Improving Productivity of Ewaise Mango Trees by Using Seed Sprout Extract of Wheat beside Carboxylic Acid Enriched With Some Macro and Micronutrients

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Abstract: During 2016 and 2017 seasons, Ewaise mango trees grown under upper Egypt conditions were subjected to foliar application of NPKMgZnFeMnCuB via carboxylic acid source at 0.05 to 0.4% and wheat seed sprout extract each at 0.25 to 1 % either singlyor in combinations. The target was elucidating the effects of these treatments on fruiting of the trees. Single and combined applications of nutrients applied via carboxylic acid at 0.05 to 0.4 % and wheat seed sprout extract at 0.25 to 1 % had an obvious promotion on growth, flowering, fruit setting, yield and both physical and chemical characteristics of the fruit relative to the control. Using wheat seed sprout at 0.25 to 1 % was superior than using all nutrients at 0.05 to 0.4 % in this respect. No material promotion on the investigated parameters was observed among the higher two concentrations of each material. Treating Ewaise mango trees grown under Upper Egypt conditions with NPKMgZnFeMnCuB in carboxylic acid form at 0.1 % plus wheat seed sprout extract at 0.5 % gave the best results with regard to yield and fruit quality.
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Key words: Nutrients, carboxylic acid, wheat seed sprout, yield, fruit quality.

1. Introduction

Selecting the best source of nutrients as well as using extracts of wheat seed sprout are considered the best horticultural practices used nowadays for promoting yield and fruit quality of mangoes and at the sametimes reducing environmental pollution.

Previous studies showed using all nutrients via all forms were responsible for improving growth, yield and fruit quality of mangoes and citrus (**Ahmed *et al*., 2001; Kassim and Marzouk, 2004, Ebeid-Sanaa, 2007, Ibrahiem*et al*., 2007, El-Sayed-Esraa, 2007; El-Sayed-Esraa, 2010; Ahmed, 2014; Ibrahiem and Al-Wasfy, 2014; Abdel Aziz *et al*., 2015; Abd El-Rady, 2015; Abd El-Wahab, 2015; Mohamed *et al*., 2015 and Oraby, 2018**).

Treating fruit crops with crop seed sprout extracts had an obvious promotion on growth, yield and fruit quality (**Refaai, 2014a and 2014b; El-Khawaga and Mansour2014; Ahmed and Habasy-Randa, 2014; Ahmed, 2014 and Abdel-Rahman, 2015**).

The target of this study was examining the effects of using different nutrients via carboxylic acid and wheat seed sprout extract on fruiting of Ewaise mango trees grown under upper Egypt conditions.

2. Materials and Methods

This investigation was conducted during two seasons 2016 and 2017 on uniform in vigour thirty-three 10- years old Ewaise mango trees onto Succary mango rootstock. The trees are grown in a private orchard situated at Waborate El- Mataana village, Esna district, Luxor Governorate. The selected trees are planted at 6 × 6 meter apart (6 between rows and 6 between trees). The selected trees were irrigated through furrow (surface) irrigation system. The soil texture of the tested orchard is silty clay with a water table depth not less than two meters.

Soil samples were taken (four samples) from a depth of 0.0 to 90 cm from soil surface and were physically and chemically analyzed before study start according to the procedure outlined by **Black *et al*. (1965)** and the obtained data are shown in Table (1).

Table (1): Mechanical, physical and chemical analysis of the tested orchard soil.

Characteristics	values
Particle size distribution:	
Sand %	: 10.1
Silt %	: 50.7
Clay %	: 39.2
Texture	: Silty clay
pH (1:2.5 extract)	: 7.49
E.C (1:2.5 extract) (mmhos/ cm/ 25°C)	: 0.69
O.M. %	: 2.92
$CaCO_3$ %	: 1.74
Total N %	: 0.15
Available P (Olsen method, ppm)	: 4.2
Available K (ammonium acetate, ppm)	: 411.0

The selected trees received a basal recommended fertilizer including the application of 20 m^3 farmyard manure (0.35 % N, 0.45 % P_2O_5, and 1.2 % K_2O) added in early December, 200 kg/ fed/ mono calcium superphosphate (15.5 % P2O5) added in mid January, 450 kg/ fed ammonium sulphate (20.6% N) added in three equal dressings in February, April and July and 200 kg/ fed potassium sulphate (48 % K_2O) added in two equal dressings applied in mid-February and April, in addition to the regular agricultural and horticultural practices which were followed in the orchard including pruning, hoeing, irrigation with Nile water as well as pathogens, insects and weed control.

This study included the following eleventreatments from macro and micronutrients, plant extracts, silicon and selenium.

1- Control treatment (spraying with water).
2- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.05%.
3- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.1%.
4- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.2%.
5- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.4%.
6- Spraying wheat seed sprout extract at 0.25 %.
7- Spraying wheat seed sprout extract at 0.5 %.
8- Spraying wheat seed sprout extract at 1 %.
9- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.05% with wheat sprout extract at 0.25%.
10- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.1% with wheat sprout extract at 0.5%.
11- Spraying nutrients (NPKMgZnFeMnCuB) via carboxylic acid at 0.2% with wheat sprout extract at 1%.

