terms of their point of view, the extent of the complaint from the proliferation of flies and insects, the extent of giving them vaccinations assessed for their children vaccinated subjects and his family when the spread of infectious disease, as well as the opinions of the respondents in connection with the few words in terms of preference over the use of municipal recipes, take care of cleanliness and beauty of the village, the use of rituals and other popular customs prevailing among the people of the countryside.

II: research variables

The independent variables are as follows: age of the respondents, educational level, family size, cultural openness - communication, economic level and living standard of the respondents. While the dependent variable is the level of health awareness - environmental by the respondents in terms of the level of proper health behavior and health practices of respondents to maintain the health of the environment.

Third: The research hypothesis

Light of the above research suggests the existence of correlation between the level of health awareness - environmental by the respondents as the dependent variable and each of the independent variables mentioned above. Has been tested this hypothesis in zero image "that there is no relationship between the level of health awareness - environmental by the respondents as the dependent variable and each of the independent variables mentioned above.

IV: sample

The research on primary data collected through the questionnaire achieved the goal of the research. The total sample 150 Quested of the rural population was selected through a random sample of villages (Kafr Ashma, Srsena, Mitt shhala) in ELshohda center, Menofia Government.

Fifth: data collection and analysis

The research data depend on the priority that has been collected through the questionnaire, personal interviews. The questionnaire is designed to achieve the goal of the research. I have been using percentages and averages, and frequency distributions, simple correlation (R) in the data analysis to study the relationship between the dependent variable and independent variables.

Results and discussion:

Social factors, communication and economic development of the respondents

1 - age of the subjects: It is clear from Table (1) that more than half of the respondents located in the age groups representing senior age and who are between the ages of (40 - more than 60 years) 'It numbered about 89 persons whom and by an estimated 59.3% and indicates that the majority of respondents, their customs and traditions associated with Baltcassel and other customs associated with the contribution of increased pollution and Mahafezaly environment. And agree that the result with the findings of some studies in that with increasing age than control subjects in the degree of environmental pollution. Also agrees that the result is the logic of scientific terms get used to top the age of farmers on the exercise of certain customs and traditions that will bring about pollution.

The results of the search indicated that the importance of environmental awareness and related practices and healthy behavior among the rural population in general and the elderly in particular, in order to create a healthy and clean environment. The mean average age of respondents is about 57 years. The results of the estimates that there is significant correlation between age and level of health awareness - environmental by the respondents, in terms of the level of healthy behavior and good health practices to maintain the health of the environment and the estimated value of the simple correlation coefficient (t) about 0.041.

Table (1) the distribution of respondents according to the categories age

categories age	number	%
20-29	25	16.7
30-39	36	24
40-49	43	28.6
50-59	28	18.7
60>	18	12
total	150	100

Source: Compiled and calculated from field research

2 – Education Level: The increasing Educational level of the population a portlets important to extend the person's scientific knowledge related to environmental health, which reflected the absorption

and adoption of practices and new ideas, as well as to create trends in personal high standard of behavior for good health, and health practices among them. As can be seen that the individual that receives a share of the education be more responsive to the changing practices of the old and bad habits and adoption of practices that help reduce environmental pollution in order to create a healthy environment clean of pathogens and vectors. It is estimated in Table (2) that more than half of the respondents was illiterate (not Inalo any premium from education), while the percentage which has completed university education to only 2% of the respondents. It is estimated that the mean level of education respondents about 2.5 degrees. As it turns out; there is no significant relationship between a level of education and level of health awareness - environmental by the respondents, with an estimated value of the simple correlation coefficient by about -0.046. The results showed in table (2) the spread of literacy among the respondents as it was found that more than half of the respondents were illiterate (52.7%). Some studies indicate a relationship between the degree of education and health awareness of the rural family, the proliferation of illiteracy leads to low awareness of health and lack of attention to disease prevention or treatment is delayed.

Table (2) the distribution of subjects, according to the educational

Level Education	number	%
illiterate	79	52.7
Reads and writes	39	26
Primary	12	8
Preparatory	9	6
Secondary	8	5.3
College	3	2
total	150	100

Source: Compiled and calculated from field research

3 - **The size of the family:** The family is the basic unit is the structure of society, and measured the strength or weakness of society as a whole strongly or weakness or weakness of its constituent families. The family is the field, who practiced human society in which social relationships, and which instilled in each of its members, traditions and customs, ideals and behavior patterns different.

These results showed the high number of children per family, where the arithmetic average of the number of children 6 son / daughter per household, while the average capacity of family 9 Items per family for a number of individuals living in the same unit of living and live a life of social and economic one, which refers to the congestion of units living to the families of the subjects and the impact on their lives and health. As shown by the presence of Altkadiwat correlation was found between the capacity of family and level of health awareness - environmental by the respondents, in terms of the level of healthy behavior and good health practices to maintain the health of the environment has reached the value of the simple correlation coefficient of about 0.071. According to some studies (3.1994), despite the presence of family planning programs, but the family size is still large and increasing number of family members affecting the food situation and the spread of infectious diseases.

The degree of cultural openness - communication of the respondents: They reflect the degree of exposure of respondents to the mass media and the degree of urban contact them.

A - The degree of exposure the subjects of mass media: The mass media in radio and television, newspapers, magazines, leaflets, booklets and other health. And use such means in the dissemination of culture and health awareness - Environmental between people and health practices to maintain the health of the environment in addition to the cinema and video as one of the ways and methods of health education. The results of table 3 indicated to increase the proportion of respondents who watch television Alpramj (28% always, 50% sometimes), and those who listen to the radio (33.3% always, 43.4% sometimes). He also noted the majority of respondents to the non-reading of newspapers and magazines, with an estimated proportion of about 64%. This may be due to the fact that 78.7% of respondents their educational, ranging from my mother (52.7%) and know how to read and write (26%), reflecting the importance of the media and visual as the main source for disseminating information and awareness of environmental health, especially in rural communities with high illiteracy rate. Therefore, you should take advantage of the

mass media to broadcast the message through scientific health at the appropriate times, either on radio or television. To submit to the listeners in the form of simplified or interesting in the form of an analog light or interesting dialogue in order to attract the largest number of listeners and viewers.

Table (3) The vulnerability of the subjects of mass media

openness communication	Always		Sometimes		Rarely		NO		Total
	N.	%	N.	%	N.	%	N.	%	
Listen to the radio	50	33.3	65	43.4	20	13.3	15	10	150
Watching TV	42	28	75	50	15	10	18	12	150
Read newspapers and magazines	15	10	22	14.7	17	11.3	96	64	150

Source: Compiled and calculated from field research

B - The degree of communication of the urban respondents: It means the degree of frequency of respondents to the nearest city to them and the purpose of the frequency; it is the degree of frequency of respondents to the nearest city to them, a city Shebin. The results showed that 22.7% of respondents attending the city daily, while 18.7% of them go once a week, while about 50.6% indicated they go to the city once a month, while about 8% said they go once a year to the city. The results also indicate the diversity of purposes for which goes respondents to the nearest city to them, it was found that 24.7% go to market crops, 20.7% for treatment, 18% to visit relatives, 12.7% for Labor, 9.3% for entertainment, 8% for the purchase of household items and the needs of the family, 4.6% for the present problems to the officials, 2% for drawn by livestock. In general, the openness of the urban areas is one important and effective factors that contribute significantly to the process of cultural friction and exposure to modern ideas and the correct behaviors to maintain health and avoid the causes of disease and environmental pollution. This has reached the arithmetic average of the degree of cultural openness - communication of respondents to 18.3 degrees. As it turns out there is significant correlation between the cultural level - the level of communication and awareness of health - environmental by the respondents, in terms of the level of healthy behavior and good health practices to maintain the health of the environment. The value of simple correlation coefficient is of about 0.097. This may be due to the fact that the Egyptian village residents are suffering the problems of poverty, ignorance and the spread of bad habits and traditions, in addition to the problems of urban planning of the countryside and the lack of infrastructure services and others. There is no doubt that the information essential role in urging the protection of the environment from pollution through the development of a media plan aimed at increasing awareness of social and environmental good behavior.

Level of Economic living standards: The economic level as well as education and family size of the factors affecting the health problems, despite the clear improvement in the economic level and the relatively high level of income in the Egyptian countryside, but that, in comparison to other developed countries is still at this level is far from the desired level, where affect household income in housing, clothing, nutrition and Edorha that affect the health of the individual. The estimates indicate that the value of the arithmetic average of the degree of the economic level of the respondents amounted to about 22.31 degrees. Also show a significant correlation between the economic level of living and level of health awareness - environmental by the respondents, in terms of the level of behavior Alasahy proper health practices to maintain the health of the environment has reached the value of the simple correlation coefficient of about 0.294. Studies show that a person who enjoys a high standard of living will be more inclined to accept the new ideas of knowledge and information. The results also showed that nearly half of respondents (51.3%) rented houses which they reside, while the percentage of those who own their homes, about 48.7%. As for the availability of devices Alcirbeiip modern has been found available homes subjects, in descending order - Radio, Color TV, TV black and white, recorder, refrigerator, washing machine - a relative importance of an estimated 92%, 66%, 29%, 30%, 26%, 3.5% respectively. As it turns out the diversity of sources of income respondents were ranked according to their relative importance in descending order as follows: Sale of agricultural crops (67.4%), the performance of occupations and the work of other non-agricultural (56.5%), paid work for others to perform some agricultural operations (23.7%), sale of dairy and products (13.4%), sale of livestock (9.4%), poultry (4.6%). He also pointed towards the 64.7% of the subjects that income levels have equal access with the rest of the families in the villages selected a

sample of the study, while 30.7% pointed to low levels of income from entering the rest of the families in the same villages, while showing high levels of entry of about 4.6% of the respondents. This results showed that about 62.7% of the respondents engaged in basic agriculture as a profession, while 37.3% engaged in work other than farming as a career major by going about their work as an agricultural high school.

Level of health awareness - environmental by the respondents: Includes the health status of residence and the prevailing habits and health behavior of the respondents and their families. The results showed a significant correlation only between the economic level of the respondents and the level of health awareness - their environmental potential level at 0.01 where the estimated value of the simple correlation coefficient of about 0.294. As it turns out non-significant correlation between the age Category, educational level, family size, level of cultural communication of the respondents (independent variables) and level of health awareness - Environmental (dependent variable), where the estimated values of simple correlation coefficient about 0.041, -0.046, -0.071, 0.097, respectively.

A - The health situation of the house: The studies on the impact of the state housing and the lack of potential for health, and private housing congestion and the lack of safe drinking water and lack of ventilation and the lack of sanitation. As experts point out that housing is health leads to many diseases Ohmaha: bronchitis, tuberculosis, rheumatic fever, heart disease, osteomalacia and rickets, infectious diseases such as meningitis, and gastroenteritis and typhoid and Albrtevodip. It is estimated availability of electricity to the homes of about 97.3% of respondents, while the available source of clean drinking water houses 68% of them, while suffering 32% of the non-availability of a source of drinking water health. As indicated 83.3% to a lack of means of sewage homes. As for the ventilation housing, he noted 83.3% to provide good ventilation their homes, while referring 16.7% that their homes and poorly ventilated. Also confirmed 30% of respondents to the presence of litter and farmyard manure (animal dung) in large quantities through the streets of the village and adjacent to their homes. As for the site barn animals has indicated 37.3% to the absence of animal shelters their homes, while only a 20% to the presence of animal pens in a building separate from the house, while referring 42.7% to the presence of animal pens inside the house and next to the living rooms. For the damage to human health, animal pens was 60.7% indicated that the presence of barn animals inside the house something normal and not harmful to health, while 39.3% pointed to the detrimental effect of the presence of animal pens inside the house. With regard to the adequacy of the number of rooms the house for a number of family members of respondents has indicated 60% as adequate, while 40% as inadequate. With regard to population density to the homes of the subjects has been shown to rise with an estimated $ 2.2 per person for room one, which shows as Houses health as well as indoor air pollution and the spread of many diseases.

B - Health habits of the respondents and their families: playing habits and traditions, an important role in the health services programs, both seeking to request these services or to refrain them and return to the folk customs in the treatment of hand, and hold on to some customs and traditions in the individual's behavior, which directly affect public health on the other. The results indicate the failure of the 97.3% of the wives or daughters of respondents wash pots in the water canals, while 93.3% said the failure of their children to practice swimming in the canals. At the same time, who pointed out the 84.7% not wash their equipment and tools for agricultural pesticide spraying canals and irrigation canals, while 15.3% have it in many cases, leading to increased pollution and disease. As for the knowledge of the subjects most prevalent diseases among the rural population of Egypt, the results showed that the most prevalent diseases in accordance with the views of respondents and their Distributions frequency in descending order as follows: schistosomiasis (87.3%), Ascaris (34.7%), conjunctivitis (18%), the common intestinal and diarrhea for children (14%), malaria (11.3%), hookworm (8.7%, anemia (7.4%), kidney disease (5.7%), arthritis (1%). and returns for these diseases to bad habits and healthy behavior is proper and non-availability of environmental awareness and adequate health care. For the views of respondents on how to obtain advice and treatment where the incidence of any disease have been ordering them and conformable to the distributions of iterative go to: a private doctor in the village (44.7%), Health Unit (32.7%), a private doctor in the city (22%) , General Hospital (20.7%), prescriptions Municipal (6.7%). As for the complaint of respondents from the large number of insects and flies, villages have indicated that, 90.7% to the spread of insects and flies, their homes and villages. Regarding the reasons for the spread of diseases in the villages of the study sample has been arranged for those reasons descending order as the following: the spread of insects and mice (70.7%), lack of hygiene and neglect (52%), lack of health awareness (26.7%), housing is not healthy

(12.7%), the use of waste water for irrigation (5.3%), the spread of garbage (2%). With regard to giving children vaccinations health assessments, he pointed to the 96.7% they vaccinate their children. also confirmed 92% of the respondents to do any vaccination against infectious disease in the case of an outbreak, and in connection with the opinions of respondents in certain phrases related to health awareness and habits, it is clear from the table (4) the approval of 99.3% of the respondents on the need for attention to cleanliness of the village and beauty, while noting 54.7% to their washing hands before eating, while stressing 90.7% on their approval of the proverbial "man doctor himself," as noted by 33.3% to preference use recipes municipality to go to the doctor, which may be due to a culture of success in non-attendance at places of treatment for regular check-ups to make sure the integrity of health, so do not go to the health unit or doctor If your only intensified by the disease.

Table (4) The views of respondents in some of the phrases associated with health awareness and habits

Phrases related to health awareness and habits of the subjects	OK		sometimes		not OK	
	N.	%	N.	%	N.	%
- Needed care and cleanliness of the village beauty	149	99.3	1	0.7	-	-
- Must wash hands before eating	68	45.3	82	54.7	-	-
- Man is himself a doctor	136	90.7	5	3.3	9	6
- Better to use the recipes for the municipality to go to a doctor	50	33.3	30	20	70	46.7
- Do you think that Zar alleviate some diseases	11	7.3	5	3.4	134	89.3
- Is a remedy for every disease	138	92	5	3.3	7	4.7
- Must wash hands / mouth after eating	68	45.3	82	54.7	-	-
- To be washing dishes and cooking Unni after eating immediately with soap and water	106	70.7	44	29.3	-	-

Source: Compiled and calculated from field research

Conclusion: The results of research to the low level of health behavior and health practices that can maintain the health of the individual and the environment, and to achieve the advancement of society economically and socially. Therefore, the research recommends the need to work to raise the economic level and living standards of rural families through the establishment of small-scale production and to encourage projects of productive families and attention to health, the environment and the dissemination of health education and environmental awareness among the population of the rural sector, as well as concern for the individual and the family and provide a healthy environment - clean water, clean housing, garbage disposal - necessary to protect them from the face of dangers and diseases, and work to increase awareness of the behavioral to the public about hygiene and environmental improvement health, in addition to the establishment of rural industries, especially related to rotate the waste.

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Influence of Sewage Water Reuse Application on Soil and the Distribution of Heavy Metals

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Abstract: The study aims to investigate the effect of the sewage water reuse in soil and plant. The use of treated sewage water on soil has an advantage of improving soil texture in terms of organic enrichment, macro- and micronutrient elements. Remarkable increase in the level of heavy metals was observed as indicated by increasing the micronutrients available content in soil (Fe, Zn, Mn and Cu). The available content of heavy metal in soil was under the permissible levels. The longer term of irrigation is the higher accumulation of metals particularly on the top soil. While, the level of heavy metals decreases as soil depth increases. Nevertheless, accumulation of metals on the soil was still far behind the risky level. This is mainly due to the fact that the level of metals in sewage irrigation water was within the permissible level according to WHO. To eliminate the accumulation of metals on the soil, it is, therefore, recommended to use an additional treatment process such as addition of dried plant leaves or lime to decrease the level of metals in the sewage irrigation water. The use of drainage water in irrigation had the highest value of basic infiltration rate. Using sewage water or drainage water in irrigation of sugar beet led to increase the N, P and K of soils after harvesting. In addition to the dry matter content.

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Key words: wastewater reuse, heavy metals, soil and plant characteristics.

1. Introduction

Egypt is located in arid region, water is becoming a very scarce resources. The planners are forced to consider any source of water which might be used economically and effectively to promote further development. With the increasing population at a high rate, the need for increasing food production is apparent.

As a consequence, the mobilization of land and water resources is proceeding fast. The development of irrigation is especially dynamic way because it is often the most important factor for increasing agricultural production.

This rapid development of irrigation translates into a sharply increasing water demand and the most accessible water resources, such as rivers and shallow aquifers are now almost entirely committed. Alternative water resources are therefore needed to satisfy further increases in demand. This is mainly a necessity in regions which are characterized by severe mismatches between water supply and demand, often associated to generally low water resources availability and asymmetries of availability and demand in a temporal and regional basis and a peculiar relationship among water and environment raise specific problems. The reuse of agricultural drainage water and treated sewage wastewater for beneficial purposes in Egypt is an attractive solution which hopefully will help considerably expansion of the irrigated agriculture or saving of fresh water for other sectors.

UN projections (UN Population Division, 1994) show that four Mediterranean countries already have less than the minimum required water availability to sustain their own food production (750 m3/inh.yr). By 2025, eight countries will be in virtually the same situation. These countries are essentially all on the Southern border of the Mediterranean (see Table 1). The crisis is already so acute in Egypt, for example, domestic water consumption exceeds 50% of the available water resources. In such places, the conventional water resources will be insufficient to even meet the domestic water demand at the beginning of the next century. On the other hand, all the Mediterranean countries of the European Union are expected to maintain themselves at or above 3000 m3/inh yr.

In the Mediterranean basin, wastewater has been used as a source of irrigation water for centuries. In addition to provide a low cost water source, the use of treated wastewater for irrigation in agriculture combines three advantages. First, using the fertilizing properties of the water (fertirrigation) eliminates part of the demand for synthetic fertilizers and contributes to decrease the level of nutrients in rivers. Second, the practice increases the available agricultural water resources and third, it may eliminate the need for expensive tertiary treatment. Irrigation with wastewater also appears to give some very interesting

effects on the soil and on the crops. As a result, the use of treated wastewater for irrigation has been progressively adopted by virtually all Mediterranean countries (Marecos do Monte et al., 1996). Because irrigation is so far the largest water use in the world and the quality requirements are usually the easiest to achieve among the various types of wastewater reuse, it is by far the largest reuse application in terms of volume.

Table (1) Area, population and annual renewable fresh water availability for 1990, 2025 and 2050 in the Mediterranean countries (UN Population Division, 1994)

Country	Area (km^2)	Total renewable fresh water per year (km^3)	Fresh water availability in m3/inhabitant year					
			1990		2025		2050	
			Population (thousands)	Availability (m3/inh yr)	Population (thousands)	Availability (m3/inh yr)	Population (thousands)	Availability (m3/inh yr)
Albania	27,531	21.00	3289	6385	4668	4499	5265	3989
Algeria	2,380,000	17.20	24935	690	45475	378	55674	309
Cyprus	9,250	0.90	702	1282	927	971	1006	895
Egypt	1,000,500	58.90	56312	1046	97301	605	117398	502
France	544,000	185.00	56718	3262	61247	3021	60475	3059
Greece	132,000	69.00	10238	5763	9868	5979	8591	6868
Italy	301,300	187.00	57023	3279	52324	3574	43630	4286
Jordan	37,300	1.31	4259	308	12039	109	16874	78
Lebanon	10,360	4.98	2555	1949	4424	1126	5189	960
Libya	1,760,000	4.62	4545	1017	12885	359	19109	242
Malta	320	0.03	354	85	422	71	439	68
Morocco	445,000	28.00	24334	1151	40650	689	47858	585
Portugal	92,400	66.00	9868	6688	9685	6815	9140	7221
Spain	504,800	111.00	39272	2826	37571	2954	31765	3494
Syria	185,000	25.79	12348	2089	33505	770	47212	546
Tunisia	126,000	4.36	8080	540	13290	328	15607	279
Turkey	780,000	203.00	56098	3619	90937	2232	106284	1910
Yugoslavia	256,523	265.00	22945	11549	24582	10780	24441	10842
Total	8,612,989	1255.04						

However, wastewater is often associated with environmental and health risks. As a consequence, its acceptability to replace other water resources for irrigation is highly dependent on whether the health risks and environmental impacts entailed are acceptable. It is therefore, necessary to take precautions before reusing wastewater. As a result, although the irrigation of crops or landscapes with sewage effluents is in itself an effective wastewater treatment method, a more effective treatment is necessary for some pollutants and adequate water storage and distribution system must be provided before sewage is used for agricultural or landscape irrigation (Asano et al., 1985).

There has been an increasing interest in reuse of wastewater in agriculture over the last few decades due to increased demand for fresh water. Population growth, increased per capita use of water, the demands of industry and of the agricultural sector all put pressure on water resources. Treatment of wastewater provides an effluent of sufficient quality that it should be put to beneficial use and not wasted (Asano, 1998). The reuse of wastewater has been successful for irrigation of a wide array of crops, and increases in crop yields from 10-30% have been reported (Asano, 1998). In addition, the reuse of treated wastewater for irrigation and industrial purposes can be used as strategy to release freshwater for domestic use, and to improve the quality of river waters used for abstraction of drinking water (by reducing disposal of effluent into rivers). Wastewater is used extensively for irrigation in certain countries e.g. 67% of total effluent of Israel, 25% in India and 24% in South Africa is reused for irrigation through direct planning, though unplanned reuse is considerably greater. During the last decade, there has been growing concern that the world is moving towards a water crisis (Falkenmark, 1989)). There is increasing water scarcity in dry climate regions, for example, in Africa and South Asia, and there are major political implications of water scarcity in some regions e.g. Middle East (Murakami, 1995). Water quantity and quality issues are both of concern. Recycling of wastewater is one of the main options

when looking for new sources of water in water scarce regions. The guidelines or standards required removing health risks from the use of wastewater and the amount and type of wastewater treatment needed to meet the guidelines are both contentious issues. The cost of treating wastewater to high microbiological standards can be so prohibitive that use of untreated wastewater is allowed to occur unregulated.

Blume, et al., (1980), found that the use of sewage effluent year after year in irrigation, markedly increased available P and N in the soil. El-Kholi et al., (2000) showed that using sewage effluent in irrigation for 47 years at El-Gabal El-Asfar farm, increased both total and DTPA extractable of heavy metals (Cd, Co, Cr, Cu and Pb).

El-Sayed, (1999) indicated that reuse of wastewater in irrigation for different periods relatively increased the accumulation of Zn in soil followed by Pb, Cu, Ni, and Cd in turn , most of Zn, Cu, Ni, and Cd accumulation in the soil were associated with available organic and carbonate fractions, whereas available Pb and organic fractions took an opposite trend. El-Koli et al. (2000) found that, reuse of sewage wastewater of Belbies drain over 35 years for irrigation, increased soil content of Fe, Mn, Zn, Cu, Cd, Pb, Ni, Co and Cr in comparison with those irrigated with Nile water. Whereas, this increase was 4 folds for Fe, Cu, Cd and Ni but 20 folds for Zn and 6 folds for Pb in the surface layers. El-Henawy (2000) stated that using drainage water or drainage water mixed with wastewater for irrigation caused an increase in soil content of available heavy metals (Ni, Pb, Co and Cd) in comparison with fresh water. Wafaa (2001) found that, concentration of available and total micro nutrient in soil (Cu, Zn, Mn and Fe) were increased in soil profiles irrigated with wastewater in comparison with those of fresh water depending on the nature and source of pollution. She also noticed that gradual decrease in heavy metals with increasing soil depth. However, the higher accumulation of those elements was found in the surface layer than the sup-surface one. Abo Sliman et al. (2001) studied the use of fresh, drainage and treated sewage water in irrigation the soil cultivated by sugar beet crop. They found that the contents of macro and microelements in soil decrease with fresh water while the continuous or alternative applying of sewage or drainage water with fresh water increase the elemental contents in soil especially with surface irrigation.

The objective of this work is to find out the effect of irrigation with different water qualities on soil physic-chemical properties particularly heavy metals distribution in soil and plant and the distribution of heavy metals in the soils.

2. Materials and methods

Soil samples were taken before planting and after harvesting during the two growing season 2008/2009 from the soil layer 0-30 cm and 30-60 cm. to analyze some physical and chemical properties of the soil (tables, 2 and 3a &b).

Table (2) physical properties of the soil before planting

Soil depth cm.	Particle size distribution			Texture class	F.C%	PWP%	AW%	BD gm/cm^3
	Sand%	Silt%	Clay%					
0-30	25.04	24.04	50.92	Clayey	44.31	24.13	20.23	1.22
30-60	26.52	22.71	50.77	Clayey	34.22	18.56	15.68	1.30

Where: FC=field capacity, PWP= permanent wilting point, AW= available water and BD= bulk density

Table (3a) chemical properties of soil before planting

Soil depth cm.	pH 1:2.5	EC dS/m	Cation meq/l				Anion meq/l			SAR	OM %	$CaCO_3$ %	CEC Meq/100g soil
			Na^+	K^+	Ca^{++}	Mg^{++}	HCO_3^-	Cl^-	SO_4^{--}				
0-30	7.87	4.22	19.20	0.80	15.75	8.25	3.15	20.30	20.55	5.52	0.65	1.18	34.84
30-60	8.03	3.49	14.50	0.75	14.65	7.15	3.15	13.7	20.2	4.38	0.50	1.70	30.50
mean	7.95	3.86	16.85	0.78	15.2	7.7	3.15	17.00	20.38	4.95	0.58	1.44	32.67

Table (3b) chemical properties of soil before planting

Soil depth cm.	Elemental content of soil before planting in ppm											
	N	P	K	Fe	Mn	Zn	Cu	Cd	Pb	Ni	Cr	Co
0-30	30.58	9.78	331	20.50	16.95	3.30	2.74	0.07	2.35	0.74	0.35	0.40
30-60	32.43	9.43	309	10.50	7.53	1.58	0.56	0.03	0.01	0.43	0.01	0.00
mean	31.51	9.61	320	15.25	12.24	2.44	1.65	0.05	1.18	0.59	0.18	0.20

3. Soil chemical analysis

Soil paste was carried out according the methods described by Richard, (1954). Electrical conductivity (ECe) was measured by EC meter as dS/m at 25 °C in soil extract according to Jackson, (1985). pH was determined in 1:2.5 soil : water suspension by Cottenie et al., (1982). Soluble cation (Na^+ and K^+) were determined using flame photometer while Ca and Mg were determined by titration with versenate according to Jackson, (1985). The soluble anion $CO_3^=$ and $HCO3^-$ were determined volumetrically against a standard solution of H_2SO_4 according to Black (1965). Cl^- was determined following Moher's method also SO_4^{--} was computed by the difference between both the sum of the cations and anions Jackson, (1985). Available nitrogen content was determined by modified Kjedahl method according to Cottenie et al., (1982). Available K was extracted by 1N ammonium acetate pH=7 and determined using flame photometer according to Knudsen et al. (1982). Available heavy metals "Co, Cr, Cd, Ni, Pb" and micro element" Fe, Mn, Zn, Cu" were extracted using DPTA method and estimated by ASS according to Cottenie et al., (1982).

3.1. Water analysis

Water qualities of irrigation water were subjected to chemical analysis for determination of EC, soluble anion and cations, SAR, N, P, K, micro nutrient "Fe, Mn, Zn, Cu", heavy metals "Co, Cr, Cd, Ni, Pb" as presented in tables (4 and 5).

Table (4) Chemical analysis of water samples

Water quality	pH	EC dS/m	Cation meq/l				Anion meq/l			SAR
			Na^+	K^+	Ca^{++}	Mg^{++}	HCO_3^-	Cl^-	SO_4—	
Fresh water	7.4	0.55	1.8	0.2	2.0	1.5	1.45	1.4	2.56	1.36
Secondary treated	7.8	1.3	7.1	0.9	2.9	2.1	4.3	4.8	3.9	4.49

Table (5) some macro and micro nutrients (ppm) of water qualities

Water qualities	N	P	K	Fe	Mn	Zn	Cu	Cd	Pb	Ni	Cr	Co
Fresh water	1.360	0.490	7.000	0.020	0.030	0.000	0.001	0.002	0.012	0.000	0.01	0.004
Secondary treated	7.850	4.850	32.600	0.331	0.063	0.032	0.016	0.006	0.091	0.030	0.040	0.015

The design of the experiment was split-split plot with two replications in the first and second seasons located in El-Mansoura farm (middle of the Nile Delta). The plot area was 10.5 m^2 (3x3.5 m). The main plots were two different water qualities, fresh water (Nile water) and secondary treated sewage water.

Date of sowing was October 10, 2008 for the first season and October 14, 2009 in the second season. 3-4 seeds of sugar beet were sown in each hill with 25 cm distance. The plants were thinned to one plant per hill after a month from planting. The harvest date was May 26 in the first growing season and 28 of May in the second growing season. The plant subjected to the following parameters:

Root yield (ton/feddan), sucrose%, gross sugar=sucrose % x root yield (ton/feddan) and leaf area determined by leaf area meter.

4. Results and Discussions

Data in table (6) showed that, irrigation of soil by fresh water gave the lowest mean values of ECe (3.86 and 3.89 dS/m) as compared to second treated waste water (stww) (4.78 and 6.05 dS/m) throughout the first and second season respectively. While, the highest mean values of ECe 4.78 and 6.05 dS/m were obtained by stww in the first and second season. These results are in agreement with obtained by Abo Sinna et al. (1994). Regarding the SAR, the irrigation by stww increased SAR values compared to irrigation by fresh water in the first and second seasons respectively. This may be due to the high content of Na ions in stww as compared with fresh water. These results were with the coincidence of the results obtained by Omar et al. (2001).

Data in the same table showed that, Na^+ was the dominant cation followed by Ca^{++} in the two seasons, while Cl^- and $SO4^{--}$ were the dominant anions. As also indicated that all ions were increased as a result of irrigation by different water qualities, but the

increase of different ions were more pronounced under irrigation by stww compared to fresh water.

Table (6) Chemical of soil paste extract after harvesting of sugar beet seasons (2008-2009)

Season no.	Water type.	pH 1:2.5	EC dS/m	Cation meq/l				Anion meq/l			SAR
				Na^+	K^+	Ca^{++}	Mg^{++}	HCO_3^-	Cl^-	SO_4^{--}	
	Before	7.95	3.86	16.85	0.78	15.20	7.70	3.15	17.00	20.38	4.95
First season	Fresh water	8.40	3.95	21.30	0.40	11.05	7.22	3.33	16.02	21.43	7.05
	Secondly treated sewage water	8.50	4.78	28.50	0.60	15.48	5.03	14.30	17.18	28.10	6. 65
Second season	Fresh water	8.95	3.89	23.00	0.40	9.40	5.80	7.50	16.10	15.00	8.31
	Secondly treated sewage water	8.27	6.05	42.40	0.60	15.10	9.00	5.00	29.60	32.40	12.21

4.1. Effect of irrigation with different water quality in the availability of some macro and micro nutrient and heavy metals content in soil after harvesting

4.1.1. Macro nutrients

Data in table (7) revealed that, the use of stww in irrigation led to increase of the N content of soil after harvesting of sugar beet. As the mean values of soil nitrogen increased from 31.51 to 39.25 and 39.75 ppm in the first and second season. This may be due to the high concentration of nitrogen in the stww.

Table (7) Available mineral content of soil after harvesting as affected by continuous irrigation with different water qualities

Season no	Water qualities	ppm											
		N	P	K	Fe	Mn	Zn	Cu	Cd	Pb	Ni	Cr	Co
	before	31.51	9.61	320	15.25	12.24	2.44	1.65	0.05	1.18	0.59	0.18	0.20
First season	Fresh water	30.50	11.00	330	16.00	15.98	2.65	2.05	0.02	1.50	0.65	0.24	0.22
	Secondary treated	39.25	13.32	373	21.32	23.45	4.21	3.22	0.12	2.80	1.05	0.33	0.36
Second season	Fresh water	30.70	11.38	339	16.94	15.05	2.84	2.11	0.08	1.60	0.71	0.25	0.25
	Secondary treated	39.75	13.54	385	22.01	24.15	4.39	3.26	0.13	2.84	1.08	0.34	0.38

Regarding the available phosphorus, data in table (7) revealed that the use of stww in irrigation led to increase of the P content of soil after harvesting of sugar beet. As the mean values of soil P increased from 9.61 to 13.32 and 13.54 ppm in the first and second season, respectively. This may be due to the high concentration of phosphorus in the stww.

In the same time the potassium availability increased significantly with irrigation by the stww. Where, values of soil K increased from 320 to 373 and 385 ppm in the first and second season. This may be due to the high concentration of potassium in the stww.

4.1.2. Micronutrient

As illustrated in table (7), the irrigation with fresh water gave the lowest mean value of Fe in the first and second season (16 and 16.94 ppm), respectively. Nevertheless, the highest value was obtained using stww in irrigation season in both seasons as the Fe value increased from 15.25 to 21.32 and 22.01ppm, respectively. These findings are in agreement with those obtained by wafaa (2001) who mentioned that irrigation by polluted water increased Fe content in soil. On the other hand, the irrigation with fresh water gave the lowest mean values of Mn in the first and second seasons (15.98 and 15.05 ppm, respectively) compared to other water qualities while the highest mean values in both seasons (23.45 and 24.15 ppm respectively). These results may be due to the high concentration of Mn in the stww. In the same time, the irrigation with fresh water gave the lowest mean values of Zn in the first and second seasons (2.65 and 2.84 ppm, respectively) compared to other water qualities while the highest mean values in both seasons (4.21 and 4.39 respectively). These results may be due to the high concentration of Zn in the stww. As regards to copper, the lowest mean values of Cu in the first and second seasons (2.65 and 2.84 ppm, respectively) was obtained with the irrigation

with fresh water, while the highest mean values in both seasons (4.21 and 4.39 respectively) obtained by the irrigation with stww. These results may be due to the high concentration of Cu in the stww.

4.1.3. Heavy metals

Concerning the effect of different quality of irrigation water on cobalt content data in table (7) revealed that, the use of fresh water gave the lowest value in the first and second season (0.22-0.25 ppm, respectively). While, the use of stww gave the highest mean values where, the mean values respective to both seasons seem to be equal (0.36-0.38 ppm, respectively). Regarding the Chromium, data obtained revealed that, the use of fresh water gave the lowest value in the first and second season (0.24-0.25 ppm, respectively). While, the use of stww gave the highest mean values where, the mean values respective to both seasons seem to be equal (0.33-0.34 ppm, respectively). Concerning Nickel, data obtained exposed that, the use of fresh water gave the lowest value in the first and second season (0.65-0.71 ppm, respectively). While, the use of stww gave the highest mean values where, the mean values respective to both seasons seem to be equal (1.05-1.08 ppm, respectively). Relating to cadmium, data obtained revealed that, the use of fresh water gave the lowest value in the first and second season (0.02-0.08 ppm, respectively). While, the use of stww gave the highest mean values where, the mean values respective to both seasons seem to be equal (0.12-0.08 ppm, respectively). For the lead, data obtained revealed that, the use of fresh water gave the lowest value in the first and second season (1.5-1.6 ppm, respectively). While, the use of stww gave the highest mean values where, the mean values respective to both seasons seem to be equal (2.8-2.84 ppm, respectively).

4.2. Effect of water quality on yield and yield component of sugar beet

Data presented in table (8) revealed that, use of stww on sugar beet irrigation gave the highest significant increase in the root weight. This significant increase was achieved in the two growing seasons. This can be attributed to the adequate effect of soil moisture and enough potassium supply that is essential for translocation content of carbohydrates in plant. It has a beneficial role in calcium and potassium nutrition.

Table (8) Effect of water quality on yield and yield component of sugar beet

Season no.	Treatment	Sucrose %	Leaf area (cm^2)	Root weight (ton/fed)	Gross sugar (ton/fed)
First Season	Fresh water	18.62	822.19	32.35	6.01
	stww	19.17	856.26	34.67	6.62
Second season	Fresh water	17.97	676.87	32.61	5.99
	stww	18.14	729.37	34.14	6.19

The mean value of root weight corresponding to the first and second growing seasons were (34.67 and 34.14 ton/fed) when irrigate with stww. While, the lowest values in the growing seasons (32.35 and 32.61 ton/fed) were obtained with irrigation by fresh water. Data in table (8) illustrate also that, the sucrose percentage tended to increase due to the use of stww for sugar beet irrigation. The difference between the two seasons was highly remarkably. Where, the irrigation with stww surpassed fresh water in increasing sucrose percentage in both seasons (0.55 and 0.17%, respectively).

Regarding the gross sugar beet yield, data in table (8), revealed that, sugar yield was highly affected by irrigation with stww in both seasons (6.62 and 6.19 ton/ fed, respectively). While, the lowest values were for irrigation with fresh water in both seasons (6.01 and 5.99 ton/fed, respectively).

Data concerning the leaf area of sugar beet plant as influenced by the water qualities are presented in table (8). The obtained result showed that, the effect of water qualities on leaf area is highly significant in the two growing seasons. The high leaf area respective to first and second seasons (856.26 and 729.37 cm^2) were obtained by secondary treated wastewater. The lowest values of leaf area (822.19 and 676.87 cm^2) were recorded with irrigation with fresh water in the first and second season respectively.

5. Conclusions

From the abovementioned discussion it can be concluded that:

1. For agricultural use in future, the reuse of treated wastewater is considered as an important component of the water policies.
2. Water use efficiency can be maximized under clay soil conditions with using low quality, (sewage water) alternatively with fresh water.
3. Considerable amount of chemical fertilizers can be saved and consequently using treated

wastewater can be minimizing pollution of environment.

4. Also, the heavy metals increases, but it is in the permeable level according to WHO. To eliminate the accumulation of metals on the soil, it is, therefore, recommended to use an additional treatment process such as addition of dried plant leaves or lime to decrease the level of metals in the sewage irrigation water.

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A New Approach to Special Relativity and its Consequences

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Abstract: The theory of special relativity by Albert Einstein is extended by the requirement that not only the coordinate points co-moving with the moving inertial frame shall fulfil the transformation formulae, but also the coordinate points resting with the rest frame. It turns out that the present new theory, although derived by strictly employing Einstein's original light beam procedure, confirms the ad hoc generalized Galilean transformation: The clock paradox is inherently avoided, without having to invoke Einstein's general theory of relativity. However, there are severe consequences: (i) the velocity of the rest frame as observed in the moving frame is not equal to the velocity of the moving frame as observed in the rest frame; (ii) furthermore, the one-way light signal speed is not a universal constant any more, but has to be assumed different in the moving frame. This leads to the definition of the rest frame to be a preferred frame, where the assumption of an isotropic light signal speed still holds. The light signal speed in the moving frame is then anisotropic and dependent on the frame velocity. Several applications are discussed in comparison to Einstein's original theory of special relativity: Light aberration effect, length contraction, time dilation, Maxwell's equations, the electric Lorentz force, the relativistic law of motion, the electromagnetic wave equation, and the relativistic Doppler frequency shift of electromagnetic radiation. It is pointed out that, in the moving frame, it must be distinguished between the light signal speed (ray velocity) and the phase velocity of light. Another issue is the fact that the interpretation of Maxwell's equations in the moving frame is not unequivocal. - However, despite of reasonable and interesting results, the final judgement of the theory will only be possible when reliable evaluations of one-way light signal speed measurements are available.
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1. Introduction

It took a couple of decades of years until Einstein's theory of special relativity (Einstein, 1905) was widely excepted by the physical community. However, there has always been criticism of this theory. This has frequently to do with the well known clock paradox (twin paradox) which implies that an observer in either of two inertial frames which are in relative motion to each other sees time in the other frame elapse slower. It is impossible to solve this problem only by the original theory of special relativity because the Lorentz transformation is symmetrical. Einstein resolved the clock paradox (Einstein, 1918) by invoking the general theory of relativity. For this purpose, he had to admit that the rest frame is not at all equivalent to the moving frame, what is of course contradictory to the original idea of relativity. Furthermore, the correction supplied by the general theory of relativity is not a continuous one but is effective only during the turnaround of the moving frame, and thus corrects only for the final state, i. e. the return of the moving frame to the position of the rest frame. To eliminate these problems, several so called test theories of special relativity have been developed: Robertson (1949) replaced Einstein's way of deduction by an experimentally supported approach, Mansouri and Sexl (1977) generalized the Lorentz transformation, and Chang (1979) reconsidered an older approach to special relativity, i. e. the "ether" theory, in the new form of the "Generalized Galilean transformation" which is an ad hoc modification of the Galilean transformation.

The present paper returns to Einstein's original light beam procedure of special relativity, figure 1 a (Einstein, 1905), modified however by extension, figure 1 b: It is required that not only the coordinate points P' of the moving frame should fulfil the transformation formula, but also the coordinate points P of the rest frame, thereby leaving the way of Einstein's logical deduction unchanged. In this way, a new transformation can very easily and straightforwardly be derived, together with all of its consequences. It turns out that this "extended Einsteinian theory of special relativity" approves the "Generalized Galilean Transformation".

2. Extension of Einstein's original theory of special relativity

The basis of Einstein's theory of special relativity (Einstein, 1905) has been a thought experiment, depicted in figure 1 a. An inertial frame $\Sigma'[x',y',z']$ moves uniformly with a velocity of v along

the X-axis of the rest frame Σ(x,y,z), where Σ and Σ' are axiparallel Cartesian coordinate systems. A light signal is emitted from the origin O' of Σ' when O' passes through the origin O of Σ. The path of this light signal is given as O'P' in the moving frame, and OP' in the rest frame, where P' is a representative point of the moving frame. The spatial coordinates of P' are expressed in both frames, along with time t and t' elapsed in Σ and Σ', respectively.

Figure 1 b shows the same situation as figure 1 a, except a representative point P of the rest frame is considered. Again, the spatial and temporal coordinates of P are expressed in a double way, firstly when measured in the rest frame, secondly when measured in the moving frame.

Einstein's theory of special relativity is now modified by the extended requirement that the transformation shall be valid for both, any coordinate point P' co-moving with the moving frame and any coordinate point P resting with the rest frame.

Corresponding to the initial condition,

$$t = 0,\quad x = 0,\quad y = 0,\quad z = 0,\ t' = 0,\ x' = 0,\ y' = 0,\ z' = 0 \quad , \tag{1}$$

the desired transformation is taken as

$$x' = A_1\, x + A_2\, y + A_3\, z + A_4\, t \quad , \tag{2 a}$$
$$y' = B_1\, x + B_2\, y + B_3\, z + B_4\, t \quad , \tag{2 b}$$
$$z' = C_1\, x + C_2\, y + C_3\, z + C_4\, t \quad , \tag{2 c}$$
$$t' = D_1\, x + D_2\, y + D_3\, z + D_4\, t \quad . \tag{2 d}$$

Because of rotational symmetry about the x(x')-axis, it follows:

$$A_2 = A_3 = B_1 = B_4 = C_1 = C_4 = D_2 = D_3 = 0\,,\quad B_3 = -C_2\,,\quad C_3 = B_2 \quad . \tag{3}$$

Hence,

$$x' = A_1\, x + A_4\, t \quad , \tag{4 a}$$
$$y' = B_2\, y - C_2\, z \quad , \tag{4 b}$$
$$z' = C_2\, y + B_2\, z \quad , \tag{4 c}$$
$$t' = D_1\, x + D_4\, t \quad . \tag{4 d}$$

Table 1 shows the further procedure in finding out the still open parameters A_1, A_4, C_2, D_1, and D_4 (except B_2), step by step: Special point events P' and P, and the origins O' and O, whose spatial and temporal coordinates are straightforward in both frames, are plugged into the transformation formulae, equations. 4 a-d. In this way, every step yields four equations, through which the results in the right column of table 1 are derived. Steps 1 to 5 are necessary and sufficient to derive the well known Lorentz transformation, assuming the light signal speed to be a universal constant c in both frames. However, proceeding with step 6 to 10, in order to get the new modified transformation, requires more open parameters to be adjusted: (i) The light signal speed in the moving frame, c', has to be assumed as a function of the angle α' between the X'-axis and the light beam, figure 1 b, and (ii) the amount of the velocity of the rest frame with respect to the moving frame, u, has not necessarily to be equal to the amount of the velocity of the moving frame with respect to the rest frame, v. Step 10 serves to determine the function c'(α'), and yields two equations, table 1, where the angle α means the angle between the X-axis and the light beam in the rest frame, figure 1 a. These two equations are solved for c'(α'), cos(α'), and sin(α'):

$$\frac{c'(\alpha')}{c} = \frac{-\cos(\alpha')\cdot\frac{c'(90°)}{c}\cdot\frac{v}{c}\cdot\frac{v}{u}\cdot\gamma^2 + \sqrt{\cos^2(\alpha')\cdot\left(\frac{c'(90°)^2}{c^2}\cdot\frac{v^2}{u^2}\cdot\gamma^4 - 1\right)+1}}{\cos^2(\alpha')\cdot\left(\frac{c'(90°)^2}{c^2}\cdot\frac{v^2}{u^2}\cdot\gamma^2 - 1\right)+1} \quad , \tag{5}$$

$$\cos(\alpha') = \frac{c}{c'(\alpha')} \cdot \frac{c}{c'(90°)} \cdot \frac{u}{v} \cdot \left(\cos(\alpha) - \frac{v}{c} \right) \quad , \tag{6}$$

$$\sin(\alpha') = \frac{c}{c'(\alpha')} \cdot \gamma \cdot \sin(\alpha) \quad , \tag{7}$$

where

$$\gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \quad . \tag{8}$$

For α'=90°, equation 5 yields

$$c'(90°) = c \quad . \tag{9}$$

As can be figured from table 1, right column, and equation 9, the parameters A_1, A_4, C_2, D_1, and D_4 are

$$A_1 = B_2 \cdot \frac{u}{v} \cdot \frac{1}{\gamma}, \quad A_4 = -B_2 \cdot \frac{u}{\gamma}, \quad C_2 = 0, \quad D_1 = 0, \quad D_4 = B_2 \cdot \frac{1}{\gamma} \quad , \tag{10}$$

so that the transformation, equations 4 a-d, becomes

$$x' = B_2 \cdot \frac{1}{\gamma} \cdot \frac{u}{v} \cdot (x - v \cdot t) \quad , \tag{11 a}$$

$$y' = B_2 \, y \quad , \tag{11 b}$$

$$z' = B_2 \, z \quad , \tag{11 c}$$

$$t' = B_2 \cdot \frac{1}{\gamma} \cdot t \quad . \tag{11 d}$$

In order to determine the ratio u/v, another definition is used, the average two-way speed of a light signal in the moving frame Σ' (Reichenbach, 1969):

$$\frac{1}{\bar{c}'} = \frac{1}{2} \cdot \left[\frac{1}{c'(\alpha')} + \frac{1}{c'(\alpha' + 180°)} \right] \quad . \tag{12}$$

This means, the reciprocal two-way speed of a light signal is defined as an average of the reciprocal one-way speed of a light signal travelling in the forward (α') direction and the one-way speed of a light signal travelling in the backward (α'+180°) direction. Taking into account equations 5 and 9, equation 12 yields:

$$\frac{\bar{c}'}{c} = \frac{1}{\sqrt{\left(\frac{v^2}{u^2} \cdot \gamma^4 - 1 \right) \cdot \cos^2(\alpha') + 1}} \quad . \tag{13}$$

The Michelson-Morley optical experiment (Michelson and Morley, 1887) says that this two-way light speed in the moving frame Σ' is independent of the direction (angle α') of the light beam, and according to Kennedy and

Thorndike (1932), the two-way light speed is also independent of the velocity v of Σ' relative to Σ. The result of those measurements was always the same, i. e. the constant two-way light speed c.

$$\bar{c}' = c = \text{const.}(\alpha', v) \quad . \tag{14}$$

From these experimental facts, it can be concluded that the term in parentheses in equation 13 must be zero: Thus it follows that

$$\frac{u}{v} = \gamma^2 \quad . \tag{15}$$

The last unknown parameter B_2 can be determined by the requirement that transverse effects should not occur, i. e. y' and z' should not be affected by motion of Σ' in the X-direction, see equations 11 b and c. This means that

$$B_2 = 1 \quad . \tag{16}$$

Equation 16 was confirmed by Ives and Stilwell (1938) who quantitatively detected the relativistic second-order Doppler shift.

Finally, the transformation, equations 11 a-d, together with the light signal speed in the moving frame Σ', equation 5, and the light aberration, equations 6 and 7, can be written down as:

$$x' = \gamma\,(x - v \cdot t) \quad , \tag{17 a}$$

$$y' = y \quad , \tag{17 b}$$

$$z' = z \quad , \tag{17 c}$$

$$t' = \frac{1}{\gamma} \cdot t \quad , \tag{17 d}$$

$$u = v \cdot \gamma^2 \quad , \tag{17 e}$$

$$c'(\alpha') = \frac{c}{1 + \frac{v}{c} \cdot \cos(\alpha')} \quad , \tag{17 f}$$

$$\cos(\alpha') = \frac{\cos(\alpha) - \frac{v}{c}}{1 - \frac{v}{c} \cdot \cos(\alpha)} \quad , \tag{17 g}$$

$$\sin(\alpha') = \frac{1}{\gamma} \cdot \frac{\sin(\alpha)}{1 - \frac{v}{c} \cdot \cos(\alpha)} \quad . \tag{17 h}$$

The direction dependent light signal speed in Σ', equation 17 f, is plotted in polar coordinates in figure 2. This gives an idea of how the velocity v of Σ' affects the light speed in Σ', for v/c=0.5 as an example. As can be figured from equation 17 f, the polar plot is an ellipse with one focal point at the origin, eccentricity v/c, semimajor axis $c\gamma^2$, and semiminor axis $c\gamma$. However, it should be noted that this is a theoretical finding which has still to be confirmed experimentally.

The equations 17 a-d form modified Lorentz transformation equations which are in accordance with the "Generalized Galilean Transformation". Equations 17 g and h express Einstein's well known light aberration effect (Einstein, 1905).

3. Applications and interpretations

3.1. Clock synchronisation

The initial condition, equation 1 (t=0,t'=0), implies that clocks can be synchronised in both frames. In case of the rest frame, the standard synchronisation procedure by light signals, according to Einstein (Einstein, 1905), can

be employed. However, this method is not applicable for internally synchronising clocks in the moving frame. The reason for this complication is the direction-dependent one-way light speed. Instead of the standard synchronisation procedure, a non-standard synchronisation method is then necessary to be applied. A simple external synchronisation is as follows: Both frames shall be thought of being equipped with a rigid arrangement of close-spaced clocks, like a lattice with clocks at the lattice points. Once the rest frame is synchronised (e. g. t=0), the moving frame simultaneously is too (e. g. t'=0), at any spatial position, just by transmission of the time setting from the nearest-by clock in the rest frame. This definition of time synchronisation can be called an absolute one, and makes the theory self-consistent, without internal contradictions.

3.2. Length contraction and time dilation

Length contraction of a moving rigid object as measured in the rest frame was already predicted by Einstein (1905) using the Lorentz transformation. He transformed the equation of the surface of a sphere in the moving frame back to the equation of the surface of a rotational ellipsoid in the rest frame, and found out that the axis of the ellipsoid in the direction of motion was shrunk by a factor of γ. By following his deduction, but using the present transformation, equations 17 a-d, this result is readily confirmed.

Dilation of time in the moving frame, compared to the time elapsed in the rest frame, was predicted using the Lorentz transformation (Einstein, 1905) to amount a factor of $1/\gamma$. The same result is confirmed by using the present transformation, equation 17 d.

In both theories, the rest frame must correctly be chosen to achieve the right result. If the reference frame is chosen to be identical with the rest frame, then the Lorentz transformation yields correct results. However, if the reference frame is chosen to be the moving frame, then the Lorentz transformation yields wrong (inverse) results, i. e. the clocks in the rest frame are slow compared to the clocks in the moving frame. This is the well known clock paradox caused by the symmetrical form of the Lorentz transformation. Contrary to this erroneous result, the present theory, equation 17 d, gives directly the right answer, no matter which of the two frames is chosen to be the reference frame: The clocks in the rest frame are fast compared to those in the moving frame.

3.3. Transformation from one moving frame to another

Three inertial frames are considered: frame no. 1, Σ'(x',y',z';t'), moving with velocity **v**', the rest frame Σ(x,y,z;t), and frame no. 2, Σ''(x'',y'',z'';t''), moving with velocity **v**''. Wanted is the transformation from Σ' to Σ''. The transformation from Σ to Σ'' is given by the equations 17 a-d, what can be written in a general vector formulation as:

$$\mathbf{r}'' = \mathbf{r} + (\gamma'' - 1) \cdot \frac{\mathbf{r} \cdot \mathbf{v}''}{v''^2} \cdot \mathbf{v}'' - \gamma'' \cdot \mathbf{v}'' \cdot t \quad , \tag{18}$$

$$t'' = \frac{1}{\gamma''} \cdot t \quad . \tag{19}$$

The transformation from Σ' to Σ is given by the inverse of the transformation from Σ to Σ':

$$\mathbf{r} = \mathbf{r}' - \left(1 - \frac{1}{\gamma'}\right) \cdot \frac{\mathbf{r}' \cdot \mathbf{v}'}{v'^2} \cdot \mathbf{v}' + \gamma' \cdot \mathbf{v}' \cdot t' \quad , \tag{20}$$

$$t = \gamma' \cdot t' \quad . \tag{21}$$

The transformation from Σ' to Σ'' is then obtained by plugging the right hand expressions of equations 20 and 21 for **r** and t into equations 18 and 19:

$$\mathbf{r}'' = \mathbf{r}' - \left[\left(1 - \frac{1}{\gamma'}\right) \cdot \frac{\mathbf{r}' \cdot \mathbf{v}'}{v'^2} - \gamma' \cdot t'\right] \cdot \left[\mathbf{v}' + (\gamma'' - 1) \cdot \frac{\mathbf{v}' \cdot \mathbf{v}''}{v''^2} \cdot \mathbf{v}''\right] + \left[(\gamma'' - 1) \cdot \frac{\mathbf{r}' \cdot \mathbf{v}''}{v''^2} - \gamma' \cdot \gamma'' \cdot t'\right] \cdot \mathbf{v}'' \quad , \tag{22}$$

$$t'' = \frac{\gamma'}{\gamma''} \cdot t' \quad , \tag{23}$$

where

$$\gamma' = \frac{1}{\sqrt{1 - \frac{v'^2}{c^2}}} \quad , \quad \gamma'' = \frac{1}{\sqrt{1 - \frac{v''^2}{c^2}}} \quad , \tag{24}$$

and the radius vectors **r**' and **r**'' define the locations in the moving frames Σ' and Σ'', respectively.

3.4. Transformation of velocity and acceleration of a particle

The transformation equations, equations 17 a-d, are given in differential form by:

$$dx' = \gamma \cdot (dx - v \cdot dt) \quad , \tag{25 a}$$

$$dy' = dy \quad , \tag{25 b}$$

$$dz' = dz \quad , \tag{25 c}$$

$$dt' = \frac{1}{\gamma} \cdot dt \quad . \tag{25 d}$$

From equations 25 a-d it is easy to derive the transformation formulae for the first and second time derivatives of the spatial coordinates:

$$\frac{dx'}{dt'} = \gamma^2 \cdot \left(\frac{dx}{dt} - v \right) \quad , \tag{26 a}$$

$$\frac{dy'}{dt'} = \gamma \cdot \frac{dy}{dt} \quad , \tag{26 b}$$

$$\frac{dz'}{dt'} = \gamma \cdot \frac{dz}{dt} \quad , \tag{26 c}$$

$$\frac{d^2 x'}{dt'^2} = \gamma^3 \cdot \frac{d^2 x}{dt^2} \quad , \tag{27 a}$$

$$\frac{d^2 y'}{dt'^2} = \gamma^2 \cdot \frac{d^2 y}{dt^2} \quad , \tag{27 b}$$

$$\frac{d^2 z'}{dt'^2} = \gamma^2 \cdot \frac{d^2 z}{dt^2} \quad . \tag{27 c}$$

Provided that the motion of a particle in the moving frame is given by sufficiently small (non-relativistic) velocities dx'/dt', dy'/dt', and dz'/dt' (all << c), it can be figured from equations 26 a-c that approximately

$$\frac{1}{c} \cdot \frac{dx}{dt} = \frac{v}{c} \quad , \quad \frac{1}{c} \cdot \frac{dy}{dt} = 0 \quad , \quad \frac{1}{c} \cdot \frac{dz}{dt} = 0 \quad . \tag{28}$$

Thus, equations 27 a-c yield the components of the acceleration in the moving frame in form of:

$$\frac{d^2 x'}{dt'^2} = \left(1 - \frac{v^2}{c^2} \right)^{-3/2} \cdot \frac{d^2 x}{dt^2} = \left[1 - \frac{1}{c^2} \cdot \left(\frac{dx}{dt} \right)^2 \right]^{-3/2} \cdot \frac{d^2 x}{dt^2} \quad , \tag{29 a}$$

$$\frac{d^2 y'}{dt'^2} = \left(1 - \frac{v^2}{c^2}\right)^{-1} \cdot \frac{d^2 y}{dt^2} = \left[1 - \frac{1}{c^2} \cdot \left(\frac{dx}{dt}\right)^2\right]^{-1} \cdot \frac{d^2 y}{dt^2} \quad , \tag{29 b}$$

$$\frac{d^2 z'}{dt'^2} = \left(1 - \frac{v^2}{c^2}\right)^{-1} \cdot \frac{d^2 z}{dt^2} = \left[1 - \frac{1}{c^2} \cdot \left(\frac{dx}{dt}\right)^2\right]^{-1} \cdot \frac{d^2 z}{dt^2} \quad , \tag{29 c}$$

where (dx/dt)/c is substituted for v/c (first of equations 28). These results coincide with the results achieved by using the Lorentz transformation (Einstein, 1905).

The components of the driving force **F'** in the moving frame, F'_x, F'_y, F'_z, are equal to the products of the rest mass m of the particle and the second time derivatives of the spatial coordinates, d^2x'/dt'^2, d^2y'/dt'^2, d^2z'/dt'^2, respectively (Newton's law of motion for sufficiently small velocities):

$$F'_x = m \cdot \frac{d^2 x'}{dt'^2} \quad , \quad F'_y = m \cdot \frac{d^2 y'}{dt'^2} \quad , \quad F'_z = m \cdot \frac{d^2 z'}{dt'^2} \quad . \tag{30}$$

The driving force **F'** of an electromagnetic field on a co-moving electro-charged particle as observed in the moving frame is determined in the next section 3.5.

3.5. Maxwell's equations in free space, electric Lorentz force, relativistic law of motion

The Maxwell equations of electrodynamics in empty space are given in the rest frame by:

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \quad , \tag{31 a}$$

$$\nabla \times \mathbf{B} = \frac{1}{c^2} \cdot \frac{\partial \mathbf{E}}{\partial t} \quad , \tag{31 b}$$

$$\nabla \cdot \mathbf{E} = 0 \quad , \tag{31 c}$$

$$\nabla \cdot \mathbf{B} = 0 \quad , \tag{31 d}$$

where **E** is the electric field vector, **B** is the magnetic field vector, and **∇** denotes the Nabla operator which is defined as the formal vector $(\partial/\partial x, \partial/\partial y, \partial/\partial z)$. Written in components, equations 31 a-d are given by:

$$\begin{pmatrix} \frac{\partial E_Z}{\partial y} - \frac{\partial E_Y}{\partial z} \\ \frac{\partial E_X}{\partial z} - \frac{\partial E_Z}{\partial x} \\ \frac{\partial E_Y}{\partial x} - \frac{\partial E_X}{\partial y} \end{pmatrix} = \begin{pmatrix} -\frac{\partial B_X}{\partial t} \\ -\frac{\partial B_Y}{\partial t} \\ -\frac{\partial B_Z}{\partial t} \end{pmatrix} \quad , \tag{32 a}$$

$$\begin{pmatrix} \frac{\partial B_Z}{\partial y} - \frac{\partial B_Y}{\partial z} \\ \frac{\partial B_X}{\partial z} - \frac{\partial B_Z}{\partial x} \\ \frac{\partial B_Y}{\partial x} - \frac{\partial B_X}{\partial y} \end{pmatrix} = \begin{pmatrix} \frac{1}{c^2} \cdot \frac{\partial E_X}{\partial t} \\ \frac{1}{c^2} \cdot \frac{\partial E_Y}{\partial t} \\ \frac{1}{c^2} \cdot \frac{\partial E_Z}{\partial t} \end{pmatrix} \quad , \tag{32 b}$$

$$\frac{\partial E_X}{\partial x}+\frac{\partial E_Y}{\partial y}+\frac{\partial E_Z}{\partial z}=0 \quad , \tag{32 c}$$

$$\frac{\partial B_X}{\partial x}+\frac{\partial B_Y}{\partial y}+\frac{\partial B_Z}{\partial z}=0 \quad . \tag{32 d}$$

The transformation to the moving frame is achieved through the equations 17 a-d, and by using the chain rule of differentiation:

$$\frac{\partial}{\partial x}=\frac{\partial}{\partial x'}\cdot\frac{\partial x'}{\partial x}+\frac{\partial}{\partial y'}\cdot\frac{\partial y'}{\partial x}+\frac{\partial}{\partial z'}\cdot\frac{\partial z'}{\partial x}+\frac{\partial}{\partial t'}\cdot\frac{\partial t'}{\partial x}=\gamma\cdot\frac{\partial}{\partial x'} \quad , \tag{33 a}$$

$$\frac{\partial}{\partial y}=\frac{\partial}{\partial x'}\cdot\frac{\partial x'}{\partial y}+\frac{\partial}{\partial y'}\cdot\frac{\partial y'}{\partial y}+\frac{\partial}{\partial z'}\cdot\frac{\partial z'}{\partial y}+\frac{\partial}{\partial t'}\cdot\frac{\partial t'}{\partial y}=\frac{\partial}{\partial y'} \quad , \tag{33 b}$$

$$\frac{\partial}{\partial z}=\frac{\partial}{\partial x'}\cdot\frac{\partial x'}{\partial z}+\frac{\partial}{\partial y'}\cdot\frac{\partial y'}{\partial z}+\frac{\partial}{\partial z'}\cdot\frac{\partial z'}{\partial z}+\frac{\partial}{\partial t'}\cdot\frac{\partial t'}{\partial z}=\frac{\partial}{\partial z'} \quad , \tag{33 c}$$

$$\frac{\partial}{\partial t}=\frac{\partial}{\partial x'}\cdot\frac{\partial x'}{\partial t}+\frac{\partial}{\partial y'}\cdot\frac{\partial y'}{\partial t}+\frac{\partial}{\partial z'}\cdot\frac{\partial z'}{\partial t}+\frac{\partial}{\partial t'}\cdot\frac{\partial t'}{\partial t}=-\gamma\cdot v\cdot\frac{\partial}{\partial x'}+\frac{1}{\gamma}\cdot\frac{\partial}{\partial t'} \quad . \tag{33 d}$$

The application of these transformation rules, equations 33 a-d, to equations 32 a-d, yields the Maxwell equations in the moving frame, written in components:

$$\begin{pmatrix} \frac{\partial E_Z}{\partial y'}-\frac{\partial E_Y}{\partial z'}-\gamma\cdot v\cdot\frac{\partial B_X}{\partial x'} \\ \frac{\partial E_X}{\partial z'}-\gamma\cdot\frac{\partial E_Z}{\partial x'}-\gamma\cdot v\cdot\frac{\partial B_Y}{\partial x'} \\ \gamma\cdot\frac{\partial E_Y}{\partial x'}-\frac{\partial E_X}{\partial y'}-\gamma\cdot v\cdot\frac{\partial B_Z}{\partial x'} \end{pmatrix}=\begin{pmatrix} -\frac{1}{\gamma}\cdot\frac{\partial B_X}{\partial t'} \\ -\frac{1}{\gamma}\cdot\frac{\partial B_Y}{\partial t'} \\ -\frac{1}{\gamma}\cdot\frac{\partial B_Z}{\partial t'} \end{pmatrix} \quad , \tag{34 a}$$

$$\begin{pmatrix} \frac{\partial B_Z}{\partial y'}-\frac{\partial B_Y}{\partial z'}+\gamma\cdot v\cdot\frac{1}{c^2}\cdot\frac{\partial E_X}{\partial x'} \\ \frac{\partial B_X}{\partial z'}-\gamma\cdot\frac{\partial B_Z}{\partial x'}+\gamma\cdot v\cdot\frac{1}{c^2}\cdot\frac{\partial E_Y}{\partial x'} \\ \gamma\cdot\frac{\partial B_Y}{\partial x'}-\frac{\partial B_X}{\partial y'}+\gamma\cdot v\cdot\frac{1}{c^2}\cdot\frac{\partial E_Z}{\partial x'} \end{pmatrix}=\begin{pmatrix} \frac{1}{\gamma}\cdot\frac{1}{c^2}\cdot\frac{\partial E_X}{\partial t'} \\ \frac{1}{\gamma}\cdot\frac{1}{c^2}\cdot\frac{\partial E_Y}{\partial t'} \\ \frac{1}{\gamma}\cdot\frac{1}{c^2}\cdot\frac{\partial E_Z}{\partial t'} \end{pmatrix} \quad , \tag{34 b}$$

$$\gamma\cdot\frac{\partial E_X}{\partial x'}+\frac{\partial E_Y}{\partial y'}+\frac{\partial E_Z}{\partial z'}=0 \quad , \tag{34 c}$$

$$\gamma\cdot\frac{\partial B_X}{\partial x'}+\frac{\partial B_Y}{\partial y'}+\frac{\partial B_Z}{\partial z'}=0 \quad . \tag{34 d}$$

Equations 34 a-d can be written as

$$\begin{pmatrix} \frac{\partial E'_Z}{\partial y'} - \frac{\partial E'_Y}{\partial z'} \\ \frac{\partial E'_X}{\partial z'} - \frac{\partial E'_Z}{\partial x'} \\ \frac{\partial E'_Y}{\partial x'} - \frac{\partial E'_X}{\partial y'} \end{pmatrix} = \begin{pmatrix} -\frac{\partial B'_X}{\partial t'} \\ -\frac{\partial B'_Y}{\partial t'} + \frac{v}{c^2} \cdot \frac{\partial E'_Z}{\partial t'} \\ -\frac{\partial B'_Z}{\partial t'} - \frac{v}{c^2} \cdot \frac{\partial E'_Y}{\partial t'} \end{pmatrix} \quad , \tag{35 a}$$

$$\begin{pmatrix} \frac{\partial B'_Z}{\partial y'} - \frac{\partial B'_Y}{\partial z'} \\ \frac{\partial B'_X}{\partial z'} - \frac{\partial B'_Z}{\partial x'} \\ \frac{\partial B'_Y}{\partial x'} - \frac{\partial B'_X}{\partial y'} \end{pmatrix} = \begin{pmatrix} \frac{1}{c^2} \cdot \frac{\partial E'_X}{\partial t'} \\ \frac{1}{c^2} \cdot \frac{\partial E'_Y}{\partial t'} + \frac{v}{c^2} \cdot \frac{\partial B'_Z}{\partial t'} \\ \frac{1}{c^2} \cdot \frac{\partial E'_Z}{\partial t'} - \frac{v}{c^2} \cdot \frac{\partial B'_Y}{\partial t'} \end{pmatrix} \quad , \tag{35 b}$$

$$\frac{\partial E'_X}{\partial x'} + \frac{\partial E'_Y}{\partial y'} + \frac{\partial E'_Z}{\partial z'} = -v \cdot \left(\frac{\partial B'_Z}{\partial y'} - \frac{\partial B'_Y}{\partial z'} \right) \quad , \tag{35 c}$$

$$\frac{\partial B'_X}{\partial x'} + \frac{\partial B'_Y}{\partial y'} + \frac{\partial B'_Z}{\partial z'} = -\frac{v}{c^2} \cdot \left(\frac{\partial E'_Y}{\partial z'} - \frac{\partial E'_Z}{\partial y'} \right) \quad , \tag{35 d}$$

where the primed field quantities are defined as:

$$E'_X = E_X \quad , \quad E'_Y = \gamma \cdot (E_Y - v \cdot B_Z) \quad , \quad E'_Z = \gamma \cdot (E_Z + v \cdot B_Y) \quad , \tag{36 a}$$

$$B'_X = B_X \quad , \quad B'_Y = \gamma \cdot \left(B_Y + \frac{v}{c^2} \cdot E_Z \right) \quad , \quad B'_Z = \gamma \cdot \left(B_Z - \frac{v}{c^2} \cdot E_Y \right) \quad . \tag{36 b}$$

The equations 36 a-b are just the well known Lorentz transformation equations of the electromagnetic field quantities from the rest frame (unprimed) to the moving frame (primed) (Einstein, 1905). The equations 35 a-d and 36 a-b can be written in a general vector form:

$$\nabla' \times \mathbf{E}' = -\frac{\partial \mathbf{B}'}{\partial t'} - \frac{\partial}{\partial t'} \left(\frac{\mathbf{v}}{c^2} \times \mathbf{E}' \right) \quad , \tag{37 a}$$

$$\nabla' \times \mathbf{B}' = \frac{\partial}{\partial t'} \left(\frac{\mathbf{E}'}{c^2} \right) - \frac{\partial}{\partial t'} \left(\frac{\mathbf{v}}{c^2} \times \mathbf{B}' \right) \quad , \tag{37 b}$$

$$\nabla' \cdot \mathbf{E}' = \nabla' \cdot (\mathbf{v} \times \mathbf{B}') \quad , \tag{37 c}$$

$$\nabla' \cdot \mathbf{B}' = -\nabla' \cdot \left(\frac{\mathbf{v}}{c^2} \times \mathbf{E}' \right) \quad , \tag{37 d}$$

where **E**' and **B**' are given by

$$\mathbf{E}' = \gamma \cdot (\mathbf{E} + \mathbf{v} \times \mathbf{B}) - (\gamma - 1) \cdot \frac{(\mathbf{v} \cdot \mathbf{E}) \cdot \mathbf{v}}{\mathbf{v}^2} \quad , \tag{37 e}$$

$$\mathbf{B}' = \gamma \cdot (\mathbf{B} - \frac{1}{c^2} \cdot \mathbf{v} \times \mathbf{E}) - (\gamma - 1) \cdot \frac{(\mathbf{v} \cdot \mathbf{B}) \cdot \mathbf{v}}{\mathbf{v}^2} \quad , \tag{37 f}$$

and **∇**' is the Nabla-operator in the moving frame, defined as the formal vector (∂/∂x',∂/∂y',∂/∂z'). The equations 37 a-d correspond to the extended notation of Maxwell's equations, formally including terms of the quasi electric

volume charge density, ρ_e', and the quasi magnetic volume charge density, ρ_m', along with their quasi current densities, $\mathbf{j}_e$' and $\mathbf{j}_m$', respectively:

$$\nabla' \times \mathbf{E}' = -\frac{\partial \mathbf{B}'}{\partial t'} - \mu_0 \cdot \mathbf{j}'_m \quad , \tag{38 a}$$

$$\nabla' \times \mathbf{B}' = \frac{\partial}{\partial t'}\left(\frac{\mathbf{E}'}{c^2}\right) + \mu_0 \cdot \mathbf{j}'_e \quad , \tag{38 b}$$

$$\nabla' \cdot \mathbf{E}' = \frac{\rho'_e}{\varepsilon_0} \quad , \tag{38 c}$$

$$\nabla' \cdot \mathbf{B}' = \mu_0 \cdot \rho'_m \quad , \tag{38 d}$$

where

$$\rho'_e = \varepsilon_0 \cdot \nabla' \cdot (\mathbf{v} \times \mathbf{B}') \quad , \quad \rho'_m = -\frac{1}{\mu_0} \cdot \frac{1}{c^2} \cdot \nabla' \cdot (\mathbf{v} \times \mathbf{E}') \quad , \tag{39 a}$$

$$\mathbf{j}'_e = -\frac{1}{\mu_0} \cdot \frac{\partial}{\partial t'}\left(\frac{\mathbf{v}}{c^2} \times \mathbf{B}'\right) \quad , \quad \mathbf{j}'_m = \frac{1}{\mu_0} \cdot \frac{\partial}{\partial t'}\left(\frac{\mathbf{v}}{c^2} \times \mathbf{E}'\right) \quad , \tag{39 b}$$

and

$$\varepsilon_0 \cdot \mu_0 = \frac{1}{c^2} \quad , \tag{40}$$

with ε_0 and μ_0 meaning the permittivity and the permeability of vacuum, respectively. Using the equations 37 a-b, and taking into account that $\mathbf{v}$ is assumed to be constant, the equations 39 a can be rewritten as:

$$\rho'_e = -\varepsilon_0 \cdot \left(\frac{\mathbf{v}}{c^2} \cdot \frac{\partial \mathbf{E}'}{\partial t'}\right) \quad , \tag{41 a}$$

$$\rho'_m = -\frac{1}{\mu_0} \cdot \left(\frac{\mathbf{v}}{c^2} \cdot \frac{\partial \mathbf{B}'}{\partial t'}\right) \quad . \tag{41 b}$$

Thus, in the moving frame, an oscillating electric field generates a quasi electric volume charge density according to equation 41 a, and an oscillating magnetic field generates a quasi magnetic volume charge density according to equation 41 b.

It should be noted that the quasi charge densities ρ_e' and ρ_m' and quasi current densities $\mathbf{j}_e$' and $\mathbf{j}_m$' fulfil the respective continuity equations:

$$\nabla' \cdot \mathbf{j}'_e = -\frac{\partial \rho'_e}{\partial t'} \quad , \quad \nabla' \cdot \mathbf{j}'_m = -\frac{\partial \rho'_m}{\partial t'} \quad . \tag{42}$$

Thus, the requirement of form invariance of physical laws in the theory of special relativity, equations 31 a-d versus equations 38 a-d, is considered to be fulfilled. An exact coincidence cannot be expected under the modified transformation (equations 17 a-d), but rather some extended form, since the rest frame and the moving frame are not equivalent. Therefore, the equations 36 a-b are taken unchanged to be the valid transformation rules for the electromagnetic field quantities, in the new theory as well as in Einstein's special relativity.

The force of an electromagnetic field on a co-moving test particle with electric charge q_e is given in the moving frame by

$$\mathbf{F}' = q_e \cdot \mathbf{E}' \quad . \tag{43}$$

Since the particle is assumed to co-move with the moving frame, i. e. dx'/dt'=0, the velocity v in the equations 36 a-b can be replaced by dx/dt. Then the equations 43, 36 a, 30, and 29 a-c yield:

$$\frac{q_e}{m}\cdot E_X=\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-3/2}\cdot\frac{d^2x}{dt^2}\quad , \tag{44 a}$$

$$\frac{q_e}{m}\cdot\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1/2}\cdot\left(E_Y-\frac{dx}{dt}\cdot B_Z\right)=\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1}\cdot\frac{d^2y}{dt^2}\quad , \tag{44 b}$$

$$\frac{q_e}{m}\cdot\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1/2}\cdot\left(E_Z+\frac{dx}{dt}\cdot B_Y\right)=\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1}\cdot\frac{d^2z}{dt^2}\quad , \tag{44 c}$$

or

$$q_e\cdot E_X=m\cdot\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-3/2}\cdot\frac{d^2x}{dt^2}\quad , \tag{45 a}$$

$$q_e\cdot\left(E_Y-\frac{dx}{dt}\cdot B_Z\right)=m\cdot\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1/2}\cdot\frac{d^2y}{dt^2}\quad , \tag{45 b}$$

$$q_e\cdot\left(E_Z+\frac{dx}{dt}\cdot B_Y\right)=m\cdot\left[1-\frac{1}{c^2}\cdot\left(\frac{dx}{dt}\right)^2\right]^{-1/2}\cdot\frac{d^2z}{dt^2}\quad . \tag{45 c}$$

These equations can be written in vector form to obtain the well known relativistic law of motion:

$$q_e\cdot\left(\mathbf{E}+\frac{d\mathbf{r}}{dt}\times\mathbf{B}\right)=\frac{d}{dt}\left[\frac{m\cdot\frac{d\mathbf{r}}{dt}}{\sqrt{1-\frac{1}{c^2}\cdot\left(\frac{d\mathbf{r}}{dt}\right)^2}}\right]\quad , \tag{46}$$

where **r** denotes the radius vector of the particle's location in the rest frame. The expression on the left side of equation 46 is straightforwardly defined to be the force of an electromagnetic field acting on a moving charged particle when measured by an observer resting in the rest frame.

3.6. Electromagnetic wave equations in free space, Doppler frequency effect, normal velocity and signal velocity of light

The classic electromagnetic wave equations in the rest frame can be derived, as is well known, from the corresponding Maxwell equations 31 a-d. Taking the curl of equations 31 a-b, and taking into account equations 31 c-d, yields:

$$\nabla \times (\nabla \times \mathbf{E}) = -\frac{\partial}{\partial t}(\nabla \times \mathbf{B}) = -\frac{1}{c^2} \cdot \frac{\partial^2 \mathbf{E}}{\partial t^2} \quad , \tag{47 a}$$

$$\nabla \times (\nabla \times \mathbf{B}) = \frac{1}{c^2} \cdot \frac{\partial}{\partial t}(\nabla \times \mathbf{E}) = -\frac{1}{c^2} \cdot \frac{\partial^2 \mathbf{B}}{\partial t^2} \quad . \tag{47 b}$$

On the other hand, by using a general vector identity, and taking into account equations 31 c-d, it follows that

$$\nabla \times (\nabla \times \mathbf{E}) = \nabla \cdot (\nabla \cdot \mathbf{E}) - (\nabla \cdot \nabla) \cdot \mathbf{E} = -(\nabla \cdot \nabla) \cdot \mathbf{E} \quad , \tag{48 a}$$

$$\nabla \times (\nabla \times \mathbf{B}) = \nabla \cdot (\nabla \cdot \mathbf{B}) - (\nabla \cdot \nabla) \cdot \mathbf{B} = -(\nabla \cdot \nabla) \cdot \mathbf{B} \quad . \tag{48 b}$$

The resulting wave equations are received by combining the equations 47 a-b, with equations 48 a-b, respectively:

$$\frac{\partial^2 \mathbf{E}}{\partial t^2} = c^2 \cdot \left(\frac{\partial^2 \mathbf{E}}{\partial x^2} + \frac{\partial^2 \mathbf{E}}{\partial y^2} + \frac{\partial^2 \mathbf{E}}{\partial z^2} \right) \quad , \tag{49 a}$$

$$\frac{\partial^2 \mathbf{B}}{\partial t^2} = c^2 \cdot \left(\frac{\partial^2 \mathbf{B}}{\partial x^2} + \frac{\partial^2 \mathbf{B}}{\partial y^2} + \frac{\partial^2 \mathbf{B}}{\partial z^2} \right) \quad . \tag{49 b}$$

The plane wave solutions of these equations, in complex form, are:

$$\mathbf{E} = \mathbf{E}_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(t - \frac{1}{c} \cdot (x \cdot n_X + y \cdot n_Y + z \cdot n_Z) \right) \right] \quad , \tag{50 a}$$

$$\mathbf{B} = \mathbf{B}_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(t - \frac{1}{c} \cdot (x \cdot n_X + y \cdot n_Y + z \cdot n_Z) \right) \right] \quad , \tag{50 b}$$

where $\mathbf{E}_0$ and $\mathbf{B}_0$ are complex vector amplitudes, f is the frequency, and n_X, n_Y, n_Z are the direction cosines of the plane wave normal **n**. For transformation of the equations 49 a-b to the moving frame, the second spatial and time derivatives must be transformed. This is done through differentiation of equations 33 a-d:

$$\frac{\partial^2}{\partial x^2} = \gamma^2 \cdot \frac{\partial^2}{\partial x'^2} \quad , \tag{51 a}$$

$$\frac{\partial^2}{\partial y^2} = \frac{\partial^2}{\partial y'^2} \quad , \tag{51 b}$$

$$\frac{\partial^2}{\partial z^2} = \frac{\partial^2}{\partial z'^2} \quad , \tag{51 c}$$

$$\frac{\partial^2}{\partial t^2} = \gamma^2 \cdot v^2 \cdot \frac{\partial^2}{\partial x'^2} + \frac{1}{\gamma^2} \cdot \frac{\partial^2}{\partial t'^2} - 2 \cdot v \cdot \frac{\partial^2}{\partial x' \, \partial t'} \quad . \tag{51 d}$$

The transformed wave equations are achieved by applying these transformation rules to the equations 49 a-b:

$$\frac{\partial^2 \mathbf{E}}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \left(\frac{\partial^2 \mathbf{E}}{\partial x'^2} + \frac{\partial^2 \mathbf{E}}{\partial y'^2} + \frac{\partial^2 \mathbf{E}}{\partial z'^2} \right) + 2 \cdot \gamma^2 \cdot v \cdot \frac{\partial^2 \mathbf{E}}{\partial x' \, \partial t'} \quad , \tag{52 a}$$

$$\frac{\partial^2 \mathbf{B}}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \left(\frac{\partial^2 \mathbf{B}}{\partial x'^2} + \frac{\partial^2 \mathbf{B}}{\partial y'^2} + \frac{\partial^2 \mathbf{B}}{\partial z'^2} \right) + 2 \cdot \gamma^2 \cdot v \cdot \frac{\partial^2 \mathbf{B}}{\partial x' \, \partial t'} \quad . \qquad (52\text{ b})$$

This means that any component of the vectors **E** or **B** fulfils the equations 52 a-b. Hence any linear combination of two of these components, e. g. the components of **E**' and **B**', equations 36 a-b, does too:

$$\frac{\partial^2 \mathbf{E}'}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \left(\frac{\partial^2 \mathbf{E}'}{\partial x'^2} + \frac{\partial^2 \mathbf{E}'}{\partial y'^2} + \frac{\partial^2 \mathbf{E}'}{\partial z'^2} \right) + 2 \cdot \gamma^2 \cdot v \cdot \frac{\partial^2 \mathbf{E}'}{\partial x' \, \partial t'} \quad , \qquad (53\text{ a})$$

$$\frac{\partial^2 \mathbf{B}'}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \left(\frac{\partial^2 \mathbf{B}'}{\partial x'^2} + \frac{\partial^2 \mathbf{B}'}{\partial y'^2} + \frac{\partial^2 \mathbf{B}'}{\partial z'^2} \right) + 2 \cdot \gamma^2 \cdot v \cdot \frac{\partial^2 \mathbf{B}'}{\partial x' \, \partial t'} \quad . \qquad (53\text{ b})$$

These equations can be rewritten in general form:

$$\frac{\partial^2 \mathbf{E}'}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \nabla'^2 \mathbf{E}' + 2 \cdot \gamma^2 \cdot (\mathbf{v} \cdot \nabla') \cdot \frac{\partial \mathbf{E}'}{\partial t'} \quad , \qquad (54\text{ a})$$

$$\frac{\partial^2 \mathbf{B}'}{\partial t'^2} = \gamma^2 \cdot c^2 \cdot \nabla'^2 \mathbf{B}' + 2 \cdot \gamma^2 \cdot (\mathbf{v} \cdot \nabla') \cdot \frac{\partial \mathbf{B}'}{\partial t'} \quad . \qquad (54\text{ b})$$

Equations 54 a-b are the theoretical basis for the evaluation of guided wave experiments to measure the one-way light signal speed in a moving frame (Sfarti, 2007).

The transformed plane wave solutions of these equations are easily obtained through transformation of the corresponding plane wave solutions in the rest frame, equations 50 a-b, by using the inversed equations 17 a-d: After employing some algebra, the final result is:

$$\mathbf{E} = \mathbf{E}_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(\gamma \cdot (1 - \frac{v}{c} \cdot n_X) \cdot t' - \frac{1}{c} \cdot (x' \cdot \frac{1}{\gamma} \cdot n_X + y' \cdot n_Y + z' \cdot n_Z) \right) \right] \quad , \qquad (55\text{ a})$$

$$\mathbf{B} = \mathbf{B}_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(\gamma \cdot (1 - \frac{v}{c} \cdot n_X) \cdot t' - \frac{1}{c} \cdot (x' \cdot \frac{1}{\gamma} \cdot n_X + y' \cdot n_Y + z' \cdot n_Z) \right) \right] \quad . \qquad (55\text{ b})$$

Because of the linearity of the equations 36 a-b, this again means, like above, that the electromagnetic quantities of the moving frame, **E**' and **B**', also fulfil the equations 55 a-b:

$$\mathbf{E}' = \mathbf{E}'_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(\gamma \cdot (1 - \frac{v}{c} \cdot n_X) \cdot t' - \frac{1}{c} \cdot (x' \cdot \frac{1}{\gamma} \cdot n_X + y' \cdot n_Y + z' \cdot n_Z) \right) \right] \quad , \qquad (56\text{ a})$$

$$\mathbf{B}' = \mathbf{B}'_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f \cdot \left(\gamma \cdot (1 - \frac{v}{c} \cdot n_X) \cdot t' - \frac{1}{c} \cdot (x' \cdot \frac{1}{\gamma} \cdot n_X + y' \cdot n_Y + z' \cdot n_Z) \right) \right] \quad . \qquad (56\text{ b})$$

On the other hand, the mathematical standard form of a plane electromagnetic wave in the moving frame is given by:

$$\mathbf{E}' = \mathbf{E}'_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f' \cdot \left(t' - \frac{1}{c'_n} \cdot (x' \cdot n'_X + y' \cdot n'_Y + z' \cdot n'_Z) \right) \right] \quad , \qquad (57\text{ a})$$

$$\mathbf{B}' = \mathbf{B}'_0 \cdot \exp\left[i \cdot 2 \cdot \pi \cdot f' \cdot \left(t' - \frac{1}{c'_n} \cdot (x' \cdot n'_X + y' \cdot n'_Y + z' \cdot n'_Z) \right) \right] \quad , \qquad (57\ b)$$

where f' is the wave frequency in the moving frame, and c'_n denotes the normal (phase) speed of light in the moving frame, in the direction of the plane wave normal **n**' given by the direction cosines, n'_X, n'_Y, n'_Z. Comparison of equations 56 a-b with equations 57 a-b, respectively, yields:

$$f' = \gamma \cdot f \cdot (1 - \frac{v}{c} \cdot n_X) \quad , \qquad (58\ a)$$

$$\frac{f'}{c'_n} \cdot n'_X = \frac{1}{\gamma} \cdot \frac{f}{c} \cdot n_X \quad , \qquad (58\ b)$$

$$\frac{f'}{c'_n} \cdot n'_Y = \frac{f}{c} \cdot n_Y \quad , \qquad (58\ c)$$

$$\frac{f'}{c'_n} \cdot n'_Z = \frac{f}{c} \cdot n_Z \quad . \qquad (58\ d)$$

For the sake of simplicity, a two spatial dimensions formulation is used (see figures 1 a and b), without restriction of generality. This means:

$$n_X = \cos(\alpha)\ ,\ n_Y = \sin(\alpha)\ ,\ n_Z = 0\ ,\ n'_X = \cos(\alpha'_n)\ ,\ n'_Y = \sin(\alpha'_n)\ ,\ n'_Z = 0 \quad , \qquad (59)$$

where α is the angle between **n** and the X-axis, and α'_n is the angle between **n**' and the X'-axis. It follows from equations 58 a-d, taking into account equation 59:

$$f' = \gamma \cdot f \cdot (1 - \frac{v}{c} \cdot \cos(\alpha)) \quad , \qquad (60\ a)$$

$$\frac{f'}{c'_n} \cdot \cos(\alpha'_n) = \frac{1}{\gamma} \cdot \frac{f}{c} \cdot \cos(\alpha) \quad , \qquad (60\ b)$$

$$\frac{f'}{c'_n} \cdot \sin(\alpha'_n) = \frac{f}{c} \cdot \sin(\alpha) \quad . \qquad (60\ c)$$

Equation 60 a expresses the relativistic Doppler effect, in agreement with Einstein (1905). Furthermore, the equations 60 a-c can be solved for c'_n, $\cos(\alpha'_n)$, and $\sin(\alpha'_n)$:

$$c'_n = c \cdot \gamma \cdot \sqrt{\frac{1 - \frac{v}{c} \cdot \cos(\alpha)}{1 + \frac{v}{c} \cdot \cos(\alpha)}} \quad , \qquad (61\ a)$$

$$\cos(\alpha'_n) = \frac{1}{\gamma} \cdot \frac{1}{\sqrt{1 - \frac{v^2}{c^2} \cdot \cos^2(\alpha)}} \cdot \cos(\alpha) \quad , \qquad (61\ b)$$

$$\sin(\alpha'_n) = \frac{1}{\sqrt{1 - \frac{v^2}{c^2} \cdot \cos^2(\alpha)}} \cdot \sin(\alpha) \quad . \qquad (61\ c)$$

It is interesting to note that the equations 61 a-c do not coincide with the equations 17 f-h, respectively. This means, there are two light speeds, the signal speed c' and the normal speed c'_n, and two respective direction angles, the beam direction α' and the direction α'_n normal to planes of constant phase. This can be understood by assigning the space in the moving frame anisotropic quality. Following Max Born's treatment of the optics of anisotropic media (crystals) (Born, 1985), the signal speed of light can be interpreted as the speed at which light energy is transported along the beam direction given by the angle α' (ray velocity). This interpretation is put to a simple plausibility test: The ratio c'/c'_n is determined in two independent ways. Firstly, c'/c'_n is calculated using the equations 17 f-h and 61 a-c. The result is:

$$\frac{c'}{c'_n} = \frac{1}{\cos(\alpha' - \alpha'_n)} \quad . \tag{62}$$

Secondly, c'/c'_n is determined by the ratio of the wave lengths, λ'/λ'_n:

$$\frac{c'}{c'_n} = \frac{\lambda'}{\lambda'_n} \quad , \tag{63}$$

where λ'/λ'_n can be directly seen in figure 3 to be equal to the right side of equation 62.

In the next section 3.7 it is confirmed that the direction of the light signal in the moving frame (angle α') really agrees with the direction of the light energy flux density, i. e. the Poynting vector.

3.7. Electromagnetic energy transport in free space in a moving frame

The propagation of light in free space in a moving frame is governed by the transformed Maxwell equations 37 a-d. The mathematical form of a plane electromagnetic wave in a moving frame is given by equations 57 a-b. Plugging equations 57 a-b into equations 37 a-b yields in terms of complex field vectors:

$$\frac{1}{c'_n} \cdot \mathbf{n}' \times \mathbf{E}' = (\mathbf{B}' + \frac{\mathbf{v}}{c^2} \times \mathbf{E}') \quad , \tag{64 a}$$

$$\frac{1}{c'_n} \cdot \mathbf{n}' \times \mathbf{B}' = -\frac{1}{c^2}(\mathbf{E}' - \mathbf{v} \times \mathbf{B}') \quad . \tag{64 b}$$

Applying again for simplicity a two dimensional spatial formulation by setting $n'_Z=0$ (equation 59), and orienting the positive X(X')-axis in the direction of **v**, it follows in terms of complex field vector components, without restriction of generality:

$$\frac{1}{c'_n} \cdot \begin{pmatrix} E'_Z \cdot n'_Y \\ -E'_Z \cdot n'_X \\ E'_Y \cdot n'_X - E'_X \cdot n'_Y \end{pmatrix} = \begin{pmatrix} B'_X \\ B'_Y \\ B'_Z \end{pmatrix} + \frac{v}{c^2} \cdot \begin{pmatrix} 0 \\ -E'_Z \\ E'_Y \end{pmatrix} \quad , \tag{65 a}$$

$$\frac{1}{c'_n} \cdot \begin{pmatrix} B'_Z \cdot n'_Y \\ -B'_Z \cdot n'_X \\ B'_Y \cdot n'_X - B'_X \cdot n'_Y \end{pmatrix} = -\frac{1}{c^2} \cdot \begin{pmatrix} E'_X \\ E'_Y \\ E'_Z \end{pmatrix} + \frac{v}{c^2} \cdot \begin{pmatrix} 0 \\ -B'_Z \\ B'_Y \end{pmatrix} \quad . \tag{65 b}$$

Solving equation 65 a for B'_X, B'_Y, B'_Z, and plugging the result into equation 65 b leads to a system of linear homogeneous equations with unknowns E'_X, E'_Y, E'_Z:

$$E'_X \cdot \left[\frac{1}{c^2} - \left(\frac{n'_Y}{c'_n} \right)^2 \right] + E'_Y \cdot \left[\frac{n'_Y}{c'_n} \cdot \left(\frac{n'_X}{c'_n} - \frac{v}{c^2} \right) \right] = 0 \quad , \tag{66 a}$$

$$E'_X \cdot \left[\frac{n'_Y}{c'_n}\cdot\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)\right]+E'_Y\cdot\left[\frac{1}{c^2}-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] = 0 \quad , \qquad (66\text{ b})$$

$$E'_Z\cdot\left[\frac{1}{c^2}-\left(\frac{n'_Y}{c'_n}\right)^2-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] = 0 \quad . \qquad (66\text{ c})$$

This system of equations has non-trivial solutions $(E'_X,E'_Y,E'_Z)\neq(0,0,0)$ only if the determinant of the coefficient matrix is zero:

$$\begin{vmatrix} \left[\frac{1}{c^2}-\left(\frac{n'_Y}{c'_n}\right)^2\right] & \left[\frac{n'_Y}{c'_n}\cdot\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)\right] & 0 \\ \left[\frac{n'_Y}{c'_n}\cdot\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)\right] & \left[\frac{1}{c^2}-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] & 0 \\ 0 & 0 & \left[\frac{1}{c^2}-\left(\frac{n'_Y}{c'_n}\right)^2-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] \end{vmatrix} = 0 \quad . \qquad (67\text{ a})$$

That is the case if either

$$\begin{vmatrix} \left[\frac{1}{c^2}-\left(\frac{n'_Y}{c'_n}\right)^2\right] & \left[\frac{n'_Y}{c'_n}\cdot\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)\right] \\ \left[\frac{n'_Y}{c'_n}\cdot\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)\right] & \left[\frac{1}{c^2}-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] \end{vmatrix} = 0 \qquad (67\text{ b})$$

or

$$\left[\frac{1}{c^2}-\left(\frac{n'_Y}{c'_n}\right)^2-\left(\frac{n'_X}{c'_n}-\frac{v}{c^2}\right)^2\right] = 0 \qquad (67\text{ c})$$

is fulfilled.

These conditions, equation 67 b and equation 67 c, are equivalent: They lead to the same quadratic equation for determining the normal light velocity c'_n:

$$\frac{1}{c^2}\cdot\left(1-\frac{v^2}{c^2}\right)\cdot c'^2_n + 2\cdot n'_X\cdot\frac{v}{c^2}\cdot c'_n - 1 = 0 \quad . \qquad (68)$$

The solution is:

$$c'_n = \frac{c}{1-\frac{v^2}{c^2}}\cdot\left(\sqrt{1-\frac{v^2}{c^2}\cdot n'^2_Y}-\frac{v}{c}\cdot n'_X\right) \quad , \qquad (69\text{ a})$$

or in terms of the direction angle α'_n:

$$c'_n = \frac{c}{1-\frac{v^2}{c^2}} \cdot \left(\sqrt{1-\frac{v^2}{c^2}\cdot \sin^2 \alpha'_n} - \frac{v}{c} \cdot \cos \alpha'_n \right) \quad . \tag{69 b}$$

A second solution, with the root in the equations 69 a and 69 b taken negative, however, has no meaning because it gives negative values of c'_n. Equation 69 b coincides with the result obtained by transformation of the plane wave solution, equations 61 a-c of section 3.6, when the angle α is eliminated.

In the following, the ray direction in the moving frame will be determined: The light ray points per definition in the direction of the energy transport. It is assumed that the energy flux density in the moving frame is still given by the Poynting vector defined as

$$\mathbf{S}' = \mathbf{E}' \times \mathbf{H}' = \frac{1}{\mu_0} \cdot \mathbf{E}' \times \mathbf{B}' \quad , \tag{70}$$

with $\mathbf{H}'=\mathbf{B}'/\mu_0$ being the complex magnetic field intensity. For determining the direction of the Poynting vector, it is sufficient to employ its time average which is given for time-harmonic fields by

$$\overline{\mathbf{S}}' = \frac{1}{2} \cdot \mathrm{Re}(\mathbf{E}' \times \mathbf{H}'^*) = \frac{1}{2 \cdot \mu_0} \cdot \mathrm{Re}(\mathbf{E}' \times \mathbf{B}'^*) \quad , \tag{71}$$

where $\mathbf{H}'^*$ and $\mathbf{B}'^*$ denote the complex conjugate quantities of $\mathbf{H}'$ and $\mathbf{B}'$, respectively, and Re means the real part of a complex quantity. E'_Z can be chosen freely, equations 66 c and 67 c. E'_X and E'_Y however are linked together according to equations 66 a and 66 b, so that only one of these variables can be arbitrarily chosen. Equations 66 a and b yield

$$\frac{E'_X}{c^2} = \left[E'_X \cdot \frac{n'_Y}{c'_n} - E'_Y \cdot \left(\frac{n'_X}{c'_n} - \frac{v}{c^2} \right) \right] \cdot \frac{n'_Y}{c'_n} \quad , \tag{72 a}$$

$$\frac{E'_Y}{c^2} = -\left[E'_X \cdot \frac{n'_Y}{c'_n} - E'_Y \cdot \left(\frac{n'_X}{c'_n} - \frac{v}{c^2} \right) \right] \cdot \left(\frac{n'_X}{c'_n} - \frac{v}{c^2} \right) \quad , \tag{72 b}$$

which leads to a simple relation between E'_X and E'_Y:

$$E'_X = -\frac{n'_Y}{n'_X - \frac{v}{c^2} \cdot c'_n} \cdot E'_Y \quad . \tag{73}$$

E'_Y shall be chosen as the independent quantity. Thus, the Poynting vector is evaluated by plugging B'_X, B'_Y, and B'_Z obtained from equation 65 a into equation 71, and then substituting the right hand side of equation 73 for E'_X in the resulting formula. The final result, in terms of components, is:

$$\overline{S}'_X = \frac{1}{2 \cdot \mu_0} \cdot \mathrm{Re} \left\{ E'_Y \cdot E'^*_Y \cdot \left[1 + \left(\frac{n'_Y \cdot c^2}{n'_X \cdot c^2 - v \cdot c'_n} \right)^2 \right] + E'_Z \cdot E'^*_Z \right\} \cdot \left(\frac{n'_X}{c'_n} - \frac{v}{c^2} \right) \quad , \tag{74 a}$$

$$\overline{S}'_Y = \frac{1}{2 \cdot \mu_0} \cdot \mathrm{Re} \left\{ E'_Y \cdot E'^*_Y \cdot \left[1 + \left(\frac{n'_Y \cdot c^2}{n'_X \cdot c^2 - v \cdot c'_n} \right)^2 \right] + E'_Z \cdot E'^*_Z \right\} \cdot \frac{n'_Y}{c'_n} \quad , \tag{74 b}$$

$$\overline{S}'_Z = 0 \quad . \tag{74 c}$$

The angle between the (time-averaged) Poynting vector and the unit vector **n'** normal to planes of constant phase is then, taking credit of the equations 68 and 69 a, given by:

$$\cos(\mathbf{n}', \overline{\mathbf{S}}') = \frac{\mathbf{n}' \cdot \overline{\mathbf{S}}'}{\sqrt{\overline{\mathbf{S}}' \cdot \overline{\mathbf{S}}'}} = \sqrt{1 - \frac{v^2}{c^2} \cdot n'^2_\gamma} = \sqrt{1 - \frac{v^2}{c^2} \cdot \sin^2(\alpha'_n)} \quad . \tag{75}$$

This expression of $\cos(\mathbf{n}',\mathbf{S}')$ coincides with $\cos(\alpha'-\alpha'_n)$ of equation 62, taking into account the equations 61 a-c and 17 f-g. That means, the direction of the light signal is indeed identical with the direction of the Poynting vector, as expected. This finding indicates the consistency of the theory.

3.8. Another interpretation of Maxwell's equations in anisotropic space

The interpretation of Maxwell's equations in free space in a moving frame, equations 37 a-d, is not unequivocal. Quasi-electric charges and quasi-magnetic charges (equations 38 a-d) as they occur with the Lorentz transformation of electromagnetic fields, equations 37 e-f, can be avoided by an additional second transformation of the field quantities:

$$\mathbf{E}'' = \mathbf{E}' \quad , \tag{76 a}$$

$$\mathbf{B}'' = \mathbf{B}' + \frac{1}{c^2} \cdot (\mathbf{v} \times \mathbf{E}') \quad , \tag{76 b}$$

so that the total transformation is given by

$$\mathbf{E}'' = \gamma \cdot (\mathbf{E} + \mathbf{v} \times \mathbf{B}) - (\gamma - 1) \cdot \frac{(\mathbf{v} \cdot \mathbf{E}) \cdot \mathbf{v}}{\mathbf{v}^2} \quad , \tag{77 a}$$

$$\mathbf{B}'' = \frac{1}{\gamma} \cdot \mathbf{B} + \frac{1}{c^2} \cdot \frac{\gamma}{\gamma + 1} \cdot (\mathbf{v} \cdot \mathbf{B}) \cdot \mathbf{v} \quad . \tag{77 b}$$

The inversion of equations 76 a-b gives:

$$\mathbf{E}' = \mathbf{E}'' \quad , \quad \mathbf{B}' = \mathbf{B}'' - \frac{1}{c^2} \cdot (\mathbf{v} \times \mathbf{E}'') \quad . \tag{78}$$

Substitution of these expressions for **E'** and **B'** in equations 37 a-d yields:

$$\nabla' \times \mathbf{E}'' = -\frac{\partial \mathbf{B}''}{\partial t'} \quad , \tag{79 a}$$

$$\nabla' \times \mathbf{H}'' = \frac{\partial \mathbf{D}''}{\partial t'} \quad , \tag{79 b}$$

$$\nabla' \cdot \mathbf{D}'' = 0 \quad , \tag{79 c}$$

$$\nabla' \cdot \mathbf{B}'' = 0 \quad , \tag{79 d}$$

with

$$\mathbf{D}'' = \varepsilon_0 \cdot \mathbf{E}'' - \varepsilon_0 \cdot \mathbf{v} \times \mathbf{B}'' + \frac{\varepsilon_0}{c^2} \cdot \mathbf{v} \times (\mathbf{v} \times \mathbf{E}'') \quad , \tag{79 e}$$

$$\mathbf{H}'' = \frac{1}{\mu_0} \cdot \mathbf{B}'' - \frac{1}{\mu_0} \cdot \frac{1}{c^2} \cdot \mathbf{v} \times \mathbf{E}'' \quad , \tag{79 f}$$

where **D**'' denotes the electric displacement field, and **H**'' means the magnetic field intensity, in the moving frame. These formulae, equations 79 a-f, correspond to the Maxwell's equations in anisotropic space by T. Chang (Chang, 1979). Quasi-electric and quasi-magnetic charges are avoided, but instead of the usual vacuum relations, $\mathbf{D}''=\varepsilon_0\mathbf{E}''$ and $\mathbf{H}''=\mu_0^{-1}\mathbf{B}''$, there formally appear unusual "quasi-material properties" of the vacuum, equations 79 e-f. The interpretations of the two formulations, equations 37 a-d, and equations 79 a-f, are quite different. In the first case, an observer in the moving frame would measure the electromagnetic field **E**', **B**', in the second case he would observe **E**'', **B**''. This second interpretation does not affect the formula for the electric Lorentz force since **E**'' equals **E**', but its magnetic counterpart differs, equation 76 b: An electric field in the rest frame does not induce a magnetic field in the moving frame, equation 77 b.

The Poynting vector is no distinguishing feature of the two interpretations because it is invariant under the transformation equations 76 a-b:

$$\mathbf{S}'' = \mathbf{E}'' \times \mathbf{H}'' = \mathbf{E}' \times \frac{\mathbf{B}'}{\mu_0} = \mathbf{S}' \quad , \tag{80}$$

what can readily be proved by employing equation 79 f. Thus, experimental evidence seems to be the only way to decide between the two interpretations.

4. Summary and conclusions

Einstein's theory of special relativity states that there is no preferred frame, i. e. any inertial frame can be chosen to be the rest frame. This is not satisfactory since it yields opposite results dependant on the choice of the rest frame, which is due to the symmetry of the Lorentz transformation. This paradox (clock paradox) cannot be resolved by the standard theory of special relativity itself but needs supplement from the theory of general relativity along with the equivalence principle (equivalence of acceleration and gravity).

In order to make the special relativity an independent theory, the old "ether" theory was reconsidered in the new form of the "Generalized Galilean Transformation". This means to back off repudiating Einstein's work.

In contrast, the present paper is meant to step forward by fully using Einstein's light beam procedure, and even extending it. This is accomplished by the requirement that, for completeness, the coordinate points resting in both of the two inertial frames, not only those ones resting in the moving frame, are to fulfil the transformation formulae. Consequently, more open parameters are needed to meet all of these requirements. This is accomplished by (i) allowing the ratio of the velocities of the frames relative to each other to be an open fit parameter, not necessarily equal to 1, and (ii) by allowing the light signal speed c' in one of the two inertial frames, the "moving frame", to deviate from the constant c. The other frame, the "rest frame", is, contrary to Einstein's statement above, but in accordance with the "Generalized Galilean Transformation", assumed to be a preferred frame defined to be motionless, in which the light signal speed is equal to the constant c in all directions. As a consequence, it turns out that (i) the light signal speed in the moving frame must be direction dependent, (ii) that the relative velocities of the frames must be different, and (iii) that the transformation of time must be independent of the spatial coordinates.

Some applications are carried out to check the new transformation: Light aberration effect, length contraction, time dilation, relativistic law of motion, electric Lorentz force, and electromagnetic Doppler frequency are found to be equal to Einstein's results. However, the clock paradox is avoided. Another effect is rather puzzling at a first glance: The transformation of the plane wave solution of the electromagnetic wave equation yields a light speed and its propagation direction which differ from those found for the light signal. This additionally occurring light speed is interpreted as to mean the phase velocity or normal velocity of light. In contrast, the light signal speed is supposed to be the velocity of electromagnetic energy transportation, i. e. the ray velocity. The existence of these two speeds of light in different directions is obviously due to the optical anisotropy of the moving frame. Another result noteworthy is the formal generation of quasi electric and quasi magnetic volume charge densities by an oscillating electromagnetic field in a moving frame. It is shown how to avoid this effect applying a different interpretation of Maxwell's equations in anisotropic space, but then there formally appears an unusual electromagnetic behaviour of the vacuum.

In real cases, it cannot be expected that one of the frames is the preferred rest frame. In these cases, the adequate transformation formulae are found by a first transformation from one of the moving frames to the rest frame, followed by a second transformation from the rest frame to the other moving frame. However, this procedure can only be evaluated if the velocities of the two moving frames relative to the rest frame are known. A measurement of the velocity of a frame could in principle be carried out by an observer resting in that frame through measurement of the light signal speed in different directions.

Finally, it is surprising that the present theory, although based on Einstein's special relativity, at last approves the "Generalized Galilean transformation", and hence supports any application of it. In other words, the "Generalized Galilean transformation" which was up to now just an ad hoc assumption appears to be a result within the framework of the present deductive theory: The "rest frame" is interpreted to be a "preferred frame", and corresponds to the fiction of the "ether".

Table 1. Transformation from rest frame Σ to moving inertial frame Σ' in standard configuration (Einstein, 1905): Special points are chosen for P' co-moving with the moving frame Σ' (figure 1 a) and for P resting in the rest frame Σ (figure 1 b). The coordinates of each point event, P' as well as P, are expressed in both frames, Σ and Σ', and plugged into the transformation formulae, equations 4 a-d, in order to find out their yet unknown coefficients C_2, A_4, D_4, A_1, D_1, step by step (B_2 remains open). Current results of each step are given in the right column of the table. v is the velocity of Σ' as observed in Σ, -u is the velocity of Σ as observed in Σ'. c denotes the isotropic light signal speed in Σ, c'(α') means the anisotropic light signal speed in Σ' (step 10). γ is defined as $\gamma=(1-v^2/c^2)^{-1/2}$.

Deduction of transformation				
step no.	point event			results obtained through plugging the coordinates of the point event into the transformation formulae, equations 4 a-d: $x' = A_1 x + A_4 t$ $y' = B_2 y - C_2 z$ $z' = C_2 y + B_2 z$ $t' = D_1 x + D_4 t$
	category	coordinates		
	O, P: resting in rest frame Σ. O', P': co-moving with moving frame Σ′	t ; x, y, z as observed in rest frame Σ	t' ; x', y', z' as observed in moving frame Σ′	
1	P'	$t; x, y, 0$	$t'; x', y', 0$	$C_2 = 0$
2	O'	$t; v\,t, 0, 0$	$t'; 0, 0, 0$	$A_4 = -A_1 \cdot v$
3	P'	$t;\ v\,t, \sqrt{c^2 - v^2}\ t,\ 0$	$t';\ 0,\ c'(90°)\ t',\ 0$	$D_4 = \frac{B_2}{c'(90°)} \cdot \frac{c}{\gamma} - D_1 \cdot v$
4	P'	$t; c\,t, 0, 0$	$t'; c'(0°)\ t', 0, 0$	$A_1 = 2 \cdot \frac{c'(0°) \cdot c'(180°)}{c'(0°) + c'(180°)} \cdot \frac{B_2 \cdot \gamma}{c'(90°)}$
5	P'	$t; -c\,t, 0, 0$	$t'; -c'(180°)\ t', 0, 0$	$D_1 = -\left(\frac{c'(0°) - c'(180°)}{c'(0°) + c'(180°)} + \frac{v}{c} \right) \cdot \frac{B_2 \cdot \gamma}{c'(90°)}$
6	O	$t; 0, 0, 0$	$t'; -u\,t', 0, 0$	$A_1 = -D_1 \cdot u + \frac{B_2 \cdot c}{c'(90°)} \cdot \frac{u}{v} \cdot \frac{1}{\gamma}$
7	P	$t;\ 0, \sqrt{c^2 - v^2}\ t, 0$	$t';\ -u\,t',\ c'(90°)\ t', 0$	$D_1 = 0$
8	P	$t; c\,t - v\,t, 0, 0$	$t'; c'(0°)\ t' - u\,t', 0, 0$	$c'(0°) = \frac{u}{v} \cdot (c - v)$
9	P	$t; -c\,t - v\,t, 0, 0$	$t'; -c'(180°)\ t' - u\,t', 0, 0$	$c'(180°) = \frac{u}{v} \cdot (c + v)$
10	P' or P	$t;\ c\ t \cos(\alpha),$ $c\ t \sin(\alpha), 0$	$t'; c'(\alpha')\ t' \cos(\alpha'),$ $c'(\alpha')\ t' \sin(\alpha'), 0$	$c'(\alpha') \cos(\alpha') = \frac{c^2}{c'(90°)} \cdot \frac{u}{v} \cdot \left(\cos(\alpha) - \frac{v}{c} \right)$ $c'(\alpha') \sin(\alpha') = c \cdot \gamma \sin(\alpha)$

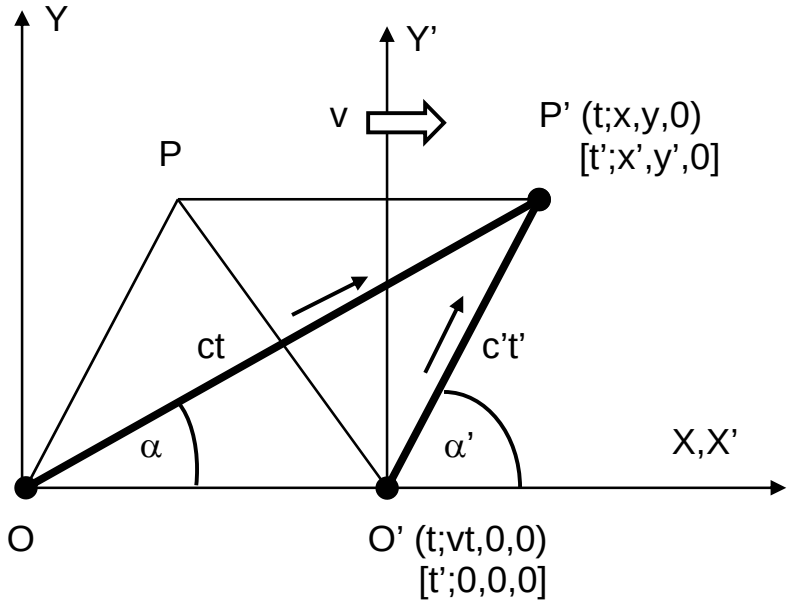

Figure 1 a

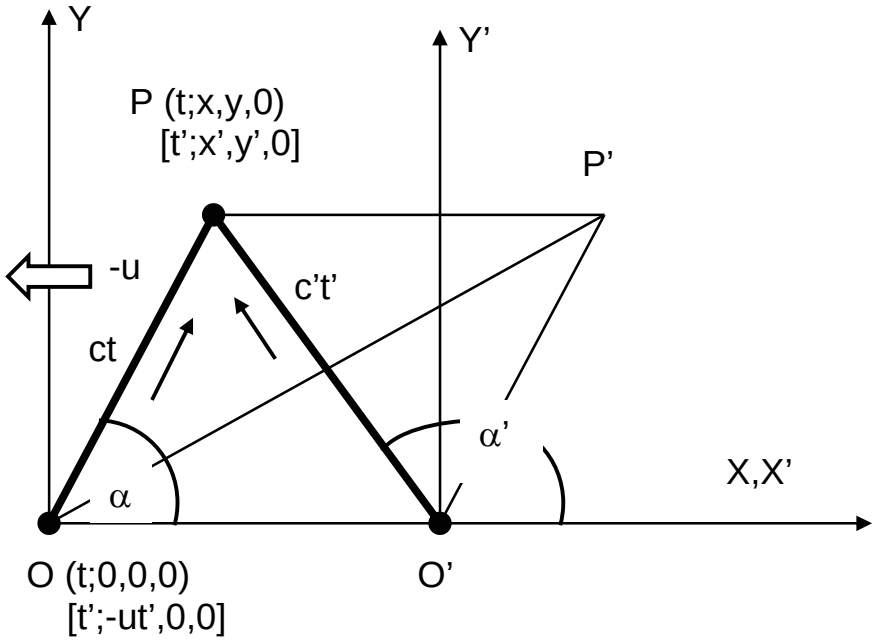

Figure 1 b

Figure 1. Thought experiment (Einstein, 1905): Light is emitted from the origin O' of the inertial frame Σ' moving with uniform velocity v as observed in the rest frame Σ. Σ and Σ' are Cartesian coordinate systems, with the axes X, Y, Z of Σ parallel to the axes X', Y', Z' of Σ', respectively. The plane of drawing shows the X/Y(X'/Y')-plane. The initial condition is: t = 0, x = 0, y = 0, z = 0, t' = 0, x' = 0, y' = 0, z' = 0.

a) A representative point P' is co-moving with Σ', with its coordinates expressed in both frames, Σ and Σ'.

b) A representative point P is resting with Σ, with its coordinates expressed in both frames, Σ and Σ'. -u is the velocity of Σ observed in Σ'.

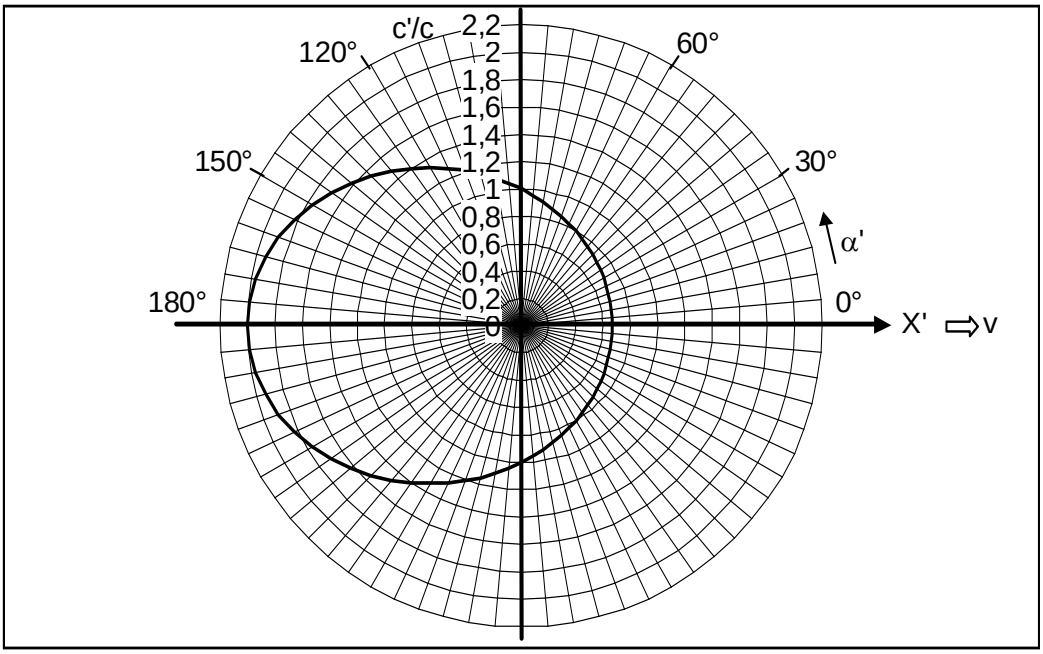

Figure 2. Anisotropy of one-way light signal speed c' as observed in a moving frame Σ': c'/c is depicted as function of the angle α' between light beam in Σ' and velocity **v** of Σ', for v/c=0.5 as an example (c = isotropic light signal speed in the rest frame Σ).

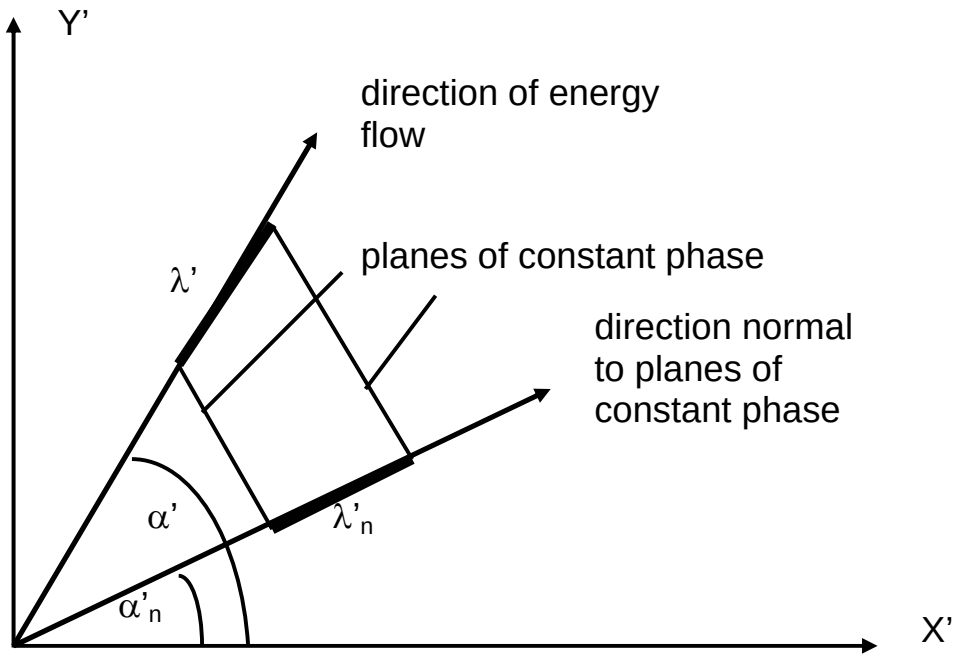

Figure 3. Plausibility test of the definition of two different light speeds, the velocity of energy flow (ray velocity, signal speed), c', and the normal (phase) velocity, c'_n: This ambiguity is caused by different wave-lengths in two propagation directions: The ratio c'/c'_n is equal to $\lambda'/\lambda'_n=1/\cos(\alpha'-\alpha'_n)$. The plane of drawing displays the (x',y')-plane of the moving frame.

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Using of Distance Education in adult education

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Abstract: Distance education courses vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study. Distance education is a method of education in which the learner is physically separated from the teacher and the institution sponsoring the instruction. It may be used on its own, or in conjunction with other forms of education, including face-to-face instruction. In any distance education process there must be a teacher, one or more students, and a course or curriculum that the teacher is capable of teaching and the student is trying to learn. The contract between teacher and learner, whether in a traditional classroom or distance education, requires that the student be taught, assessed, given guidance and, where appropriate, prepared for examinations that may or may not be conducted by the institution. This must be accomplished by two-way communication.
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Keywords: Distance Education, adult education

Introduction:

But distance education in America and for the first time at the University of Illinois Veslin was implemented in 1874. In 1900, university education through correspondence, face became more public. National Association of Home Education in 1926 and led the establishment of distance education and related programs in universities and schools, and more important aspect to find drivers. Education in 1920 invented the radio and TV appearance in 1940 led to important new techniques in communications that the nature of the field of distance education also created dramatic changes.

. Trainers using these new technologies were successful educational programs to millions seek learning opportunities and thereby reach out to the educational spaces, training centers to expand. With the development of long-distance telephone system in the early twentieth century method of capacity and distance learning methods for students to access educational opportunities in the world increased Translation. But until the invention of mobile tele conference ever in the 80 and 90 and the main role in the concept of distance education did not play. Telemetry system, allowing for teachers conference provided that without the slightest delay at a time when your students can listen to them talk and sometimes they see.

Expansion of computer networks in the decade 1990 and connect millions of people through lines to the telephone networks made it possible to simply distance learning via computers and computer conferences around the world is possible (a) and Today with the development of control technology are in science and technology around the world.

What is Distance Education?

Distance education is education designed for learners who live at a distance from the teaching institution or education provider. It is the enrollment and study with an educational institution that provides organized, formal learning opportunities for students. Presented in a sequential and logical order, the instruction is offered wholly or primarily by distance study, through virtually any media. Historically, its predominant medium of instruction has been printed materials, although non-print media is becoming more and more popular. It may also incorporate or make use of videotapes, CD or DVD ROM's, audio recordings, facsimiles, telephone communications, and the Internet through e-mail and Web-based delivery systems. When each lesson or segment is completed, the student makes available to the school the assigned work for correction, grading, comment, and subject matter guidance by qualified instructors. Corrected assignments are returned to the student. This exchange fosters a personalized student-instructor relationship, which is the hallmark of distance education instruction.

Historically, most distance education courses were vocational in nature, but today courses are offered for academic, professional, and avocational purposes for students of all ages. There are numerous specialized programs, such as those for blind persons and for parents of small children with hearing impairments. Distance education is available in practically any field,

from accounting to zoology. Courses are offered in gemology, high school diploma, journalism, locksmithing, child day care management, yacht design, and many fascinating subjects. Distance education courses also vary greatly in scope, level, and length. Some have a few assignments and require only a few months to complete, while others have a hundred or more lesson assignments requiring three or four years of conscientious study.

Since 1890, more than 130 million Americans have studied at DETC member institutions, including Franklin D. Roosevelt, Walter P. Chrysler, Walter Cronkite, Barry Goldwater, Charles Schulz, and many other distinguished alumni of DETC members. Unlike most distance education courses offered by traditional colleges and universities that are semester and classroom oriented, with courses offered by most of the DETC-accredited institutions you can study any time and anywhere. Distance education is especially suited for busy people who wish to increase their knowledge and skills without giving up their jobs, leaving home, or losing income. You learn while you earn. Many courses provide complete vocational training; others prepare you for upgrading in your present job, without losing wages, experience or seniority. You receive individual attention, and you work at your own pace.

In recent years, technology has played a significant role in transforming the traditional distance education school into a dynamic, interactive distance learning method using toll-free telephone lines, as well as a diverse array of personal computers, video devices, CD and DVD ROMs, online courses over the Internet, interactive devices, and other modern technological innovations. The future for distance study promises to be exciting!

ADAPTABILITY

Distance education can be used for some aspects of most disciplines. For example, several institutions of higher education already have developed certificate programs, undergraduate programs, and graduate programs in health and physical education that are delivered using distance education methods. Eastern Oregon University, Emporia State University, Kutztown University, LaSalle University, the Medical College of Wisconsin, University of Wisconsin at Stevens Point, and Virginia Tech are among institutions integrating distance technology into their physical education programs.

Traditional programs that are heavily based in skill development and demonstration or require laboratory work can be offered in a distance education framework using interactive video interfaced with computers to facilitate a hands-on learning approach at a distance. Classes that use lecture and laboratory experiences are easily adapted to a distance education situation. Course materials, including animals for dissection, are sent to class participants with video and written instructions and assignments.

EFFECTIVE TEACHING AND LEARNING WITH DISTANCE EDUCATION

Distance education dictates changes in behavior for both the teacher and the learner. The successful student develops persistence and skills in self-directing work. The successful distance education teacher becomes conversant with new technology and develops new instructional styles, moving from creating instruction to managing resources and students and disseminating views (Strain, 1987). Administrative and faculty support for distance education are critical to the success of this instructional method. Administrators should take note that the implementation of a distance education program may allow access to a greater number of students. However, the time and work associated with teaching at a distance exceeds the normal requirements of campus-based instruction.

Students in distance education settings perform as well or better on assignments, class activities, and exams when compared to campus-based students (St. Pierre, 1998). Nevertheless, students must maintain persistence and a clear focus to succeed in a distance learning situation. Self-direction, a passion for learning, and strong individual responsibility are important influences on achievement. There are indications that distance education works best for more mature, motivated, well-organized, and already accomplished learners (Rintala, 1998).

Garrels (1997) describes five critical elements for successful teaching at a distance:

1. Instructor enthusiasm. This requires animation and comfort in front of the camera, or with the technology utilized. Faculty support and interest are critical to the success of distance learning endeavors.
2. Organization. Teaching materials must be prepared in advance; timing, variation, and smooth transitions must be planned. Instructors should allocate from 3 to 5 hours of preparation for each hour of distance instruction. Great attention to detail is required long before the actual classroom activity occurs (Summers, 1997).
3. Strong commitment to student interaction. Whatever the modality used to teach at a distance, the instructor must encourage and facilitate ongoing communication between the students and the instructor.
4. Familiarity with the technology used in the class format. Faculty development is important before beginning any distance activities, and instructors should be trained in video use, computer use, or other forms of instructional technology used.
5. Critical support personnel. Production staff, graphic designers, and technical staff members will help the instructional setting produce successful teaching at a

distance.

Distance education is any type of schooling that takes place away from a physical campus. Distance education is also known as:

- distance learning
- virtual learning
- online learning
- e-learning
- online education
- web-based training

Types of Distance Education Programs:

There are two types of programs offered by distance education schools: synchronous learning programs and asynchronous learning programs. With synchronous learning, distance education students must log on to the school's website at a set time. Often, they interact with their peers and professors via group chats, web seminars, video conferencing, and phone call-ins. With asynchronous learning, distance education students complete all coursework on their own time. They often learn via assignment sheets, message boards, email, pre-recorded video lectures, mp3s, and traditional mail correspondence.

Distance education began for the delivery of courses to students who live in remote areas. Over the years, though, this form of education has become the preferred method for learning outside of the classroom. Distance Education is now undertaken by people with busy schedules, hectic lifestyles, special needs, and also those living in isolated areas. What's more, with such flexible learning options you can choose to study at any time and from any location you like.

There are a number of different **forms of distance education** and it's important to know which method you prefer:

- **Correspondence learning:** your course materials are printed and sent out to you by mail/courier. The advantages are that you have a printed set of reference materials, you can study anywhere and you are not reliant on a computer, you can learn for long periods of time.
- **eLearning:** your course materials are provided to you in multimedia format; that is, on CD/DVD. In this way you can choose to take your study materials within you and learn anywhere in the world with just a laptop.
- **Online learning:** no materials are sent to you and you do all your learning online. The limitation is that you need to be logged onto a computer (though you may be able to download and print some of your materials yourself, though this can cost you more in ink), there is a limit to how much you can absorb and do online, and most people's attention span on-screen is limited to 20 minutes (your eyes get tired after that).
- **Broadcast learning:** where you tune into a series of television, radio or Internet broadcasts (e.g. podcast, YouTube, etc.).
- **Teleconferencing:** where your lessons are conducted in real time through an Internet connection. Limitations are that streaming can be slow, connections can cause problems (students and teachers generally need to be computer literate) and there can be delays in talk-time, depending on software, hardware and connection capabilities.

Conclusion:

Interactivity is accomplished via telephone (one-way video and two-way audio), two-way video or graphics interactivity, two-way computer hookups, two-way audio. Interactivity may be delayed but interaction provided by teacher telephone office hours when students can call or through time with on-site facilitators. Classes with large numbers of students have a limited amount of interactivity. Much of the activity on computer networks is on a delayed basis as well. Possibilities for audio and visual interaction are increasingly wide.

Distance learning is expanding and examples of it are increasing dramatically. Fewer than 10 states were using distance learning in 1987; today, virtually all states have an interest or effort in distance education. Distance learning systems connect the teacher with the students when physical face-to-face interaction is not possible. Telecommunications systems carry instruction, moving information instead of people. The technology at distant locations are important and affect how interaction takes place, what information resources are used, and how effective the system is likely to be.

Technology transports information, not people. Distances between teachers and students are bridged with an array of familiar technology as well as new information age equipment. What sets today's distance education efforts apart from previous efforts is the possibility of an interactive capacity that provides learner and teacher with needed feedback, including the opportunity to dialogue, clarify, or assess. Advances in digital compression technology may greatly expand the number of channels that can be sent over any transmission medium, doubling or even tripling channel capacity. Technologies for learning at a distance are also enlarging our definition of how students learn, where they learn, and who teaches them. No one technology is best for all situations and applications. Different technologies have different capabilities and limitations, and effective implementation will depend

on matching technological capabilities to education needs.

Distance education places students and their instructors in separate locations using some form of technology to communicate and interact. The student may be located in the classroom, home, office or learning center. The instructor may be located in a media classroom, studio, office or home.

The student may receive information via satellite, microwave, or fiber optic cable, television (broadcast, cable or Instructional Television Fixed Services (ITFS), video cassette or disk, telephone - audio conferencing bridge or direct phone line, audio cassette, printed materials - text, study guide, or handout, computer - modem or floppy disk, and compressed video. Recent rapid development of technology has resulted in systems that are powerful, flexible, and increasingly affordable. The base of available information technology resources is increasing with dramatic speed. Much has been learned about connecting various forms of technology into systems, so that the ability to link systems is growing. Most distance learning systems are hybrids, combining several technologies, such as satellite, ITFS, microwave, cable, fiber optic, and computer connections.

High front-end costs prevented an early widespread adoption of electronically mediated learning. Distance learning has been aggressively adopted in many areas because it can meet specific educational needs. As the concept of accountability became accepted and laws required certain courses in high school in order for students to be admitted to state colleges, telecommunications was examined as a way to provide student access to the required courses. Many rural school districts could not afford the special teachers to conduct required courses. Distance education met this need by providing courses in schools where teachers were not available or were too costly to provide for a few students. It also fulfilled a need for teacher training and staff development in locations where experts and resources were difficult to obtain. These systems link learner communities with each other and bring a wide array of experts and information to the classroom.

Challenges which faced the early users of distance education are still with us today. If distance education is to play a greater role in improving the quality of education, it will require expanded technology; more linkages between schools, higher education, and the private sector; and more teachers who use technology well. Teachers must be involved in planning the systems, trained to use the tools they provide, and given the flexibility to revise their teaching. Federal and state regulations will need revision to ensure a more flexible and effective use of technology. Connections have been established across geographic, instructional, and institutional boundaries which provide opportunities for collaboration and resource sharing among many groups In the pooling of students and teachers, distance learning reconfigures the classroom which no longer is bounded by the physical space of the school, district, state or nation.

The key to success in distance learning is the teacher. If the teacher is good, the technology can become almost transparent. No technology can overcome poor teaching which is actually exacerbated in distance education applications. When skilled teachers are involved, enthusiasm, expertise, and creative use of the media can enrich students beyond the four walls of their classroom.

Teachers need training in the system's technical aspects and in the educational applications of the technology. Areas for assistance include the amount of time needed to prepare and teach courses, how to establish and maintain effective communication with students, strategies for adding visual components to audio courses, ways to increase interaction between students and faculty, planning and management of organizational details, and strategies for group cohesion and student motivation.

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3/31/2011

Different techniques in Participatory Rural Appraisal (PRA)

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Abstract: RRA is a social science approach that emerged in the late 1970s. The basic idea of RRA is to rather quickly collect, analyse and evaluate information on rural conditions and local knowledge. This information is generated in close co-operation with the local population in rural areas. Therefore, the research methods had to be adjusted to local conditions, i.e. they had to meet the communication needs of illiterate people or people who are not used to communicating in scientific terms. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA is intended to enable local communities to conduct their own analysis and to plan and take action . PRA involves project staff learning together with villagers about the village. The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation. Participatory Rural Appraisal (PRA) is considered one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-up approach, and from blueprint to the learning process.
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Keywords: Participatory Rural Appraisal (PRA)

Introduction:

PRA requires researchers / field workers to act as facilitators to help local people conduct their own analysis, plan and take action accordingly. It is based on the principle that local people are creative and capable and can do their own investigations, analysis, and planning. The basic concept of PRA is to learn from rural people. Chambers (1992) has defined PRA as an approach and methods for learning about rural life and conditions from, with and by rural people. He further stated that PRA extends into analysis, planning and action. PRA closely involve villagers and local officials in the process. Similarly, Rapid Rural Appraisal (RRA) reflects the new thinking about development, needs, and people oriented responsibilities. It is a process that is highly systematic and structured, relying on interdisciplinary teamwork and special strategies for data collection and analysis such as triangulation, probing, and iteration. Some critics consider RRA to be a quick and dirty technique(Guijt, 1998).

There are a wide range of participatory tools and techniques available. People can use these tools and techniques according to their situation or needs. Generally, the application of different tools may vary from one situation to another. However, the process for conducting RRA/PRA remains the same.

The most common methods are the following:

1- Diagramming, Mapping and Modeling:
- transects
- maps (resource, social, farm)
- venn diagrams
- seasonally analysis
- historical analysis (time lines, trend lines, activity profiles)

2- Ranking and scoring
- pair wise ranking
- matrix ranking
- matrix scoring
- well-being analysis and wealth ranking
- proportional piling
- pie charts (injera charts)

3- Problem analysis
- identification and specification
- causal chaining
- prioritization

Community Sketch Maps

The purposes of community sketch map or a model: is a visual representation of what the community perceives as their community space. This include showing the shape (appearance) of the community, boundary and all the major features as understood and known by the community(Scrimshaw and Gleason, 1992).

The map shows where resources, activities, problems and opportunities are located, as well as the dimension and scope of issues to be investigated. It is critical to understanding the boundaries and characteristics of the community involved.

Topographical data (elevation, slope, drainage etc.)

Topographical data are basic when drawing a map of community, so is information on soils, vegetation, water availability, road, schools, health facilities etc. There are different sketch maps known for different purposes. Some of them include(Dunn, 1992):

A. Social maps: Specific type of topical map representing households according to certain indicators.
- Indicates where people live and how many people live in an area
- Social and residential differences in status and wealth
- Buildings where people live or work, uses of space in a house

B. Physical and resource maps: drawn by the people to show natural resource of an area, location and use of natural resources.
- fields and land uses
- physical land features
- water location, quality and use
- soil types, uses, location

C. Topical maps: specific topic maps are drawn to draw attention to a particular type of information of the area, example:-
- location of forest resources
- soil types
- different crops grown
- houses and the number of people live in
- social & economic infrastructures etc.

D. Farm sketch: Making a farm or compound sketch highlight details that would otherwise be lost in a smaller scale maps.

Procedures for collecting spatial data

Who draws the maps?

The community members of their representatives together with the PRA team and the local extension field staff undertake this exercise. The various parties having different but complementary ideas to the process.

HOW?

The community members are the best experts of their area. While it is tempting for a team member to take charge and save time by drawing the
map, it is advisable to let ordinary villagers draw the map on the ground. Literacy is not necessary in order to draw a map of one's place. The PRA team should explain the process clearly. The sketch map is drawn using their fingers, sticks and other locally available materials such as pebbles, leaves, and flowers. The community should be guided through questions to draw the map of their community territory of application(IUCN, 2001).

Community sketch map helps in defining micro-zones, knowing about disparities in wealth, differences in land use. This exercise provides to locate areas where particular problems are thought to be prevalent. The map is also used to lay the transect route. While the map is still on the ground the community members mark the most representative cross section of the community.

How should one proceed to sketch maps or models?

Before:
- Decide what type of map you want
- Bring people together who will have some knowledge about the area and can contribute
- Choose suitable time and place
- Bring materials with you on which you can copy a map drawn on the ground(Scoones, 1993).

During:

Try to minimize your own participation be an observer?
- Encourage by asking op0en questions
- Encourage the use of different materials, i.e. flowers, twigs, sticks etc
- Be patient!(Swift and Umar, 1991)

After:
- Maker a copy of the map or model, including mapper's names
- Try drawing the same type of map with different groups of people. i.e. one group of women, a group of old men and the young
- Keep it simple
- Orient it appropriately
- Cross-check the map, compare with what you see
- Draw it in the area of study with the local people.

Mobility diagram

The community can get goods and services from different places. Some resources will be available with in the PA, others on the boundaries of the community. People daily, weekly and occasionally fetch for those resources in and out of their area. Therefore they travel long distances under difficult situations.

Purpose

The diagram is used to understand the places traveled, resources collected and to identify the persons travailing. The resource centers could have problems and the road and means of transportation may not be appropriate, PRA team needs to know the critical goods and services that people travel to fetch for.

What?

The community center and the places of goods and services are listed. The pull factors and the reasons for not having the resource at the center are recorded. The team tries to understand the condition of the resources, and opportunities to establish with in the community. The community members may face difficulties on the road and may also be inconvenient to get goods and services at the destination(Uphoff, 1992).

Who?

The PRA team identifies individuals or groups who travel to other places on a purpose. Discussion with men and women travelers can give a clue about resource scarcity(Mukherjee, 1992).

How?

- Select informants who travel for resources
- Write down as many places as possible visited and resources the most wanted.
- The difficulties faced on the way and at the destination discussed
- The informants mark on the ground the starting point and destination for different resources or services.

Application

The PRA team and informant record resources in short supply and the reasons for not having in the community. The community action plans include ways and means to get critical resources in the future. The difficulties faced on the road and at the resource center (destination) taken due consideration for improvement(Clayton, 1997).

Gender daily calendar:

Purpose

Most daily activities in traditional rural, societies are managed along gender lines. There are activities that are specifically performed by women, men or children. In some communities gender role divisions are still pronounced. In such cases it is necessary for the PRA team to be aware in order not to be seen as interfering with the community cultural norms specific gender roles so that new programmers are not introduced to overburden an already overworked group. Introducing gender awareness in PRA helps a community to begin examining itself(NCAER, 1993).

Who

Community members both men and women, young and old should be in attendance. PRA team members, men and women and local extension staff in the analysis of gender roles and responsibilities.

How

It is better if the community is allowed to lead gender related discussions. The PRA team facilitates discussions through a neutral process of mapping out a gender daily calendar. Men and women discuss on each daily activities on agreed season (raining or dry season). The groups on their timetable, from the time they wake up in the morning to the time they got to sleep in the evening.

Application

Gender daily calendar provides a clear picture of who does what in the community. It will help in the formulation of the community Action Plan. The community will become aware that unless some changes in gender relations are effected rural development will not proceed as quickly as they would like it to be(Holland, 1998).

_ **Daily-activity profiles** -- Researchers can explore and compare the daily-activity patterns of men, women, youth, and elders by charting the amount of time taken to complete tasks.

_ **Semi structured interviewing** -- A semi structured interviewing and listening technique uses some predetermined questions and topics but allows new topics to be pursued as the interview develops. The interviews are informal and conversational but carefully controlled(Chambers, 1994).

Semi structured interviews (SSI)

SSI is a guided interview here the major topics and a few key questions are formulated before the interview. But many new additional are asked during the interview based on answers to the key question.

Types of SSI:

1. The individual interview

- Get representative information about the society form individual informants
- Ask individuals at a time

2. The key informant interview

- Get specialized information from one or group of persons about the community
- Informants with specialized knowledge

3. Group interviews:

- Useful for obtaining general information about the community
- Better for cross checking information
- Group interviews require very careful preparation
- The ideal group is 8 – 15 people

_ **Types, sequencing, and chain interviews** -- Individual, pair, and group interviews are combined in a sequence to take advantage of key informants and specialist groups.

Using secondary sources

- Secondary sources of information include previously written documents maps, diagrams, tables etc
- Review secondary sources before beginning field survey is census data, aerial photos, marketing reports, etc.
- In reviewing secondary sources, you should keep summary notes, in the form of short paragraphs, diagrams, charts, etc
- In reviewing secondary sources, you should keep summary notes, in the form of short paragraph, diagrams, charts, etc.
- Be as critical as possible in reviewing secondary sources
- To develop understanding of local livelihoods
- Short period of time

Venn Diagram (Institutional analysis)

Venn diagramming is a method to find out who, what person or organizations are important in and for a community.

Purpose

To identify groups and institutions operating in the community and to show how they interact with each

other To show the degree of their cooperation and involvement in development programs. To discover their important or influence on decision making in the community.

What?

Venn diagrams have been used with in PRA in institutional context to discuss:

- The role and significance of various institutions
- Levels of communication between organizations
- The role of project bodies and their intervention Improving missing links between existing organizations,
- Potential for working through existing organizations, which ones and with which links.
- Potential roles for new organization
- Formal and non-formal groups and their levels of cooperation
- Communities perceptions of the institutions, always

Who?

The PRA team, key informants as elders, religious leaders, extension staff and other knowledgeable person take the responsibility of listing and
evaluation of individuals and institutions influencing decision making of the community.

How?

List institutions in the community and discuss importance of each institution and what they do. Make different sized circles and not which circle represents each institution i.e. big circle very important and decision maker, small circle with little importance. During overlapping the circles, the size of the circle indicates the importance of the institution, the distance between the circles indicate the degree of contact between institutions. For instance a large overlap high interaction. No overlap distant relationship.

Application

Identify individuals, groups or institutions. Important in the lives of people and establish close relationship with them. Provide the necessary support and effectively utilize their skills and experiences.

_ **Participatory diagramming** -- People are encouraged to display their knowledge on pie and bar charts and flow diagrams.

_ **Wealth and well-being rankings** -- People are asked to sort cards (or slips of paper) representing individuals or households from rich to poor or from sick to healthy. This technique can be used for crosschecking information and for initiating discussions on a specific topic (for example, poverty). The technique can also be used to produce a benchmark against which future development interventions can be measured or evaluated(Blackburn, 1999).

Ranking and scoring

Presentation:

A way in which various kinds of things can be compared according to different qualities people value. It places in an order of what is more or what is less important.

Purpose

Ranking methods allow us to see individual and group priorities among a number of alternative problems or solutions. It helps to generate reasons why people choose one item from the other.

What

People could use three different ways to generate a criteria for comparison and make up their choices.

(1) preference ranking
(2) pairewise ranking
(3) direct matrix ranking
(4) and direct matrix scoring

Preference ranking method helps to quickly get a good idea of what people think are the priority problem or preferences. The criteria attached to make up a choice is used to consider in the action plan. Individuals or groups vote on the items from most important to least important item. The choices could be between crop varieties, water points, food diets, livestock species, problems, solutions and many different issues, which require preferences. Paire wise ranking is used to compare between two items and make up a choice. It is more useful for exploring the reasons why people prefer one possibility over another. The moment a preference is made lots of criteria are explored to compare items using a group of criteria before a choice. Direct matrix ranking is used to list items to be compared along horizontal line and criteria on the vertical line to rank choices from most important to least important (i.e. 1st, 2nd, 3rd, 4th etc) In this case frequency of the items valued as the 1st choice helps to make up a final decision. Direct matrix scoring helps to attach a score to a comparable items against each criteria listed before a choice. A comparison could be made out of a score of 10(for instance) a comparison could be made between many items against one criteria set, and attach a score out of a maximum of 10 to items to be chosen. The frequencies of the highest scores (closer to 10) attached against many criteria helps to make up a decision for preference.

Who

Ranking and scoring could be done with individuals, households, community members deliberately selected and with mixed group of men, women, traditional leaders, local officials, extension workers etc. The group combination depends upon the issues to be ranked. Who should decision on the issues to be compared? Leads to the choice of informants.

How

The groups for discussion lists items to be compared. Let them generate either directly or thorough pair wise comparison criteria for ranking. Putting in an order of importance or ranking could be done through ranking order, scoring or key voting, from the most to least

important. Thorough courting frequencies list in ranked order the items to be compared and make up a decision. The final choice could be made through group of criteria or a single but most important critieria. Some times, the period for ranking (emergency) or vested need to the item may influence decision-making procedures. While listing criteria, do not mix up. PRA teams criteria with those of the informants. Use positive criteria for comparison

Application

Community action plans are developed on the basis of peoples preferences. The problems, solutions technical inputs etc are arranged on the interests of the users(Appleyard, 1998).

_ **Direct-matrix pair-wise ranking and scoring** -- Direct-matrix pair-wise ranking and scoring is a tool used to discover local attitudes on various topics. People rank and compare individual items, using their own categories and criteria, by raising hands or placing representative objects on a board. For example, six different shrubs can be ranked from best to worst for their fuel, fodder, and erosion-control attributes. Other resources can be ranked in terms of taste or marketability. Wealth ranking can be used to identify wealth criteria and establish the relative position of households(Carmen, 1996).

_ **Matrices** -- Matrices can be used to gather information and to facilitate or focus analyses and discussions. For example, a problem opportunity matrix could have columns with the following labels: soil type, land use, cropping patterns, and available resources; and rows with the following labels: problems, constraints, local solutions, and initiatives already tried.

_ **Traditional management systems and local-resource collections** -- Local people collect samples (for example, of soils, plants). This can be an efficient way to learn about the local biodiversity, management systems, and taxonomies.

_ **Portraits, profiles, case studies, and stories** -- Household histories or stories of how a certain conflict was resolved are recorded. This can provide short but insightful descriptions of characteristic problems and how they are dealt with.

_ **Key probes** -- A question addressing a key issue is asked of different informants, and the answers are compared. The question might be something like "If my goat enters your field and eats your crops, what do you and I do?"

_ **Folklore, songs, poetry, and dance** -- Local folklore, songs, dance, and poetry are analyzed to provide insight into values, history, practices, and beliefs.

_ **Futures possible** -- People are asked how they would like things to be in 1 year and to predict what will happen if nothing is done or if something is done. People's desires, wishes, and expectations are revealed.

_ **Diagrams exhibition** -- Diagrams, maps, charts, and photos of the research activity are displayed in a public place to share information, facilitate discussions, and provide an additional crosschecking device. The exhibition can inspire other villagers to take part in research activities.

_ **Shared presentations and analysis** -- Participants are encouraged to present their findings to other villagers and to outsiders, providing another opportunity for crosschecking, feedback, comment, and criticism.

_ **Night halts** -- The researchers live in the village during the research process. This facilitates all interactions between the outsiders and the villagers, invites change in the outsiders' attitudes, and allows for early-morning and evening discussions, when villagers tend to have more leisure time.

_ **Short questionnaires** -- Short and issue-specific questionnaires can be useful if conducted late in the research process.

_ **Field report writing** -- Key findings are recorded before "leaving" the village. (This assumes that the community has consented to having the research data leave the village.) Brief summaries are made of each diagram, model, and map, as well as of the process involved in creating them.

_ **Survey of villagers' attitudes toward PRA** -- To improve the PRA process and techniques and maintain realistic expectations, the researcher asks the villagers what they expected and what they learned from the PRA research process.

_ **Intriguing practices and beliefs** -- Indigenous practices and beliefs are noted, even if they are based on myth or superstition. Even practices that are unusual or don't fit in with conventional scientific thinking are worth exploring because they are meaningful to local people.

CONCLUSION:

As a result of the PRAs, the communities are expected to attain many benefits including:

• Expressing their own ideas and concerns;
• Organizing their knowledge about the past and present;
• Identifying as a community their problems, the causes of these problems and possible solutions;
• Developing a common plan to address these problems;
• Developing the ability to use their own resources more effectively and attract more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following benefits:

• Developing better understanding of rural environments and social as well as economic dynamism taking place there;
• Appreciating the fact that communities are capable of analyzing their problems and outlining possible solutions to their problems;

• Participating in designing possible solutions to community problems;
• Utilizing the results of the PRA work as a research output for publications and presentations;
• Building their research and problem investigation capabilities;
• Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;
2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;
3. utilization of the research questions/problems identified during the PRAs for further investigation;
4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.

PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas.

During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

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Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA): Complementary methods in rural research

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Abstract: Promising potentials include farmers' own farming systems research, alternatives to questionnaire surveys, monitoring, evaluation and lateral spread by local people, empowerment of the poorer and weaker, and policy review. Changes in personal behavior and attitudes, and in organizational cultures, are implied. PRA parallels and resonates with paradigm shifts in the social and natural sciences, business management, and development thinking, supporting decentralization, local diversity, and personal responsibility. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA evolved from Rapid Rural Appraisal (RRA). In recognition of the fact that the community to which development projects are supposed to serve is not involved in the process and the subsequent flaws implicit in designing and implementing such projects, development practitioners and thinkers started to investigate ways for effective community participation in the overall process. This led to a series of information collection techniques used to collect and analyze data in rural areas, nown as Rapid Rural Appraisal (RRA), which was developed in the 1970s and 1980s.
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Introduction:

PRA has many sources. The most direct is rapid rural appraisal (RRA) from which it has evolved. RRA itself began as a response in the late 1970s and early 1980s to the biased perceptions derived from rural development tourism (the brief rural visit by the urban-based professional) and the many defects and high costs of large-scale questionnaire surveys. PRA has much in common with RRA but differs basically in the ownership of information, and the nature of the process: in RRA information is more elicited and extracted by outsiders as part of a process of data gathering; in PRA it is more generated, analyzed, owned and shared by local people as part of a process

of their empowerment. The term Participatory Rural Appraisal (PRA) is being used to describe a growing family of approaches and methods to enable local people to share, enhance and analyze their knowledge of life and conditions, to plan and to act (Bhat and satish, 1993).

PRA flows from and owes much to the traditions and methods of participatory research , applied anthropology, and field research on farming systems and has evolved most directly from a synthesis of agroecosystem analysis and rapid rural appraisal (RRA).

RRA is a social science approach that emerged in the late 1970s. The basic idea of RRA is to rather quickly collect, analyse and evaluate information on rural conditions and local knowledge. This information is generated in close co-operation with the local population in rural areas. Therefore, the research methods had to be adjusted to local conditions, i.e. they had to meet the communication needs of illiterate people or people who are not used to communicating in scientific terms (Blackburn and holand, 1999).

Tools like mapping, diagramming and ranking were developed or improved in order to gather information for decision-makers in development agencies. One of the key principles of RRA is the visualisation of questions and results by using locally comprehensible symbols. A main reason for developing RRA was to find shortcuts in the search for relevant information on rural development issues in order to avoid costly and time consuming research procedures (Cernea, 1999).

In most of the cases RRA is carried out by a small team of researchers or trained professional in one to three days in a kind of workshop. The role of the local population in RRA is to provide relevant local knowledge for research purposes and development planning. The RRA team manages the process and maintains the power to decide on how to utilise this

information(Chambers, 1997).

Rapid Rural Appraisals are based on the following principles:

1. quick and cost-effective;
2. multidisciplinary teams (at least social and technical sciences being present);
3. optimal ignorance: don't collect more information than strictly needed; as far as possible the information should come from the people themselves;
4. triangulation: in order to ensure that the crucial information is valid, information from one person is checked by seeking it from another person as well;
5. observations in the village, the houses and the fields are seen as a valuable source of information.

RRA delivers what it set out to do: it assists outsiders to gain insight into the daily life of the members of the target group and their problems and opportunities. Using a series of tools it is able to deliver fairly reliable information in a cost-effective way. In RRAs the target group is given a voice: they become the experts who explain their ideas and their knowledge to outsiders. The 'dead' and impersonal information of surveys is replaced by personal stories from the people concerned(Cornwall, 2008).

The tools used during RRAs assume that local people are willing to provide the information requested, but in practice people can have several reasons not to do so:

- they can be afraid of all kinds of political complications;
- they can be short of time to explain everything;
- they can be afraid of having to pay taxes;
- they can give desirable answers in order to please the enumerators ('those poor guys who seem to know nothing should not be given too complex answers');
- they can give those answers which they think will assist them to be among the beneficiaries of expected projects (not only the project doing the RRA!);
- they can be afraid to show they do not understand a question or do not know the answer, and so they just make up an answer(Chaudhari, 1995).

Indeed, these are the same as listed in for structured surveys. There is no reason to assume that with RRAs these problems are less serious than with surveys. In comparison with surveys, RRA teams have a better chance of overcoming these problems. They have more time and possibilities to:

(a) put the farmer at ease (especially by using non-verbal communication);
(b) show interest in what (s)he does, e.g. by taking some soil or anything else with a low social value and examining it together;
(c) discuss things that they observe;
(d) adjust the dialogue to the specific interest of the farmer;
(e) cross-check crucial answers of one respondent with that of another(Mancarenhas, 1991).

Although the much used semi-structured interview offers many more possibilities to enter into a normal dialogue than pre-coded questionnaires, the initiative is still with the visitor. Many semi-structured interviews start with such questions as 'How many children do you have and how much land?'. With these questions the respondent will start to wonder what the expert is going to do with this information. The information as such is meaningless. If there are 8 children and 3 hectares of land, does this mean the family has a shortage of land? In some situations, yes, in others, not at all. So let the farmer talk freely and she will elaborate herself on this issue when she thinks it is relevant. Often there is only a weak link or no link at all between the results of an RRA and the follow-up activities of projects. Experts can always find reasons to continue doing what they have always done(Gary, 1992).

Since there is no feedback to the people who have been interviewed during the exercise, nobody will ever notice. The simple fact that an RRA took place raises expectations in the community that they will profit from future project activities, which might not be the case. The results of RRAs can be misleading when the people whom the teams have met are not representative of the total target population. The following biases are often found:

- more men than women are seen;
- villages close to central towns or good roads are selected;
- better-off farmers are visited more often (they have the time, they do not migrate, they live near the road, etc.);
- farmers involved in projects or applying new technologies are visited more often(Guijt and shah, 1998).

All in all, the weak points in the way RRAs are too often implemented lead critics to the conclusion that RRAs are indeed much quicker and cheaper than the lengthy surveys they have replaced, but that the quality of the results is all too often not much better. In practice many RRAs are still 'extractive'; information is gathered in the villages and the analysis is done elsewhere by experts. Critics conclude that the quality of an RRA highly depends upon the expertise of the individuals carrying it out(Mikkelsen, 1995).

Participatory Rural Appraisal (PRA):

PRA are good for:

• Providing basic information in situations where little in known
• Identifying and assessing problems
• Appraising, designing, implementing, monitoring, and evaluation programs and projects
• Getting a better picture of needs and organizations' ability to meet them
• Developing and transferring appropriate technologies
• Appraising emergencies

• Planning projects that are more relevant, restructuring administrations, assisting in decision-making and policy formation
• Generating hypotheses, ruling out inappropriate ones
• Providing guidelines for survey designs and assessing the applicability of their results to other places.
• Fleshing – out complementing, interpreting, or giving depth and context to information obtained through other methods(Chambers, 1998).

PRA is not very useful for:
Working in situations in which the problem is not usefully addressed at the local or group level, for example, in situations where large-scale structural reorganization is necessary (but even then, local views may help to shape the change).

The objectives of the PRA are:
• to enable rural people to organize their knowledge, share experience among
themselves and gather information on resources they have
• to understand the rural environments and social as well as economic
dynamism
• to understand the trends in the rural socio economic conditions
• to enable the community identify their problems, causes of these problems and
possible solutions
• to enable the community develop a community action plan to address their
problems
In order to limit the PRA to the objectives set and to have consistency in conducting the PRA in the different villages, a PRA manual was prepared by the socio economic team. In line with the manual, emphasis was accorded to the following topics:
1) Village History. The first day of the PRA discussion begins with history of the village which enabled participants to easily and comfortably tell about the history of their village.
2) Agriculture and Livestock. Focus group discussions were made on agriculture and livestock rearing practices including the problems encountered and possible solutions.
3) Social service. The provision of social services like education and health including the associated problems were also discussed in focus group discussions.
4) Village institutions. Institutions, both from within the village and outside, as well as formal and informal with which the rural communities interact have been addressed.
5) Trend lines. Trends in food availability, forest, population growth, wealth, rainfall and poverty are addressed in this section.
6) Wealth ranking, problem analysis, and community action plan. Finally, the participants ranked the community on the basis of its wealth, discussed the major problems and formulated action plan. The PRA is to be followed with a more quantitative and structured socioeconomic survey, which will then be followed by specialized researches in specifically selected areas; notably, poverty and coping mechanisms, microfinance, marketing, utilization and management of natural resources, and gender.
At the end of the 1980s, Participatory Rural Appraisal was developed in response to the too mechanistic and extractive implementation of RRAs. In PRAs the target group is encouraged to learn and the role of outsiders is reduced to a facilitator of the learning process. PRA aims to empower local people by encouraging them to share, enhance and analyse their knowledge of life and conditions and to plan, act, monitor and evaluate.
As with RRA it is hard to define what exactly a PRA is (some even prefer not to define it and just refer to "a family of approaches"). PRA shares the basic principles of RRA (quick, multidisciplinary, observations, etc.), yet now it is the local people who are encouraged to analyse their own situation and plan activities to improve it. The three basic pillars of PRA (and the basic differences from RRA) are:
1. the behaviour and attitude of outsiders, who facilitate rather than dominate;
2. the methods, which are open, group-oriented, visual and comparative;
3. sharing of information, food, experiences, etc. between in- and outsiders.
For the tools used, two issues stand out:
1. 'Handing over the stick': instead of outsiders trying to understand the knowledge of the local people, PRA tries to facilitate local people to develop their capabilities. They collect and analyse the data and propose actions to be undertaken.
2. Visualisation and sharing: local people convey their ideas and knowledge in a visual way. In verbal communication, outsiders dominate the dialogue more easily (via eye contact, cross-checking, etc.) than in communication via visual aids. When a map is drawn by a stick in the soil all can contribute, and local people feel more confident than when outsiders try to draw a map on a piece of paper with a pen - a typical tool of powerful outsiders. Sharing also explicitly involves the food and shelter during the PRA.
The most commonly used tools are:
- participatory mapping: a group of villagers makes a map of the community. The way they do this and what they find important provide good entry points for discussions about crucial aspects of village life;
- village transects: together with a (small) group of villagers the team walks through the village (or another relevant area) and discusses the things observed;

- ranking: people are asked to compare units (e.g. families /trees /crops) and to group them according to their own criteria. For example, via pair-wise comparing the importance of certain trees, people find out which criteria they use to assess the usefulness of these. Ranking is also used to stratify the local population, e.g. via wealth ranking. Both the results of the ranking and the criteria used provide entry
points for further discussions.
- historical recalls: the lifestory of families are recalled and the main events are used as reference points in the analysis of the present situation;
- calendars: people indicate how things change over time, e.g. in which months they have to borrow money, when their children get malaria, when the rains are normally expected, etc.

Combining information obtained from all the tools provides the villagers with an explicit picture of their daily life. This not only helps them to start a discussion on their main problems and how to tackle them, it also boosts their self-esteem because they are able to make this analysis themselves.

Conclusion:

It is imperative that development activities/initiatives should not be attempted until participatory rural appraisal (PRA) or participatory action research (PAR) has been carried out and that the socio – economic and other factors affecting communities are well understood by the people confronted with the problem.

Kamla Bhasin (1999) suggests that development practitioners should constantly ask themselves: “am I increasing the confidence of the poor, their faith in themselves, and their self – reliance, or am I making them instruments of my own plans of action, imposing my own ideas on them and that of my organization and/or institution?” Social Development is a process of gradual change in which people increase their awareness of their own capabilities and common interests, and use this knowledge to analyse their needs; decide on solutions; organize themselves for cooperative efforts; and mobilize their own human, financial and natural resources to improve, establish and maintain their own social services and institutions within the context of their own culture and their own political system. To give effect to this understanding of social development, participation of communities in their own development is important. The participatory approaches, including PRA provides first step/stage in sustainable community development.

As a result of the PRAs, the communities are expected to attain many benefits including:

• Expressing their own ideas and concerns;
• Organizing their knowledge about the past and present;
• Identifying as a community their problems, the causes of these problems and
possible solutions;
• Developing a common plan to address these problems;
• Developing the ability to use their own resources more effectively and attract
more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following
benefits:

• Developing better understanding of rural environments and social as well as
economic dynamism taking place there;
• Appreciating the fact that communities are capable of analyzing their problems
and outlining possible solutions to their problems;
• Participating in designing possible solutions to community problems;
• Utilizing the results of the PRA work as a research output for publications and
presentations;
• Building their research and problem investigation capabilities;
• Supporting their classroom discussions to students with practical examples from
the PRA findings.

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Rural development through information and communication technologies (ICT)

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Abstract: The concept of development of the rural, today, is not just project initiatives and governance; it is much more beyond that. This paper uncovers a whole plethora of ICT emergence as a technology of the new millennium. Against the backdrop of the ongoing ICT boom, this paper makes an attempt towards studying its applications and usage planning process and policy making for the rural communities focusing on how it helps in aligning the key factors and reduce the problems of alienation, fragmentation and dislocation of knowledge. Review of literature shows that intervention of information and communication technologies (ICT) in rural development initiatives are capable of development, but are not successful. Lack of community participation, absence of an integrated approach and non-inclusion of traditional knowledge systems (TKS) in the project designs are the major impediments. We therefore suggest a systems-based approach in the design of e-Governance projects, and brief some future directions. Sustained development using rural informatics is possible, only if ICT interventions are able to respond to the local needs and re-adjust as per the prevailing knowledge (Traditional Knowledge Systems- TKS) of the rural areas.
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Keywords: information and communication technologies (ICT), rural development

Introduction:

Direct or indirect application of ICT, in rural development sector has also been referred to as “Rural Informatics”. Rural economies can be benefited from ICT by focusing on social production, social consumption and social services in the rural areas (Malhotra, 2001). The inculcation of a Citizen-to-Government (C2G) and Citizen-to-Citizen (C2C) interface would provide this link that would also lead to community participation in design and implementation of ICT interventions. This in return could promise better economic opportunities as well as social inclusion of rural people in the processes of governance. Such attributes in the social set up are essential prerequisites for good governance and rural development.

Globalization and technological changes, the processes in the past fifteen years have been quickly lead to a new global economy have been driven with the reinforced technology and fuel (energy) that by providing information and knowledge.

The global economy requires the kind of necessity and purpose of educational institutions. Since the current trend towards reducing incomplete information and access to accurate information is growing, other schools can not control time to transfer a set of prescribed information from teacher to student during a fixed time point are, but schools must to promote Culture of "Teaching for Learning For example, acquisition of knowledge and continuous learning skills which make possible during the individual's life. According to Alvin Toffler, illiterate in 21st century, who was not read and write but those who do not know which fail to learn or remember are illiterate. (Jauhari, 2004).

Concerns about educational quality and educational opportunities with the necessity of developing those most vulnerable are the accumulation of globalization is symbiotic. Generally, "the changes of globalization in developing countries, on low-income groups, especially women and girls and" low skill workers, as well as all groups applying for and obtaining new skills to press. (Bellamy and Taylor, 1998).

In the rural context, development involves use of physical, financial and human resources for economic growth and social development of the rural economies (Burkey, 2000). The term rural development also represents improvement in quality of life of rural people in villages. As per Chambers (1983) “Rural Development is a strategy to enable a specific group of people, poor rural women and men, to gain for themselves and their children more of what they want and need.” Singh (1999) defines Rural Development as “A process leading to sustainable improvement in the quality of life of rural people, especially the poor”. The fact of the matter is that three quarters of the world’s poor, about 900 million people are in rural areas, and the Millennium poverty target set by Millennium

Development Goals (MDG), cannot be met unless the world addresses rural poverty. “Sustainable Rural Development can make a powerful contribution to four critical goals of: Poverty Reduction, Wider shared growth, Household, national, and global food security and Sustainable natural resource management” (World Bank, 1997). Hence worldwide there is a growing emphasis on development of rural economy of the countries. Any improvement, in the social or economic status of rural areas would not just directly benefit rural poor but would also bring down the migration-pressures on cities and contribute by positive ripple effect in global stride towards development.

The process of development in a country is to be aided by its governance. The goal of governance “should be to develop capacities that are needed to realize development that gives priority to the poor, and creates needed opportunities for employment and other livelihoods” (The World Bank, 1992, UNDP, 1994). Increased number of poor, hungry or marginalized people in a country represents decrease in its quality of governance. To promote development, various studies have proposed governance in the contextual realities of each country, including veritable participation of citizens in the governmental decision-making process (Grindle, 2004; Evans and David, 2006). Several

Institutions and experts accept Governance as a reflexive process, wherein policies, institutions, outcomes and analysis interact, to maximize the process of participatory development (UNDP, 1997; Ludden, 2005; Mehta, 2006).

Information and communication technologies (ICT), including radio and television and the newer digital technologies like computers and the Internet as potentially are introduced powerful tools and activators of educational reform and changes. different ICT, when properly applied can be developed to help access to education and the relationship between training and workshops to strengthen the increasingly digital, the quality of education also helped to create teaching and learning in an active process connected to real life high take. However, the experience of being raised by ICT in the classroom and other educational sites around the world during the last few decades proves that is not automatic fully realize the potential benefits of ICT training. (Guptaand et al, 2004)

Effective integration of ICT in the educational system is a complex process that involves not only technology but also involves educational and technical training, institutional readiness, teacher competencies and long-term investment. In fact the subject of such vital importance is that the technology to get the easiest part of it. Introduced ICT information and communication technologies are for this purpose, as a different set of tools and technology resources, used to information communicate, create, release, storage and management have been defined. These technologies are including computers, internet, broadcasting technologies (radio and television) and telephone. In recent years started a wave of intense public interest about how computers and the Internet can become a better control to the efficiency and effect of education at all levels and in both formal and informal development. (Rogers and Shukla, 2001).

But nowadays, ICT is more than a technology. Although the old technologies such as telephone, radio and television, will be less attention in the past but were used as educational tools. For example, "radio and television are used for over forty years to open and distance education. In this regard, although print remains the most expensive method and therefore available, but in developed and developing countries is provided the most prominent mechanism.

ICT for developing countries, are associated a potential for increased availability and quality of training and development. ICT basis and attract a lot of knowledge and its acquisition, providing unprecedented opportunities for developing countries, adding and expanding educational systems, improve policy formulation and implementation of opportunities to expand scope of work and gives poor facilitation. One of the biggest hardships that the poor are bearing the other people, who live in the poorest countries, is the sense of isolation. Communication technologies such sensory loss, are guaranteed and also has been unthinkable facilitate access to knowledge through the ways that already. However, the reality of the digital divide (the gap between those who control access technology and those who do not have access) means that the introduction and integration of ICT are challenging at different levels and in various types of training, most commitments. Failure in this struggle to become more significant gap of knowledge and the deepening economic and social inequalities (UNDP, 1997; Ludden, 2005; Mehta, 2006).

How ICT can help developing access to education?

ICT is a potentially powerful tool for developing educational opportunities, whether formal or informal is for areas already "stated (rural and dispersed populations) ethnic minorities, women, girls, disabled and old people traditionally excluded from education groups because of cultural or social reasons are also all those financial reasons or time constraints can not register in educational centers. Any time, anywhere (defining feature ICT) capability in ICT is a passing of time and place. ICT, education or training with asynchronous features provide a time delay between education and its acceptance by students makes it possible.

ICT applications in education:

Organizations and educational policy planners should first of all about the desired educational outcomes (mentioned above) is straightforward. The broad objectives must choose different technologies used to go and how to apply the guidance to go. Potential of each technology varies according to how to use. Haddad and Draxler have been identified IT application in education at least five levels of:

1. present,
2. experimental proof,
3. practice and practice,
4. interaction,
5. collaboration

Each of the different ICT tools (print, audio cassette and video, broadcast radio and television, computer or Internet) may provide the most basic means and surfaces used to go to prove. Except for visual technology, practice and practice the maximum use of both technologies may be offered. Each of the different ICT (print, audio cassette and video, broadcast radio and television, computer or Internet) used to may provide the most basic means and surfaces. Except for visual technology, may be offered practice and practice the maximum use of both technologies. The other network computers and Internet, ICT interactive learning that are provided and they if only used for providing proof or go, was not realized can better their full potential (Jauhari, 2004)

Results:

This paper is a multidisciplinary study of ICT initiatives for rural development. It emphasizes adoption of a more systematic approach for integrating Traditional Knowledge Systems (TKS) and ICT inputs to ensure sustainability of rural e-governance projects. The study of literature related to rural development and e-governance has indicated various issues impeding success of such initiatives. The main issues are lack of localization of content for rural communities and inadequate participation of rural communities in design of rural ICT initiatives. The study therefore suggests the use the systems-approach to integrate the relevant TKS along with ICT initiatives in the design of e-governance systems for rural development. This participatory approach can lead to creation of more acceptable and sustainable e-governance projects**.**

Regardless of the wide differences in ICT access between rich and poor countries and between different groups in the country, there are concerns that challenge the application of ICT in education with the existing differences among the lines of economic, social, cultural, geographic and gender will be broader. Everyone equal opportunities in terms of suitability for participation are necessary, but access to various factors, either as users or as producers through their sources is difficult and heavy. Therefore, the primary differences enhance and even grow. Consequently, programmers' international education is faced with a difficult challenge and how to help solve the problem and its development.

Promoting ICT in education, when done without careful study, can lead to the marginalization of those with more favorable conditions are unknown. For example, "women compared with men, because of illiteracy, lack of higher education, lack of time and mobility and poverty, controlling access to ICT and fewer opportunities for training are relevant. Also, more boys than girls' access to computers at home and school are not strange to say that if more boys than girls are willing to work with computers. The report of the University Association of American Women is that "Although some girls have an important gender gap have been limited, but today's technology, technology club, and boys in public schools while its own problems and programs are settled girls use computers for word processing the brand"**.** In an assessment in four African countries, the activities organized by World links remote international cooperation on projects between teachers and students in developing countries will promote, despite creating programs without regard to sex contacts, sexual inequalities remain Uganda and Ghana. In addition, while more girls than boys in relation to academic performance and advanced communication skills program will enjoy more than boys, but they were unable to perform their technological skills were. A set of economic factors, organizational and cultural differences involved in the social.

"The high ratio of students to computers and politics, whoever came first, the first is used in accordance with the girls wanted it." Girls travel restrictions in the early hours of daily work and home responsibilities are that this will limit their access. Also because local patriarchal beliefs dominate the boys are in the computer lab environment. Including proposed measures to address this discrimination, strategies to encourage schools to create "fair use" in the computer labs and the holding of meetings and sexual sensibilities conductivity decreased defense duties after school girls. ICT provides access to only a small part of the action is created equal. Equal attention should also be applied to ensure the technology really "is used by learners and ways of how well their needs will cure.

An educational program that reinforced this approach shows the overall program is bilingual. The program seeks to establish technology learning centers for bilingual teachers, students, teachers, parents and community members. Technical teams from each center three students, two teachers and the director of the Center with at least one female student and a teacher are female.

Another example of a general approach to the

application of ICT in education, radio education project Gobi Women of Mongolia, which seeks to provide professional and educational structure of women's favorite courses around the nomads and their opportunities for income generation.

It contains topics such as livestock rearing, family support (family planning, health, nutrition and health) to create income in the application of local raw materials and basic skills for the job is a new market.

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Comparative Study Between Low Dose Bupivacaine With Fentanyl & Bupivacaine Alone For Cesarean Section.

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Abstract: Objective: The aim of the present study is to evaluate the efficacy of reducing the bupivacaine dose with addition of fentanyl in spinal anesthesia for cesarean section**. Patients and Methods:** This prospective study was done during a period started from January 2008 to Decemeber 2009. It was conducted on 40 patients in the age group of 20-35 years. They were divided randomly into two groups having 20 patients in each, group B received 2ml intrathecal hyperbaric bupivacain 0.5% (10mg) & group BF received 1.5ml (7.5mg) hyperbaric bupivacain 0.5% plus 25 µg fentanyl. The efficacy of anesthesia, patient satisfaction and neonatal affection were assessed.
Results*:* Adequate sensory blockade (T6 or higher) was obtained in 75% of all cases. Two cases need general anesthesia & were excluded from the research. Two patients in groups BF need IV nalbuphine supplementation after delivery of the baby. Hypotension occurs in 80% of patients in group B & in 40% of patients in group BF. This difference in incidence of hypotension is significant. Number of ephedrine treatment & total dose of ephedrine were all significantly lower in group BF but the difference was not significant. There were no significant differences in quality of anesthesia between the tow groups. **Conclusion*:*** lowering bubivacaine dose to 1.5 ml instead of 2.0 ml (usual dose for cesarean section) and adding 25ug fentanyl is associated with a significant decrease in the incidence of hypotension and the number and total dose of ephedrine used.
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Key Wards; Bupivacaine - Fentanyl - Cesarean Section.

1. Introduction:

The combination of bupivacaine with fentanyl for cesarean section has been shown to improve the quality of spinal anesthesia but without unwanted effects. Decreasing the bupivacain dose can lead to decrease the maternal hypotension, ephedrine requirements, nausea, and time to discharge from the recovery room (1). Spinal anesthesia is preferred for caesarean section as it is simple, easy to perform, economical and produces rapid onset of anesthesia & complete muscle relaxation. In addition the mother is awake; hence the incidence of pulmonary aspiration is minimal. The incidence of neonatal depression is also very minimal. The main disadvantages include nausea & vomiting due to peritoneal traction, hypotension & bradycardia due to lesser control of the height of sensory & autonomic block & shorter duration of action requiring early postoperative analgesics (1).

The use of intrathecal fentanyl provided a more intense sensory block & allowed lower bupivacaine doses. Limiting the bupivacaine dose has been advocated with goals of decreasing maternal hypotension, vasopressor requirements, nausea & time of discharge from the recovery room & improvement of maternal satisfaction (2).

The aim of the present study is to evaluate the efficacy of reducing the bupivacaine dose with addition of fentanyl in spinal anesthesia for cesarean section. In this study mothers were allocated randomly to tow groups, either bupivacaine or low dose bupivacaine with fentanyl to compare the onset of action, intraoperative hemodynamics, quality of analgesia, degree of muscle relaxation, duration of analgesia & any adverse effect on the mother & newborn.

2. Patients and Methods:

The combination of bupivacaine with fentanyl for cesarean section has been shown to improve the quality of spinal anesthesia but without unwanted effects. Decreasing the bupivacain dose can lead to decrease the maternal hypotension, ephedrine requirements, nausea, and time to discharge from the recovery room (1). Spinal anesthesia is preferred for caesarean section as it is simple, easy to perform, economical and produces rapid onset of anesthesia & complete muscle relaxation. In addition the mother is awake; hence the incidence of pulmonary aspiration is minimal. The incidence of neonatal depression is also very minimal. The main disadvantages include nausea &

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3. Results:

Statistical analysis were performed with the use of SPSS 13.0 for windows (SPSS Inc. Chicago.IL).Student test was used to compare numerical variables .Data distribution &frequency differences were analyzed with the person chi-square test. The significance level was set at $p<0.05$was used for all tests .The results was expressed as mean ± SD.

Demographic data, duration of surgery, spinal block to delivery time (min) were comparable between the two groups (table 1). Adequate sensory blockade (T6 or higher) was obtained in 75% of all cases. Two cases need general anesthesia & were excluded from the research. Two patients in groups BF need IV Nalbuphine supplementation after delivery of the baby. Hypotension occurs in 80% of patients in group B & in 40% of patients in group BF. This difference in incidence of hypotension is significant (fig. 1). Number of ephedrine treatment & total dose of ephedrine were all significantly lower in group BF but the difference was not significant. There were no significant differences in quality of anesthesia between the tow groups.

APGAR scores at 1&5 min were similar. The incidence of side effects such as nausea, vomiting & shivering was more in group B than group BF. The incidence of pruritis was two cases in group BF but did not require treatment (table 2).

Table (1): Demographic data of patients undergoing spinal anesthesia for cesarean using 10mg or 7.5 mg intrathecal bupivacaine combined with 25µg fentanyl

	Group B Mean (SD)	Group BF Mean (SD)	P Value
Age (Years)	25.41 (3.83)	24.56 (3.16)	0.65
Weight (Kg)	75.4 (8.6)	75.8 (6.4)	0.87
Height (cm)	162.7 (1.8)	162.4 (2.1)	0.63
Primipara/Multipara	4/16	3/17	0.6
Gestational age (weeks)	38.5 (0.8)	38.2 (0.5)	0.16
Spinal block-to-delivery time (min)	9.0 (1.5)	8.75 (1.2)	0.7
Duration of surgery (min)	46.35 (9.87)	45.6 (5.26)	0.75

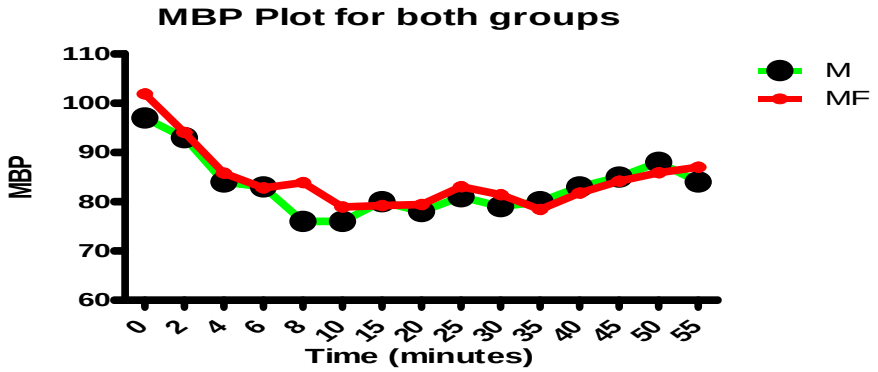

Figure1: Mean arterial blood pressure (MAP) in patients undergoing cesarean delivery using spinal anesthesia using 10mg hyperbaric intrathecal bupivacaine or 7.5mg hyperbaric intrathecal bupivacaine combined with 25µg fentanyl.

Table (2): The comparable parameters between the two groups

	Group B	Group BF	P Value
Respiratory Rate	21.3 (2.6)	21.05 (3.59)	0.8
Onset of sensory (min.)	1.35 (0.59)	1.83 (1.2)	1
Bradycardia	3/17	1/19	0.29
Hypotension	16/4	8/12	0.02
Quality of anesthesia	19/1	19/1	1
Uterine tone	8/12	11/9	0.53
Nausea & vomiting	2/18	2/18	1
Pruritis	0/20	2/18	-

- $P < 0.05$ is significant and $P < 0.001$ is highly significant

4. Discussion

The prevention & treatment of maternal hypotension associated with spinal anesthesia for cesarean section remains a difficult problem with no consensus as to the optimal mode of management. This lack of consensus is probably due to the causes of hypotension. As hypotension is predominately due to venous, arterial & arteriolar vasodilatation secondary to sympathetic blockade, the dose of local anesthetic is an important part of the etiology of the hypotension (3).

It has been reported that increasing the dose of local anesthetic increased maternal hypotension. Intrathecal opioids enhance analgesia without altering the degree of sympathetic blockade when added to sub therapeutic dose of local anesthetic (4).

In our study the incidence of hypotension could not be reduced but the severity of hypotension & number of ephedrine injection are reduced in group BF than group B & even the dose of vasopressor ephedrine during hypotension episodes was decreased group BF. The administration of intrathecal opioid carries a risk of respiratory depression (5).

Varrassi et al, noted that administration of 25µg fentanyl during spinal anesthesia in non premedicated elderly patients did not alter respiratory rate end tidal carbon dioxide tension, minute ventilation, respiratory drive, respiratory timing or ventilatory response to carbon dioxide(6). This in agreement with our study as the respiratory rate & the oxygen saturation haven't changed from the base line rate. Also none of the new born had 5min APGAR score <7. Similar observations were made by Biswas indicating that the dose of fentanyl may not have significant effect on the newborn (7). The incidence of other side effects i.e nausea, vomiting was significantly lower in bupivacaine fentanyl group than bupivacaine only group.

Only two cases of group B suffer from nausea &vomiting. These data are consistent with the study of Manuallany & colleagues. They suggested that 20mg intrathecal fentanyl was superior to 4µg .for prevention of perioperative nausea during cesarean delivery performed with bupivacaine spinal anesthesia (8).

The most important of both successful surgical anesthesia & time until recovery is the dose of local anesthetic drug (9). Low dose of spinal anesthesia has advantage of providing cardiovascular stability & it is advocated that 8mg of 0.5% Bupivacaine heavy is the optimal dose for cesarean section (10).

This study demonstrate that C.S. can be completed with low dose bupivacaine (1.5) mg & fentanyl 25µg . The synergistic action of fentanyl & local anesthetics in central neuraxial block improves the quality of intraoperative analgesia and also prolongs the postoperative analgesia.

A number of studies have used 25µg of intrathecal fentanyl as adjunct to the anesthetic agent with good results .A few studies have used intrathecal fentanyl in <25µg, but most studies have shown that 25µg of fentanyl provides maximum duration of postoperative analgesia with minimal side effects (respiratory depression & pruritus)(11) . Another study on parturient for cesarean delivery ,found that the peak sensory level was higher and motor block more intense in patients receiving 5mg isobaric bupivacaine with fentanyl 25µg (2).

So in this study we give 7.5mg bupivacaine plus 25µg fentanyl &the result about quality of anesthesia. Level sensory & motor block were equal to 10mg bupivacaine. Atallah & colleague reported the incidences of clinically relevant bradycardia and hypotension were 8.5 % and 11% respectively in the whole study population. Similar results have been reported in previous investigations in which low dose spinal anesthesia has been shown to reduce the effects of spinal block on heart rate and blood pressure when small doses of hyperbaric bupivacain 0.5% are used (12).

In agreement with pervious investigations, bupivacaine–fentanyl combination produced good intra-operations &postoperative analgesia & better patient satisfaction without prolonging recovery room discharge (13).

In the study using levobupivacaine with fentanyl 15µg for spinal anesthesia in urological surgery, no single incidence of pruritis were reported and this agrees with our study (14). The main concern about the low

incidence of pruritis was the infrequent asking the patients about pruritis .In this study only tow cases in group BF suffer from itching in the face but dose not require treatment.

The level of sensory block & grade3 of motor block was similar in both groups & this was satisfied by patients & obstetricians in all patients except two patients needed general anesthesia by thiopental in group BF& this may be due to the uncooperative patient. Kuusniemi et al studied the effect off adding fentanyl 25µg to three different doses of bupivacaine (10, 7.5 & 5mg & compared with 10mg bupivacaine without fentanyl in spinal anesthesia for urological surgeries .they concluded that the addition of 25 µg. of fentanyl to 5mg. bupivacaine resulted in shorter lasting motor block but maintained the same level of sensory analgesia as with larger doses of bupivacaine (7.5, 10mg) with or without fentanyl.

Sellm Turhanoglu et al preferred a 4mg bupivacaine dose with fentanyl for cesarean section. But insufficient motor blockade is observed and reflected on satisfaction of the patient & obstetrician & this is a drawback for delivery. Lower motor blockade scores were reported in pervious studies when fentanyl & bupivacaine were co administrated for spinal anesthesia (2,4).

5. Conclusions

It looks like lowering bubivacaine dose to 1.5 ml instead of 2.0 ml (usual dose for cesarean section) and adding 25ug fentanyl is associated with a significant decrease in the incidence of hypotension and the number and total dose of ephedrine used. Other parameters as the level of sensory block & motor block, quality of anesthesia, uterine tone APGAR score and the incidence of complication have no significant difference.

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Autocrine growth regulation of keloid and normal human dermal fibroblasts

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Abstract: Dermal fibroblasts were examined for autocrine control. Four experiments were done on each keloid and normal human dermal fibroblasts to study the effects of fibroblasts conditioned medium at 25% & 50% concentration on passage two (P2) cultured fibroblast. In each experiment, growth was quantitated by cell count, protein and Deoxyribonucleic acid (DNA) assays. The conditioned medium in our experimental models resulted in increase in the cell yields in the conditioned medium groups. There was definite increase in the cell population with the 25% and 50% conditioned medium over the experimental time period with both normal skin and keloid fibroblasts. The amount of protein & DNA per million cells is increased in cultured keloid fibroblasts and decreased with cultured normal dermal fibroblasts. The study showed that the autoscreation of culture keloid fibroblasts contain both mitogenic and metabolic signals that increase the cell count, protein and DNA content per million cells.
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Key words: autocrine control; keloid fibroblasts; normal human dermal fibroblasts; cell count; protein assays; DNA assays.

1. Introduction

Keloid is one of the most challenging clinical problems, especially in plastic surgery practice. The term keloid was originally described in the 1800s as “cheloid,” which is derived from the Greek root “chele,” which means “crab claw.” (Brissett and Sherris, 2001). Keloids are unique to humans and are characterized by an overabundant extracellular matrix (ECM) deposition, especially collagen in the dermal region of the skin and by an abnormal response of fibroblasts to growth modulators (Raghow, 1994; Tredget et al., 1997). Keloid tends to occur in darker-skinned races with a familial tendency (Eryilmaz and Uygur, 2010). These abnormal scars may follow surgery, ear piercing, burns, lacerations, abrasions, tattoo placement, vaccinations, insect bites, and any inflammatory process such as acne, varicella, or folliculitis (English and Shenefelt, 1999). In addition to the disfigurement keloid scar may inflict on patients, they can be complicated by pruritus, tenderness, burning, secondary infection, ulceration, and restriction of motion (Sherris et al., 1995; Shaffer et al., 2002).

The treatment of keloid scarring remains one of the most difficult challenges in plastic surgery. Several therapeutic modalities were described. These include surgery, silicone gel-sheets, steroid injections, compression garments, cryosurgery, radiotherapy, laser therapy, interferons, 5-fluorouracil and bleomycin. There is still no single effective treatment protocol for keloids management and no consensus on the best way to treat keloids (Mofikoya et al., 2007). Most of these treatment protocols are plagued with spectre of recurrence as well as various side effects, ranging from skin pruritus to pain (Donkor,2007; Butler et al., 2008).

Dermal fibroblasts have autocrine and paracrine functions (Igarashi et al., 1993). Fibroblasts in keloids have different properties than those seen in normal skin. In this study, we are investigating differences in the autocrine control of both cultured normal dermal and keloid fibroblasts.

2. Materials and methods

This part of the work was done in the tissue culture research laboratory, Plastic Surgery department, Ain Shams university hospital. The objective of this phase was studying the growth and microscopic characteristics of cultured normal and keloid fibroblast *in vitro* and using cultured cells to evaluate the effects of fibroblast conditioned medium on their growth, protein and DNA synthesis *in vitro*.

The fibroblasts were obtained from human normal skin and keloid scars removed surgically under anesthesia.

Two of the keloids were from the ear lobule and two from the upper arm and face. The normal skin was obtained from four patients operated upon for cosmetic surgery (breast and abdominoplasty). These specimens were collected aseptically in the operation room and

transferred to the cell culture laboratory.

Two methods were used for fibroblast isolation and cultivation. The first is the explants culture technique according to protocol described by Keira et al. (2004). Isolation and dispersed cell culture according to protocol described by Lee et al. (2006) using different in concentration of trypsin, type of collagenase and centrifugation rate. We used high concentration of trypsin (0.3%) instead of 0.25%, collagenase NB 4 Standard Grade instead of collagenase type II and the centrifugation rate at 2000 rpm for 10 min instead of 500 ×g for 5 min.

Primary culture from each specimen was established and propagated first in a serum-containing medium (DMEM supplemented with 10% FBS), then in a serum free medium (Ultra Culture).

2.1 Preparation of Conditioned media

Conditioned media were prepared from 50% confluent passage one (P1) normal and keloid fibroblasts by using serum free medium.

Conditioned media were aseptically aspirated and stored in the refrigerator. P2 cultures were fed with different concentration of unconditioned media and conditioned media (25% & 50% v/v) every other day till the cultures were near confluent.

2.2 Methods of assay

Growth of cells in culture was assayed by cell counting using the standard hemocytometer chamber and spectrophotometric DNA& protein assays.

(1) Cell Counting

Cell count was done by using hemocytometer and the dye exclusion technique to calculate the number of viable cells.

(2) DNA ASSAY

DNA was extracted from culture cells using QIAamp DNA FFPE Tissue Kits manufactured by QIAGEN Group, Germany; 2007. The absorbance was measured at 260 nm by a spectrophotometer (Ultraspec 1000, UV/visible spectrophotometer, Amersham Pharmacia Biotech, Cambridge, England).

(3) PROTEIN ASSAY

Preparation of cell lysates from cultured cell pellets was done according to technique described by Eissa and Seada (1998). The concentration of protein was measured in cell lysate samples by the method described by Bradford (1976). A convenient standard curve can be made by using a series of dilutions of bovine serum albumin. Protein concentrations in the samples were determined spectrophotometrically at 595 nm (Ultraspec 1000, UV/visible spectrophotometer, Amersham Pharmacia Biotech, Cambridge, England).

3. Results:

In our experiments, we could successfully culture both normal human dermal and keloid fibroblasts using the explants culture technique shown in Figure 1 and the dispersed cell culture technique shown in Figure 2.

Microscopically, the gross characteristics and morphology of the cultured keloid fibroblasts were not different from those of normal fibroblasts under the culture conditions.

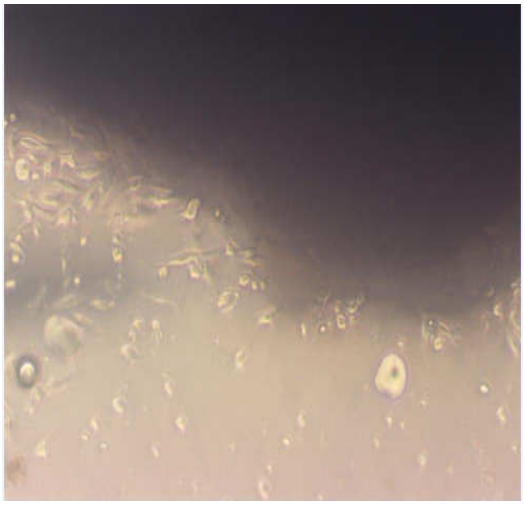

Figure 1. Fibroblasts proliferating from the edges of the explanted tissue to the Petri dish

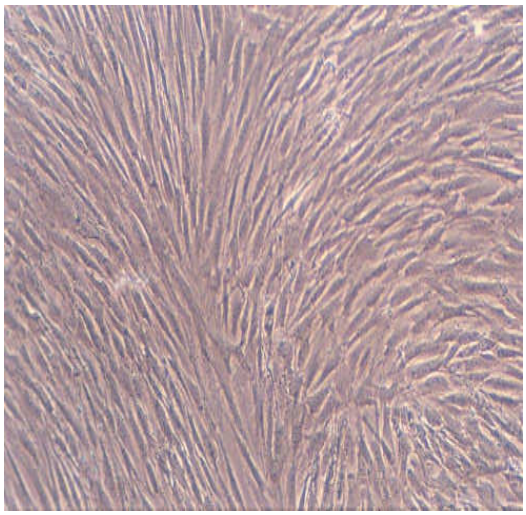

Figure 2. P2 confluent fibroblast culture

Table 1. The effects of 25%& 50% conditioned medium on P2 cultured Normal human dermal fibroblasts.

EXP. Number	Sample	Cell Count / T -75 flask	% Control	µg Protein/ $1x10^6$ cells	% Control	µg DNA / $1x10^6$ cells	% Control
1	Control	$1.8x10^6$	100 %	625	100 %	88.2	100 %
	25%	$3.4x10^6$	188.9 %	357.4	57.2 %	51.7	58.6 %
	50%	$3.8x10^6$	211.1 %	322.4	51.6 %	47.4	53.7 %
2	Control	$2x10^6$	100 %	684.6	100 %	98.7	100 %
	25%	$3.8x10^6$	190 %	416.9	60.9 %	58.3	59.1 %
	50%	$4.3x10^6$	215 %	368.2	53.8 %	52.6	53.3 %
3	Control	$2.1x10^6$	100 %	729	100 %	108.4	100 %
	25%	$4x10^6$	190.5 %	426.8	58.5 %	62.2	57.4 %
	50%	$4.2x10^6$	200 %	385.6	52.9 %	54.2	50 %
4	Control	$1.5x10^6$	100 %	528	100 %	73.6	100 %
	25%	$2.6x10^6$	173.3 %	296.4	56.1 %	44.2	60.1 %
	50%	$3.2x10^6$	213.3 %	278.4	52.7 %	36.8	50 %

Table 2. The effects of 25%& 50% conditioned medium on P2 cultured Keloid fibroblasts.

EXP. Number	Sample	Cell Count / T -75 flask	% Control	µg Protein/ $1x10^6$ cells	% Control	µg DNA / $1x10^6$ cells	% Control
1	Control	$1.6x10^6$	100 %	216	100 %	27.3	100 %
	25%	$3x10^6$	187.5 %	220	101.9 %	37.9	138.8 %
	50%	$3.2x10^6$	200 %	229.5	138.7 %	46.3	169.6 %
2	Control	$1.8x10^6$	100 %	275.6	100 %	37.8	100 %
	25%	$3.4x10^6$	188.9 %	280	101.6 %	44.5	117.7 %
	50%	$3.7x10^6$	205.6 %	288.5	104.7 %	52.3	138.4 %
3	Control	$1.9x10^6$	100 %	320	100 %	41	100 %
	25%	$3.6x10^6$	189.5 %	379	118.4 %	50	122 %
	50%	$3.8x10^6$	200 %	388	121.3 %	55	134.1 %
4	Control	$1.3x10^6$	100 %	528	100 %	70	100 %
	25%	$2.2x10^6$	169.2 %	578	109.5 %	78	111.4 %
	50%	$2.8x10^6$	215.4 %	596	112.9 %	85.4	122 %

Four experiments were done on each keloid and normal human dermal fibroblasts to study the effects of fibroblasts conditioned medium at 25 & 50% concentration on P2 fibroblast. In each experiment, growth was quantitated by cell count, protein and DNA assays. The data are shown in Table 1 and Table 2 and curves are shown in Figure 3, Figure 4 and Figure 5.

Serum free conditioned medium increases cell count in both cultured normal human dermal and keloid fibroblasts (Figure 3).

Protein concentration / 1x 10^6 cells increases in cultured keloid fibroblasts and decreases in cultured normal human dermal fibroblasts in response to their autosecreations released in serum free conditioned medium and that this effect is dose-related (Figure 4).

DNA/1x 10^6 cells increases in cultured keloid fibroblasts treated by 25% & 50% conditioned medium and decreases in cultured normal human dermal fibroblasts (Figure 5).

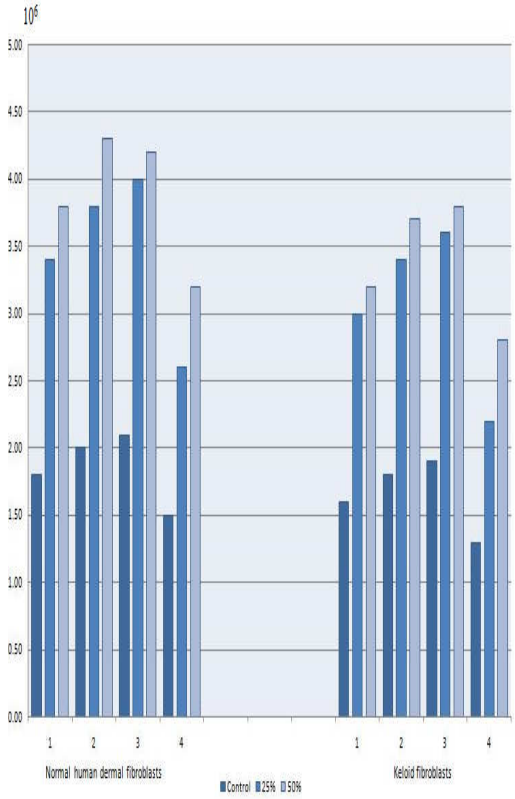

Figure 3. Cell count of cultured normal human dermal fibroblasts versus keloid fibroblasts

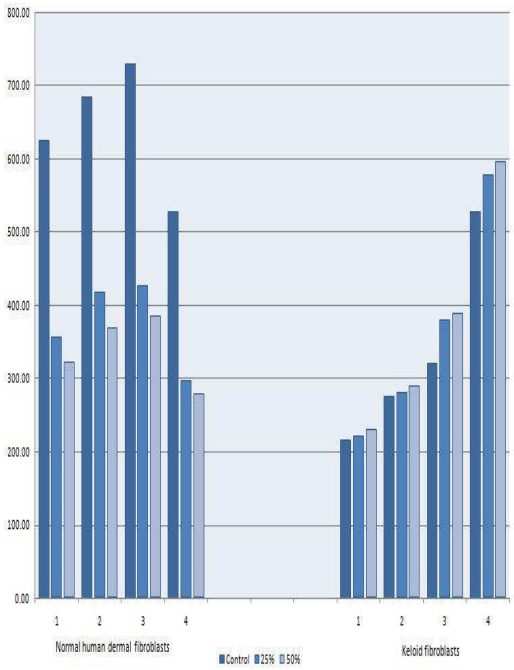

Figure 4. Protein concentrations in cultured normal human dermal fibroblasts versus keloid fibroblasts

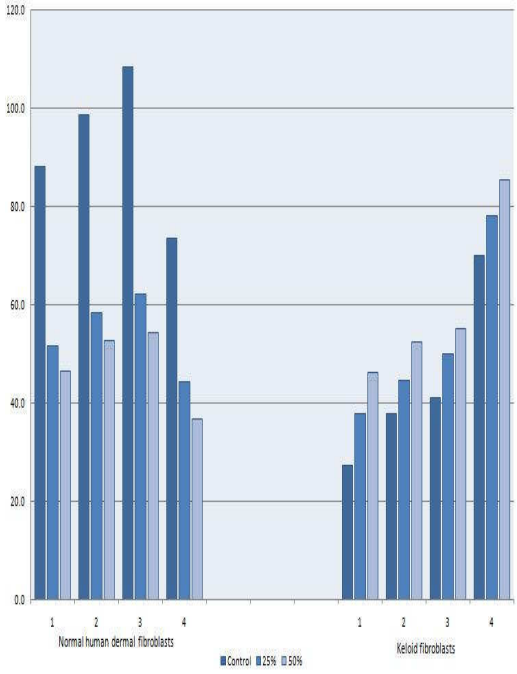

Figure (5): DNA concentrations in cultured normal human dermal fibroblasts versus keloid fibroblasts

4. Discussion

Calderon et al. (1996) evidenced that keloid fibroblasts possess an increased *in vitro* proliferation capacity which is consistent with a decreased apoptosis rate. Also, keloids are known to produce large amounts of ECM components that are even qualitatively different from those involved in the normal healing process (Luo et al. 2001). Matsuko et al. (1988) demonstrated a greater density of fibroblasts in keloids than in normal granulation tissue suggesting that fibroblast proliferation *in vivo* is increased in keloids. Kischer, (1992) has alluded to the hypercellular nature of keloids early in their development. This difference disappears in later phases of keloid development where cell numbers are the same or less than in normal scar or dermis (Mancini and Quaife, 1962).

In our study the cell yields in our conditioned medium groups were more than the control. There was definite increase in the cell population with the 25 and 50% conditioned medium over the experimental time period comparable to the control with both normal skin and with keloid fibroblasts.

Meenakshi et al. (2005) showed that Keloid fibroblasts have higher proliferation rate than normal skin fibroblasts. The rates of DNA synthesis and protein synthesis were studied in order to analyse the metabolic activity of these fibroblasts. Both these studies showed that keloid fibroblasts were metabolically more active than fibroblasts from normal skin.

In our study we confirmed the increased in metabolic activity of keloid fibroblasts. The amount of protein & DNA per million cells increased with keloid fibroblasts cultured in 25% & 50% serum free conditioned medium.

Younai et al. (1994) investigated the *in vitro* effects of Transforming growth factor-beta 1 (TGF-β1) on the rate of collagen synthesis in keloid fibroblasts and normal skin fibroblasts. In response to exogenous TGF-β1, keloid fibroblasts produced 12 times more collagen than normal fibroblasts. Tan et al. (1993) evaluated the effects of basic fibroblast growth factor (b.FGF) on keloid fibroblast cultures. They found that b.FGF causes a dose dependent inhibition of hydroxyproline biosynthesis, an index of collagen production. b.FGF may not play a key role in the formation of keloids, but that it may be a potential modulator in their treatment or prevention (Hanasono et al. 2003).

We did not assess the role of cytokines produced or released by cultured keloid fibroblast treated by conditioned medium. From the work done by different authors, the relative roles of TGF-β and b.FGF may explain the proliferative & metabolic effect of autocrine secretions of culture keloid fibroblast.

5. Conclusion

The *in vitro* culture studies allow for a defined system with well-defined parameters of cell type, cell number and the effect of autocrine secretion in different concentration on the cells. These *in vitro* systems are well suited for some creative designs to investigate the mechanisms underlying both normal and abnormal healing processes. The data confirmed that keloid fibroblasts were metabolically more active than fibroblasts from normal skin when treated with conditioned medium.

A study on cytokines produced by fibroblasts especially TGF-β and b.FGF may cast light on the pathogenesis and possible therapeutic approaches to keloid. This idea is suggested for future research specially because there is no suitable animal model for keloids and it is not ethical to do experimentation on living human keloid patient.

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A study of Some Social Factors Affecting the Societal Belonging to the Rural Youth

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Abstract: the research aimed are to determine the degree of affiliation of respondents from upscale youth of their community, as well as determine the relationship between the degree of affiliation of respondents to their community and all of the social factors under study. Also, determine the contribution of independent factors of the subject of study combined in the interpretation of the overall contrast between the subjects in the degree of belonging to their community. The research was conducted on a sample of rural youth, located in the age (20-35 years), an estimated 200 persons from the Sahel Aljawabr village, alshouhda Markz (district), Monofia Governorate. Data was collected through personal interviews with the subjects by questionnaire designed for this purpose. The researcher has been used in the tabulation and analysis of data tables exclusively numerical, percentages, and simple correlation coefficient of Pearson to determine the significant relationship between the factors independent of the subject of study and the affiliation of respondents to their community. Moreover the use of "T" and "F" tests to identify the significant differences between some of the independent factors and belonging to the local community also used relational analysis of the multi-model (progressive) Step Wise to determine the contribution of these factors in the interpretation of the overall contrast between the subjects in the degree of this association. The main results are: (1) Rural Youth has a somewhat high degree of belonging to a combined local and stand with it, and has the desire for advancement and development subject to the availability of appropriate conditions for it. (2) Significant relationship between the level of affiliation to the community and the following independent variables: the profession of the respondents, exposure to mass communication, family size, type of family, family cohesion, the state of housing, and the problems experienced by rural youth. (3) Proved to be a not significant relationship between the level of affiliation to the community and the following independent variables: age, type and level of education, marital status of respondents, the presence of children of respondents, and the social situation of young rural families of the subjects. (4) Some of the independent factors contribute to the interpretation of the overall contrast between the respondents in terms of their belonging to their community by 48.1%, and the most important of these factors, exposure to mass communication, and family size, and family cohesion.
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Keywords: Social Factors Societal Belonging, Rural Youth

Introduction:

Youth is the mirror that reflects the true reality of a nation, to understand her mind and her heart beating, and the evidence can be based upon this nation in its rise, progress and predict its future, especially if those belonging and loyalty to their homeland. Where they represent the basic foundation in advancing social and economic development, and in view of its gift for energies make them more dynamic and active and the capacity and determination to work and tender and more able to cope with change.

The Egyptian youth is the most important wealth in Egypt, the source of its strength and its present and future of its national project, which is always constant, and built on the basis of successes and victories over the ancient and modern history. Where they represent a key element in the human resources and is located upon themselves the task of achieving their role in the development process.

Statistical data indicate that, the proportion of rural youth amounted to 58% of the total youth of the Republic, which is located in the age group (15-35 years), which represents the ratio of 42.77% of the total population of the Republic.

Based on this, it is clear that Egyptian society is a young society has the energies and productive capacities should be utilized, provided good preparation, training and especially the young rural of them. Moreover, define their roles as good citizens can take advantage of them to increase their participation actively in the development of their communities, and increase their sense of belonging to their community or national level.

The affiliations of the meanings are the important attempts of the Egyptian society to instill in the hearts of her children, because the affiliation is the ligament which connects the individual to their land and homeland. In addition to the sense of the relationship of the meanings of great means as sacrifice and loyalty to this land, which may be driven by giving and active participation in order to improve the reality around him, in order to preserve the nation its strength and survival. If the social value of belonging must be instilled in every member of society, young people in general and rural youth in particular are most in need of this value in order to raise them to the love and defend of their community and their participation in development.

Problem of the study:

Despite the importance of the role played by rural youth in the Egyptian society as a key element in the development process, as also, it represents the technical cranks underpinning the renaissance of his community. Nevertheless, some of the writings and studies have indicated the prevalence of certain manifestations of negative behavioral among rural youth, which are considered indicators of the weakness of belonging to their community such as the desire of permanent migration, and seek to acquire a nationality other than the Egyptian nationality. Also, do not bear the responsibility, and lack of attention to general issues of society, and weak participation in development, and the prevalence of individualism, and alienation. Therefore, the most serious problems that may encounter the rural community is the weak Affiliation of rural youth to their community, because of the serious consequences as a result, the needed research and study of this phenomenon, and find out how much disparity between the rural youth in the degree of affiliation and to identify factors that may affect the affiliation of these young people to their community Local.

Because the serious consequences as a result of weak sense of belonging or not belonging is not only on the young people but also on the nation's present and future, the problem of this research is limited to the following questions:

1 - What are the indicators of rural youth belonging to their community?

2 - How can determine the degree of rural youth belonging to their community?

3 - What are the social factors that may affect the degree of rural youth belonging to their community?

4 - How can determine the combined effect of independent variables, the subject of the study on rural youth belonging to their community?

Objectives of the study:

The above objectives of the research can be identified as follows:

1 - Identify indicators of rural youth affiliation.

2 - Determine the degree of rural youth belonging to their community.

3 - Determine the relationship between the degree of affiliation of rural youth to their community and all of the social factors which are the following: age, gender, educational level, marital status, occupation, and there are children, exposure to mass communication, social status to the family of young people, the size of the family under examination, the type of family that live by Category, family cohesion, housing status, and problems experienced by rural youth.

4 - Determine the relative contribution of the social factors studied in the interpretation of the overall contrast between the subjects as belonging to their community. (Determine the combined effect of independent variables under study on the degree of rural youth belonging to their community).

Study plan:

To accomplish the objectives of the current study, it was a plan under which the study was divided into the following elements:

1 - The concept of belonging.

2 - Hypotheses of the study.

3 - Way of research.

4 - The quantification of the variables of the study.

5 - Results of the field study.

6 - General discussion of the results.

7 - The study's recommendations.

First: the concept of belonging:

Colorful views of social scientists about the concept of loyalty, some of them felt that it defended the pay of the individual to join a particular group, and some of them felt that sense of pride and pride to be from this group, and some of them believed that a trend or a tendency toward the group, which belongs to it, also finds some that membership can be achieved only in the presence of a group to join the individual and united with them and realize their particular social status.

Is generally thought by scientists that can be defined as belonging community-based rural youth as a "link rural youth in their community and their adherence to the norms and standards prevailing in it, awareness of their problems, their devotion to him and support him and defend it from any external threat, purchase of products and industries that bears his name, and their determination permanent property of the public, and participation in development".

The previous studies indicated that, it can extract some of the elements that can be used in this study to measure the rural youth belonging to their community.

Indicators of rural youth belonging to their community:

1 - Link young people in the village and not a desire to stay away from them.

2 - Young people's commitment to social standards of the rural village.

3 - The social relations between rural youth and the people of his village.

4 - Readiness of rural youth to assume leadership responsibility.

5 - Youth participation in rural community development projects in the village.

6 - Satisfying rural youth for services in the village.

Second: The hypotheses of the study:

General theoretical hypothesis:

There is a relationship between the independent factors studied and the rural youth belonging to their community.

Research hypotheses:

1 - The degree of affiliation of respondents from the rural youth to their community, according to their level of education.

2 - The degree of affiliation of respondents from the rural youth to their community, according to their kind.

3 - The degree of affiliation of respondents from the rural youth to their community according to their marital status.

4 - The degree of affiliation of respondents from the rural youth to their community, according to their profession.

5 - There is a difference between respondents from the rural youth who have children and who do not have children in the degree of belonging to their community.

6 - There is a relationship between the age of the subjects of rural youth, and between the degrees of belonging to their community.

7 - There is a relationship between the degrees of exposure the subjects of rural youth the means of mass communication and between the degrees of belonging to their community.

8 - There is a relationship between family size of respondents from rural youth, and between the degrees of belonging to their community.

9 - The degree of affiliation of respondents from the rural youth to their community according to the type of their families.

10 - The degree of affiliation of respondents from the rural youth to their community according to social status to their families.

11 - There is a relationship between the degree of coherence of the families of the subjects of rural youth, and between the degrees of belonging to their community.

12 - There is a relationship between the state of residence of respondents from the rural youth, and between the degrees of belonging to their community.

13 - There is a relationship between the degree of suffering of the subjects of rural youth problems, and between the degrees of belonging to their community.

14 - Independent contributing factors studied in the interpretation of the overall contrast between the subjects of rural youth in the degree of belonging to their community.

Procedural definitions of some concepts used in the research:

Affiliation rural youth of the community:

It is intended in this search link of rural youth in his village, and the unwillingness to separate from her and his commitment to social standards prevailing, and participation in its development, and sense of responsibility towards it.

Rural youth:

They are individuals who live in the countryside and the fall in the age group of 20-35 years.

Profession:

It means the type of work in the research, which works by rural youth, whether working in agriculture, or employees, or craftsman, or free acts, or does not work.

Family cohesion:

It is intended in this research is the rule of the love feelings and affection between the rural youth and his family, commitment to its standards, contribute to the activities undertaken by, and concerted individuals with a family in times of crisis.

The case of housing:

It is intended in this research possession of the young man or his family to rural residence, whether property, or rent, and determine the specifications, in terms of construction material, roof, floor, and paint.

Third: The research method:

Methodology of the study:

The theoretical foundation for the study was built on the concept of belonging, and rural youth belonging to his community as an input to its curriculum with the assistance of the quantification sociometry in data processing for the construction of a measure or indicator of the local affiliation, allowing the identification of the determinants of affiliation on the one hand, and nature of hand.

Search area:

This research was conducted on the village of Sahel Al-Jawabr – Alshouhda district – Monofia Governorate.

The research sample:

Volume of 200 study samples of males and females were selected randomly from the total number of youth in the age group of 20-35 years old in the village.

Method of data collection:

After selecting the research objects and the formulation of hypotheses, a questionnaire was developed to collect data from respondents, personal interviews. After the completion of data collection as the previous, they were discharged, record and process as a prelude to quantitative statistical analysis in order to achieve the research objectives and hypotheses. The initial test and field data collection took about three months (October, November, and December 2010).

Statistical analysis tools:

This research has been used a number of statistical methods for the analysis of research data by the nature of the variables and objectives of the study, which used a quantitative method and percentages to describe the social factors under study. In addition to describe and determine the level of affiliation of the respondents, through the studied indicators to measure the affiliation of rural youth to their community.

To determine the effect of social factors relationship in the search, the affiliation of rural youth for their community, a simple correlation coefficient have used, also used the (T), and (F) test. Also, the multiple regressions Stepwise analysis is used, to determine the contribution of the factors, studied in the interpretation of total contrast between respondents in terms of belonging to their community.

Statistical hypotheses:

To achieve the research hypotheses were developed fourteen statistically presumably, specializes hypothesis (1-13) tested the impact of factors independent of both the unit on the degree of affiliation of the study sample to their local community, involving all in one argument:

The degree of belonging to the local community is not affected significantly by the following independent variables: age and type of respondents, the educational level of respondents, and marital status of respondents, and the profession of the respondents, and having children and who do not have children of the respondents and the exposure the subjects of the means of mass communication, and social status to the family of the young rural of the subjects, and the size of the family respondents, and the type of family respondents, and family cohesion of the respondents, and the status of housing for the respondents, and problems experienced by young people from rural respondents.

The fourteen statistical Purposes:

Respect to test the combined effect of independent variables under study on the degree of affiliation of the respondents sample, their community and spoken: not affected by the degree of affiliation of the youth sample their community influence the aggregate of the independent variables under study.

Fourth: the quantification of the variables of the study:

Requests choose to study for the quantitative approach to the necessity of forming some benchmarks and indicators that represent the digital various dependent variables and independent study, so that it can conduct statistical tests appropriate to the nature of the above mentioned hypotheses.

A - Quantitative measurement of the variable of: (rural youth belonging to their community):

Was measured by the rural youth belonging to their community through 6 indicators are:

1 - Link to rural youth in the village and not a desire to stay away from them:

Was measured by surveying the respondent opinion over 6 words, on a scale consisting of four levels, namely: link to a large extent, a medium degree, small scale, does not happen, and given grades 4, 3, 2.1, respectively, in the case of positive phrases and vice versa in the case of phrases negative. The study considered the sum of answers of respondents to the previous statements quantitative indicators to measure the index of the study sample.

2 - The commitment of rural youth social standards:

Measured by surveying the opinions of the respondents over 6 words, on a scale consisting of four levels, namely: a commitment to a large extent, a medium degree, small scale, does not happen and given grades 4, 3, 2.1, respectively, in the case of positive phrases and vice versa in the case of expressions of negative. The study considered the sum of answers of respondents to the previous statements quantitative indicators to measure the index of the study sample.

3 - The social relations between rural youth and the people of his village:

Was measured surveying the opinion of the respondents to 8 words, on a scale consisting of four categories: relationships strong enough large, medium degree, small scale, does not exist, and given grades 4, 3, 2.1, respectively, in the case of positive phrases and vice versa in the case of negative terms, and considered the sum of the study respondents

answers to the previous statements quantitative indicators to measure the index of the study sample.

4- Rural Youth ready to shoulder the responsibility of leadership:

Was measured surveying the opinion of the respondents to 6 words, on a scale consisting of four categories are: willing substantially, moderately, small scale, and there, and given grades 4, 3, 2.1, respectively, in the case of positive phrases and vice versa in the case of phrases negative. The study considered the sum of answers of respondents to the previous statements quantitative indicators to measure the index of the study sample.

5- Youth participation in rural community development projects in the village:

Was measured by survey respondents felt about the projects that have been established in their village, and set their answer is yes and no, If the answer is yes and asked them to specify the name of the project, and the number of projects that participated in them, were given one degree for every project in which the respondents.

6– Satisfying the rural youth for services in the village:

Was measured in a survey felt the subjects on the existing services in the village, if any service has been asked about the degree of satisfaction with them, and on a scale consisting of three levels, namely: satisfied, the same, not at all satisfied, and given grades 3, 2, 1 respectively, then collected the total grade for all services to reflect the degree of satisfaction with the services category his village.

The overall rural youth belonging to their community:

Was measured by collecting, the lower and upper limits of the actual extent of the six indicators, used to measure the rural youth belonging to their community, as shown in Table (1).

Table (1) the overall rural youth belonging to their community

Indicators of rural youth belonging to their community	Minimum	Maximum
Link to rural youth in the village and not a desire to stay away from them	6	24
Commitment to rural youth social standards of the village	6	24
The power of social relations between rural youth and the people of his village	8	32
Willingness of rural youth to assume leadership responsibility	6	24
Participation of rural youth in community development projects in the village	1	10
Satisfaction with services in the village	20	60
total	47	174

B - The quantification of the independent variables:

1 - Age: Use the number of years representing the age as a numerical category indicator to measure this variable.

2 - Type: Use classification (male, female), by given values (2) and (1) for each of them respectively, and the digital indicator to measure this variable.

3- Educational level: The respondents have distributed according to this variable into seven categories which are: illiterate gave zero, read and write and gave 4 degrees, holds a primary and gave him 6 degrees, holds a middle, and gave him 9 degrees, holds a secondary or intermediate certificate and gave him 12 degrees, holds a degree above average and gave him 14 degrees, holds a university degree or higher and gave him (16 - 22) degrees, respectively.

4 - Marital Status: The distribution of respondents according to this variable into four categories: single and gave 3 degrees, married and gave 4 degrees, and divorce gave two degrees, a widower and gave one degree.

5 - Profession: The respondents distributed according to this variable into five categories are: employee and gave 4 degrees, a farmer gave 3 degrees, the work of free and gave 5 degrees, a student gave two degrees, does not work gave one degree.

6 –Presence of children: the subjects were distributed according to this variable into two categories: There are the sons gave him two degrees, there are no sons and gave one degree.

7 - Exposure to mass communication: This variable was measured through three sources: the numbers of hours listen to the radio every day, the number of hours per day watching television, the number of times to read the daily newspapers in the week. To convert those items to the weekly average has been doing the following: For item (1), (2) (radio and television) has been multiplied its Category × 7, the item (3), which is read daily newspapers in the week, was multiplied × 1. The total calculated degree for this variable with the total scores obtained by the category of the three items.

8 - social status to the family of the young man: This variable was measured by asking category for

defining the status of his family between the families of the country to choose from three levels, namely high, medium, and were intact and given to grades 3, 2, 1 respectively.

9 - The size of the family category: Use the number of family members living permanently in residence category as a numerical indicator to measure this variable.

10 - Type of Family: Use classification (simple family, a complex family), where the given values (1), (2) each, respectively, the numerical indicator to measure this variable.

11 - family cohesion: was measured this variable for respondents from rural youth in exploring their opinion on (9) statements on a scale consisting of four categories: the coherence of a large extent, a medium degree, small scale, does not occur, and given grades 4, 3, 2, 1, respectively, in the case of positive phrases and vice versa in the case of negative phrases.

12 - The housing status: This variable was measured by the following items:

- Household form of tenure, whether owned or a lease and gave the two degrees, in the case of the owning and the degree and one for rent.
- The number of rooms at home and given the degree of one each room in the house.
- Walls and building material has been given two degrees, a brick red, and the degree of one brick raw.
- The type of roof and gave the two degrees of concrete, and the degree of one of the wood.
- The type of ground and gave the four degrees of Ceramics, and three degrees of the tiles, and two degrees of cement, and one degree of clay.
- Paint the walls and gave the four grades of oil paint, and three grades of paint with lime, and turbinate two degrees, and one degree of clay.
- The water cycle and gave the two degrees of the modern water cycle, and the degree of one for the classical cabinet.

Then, collected total score of these items to reflect on the state of residence of respondent.

13 - Problems facing rural youth: was measured this variable and the survey saw respondents in 10 problems to determine the degree of suffering which, on a scale consisting of four categories: suffering greatly, moderately, highly vulnerable, and suffering, and given a grade 4, 3, 2, 1, respectively, of the digital expression of this variable.

V: Results of field study:

A - Level of affiliation of respondents from rural youth for their community:

This section deals with a description of the level of affiliation of respondents from the rural youth to their community as measured by six indicators taken by the present study is a measure of this, namely:

1 - Link young rural village and not a desire to stay away from them:

The results showed that slightly less than half of respondents (48.5%) in the research sample was a high level of association with the village, while the percentage of respondents, those with the link average (40%), while the percentage of those with a weak link (11.5%).

2 - The commitment of rural youth social standards:

The percentage of respondents who had their level of commitment to high social standards (61%), while it became clear that some (35%) the level of their commitment to the medium, while the percentage of respondents, those with weak commitment (4%) only.

3 - The social relations between rural youth and the people of his village:

Is shown from the results that about two-thirds of respondents in the research sample was the level of social relations people of the village up with a percentage (68%), while nearly a third of respondents (30%) level of strength of social relationships have an average, as it turns out that the proportion of respondents in category vulnerable to the power of social relations for young people was (2%) only. These results show the power of social relations to the majority of respondents from the rural youth in the study sample.

4 - Readiness of rural youth to assume leadership responsibility:

The results indicated that the proportion of respondents in the medium category of the willingness of respondents from the rural youth to assume leadership responsibility was (47%), and in the readiness category accounted for the high (30%), and in the category of the weak level of preparedness accounted for in the sample (23%). It is clear from previous findings that the highest percentage of respondents had an average level of willingness to shoulder the responsibility of leadership.

5 –The rural youth satisfaction in the village for the services:

The results indicated that more than half of respondents (58%) in the sample of the research was the degree of satisfaction with services in the village medium, while the percentage of respondents in the category of high level of satisfaction (24%), the percentage of respondents who were weak, reaching the level of satisfaction (18%). It is clear from these results that the highest percentage of respondents satisfied with the level of services for their village average.

6 - Youth participation in rural community development projects in the village:

The results showed that more than three-quarters of respondents (79%) in the sample was their participation in community development projects in the village is weak, and in the medium category of the post is the proportion of respondents (16%) and the lowest proportion of respondents located in the category of level of participation high and accounted for (5%), this is clear from the results the low participation of respondents in their community development projects.

The overall affiliation of respondents from rural youth to their community:

The results indicate that (65%) of the sample the degree of belonging to their community medium, the level of belonging in the category accounted for the high (32%), while the level of belonging in the category accounted for the weak (3%) only.

Form the previous results; it is clear that the majority of respondents in the research sample were the level of belonging to their community between levels (average, high), each indicator measure after the affiliation of the community, as set forth in Table (2), with the exception of the participation of rural youth in community development projects in the village. Due to it requires money in most cases, which is not available sufficiently with young people, as is clear from these results, in general, rural youth has a high degree to some extent, of belonging to a combined local and stand with it, and the desire for advancement and development of the condition availability of suitable conditions for that, despite the suffering of many of the economic and social problems, so officials must invest this level of belonging among rural youth and the exploitation of its energies even have a role in the rise and development of his community.

Table (2) Distribution of respondents from rural youth and their grades according to the level in Indicators belonging to the local community of the study sample

Indicators of rural youth belonging to the local community	The level of the respondents belonging to local community					
	Number	%	Number	%	Number	%
- Link rural youth in the village and not a desire to stay away from them	23	11.5	80	40	97	48.5
Commitment to rural youth social standards.	8	4	70	35	122	61
The power of social relations between rural youth and the people of his village.	4	2	60	30	136	68
Willingness of rural youth to assume leadership responsibility.	46	23	94	47	60	30
The rural youth satisfaction for services in the village.	36	18	116	58	48	24
Participation of rural youth in community development projects in the village.	158	79	32	16	10	5
Respondents belonging to their community overall	6	3	130	65	64	32

B - Factors related to social affiliation of respondents from the rural youth to their community

To demonstrate the impact of independent variables (individually / and collectively) on the dependent variable (belonging to the local community) - Assumptions of statistical (1-13) - The results of statistical analysis contained in schedules 3.4, 5, significant relationship between the level of affiliation to the community and the independent variables the following: career subjects, and exposure to mass communication, and family size, type of family, and family cohesion, and the state of housing, and the problems experienced by rural youth, as proved significant of these factors on the social level of 0.01, the age, type and level of education, and marital status of respondents, and the presence of children of the respondents, and the social situation of young rural families of the subjects has proved to be significant of these factors on the potential level .05, which means rejection of statistical hypotheses and accept the imposition of the previous theoretical work on them.

The imposition of Statistical Fourteenth your statement on the impact of the independent variables combined at the dependent variable (belonging to the local community) has noted the results of statistical analysis contained in Table No. (6) using the method of regression staging to the presence of five variables contribute to the combined rate of 48.1% in the interpretation of the overall contrast between the subjects in terms of belonging to their community, and that the remaining percentage of 51.9% explained by other variables not included in the study. The value of (P) calculated to test the moral of this link the multi-16.77, a moral value statistically significant at 0.01 level, and therefore we can deduce

the existence of correlation of multiple variables, the five collectively they age, educational level, and exposure to mass communication, and family size, and family cohesion, and between youth belonging the rural community. This was to contribute significantly to all the above factors except for age, educational level, reaching values (q) calculated for this contribution is 3.79, 9.94, 16.77, respectively, and all these values are significant at 0.01 level which underlines the importance of these factors (exposure to mass communication, family size, family cohesion) to increase rural youth belonging to their community.

And occupies the exposure to mass communication ranked first in terms of impact in the dependent variable, where a $ 7.3%, and then come to family size in the second with a $ 2.9%, and then family cohesion in the third and was worth 0.9%, with the total impact of three factors mentioned above in the sense of belonging to the local community about 11.1%.

VI: The general discussion of the results:

- The results of the study, the high level of respondents link their village of rural youth, which may be due to the case of evolution and development, which recently saw the Egyptian village, and the completion of infrastructure projects by.
- The results of the study, the high level of commitment to the subjects of rural youth social standards, which may be due to the socialization process of the rural family, where interest in clarifying and teaching the social norms of youth and urged the need for commitment and stick to it, and at the same time, the family process of social control official, and that assess the behavior of deviating from these standards in the rural community.
- The results of the study the power of social relations among a majority of rural youth and the people of their village may be due to what is characteristic of rural culture of the multiplicity of linkages between a Fred rural community, and the need to preserve them, and stick to it, on the basis that these relations are given to the family and society fort to cope with problems and emergencies which may threaten the building group.
- The results showed that the highest percentage of respondents was the level of readiness moderate to shoulder the responsibility of leadership, which can be interpreted in light of their age and inexperience, lack of exercise to the work of leadership by, in addition to the spread of traditions and traditional values in the rural community and most importantly respect for the views Great, therefore, left the leadership for the elderly.
- The results showed that the highest percentage of respondents was their level of satisfaction with the services their village average, which may be due to the availability of a variety of services from transportation, electricity, drinking water, and means of communication, education, health, and youth centers and other village Egyptian but the level of performance of these services may not be required efficiency which affects the level of satisfaction of rural youth for these services.
- The results of the study, the low participation of respondents in development projects in their community, which may be due to the lack of the elements involved in these projects and in particular of the funds, which are often in possession of the head of the family, so if there was participation are often attributed to the head of the family, even though the participation of children efforts in development projects, a result that may be logical in light of the conditions experienced by these young people and the culture of the rural community.
- The results of the study different subjects belonging to their community according to their profession, with average degrees of belonging among the subjects of the students and staff, down to the farmers and do not work. This may be due the difference that students are still at the stage of dependence on their families in meeting their needs, and therefore did not happen to them positions with the community to judge him satisfaction or dissatisfaction, but staff may feel that they have learned and got a job met some of their ambitions, which makes them feel of belonging to their community, contrary to the farmers who have been affected much due to the economic reform policy, as well as the unemployed who do not have jobs so it is natural to weaken belonging to their community.
- The results of the study, high affiliation of respondents to their community high degree of exposure to mass communication, which can be interpreted that the vulnerability of rural youth the means of mass communication to give it a great deal of culture, and thus be aware of what is going on around him of the matters concerning the community, and this recognition is a testament to love and belonging to their community.
- The results of the study's affiliation rural youth to their local community affected by the size of their families, and may be explained by the fact that the large size of the family in the rural community associated with him to achieve some economic and social objectives of the family, raising their social status in the community and more from their association with him and consequently increase belonging to their community Local, where they feel

they are an important part of it does not do without him.

- The results of the study the impact of rural youth belonging to their community the type of family, ie respondents who live in families were simpler belonging of the community of respondents who live in extended families. This may be because of this difference to the children of families simple in the countryside are often educated and have jobs or sources of income to ensure their economic independence from their extended family, and therefore they feel that freedom from authority and control of the extended family, and develop their lives according to their potential and their circumstances, thus increasing their love and their association with in their local community.

- The results of the study, high affiliation of respondents to their community high degree of cohesiveness of prisoners, may be explained to what it feels like the family of coherent stability and tranquility, spreads a spirit of friendship, love and cooperation between them, which makes them more belonging for their families and, hence, their love and dedication to their community and become more belonging to him.

- The results showed a high degree of affiliation of the respondents for their community improvement in the situation their homes, and may be explained by the fact that young people when he feels that he has a house harboring him and have a family inside, and have the requirements of a decent life, so it has a payoff well in the tablet belonging to his community, while affecting the lack of housing or low negative impact on his belonging to the local community, to a sense of rural disabled young family and his community to meet the needs and desires in a fundamental right which weakens the rights of the membership.

- The results of the study subjects have lower affiliation rural youth about their community the more problems they suffer. May be explained by this that the greater the severity of the problem experienced by rural youth such as unemployment, poverty, and inequality, this may affect negatively to satisfy the essential needs of young people, which is reflected in the composition of social and psychological and physical, and gets the feeling of hatred and dissatisfaction with society and weakens belonging to him.

VII: Recommendations of the study:

Based on the findings of research it can recommend the following:

1 - the organs of the Ministry of young people through youth centers at the level of the Republic and the NGOs, government can stimulate and encourage rural youth to participate in developmental projects in their communities, in any form of participation so that the young people of its importance, and thus increase their sense of keeping it up, which strengthens the affiliation of their community Local.

2 - Develop the legislation and the necessary safeguards, which emphasize equality and non-discrimination among young people in terms of access to jobs, education, health, housing, increasing their sense of social justice, and consequently increase belonging to their community.

3 - The necessity of those responsible for the visual media and audio-visual work to develop information programs that aim to inculcate the values and working to increase membership of the community of rural youth.

4 - The need for coordination between the competent organs of Scientific Research and the Ministry of Youth to study the problems faced by rural youth, which affect the membership of their community in order to reach a solution that suited her.

5 - The Ministry of Education, in coordination with the Ministry of Higher Education to develop curricula includes content on the scientific material increase of the values that encourage increased membership among young people in general.

Table (3) Values of simple correlation coefficient between some independent factors and their relationship to dependent variable (belonging to the local community)

Independent variables	Simple regression coefficient	Type of significance	Level of significance	Tabular (d) value
Age	-0.33	Insignificant	0.05	0.098
Exposure to mass communication	0.150	significant	0.01	0.128
Family size	0.113	significant	0.01	0.098
Family cohesion	0.341	significant	0.01	0.128
housing case	0.227	significant	0.01	0.128
Problems facing rural youth	-0.128	significant	0.01	0.098

Table (4) Test values (v) for some of the factors and their relationship to the independent variable of (Belonging to the local community)

Independent variables	Calculated (T) value	Type of significance	Level of significance	Tabular (d) value
Type	-0.324	Insignificant	0.05	1.966
Having children	0.798	Insignificant	0.05	2.588
Family type	2.34	significant	0.01	1.966

Table (5) Analysis of variance to test the difference between the mean scores of respondents Affiliation For their community, according to some independent factors

Independent variables	Sources of difference	Degree of freedom	Total Square deviations	Average total Square deviations	Calculated (F) value	Tabular (F) value	Type of significance	Level of significance
Educational level	Between group	52	1076.02	20.69	1.13	1.22	Insignificant	0.05
	Within groups	148	2745.26	18.55				
	Total	200	3821.28	-				
Marital Status	Between groups	52	22.69	0.436	1.15	1.21	Insignificant	0.05
	Within groups	148	56.92	0.385				
	Total	200	79.61	-				
Profession	Between groups	52	263.32	5.06	1.37	1.22	significant	0.01
	Within groups	148	556.50	3.76				
	Total	200	819.82	-				
Social status To the family of the young	Between groups	52	41.65	0.801	1.09	1.32	Insignificant	0.05
	Within groups	148	110.65	0.748				
	Total	200	152.30	-				

Table (6) Model analysis of the independent variables in the complex impact on the dependent variable (Belonging to the local community) using the method of gradual decline

Independent variables	Correlation coefficient	The cumulative percentage To contribute to the relative (coefficient of determination)	Contribution of each factor in contrast with the dependent variable	F value
Age	0.001	3.3	3.3	0.421
Educational level	0.009	9.4	6.1	1.77
Exposure to mass communication	0.028	16.7	7.3	*3.79
Family size	0.039	19.6	2.9	*9.94
Family cohesion	0.231	48.1	0.9	*16.77

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Using degree- day unit accumulation to predict potato tubeworm incidence under climate change conditions in Egypt

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Abstract: The potato tuber worm, *Phthorimaea operculella Zeller*, is a serious pest of potato, *Solanum tuberosum L.*, in subtropical and tropical production systems around the world. Knowledge of the temperature-dependent population growth potential is crucial for understanding population dynamics and implementing pest control strategies in different agro-ecological zones. Potato tuber moth is considered among the most important potato insect pests in Egypt. The aim of this study was to predict degree day's unit and annual generation peaks for tuber worm under current and expected future climate by using the relationship between the accumulated thermal heat units expressed as degree-days unit (DDU) and the population fluctuations. It is evaluated how temperature influences the annual generation in two distinct locations in Egypt using the climate change data output from the HadCM3 model for A1 scenario proposed by the Intergovernmental Panel on Climate Change. Our results indicated that population of the tuber worm at Ismailia gave the highest number of generations as compared with EL Beheira location under current climate. Generation numbers of tuber worm under climate change conditions increased especially in Ismailia location. However, the expected generation numbers of the tuber worm in 2050 and 2100 are expected to be 9-11 and 10-12 generations per year, respectively.
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Keywords: Potato tuber worm, Climate change, Degree day unit, Generations, *Phthorimaea operculella Zeller*, threshold temperature.

1. Introduction:

Potato, *Solanum tuberosum L.* is a crop of international importance for consumers everywhere in the world. Potato tuber worm, *Phthorimaea operculella Zeller* (Lepidoptera: Gelechiide), is considered among the most impotent potato insect pests in Egypt. Temperature has a direct influence on the activity as well as on the rate of development of insects and other ectothermic organisms. According to Zalom and Wilson (1982) the rate of development is based on the accumulation of heat measured in physiological rather than chronological time. Chiang (1985) denominates "optimal range" the temperature going from the lower threshold to the upper threshold, where the development is directly proportional to temperature. Outside these limits activity decreases to almost a standstill without necessarily causing death. The thermal unit provides a valuable tool for insect pest control; in forecasting infestations monitoring and timing insecticide applications Zalom *et al.*, (1983). From the practical aspect, cumulated thermal units have been used to predict the seasonal development and emergence of various insects Eckenrode *et al.*, (1975), Sevacherian *et al.*, (1977), Daoud *et.al.* (1999) and Khalil *et. al.*, (2010). The assessment report from the Intergovernmental Panel on Climate Change (IPCC) predicts an increment in mean temperature from 1.1 to 5.4^{o}C toward the year 2100 Meehl *et al.* (2007). An increment of this magnitude is expected to affect global agriculture significantly Cannon (1998). In addition, such changes in climatic conditions could profoundly affect the population dynamics and the status of insect crops pests Woiwod (1997). These effects could either be direct through the influence that weather may have on the insects physiology and behavior Parmesan (2007), Merrill *et al.* (2008), or may be mediated by host plants, competitors or natural enemies Bale *et al.*, (2002).

The objective of the present study is to predict potato tuber worm annual generation peaks under current and expected future climate changes by using the relationship between the cumulated thermal heat units expressed as degree-days (DD's) and the population fluctuations of potato tuber worm in four governorates in Egypt.

2. Materials and Methods

1- Experimental area :

This study was conducted in two locations in Egypt (EL Beheira and Ismailia); we selected these locations as thy displayed different micro climates and the highest potato yields in comparison with other locations Agriculture Statistic, (2008).

2- Estimate degree-days units :

2-1- Under current climate temperature:

For the estimation of degree day's unit, we obtained daily temperature records from Central Laboratory for Agricultural climate (CLAC) from 2004 to 2008 for These two experimental locations (EL Beheira and Ismailia) and the average were calculated and processed for abrojection on future climate consequences (2050 and 2100).

2-2- Under future climate data (2050 and 2100):

Climate change scenarios for locations were assessed according to prediction conditions derived from MAGICC/SCENGEN software of the university of East angle (UK). In this study the A1 scenario of climate data were used. The principle of MAGICC/SCENGEN is allowing the user to explore the consequences of a medium range of future emissions scenarios. The user selects two such scenarios from library of possibilities. In order to be able to compare a no action scenario with an action or policy scenario.

Thus in MAGICC/SCENGEN the two emission scenarios are referred to as a reference scenario and policy scenario Wigley *et al.*, (2000). The data which were generated from MAGICC/SCENGEN are represented in one scenario A1 these scenarios are described by IPCC 2001 as follows: The A1 scenario describes a future world of very rapid economic growth, global population that peaks in mid-century and declines thereafter, and the rapid introduction of new and more efficient technologies.

3- Determination of the thermal units required for potato tuber worm development in relation with degree day's unit (DDU):

Maximum and minimum temperatures were transformed to heat units using the lower threshold temperature (t_0) 9.6˚C with 459.6 (DDU) for a generation of potato tuber the average developmental time needed for completion of the potato tuber worm was calculated according to the hereunder formula Elsaadany *et al.*, (2000) and Richmond *et al.*, (1983) formula as follows:

$H = \sum D\text{-}D$

Where:

H= Number of heat unit to emergence.

D-D= (Max. t. + Min. t.)/2 – t_0, if Max. t.> t_0 < Min

D-D=(Max.t.–t_0)/2/2(Max.t-Min.t) ,if Max.t.> t_0<Min

D-D= Zero, if Max. t.> t_0< Min

t_0= threshold temperature = 9.5˚C

3. Results and Discussion

Current climate:

Under current climate conditions, generation number one gave the highest number of days and generation number six gave the lowest number of days, at EL Beheira and Ismailia (Table 1). The mean values of thermal units required for complete development of *Phthorimaea operculella* generation were 466 and 467 units in EL Beheira and Ismailia, respectively. So, the *Phthorimaea operculella* exhibited 9 and 10 generations in El Beheira and Ismailia, respectively.

Expected future climate:

Generation number of *Phthorimaea operculella* (Table 1) at El-Behaira is expected to be increased by one generation in 2050 (it will roach 10 generations) to two generations in 2100 (11 generations) in comparison with current climates (9 generations).The first generation longest period under current and future climate (2050 and 2100), being 81, 73 and 64 days, The number of days per generation in 2050 and 2100 is expected to be shortened of 8 and 17 days respectively compared to that under the current climate, respectively. The sixth generations under current climate took lowest number of days (24 days) in comparison with other generations days and the sixth and seventh generations under future climate (2050 and 2100) took the lowest number of days (23 and 22 days generations), respectively.

The mean period of generation under current climate lasted longest period, being 36 days in comparison with the expected future climate conditions in 2050 (32 days) and 2100 (31 days) (Table, 1).

Generation number of *Phthorimaea operculella* (Table 2) at Ismailia is expected to be increased from one generation per year in 2050 (11 generations) to two generations in 2100 (12 generations) in comparison with current climate (10 generations). The first generations took the highest number of days under current and future climate in 2050 and 2100, being 81, 65 and 61days, respectively. The number of days in 2050 and 2100 is expected to bee reduced of 16 and 20 days compared to that obtained an the current climate, respectively. The sixth generation under current climate took the lowest number of days (24 days) in comparison with the other generations. The sixth and the seventh generation under future climate in 2050 and 2100 took lowest number of days (22 and 21) in comparison with the other generations.

The mean period of generation under current climate lasted longest period, being 36 days in comparison with the expected future climate conditions in 2050 (30 days) and 2100 (29 days) (Table, 2).

As a conclusion, the effect of climate change is expected to have asignificant effect on the ecological parameters of *Phthorimaea operculella* (i.e., generations).

Table (1): Comparison between degree days and generation numbers of *P. operculella* under current and future climate (2050 and 2100) in EL Beheira region.

No. of generation			1	2	3	4	5	6	7	8	9	10	11	Mean
Current Climate		Day	81	44	29	27	26	24	27	29	36			**36**
		DDU	464	464	472	465	471	464	466	467	463			**466**
Future Climate	2050	Day	73	48	21	21	24	23	23	25	27	28		**32**
		DDU	460	463	468	466	466	465	460	467	474	468		**464**
	2100	Day	64	50	23	19	24	22	22	23	25	26	29	**31**
		DDU	464	465	475	466	476	462	466	469	472	462	466	**468**

Table (2): Comparison between degree days and generation numbers of *P. operculella* under current and future climate (2050 and 2100) in Ismalia region.

No. of generation			1	2	3	4	5	6	7	8	9	10	11	12	Mean
Current Climate		Day	81	43	27	26	25	24	25	27	37	45			**36**
		DDU	461	466	472	471	464	469	470	469	465	464			**467**
Future Climate	2050	Day	65	47	24	20	24	22	22	23	26	26	34		**30**
		DDU	473	472	466	470	464	475	462	477	479	460	466		**471**
	2100	Day	61	43	26	19	23	21	21	22	23	25	25	40	**29**
		DDU	466	469	460	477	477	469	466	461	473	466	463	462	**469**

In general, these results are in accordance with Abolmaaty, *et.al* (2010), which recorded that the expected generation numbers of the *Tuta absoluta* in 2050 and 2100 should be 12-14 and 13-15 generations per year, respectively, and degree with FAO/IAEA (2000), which recorded that, the *B. zonata* had 6-10 overlapping generations per year. results similar were obtained by Tranka, *et al.*, (2007), which reported that the effect of climate change for multivoltine species such as the European

corn borer *Ostrinia nubilalis* Hubner (Lepidoptlera: Pyralidae) will be that it may be able to produce additional generations, relative to current conditions, in a given locality, with a potentially greater impact on their host plants. For example, *O. nubilalis* is predicted to become bivoltine – i.e. to produce two generations per season rather than one – in the Czech Republic as a result of predicted increases in temperatures during the period 2025-50. Similar predictions were reported by Kriticos (2007), who mentioned that, climate change scenarios for the 2080s indicate that in the central Pacific, the change in potential distribution is relatively minor for Oriental fruit fly (OFF), *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae). Parts of New Zealand could become substantially more climatically suitable, increasing the likelihood of successful establishment of OFF after an incursion, and seriously threatening the horticultural sector. Should OFF become established in New Zealand, it is likely to follow any expansion of the horticultural sector into the coastal areas of the eastern part of the South Island as far south as Oamaru. In the same line.

The insect may develop generations under awarmer climate. High temperature in the future may thus increase the damage on crops, by increasing the number generations Abolmaaty *et al.,* (2010).

Estay *et al.,* (2009) predict a change in the equilibrium density of the confused flour beetle, *Tribolium confusum* Jacquelin (Coloeoptera: Tenebrionidae) from 10 to 14% under the moderate B2 scenario and 12 to 22% under the extreme A2 scenario for the period, 2071–2100, which imply a severe change in the pest status in the southern region of Chile.

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Different techniques in Participatory Rural Appraisal (PRA)

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Abstract: RRA is a social science approach that emerged in the late 1970s. The basic idea of RRA is to rather quickly collect, analyse and evaluate information on rural conditions and local knowledge. This information is generated in close co-operation with the local population in rural areas. Therefore, the research methods had to be adjusted to local conditions, i.e. they had to meet the communication needs of illiterate people or people who are not used to communicating in scientific terms. Participatory Rural Appraisal (PRA) as a method falls under the qualitative and participatory group of research methods. PRA is intended to enable local communities to conduct their own analysis and to plan and take action . PRA involves project staff learning together with villagers about the village. The aim of PRA is to help strengthen the capacity of villagers to plan, make decisions, and to take action towards improving their own situation. Participatory Rural Appraisal (PRA) is considered one of the popular and effective approaches to gather information in rural areas. This approach was developed in early 1990s with considerable shift in paradigm from top-down to bottom-up approach, and from blueprint to the learning process.
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Keywords: Participatory Rural Appraisal (PRA)

Introduction:

PRA requires researchers / field workers to act as facilitators to help local people conduct their own analysis, plan and take action accordingly. It is based on the principle that local people are creative and capable and can do their own investigations, analysis, and planning. The basic concept of PRA is to learn from rural people. Chambers (1992) has defined PRA as an approach and methods for learning about rural life and conditions from, with and by rural people. He further stated that PRA extends into analysis, planning and action. PRA closely involve villagers and local officials in the process. Similarly, Rapid Rural Appraisal (RRA) reflects the new thinking about development, needs, and people oriented responsibilities. It is a process that is highly systematic and structured, relying on interdisciplinary teamwork and special strategies for data collection and analysis such as triangulation, probing, and iteration. Some critics consider RRA to be a quick and dirty technique(Guijt, 1998).

There are a wide range of participatory tools and techniques available. People can use these tools and techniques according to their situation or needs. Generally, the application of different tools may vary from one situation to another. However, the process for conducting RRA/PRA remains the same.

The most common methods are the following:

1- Diagramming, Mapping and Modeling:
- transects
- maps (resource, social, farm)
- venn diagrams
- seasonally analysis
- historical analysis (time lines, trend lines, activity profiles)

2- Ranking and scoring
- pair wise ranking
- matrix ranking
- matrix scoring
- well-being analysis and wealth ranking
- proportional piling
- pie charts (injera charts)

3- Problem analysis
- identification and specification
- causal chaining
- prioritization

Community Sketch Maps

The purposes of community sketch map or a model: is a visual representation of what the community perceives as their community space. This include showing the shape (appearance) of the community, boundary and all the major features as understood and known by the community(Scrimshaw and Gleason, 1992).

The map shows where resources, activities, problems and opportunities are located, as well as the dimension and scope of issues to be investigated. It is critical to understanding the boundaries and characteristics of the community involved.

Topographical data (elevation, slope, drainage etc.)

Topographical data are basic when drawing a map of community, so is information on soils, vegetation, water availability, road, schools, health facilities etc. There are different sketch maps known for different purposes.

Some of them include(Dunn, 1992):

A. Social maps: Specific type of topical map representing households according to certain indicators.
- Indicates where people live and how many people live in an area
- Social and residential differences in status and wealth
- Buildings where people live or work, uses of space in a house

B. Physical and resource maps: drawn by the people to show natural resource of an area, location and use of natural resources.
- fields and land uses
- physical land features
- water location, quality and use
- soil types, uses, location

C. Topical maps: specific topic maps are drawn to draw attention to a particular type of information of the area, example:-
- location of forest resources
- soil types
- different crops grown
- houses and the number of people live in
- social & economic infrastructures etc.

D. Farm sketch: Making a farm or compound sketch highlight details that would otherwise be lost in a smaller scale maps.

Procedures for collecting spatial data

Who draws the maps?

The community members of their representatives together with the PRA team and the local extension field staff undertake this exercise. The various parties having different but complementary ideas to the process.

HOW?

The community members are the best experts of their area. While it is tempting for a team member to take charge and save time by drawing the
map, it is advisable to let ordinary villagers draw the map on the ground. Literacy is not necessary in order to draw a map of one's place. The PRA team should explain the process clearly. The sketch map is drawn using their fingers, sticks and other locally available materials such as pebbles, leaves, and flowers. The community should be guided through questions to draw the map of their community territory of application(IUCN, 2001).

Community sketch map helps in defining micro-zones, knowing about disparities in wealth, differences in land use. This exercise provides to locate areas where particular problems are thought to be prevalent. The map is also used to lay the transect route. While the map is still on the
ground the community members mark the most representative cross section of the community.

How should one proceed to sketch maps or models?

Before:
- Decide what type of map you want
- Bring people together who will have some knowledge about the area and can contribute
- Choose suitable time and place
- Bring materials with you on which you can copy a map drawn on the ground(Scoones, 1993).

During:

Try to minimize your own participation be an observer?
- Encourage by asking op0en questions
- Encourage the use of different materials, i.e. flowers, twigs, sticks etc
- Be patient!(Swift and Umar, 1991)

After:
- Maker a copy of the map or model, including mapper's names
- Try drawing the same type of map with different groups of people. i.e. one group of women, a group of old men and the young
- Keep it simple
- Orient it appropriately
- Cross-check the map, compare with what you see
- Draw it in the area of study with the local people.

Mobility diagram

The community can get goods and services from different places. Some resources will be available with in the PA, others on the boundaries of the community. People daily, weekly and occasionally fetch for those resources in and out of their area. Therefore they travel long distances under difficult situations.

Purpose

The diagram is used to understand the places traveled, resources collected and to identify the persons travailing. The resource centers could have problems and the road and means of transportation may not be appropriate, PRA team needs to know the critical goods and services that people travel to fetch for.

What?

The community center and the places of goods and services are listed. The pull factors and the reasons for not having the resource at the center are recorded. The team tries to understand the condition of the resources, and opportunities to establish with in the community. The community members may face difficulties on the road and may also be inconvenient to get goods and services at the destination(Uphoff, 1992).

Who?

The PRA team identifies individuals or groups who travel to other places on a purpose. Discussion with men and women travelers can give a clue about resource scarcity(Mukherjee, 1992).

How?
- Select informants who travel for resources
- Write down as many places as possible visited and resources the most wanted.
- The difficulties faced on the way and at the destination

discussed
- The informants mark on the ground the starting point and destination for different resources or services.

Application

The PRA team and informant record resources in short supply and the reasons for not having in the community. The community action plans include ways and means to get critical resources in the future. The difficulties faced on the road and at the resource center (destination) taken due consideration for improvement(Clayton, 1997).

Gender daily calendar:

Purpose

Most daily activities in traditional rural, societies are managed along gender lines. There are activities that are specifically performed by women, men or children. In some communities gender role divisions are still pronounced. In such cases it is necessary for the PRA team to be aware in order not to be seen as interfering with the community cultural norms specific gender roles so that new programmers are not introduced to overburden an already overworked group. Introducing gender awareness in PRA helps a community to begin examining itself(NCAER, 1993).

Who

Community members both men and women, young and old should be in attendance. PRA team members, men and women and local extension staff in the analysis of gender roles and responsibilities.

How

It is better if the community is allowed to lead gender related discussions. The PRA team facilitates discussions through a neutral process of mapping out a gender daily calendar. Men and women discuss on each daily activities on agreed season (raining or dry season). The groups on their timetable, from the time they wake up in the morning to the time they got to sleep in the evening.

Application

Gender daily calendar provides a clear picture of who does what in the community. It will help in the formulation of the community Action Plan. The community will become aware that unless some changes in gender relations are effected rural development will not proceed as quickly as they would like it to be(Holland, 1998).

_ **Daily-activity profiles** -- Researchers can explore and compare the daily-activity patterns of men, women, youth, and elders by charting the amount of time taken to complete tasks.

_ **Semi structured interviewing** -- A semi structured interviewing and listening technique uses some predetermined questions and topics but allows new topics to be pursued as the interview develops. The interviews are informal and conversational but carefully controlled(Chambers, 1994).

Semi structured interviews (SSI)

SSI is a guided interview here the major topics and a few key questions are formulated before the interview. But many new additional are asked during the interview based on answers to the key question.

Types of SSI:

1. The individual interview
- Get representative information about the society form individual informants
- Ask individuals at a time

2. The key informant interview
- Get specialized information from one or group of persons about the community
- Informants with specialized knowledge

3. Group interviews:
- Useful for obtaining general information about the community
- Better for cross checking information
- Group interviews require very careful preparation
- The ideal group is 8 – 15 people

_ **Types, sequencing, and chain interviews** -- Individual, pair, and group interviews are combined in a sequence to take advantage of key informants and specialist groups.

Using secondary sources
- Secondary sources of information include previously written documents maps, diagrams, tables etc
- Review secondary sources before beginning field survey is census data, aerial photos, marketing reports, etc.
- In reviewing secondary sources, you should keep summary notes, in the form of short paragraphs, diagrams, charts, etc
- In reviewing secondary sources, you should keep summary notes, in the form of short paragraph, diagrams, charts, etc.
- Be as critical as possible in reviewing secondary sources
- To develop understanding of local livelihoods
- Short period of time

Venn Diagram (Institutional analysis)

Venn diagramming is a method to find out who, what person or organizations are important in and for a community.

Purpose

To identify groups and institutions operating in the community and to show how they interact with each other To show the degree of their cooperation and involvement in development programs. To discover their important or influence on decision making in the

community.

What?

Venn diagrams have been used with in PRA in institutional context to discuss:

- The role and significance of various institutions
- Levels of communication between organizations
- The role of project bodies and their intervention Improving missing links between existing organizations,
- Potential for working through existing organizations, which ones and with which links.
- Potential roles for new organization
- Formal and non-formal groups and their levels of cooperation
- Communities perceptions of the institutions, always

Who?

The PRA team, key informants as elders, religious leaders, extension staff and other knowledgeable person take the responsibility of listing and
evaluation of individuals and institutions influencing decision making of the community.

How?

List institutions in the community and discuss importance of each institution and what they do. Make different sized circles and not which circle represents each institution i.e. big circle very important and decision maker, small circle with little importance. During overlapping the circles, the size of the circle indicates the importance of the institution, the distance between the circles indicate the degree of contact between institutions. For instance a large overlap high interaction. No overlap distant relationship.

Application

Identify individuals, groups or institutions. Important in the lives of people and establish close relationship with them. Provide the necessary support and effectively utilize their skills and experiences.

_ **Participatory diagramming** -- People are encouraged to display their knowledge on pie and bar charts and flow diagrams.

_ **Wealth and well-being rankings** -- People are asked to sort cards (or slips of paper) representing individuals or households from rich to poor or from sick to healthy. This technique can be used for crosschecking information and for initiating discussions on a specific topic (for example, poverty). The technique can also be used to produce a benchmark against which future development interventions can be measured or evaluated(Blackburn, 1999).

Ranking and scoring

Presentation:

A way in which various kinds of things can be compared according to different qualities people value. It places in an order of what is more or what is less important.

Purpose

Ranking methods allow us to see individual and group priorities among a number of alternative problems or solutions. It helps to generate reasons why people choose one item from the other.

What

People could use three different ways to generate a criteria for comparison and make up their choices.

(1) preference ranking
(2) pairewise ranking
(3) direct matrix ranking
(4) and direct matrix scoring

Preference ranking method helps to quickly get a good idea of what people think are the priority problem or preferences. The criteria attached to make up a choice is used to consider in the action plan. Individuals or groups vote on the items from most important to least important item. The choices could be between crop varieties, water points, food diets, livestock species, problems, solutions and many different issues, which require preferences. Paire wise ranking is used to compare between two items and make up a choice. It is more useful for exploring the reasons why people prefer one possibility over another. The moment a preference is made lots of criteria are explored to compare items using a group of criteria before a choice. Direct matrix ranking is used to list items to be compared along horizontal line and criteria on the vertical line to rank choices from most important to least important (i.e. 1st, 2nd, 3rd, 4th etc) In this case frequency of the items valued as the 1st choice helps to make up a final decision. Direct matrix scoring helps to attach a score to a comparable items against each criteria listed before a choice. A comparison could be made out of a score of 10(for instance) a comparison could be made between many items against one criteria set, and attach a score out of a maximum of 10 to items to be chosen. The frequencies of the highest scores (closer to 10) attached against many criteria helps to make up a decision for preference.

Who

Ranking and scoring could be done with individuals, households, community members deliberately selected and with mixed group of men, women, traditional leaders, local officials, extension workers etc. The group combination depends upon the issues to be ranked. Who should decision on the issues to be compared? Leads to the choice of informants.

How

The groups for discussion lists items to be compared. Let them generate either directly or thorough pair wise comparison criteria for ranking. Putting in an order of importance or ranking could be done through ranking order, scoring or key voting, from the most to least important. Thorough courting frequencies list in ranked order the items to be compared and make up a decision. The final choice could be made through group of

criteria or a single but most important critieria. Some times, the period for ranking (emergency) or vested need to the item may influence decision-making procedures. While listing criteria, do not mix up. PRA teams criteria with those of the informants. Use positive criteria for comparison

Application

Community action plans are developed on the basis of peoples preferences. The problems, solutions technical inputs etc are arranged on the interests of the users(Appleyard, 1998).

_ **Direct-matrix pair-wise ranking and scoring** -- Direct-matrix pair-wise ranking and scoring is a tool used to discover local attitudes on various topics. People rank and compare individual items, using their own categories and criteria, by raising hands or placing representative objects on a board. For example, six different shrubs can be ranked from best to worst for their fuel, fodder, and erosion-control attributes. Other resources can be ranked in terms of taste or marketability. Wealth ranking can be used to identify wealth criteria and establish the relative position of households(Carmen, 1996).

_ **Matrices** -- Matrices can be used to gather information and to facilitate or focus analyses and discussions. For example, a problem opportunity matrix could have columns with the following labels: soil type, land use, cropping patterns, and available resources; and rows with the following labels: problems, constraints, local solutions, and initiatives already tried.

_ **Traditional management systems and local-resource collections** -- Local people collect samples (for example, of soils, plants). This can be an efficient way to learn about the local biodiversity, management systems, and taxonomies.

_ **Portraits, profiles, case studies, and stories** -- Household histories or stories of how a certain conflict was resolved are recorded. This can provide short but insightful descriptions of characteristic problems and how they are dealt with.

_ **Key probes** -- A question addressing a key issue is asked of different informants, and the answers are compared. The question might be something like "If my goat enters your field and eats your crops, what do you and I do?"

_ **Folklore, songs, poetry, and dance** -- Local folklore, songs, dance, and poetry are analyzed to provide insight into values, history, practices, and beliefs.

_ **Futures possible** -- People are asked how they would like things to be in 1 year and to predict what will happen if nothing is done or if something is done. People's desires, wishes, and expectations are revealed.

_ **Diagrams exhibition** -- Diagrams, maps, charts, and photos of the research activity are displayed in a public place to share information, facilitate discussions, and provide an additional crosschecking device. The exhibition can inspire other villagers to take part in research activities.

_ **Shared presentations and analysis** -- Participants are encouraged to present their findings to other villagers and to outsiders, providing another opportunity for crosschecking, feedback, comment, and criticism.

_ **Night halts** -- The researchers live in the village during the research process. This facilitates all interactions between the outsiders and the villagers, invites change in the outsiders' attitudes, and allows for early-morning and evening discussions, when villagers tend to have more leisure time.

_ **Short questionnaires** -- Short and issue-specific questionnaires can be useful if conducted late in the research process.

_ **Field report writing** -- Key findings are recorded before "leaving" the village. (This assumes that the community has consented to having the research data leave the village.) Brief summaries are made of each diagram, model, and map, as well as of the process involved in creating them.

_ **Survey of villagers' attitudes toward PRA** -- To improve the PRA process and techniques and maintain realistic expectations, the researcher asks the villagers what they expected and what they learned from the PRA research process.

_ **Intriguing practices and beliefs** -- Indigenous practices and beliefs are noted, even if they are based on myth or superstition. Even practices that are unusual or don't fit in with conventional scientific thinking are worth exploring because they are meaningful to local people.

CONCLUSION:

As a result of the PRAs, the communities are expected to attain many benefits including:

• Expressing their own ideas and concerns;
• Organizing their knowledge about the past and present;
• Identifying as a community their problems, the causes of these problems and possible solutions;
• Developing a common plan to address these problems;
• Developing the ability to use their own resources more effectively and attract more resources from the outside.

The academicians/researchers involved in the PRAs are expected to get the following benefits:

• Developing better understanding of rural environments and social as well as economic dynamism taking place there;
• Appreciating the fact that communities are capable of analyzing their problems and outlining possible solutions to their problems;
• Participating in designing possible solutions to community problems;

• Utilizing the results of the PRA work as a research output for publications and presentations;
• Building their research and problem investigation capabilities;
• Supporting their classroom discussions to students with practical examples from the PRA findings.

The main objectives of the current PRA are:

1. empowerment of rural communities by assisting them to systematically utilize their local knowledge to identify problems and strengths, develop skills of analysis, and design appropriate mechanisms for intervention by themselves and/or by development agents;
2. advancement of understanding by academicians/researchers of local knowledge and acknowledgement of the capacity of communities to gather data, conduct analysis, and identify as well as prioritize problems and solutions;
3. utilization of the research questions/problems identified during the PRAs for further investigation;
4. documenting and presenting the outcomes of the PRAs to development agents (governmental and non-governmental) and other stakeholders so that they could undertake interventions in line with the findings.

PRA consists of a series of participatory exercises which help community members better assess their history, resources, and overall situation as concerns agriculture, health, marketing, credit, coping mechanisms, education, and other important areas.

During the conduct of the PRAs, rural communities in the selected villages will gather information on the resources they already possess; organize their knowledge; share experience among themselves; learn from each other; identify and prioritize local development needs; and develop action plans which respond to these needs.

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