Each treatment was replicated three times, one tree per each (33 trees for carrying out all treatments). Spraying of micro and macro nutrients and plant extracts was done three times at growth start (mid. of Feb.), just after fruit setting (mid. of April) and at three weeks later (1st week of May). Triton B as a wetting agent was added at 0.3 ml/ I water to all solutions. Foliar application was carried out till runoff (20 L/ tree)**.**

Statistical analysis was done using randomized complete block design (RCBD) with three replicates, each with one Ewaise mango trees. Each block contained eleven treatments.

Generally, the following measurements were recorded during the three seasons of study.

Four branches for each tree were labeled (1st of Mar.) for measuring mean shoot length, number of leaves / shoot, shoot thickness (cm.) and leaf area (cm^2) in the spring growth flush.

Table (2): Chemical composition of wheat seed sprout

Constituent	Values (mg/100 g F.W)
Asparatic acid	3.3
Arginine	4.0
Alanine	3.1
Isoleucine	4.1
Glutamic acid	5.2
Thiamine	3.1
Riboflavin	3.0
Pyridoxine	2.5
Vitamin E	0.59
K	644
P	600
Mg	319
Ca	292
Fe	511
Zn	218

Twenty leaves below panicles in the spring growth cycle (according to **Summer, 1985)** were taken in the first week of July for measuring the leaf area (cm^2) using the following equation as reported by **Ahmed and Morsy (1999).**

LA = 0.70 (L × W) - 1.06 where LA = leaf area (cm^2)

L = Maximum length of leaf (cm.) W = Maximum width of leaf (cm.)

Samples of five mature and fresh leaves from Spring growth cycle (1st week of July) per each replicate were taken. The leaves were cut at small pieces, homogenated and extracted by 25 % acetone in the presence of a little amount of Na_2CO_3 and silica quartz then filtered through central glass funnel G_4.

The optical density of the filtrate was determined using CarlZeis spectrophotometer at the wave length of 662, 644 and 440 om to determine chlorophylls (a and b) and carotenoids, respectively, Content of each pigments was calculated by using the following equations (according to **Von-Wettstein, 1957 and Hiscox and Israstam, 1979)**.

Chl. A = (9.784 x E 662) - (0.99 x E 644) = mg/L.

Chl. B = (21.426 x E 644) - (4.65 x E 662) = mg/L.

Total carotenoids = (4.965 x E 440 - 0.268 (chlorophyll a + chlorophyll b)

E = Optical density at a given wave length.

The chlorophylls a and b as well as total carotenoids were calculated as mg/ 100 g fresh weight of leaves. Also total chlorophyll was estimated (mg/ g F/W.)

In both seasons and in early April the fourth pair of leaves from the base non-fruiting of spring growth

shoots were selected and tagged according to **Summer (1985).**

Ten tagged leaves from each tree were collected carefully at random at the end of September in (2016 and 2017 seasons). As soon as the leaf samples were picked, they were cleaned with cloth damp to remove any residues that might affect the results. The leaves were oven dried at 70 °C for 48 hours, ground and stored in small pockets prior analysis. Plant material (0.2 g) was digested using hydrogen peroxide and plus sulfuric acid as recommended by **(Wilde *et al.* 1985).**

The digested materials were transferred quantitatively to 50 m1 volumetric flash and raised up to the uniformity volume for determination of the following nutrients:-

1. Nitrogen % was determined by the modified micro kjeldahl method as described by **Wilde *et al.*, (1985).**
2. Phosphorus % was determined by using spectrophotometer **Chapman and Pratt (1975).**
3. Potassium % was determined by using Flame photometer according to the procedure reported by **Chapman and Pratt (1975).**
4. Magnesium % was determined using atomic absorption spectrophotometer Perkin Elmer model 5000 according to **Wilde *et al.*, (1985).**

The number of fruits per the tagged panicle (ten tagged panicles/ tree) was counted every week after full bloom to determine the initial number of fruits per panicle. Total number of setting fruits was calculated. Total number of fruits retained for each of the tagged panicle at the beginning of harvest was also estimated. Percentage of fruit retention was estimated by dividing total number of fruits retained by total number of setting fruits and multiplying the product by 100.

Harvesting was achieved during the regular commercial harvesting time under Luxor Governorate conditions (mid of July) in both seasons when the flesh of fruits become yellowish **(Hulme, 1971)**. The yield expressed in weight and number of fruits per tree was recorded.

Twenty fruits were taken randomly from the yield of each tree then transferred to the laboratory for determining the following physical and chemical characteristics of the fruits.

1. Average fruit weight (g.)
2. Averages fruit dimensions (in cm) (height, diameter and thickness) by vernier caliper.
3. Percentage of fruit pulp.
4. The flesh of fruit was well minced with an electric blender and the paste was squeezed and the total soluble solids were determined by using hand refractometer (according to **A.O.A.C., 2000).**
5. The percentages of the total and reducing sugars were determined according to **Lane and Eynon (1965)** volumetric method that outlined in **(A.O.A.C., 2000).** Non reducing sugars were calculated by the differences between total and reducing sugars.
6. Twenty five grams of flesh was blended with 100 ml distilled water by an electric blender, the extract was filtrated and twenty ml. of it was titrated against 0.1 N sodium hydroxide using phenolphthalein as an indicator according to the **(A.O.A.C., 2000)**. Acidity was determined as g citric acid/ l00 g pulp.
7. The pulp content of vitamin C (mg. L-Ascorbic acid/ 100 g pulp) was determined by titration with 2, 6 dichlorophenol indophenol dye according to **(A.O.A.C., 2000).**
8. Total fibre % was determined according to **A.O.A.C. (2000)**.

All the obtained data during the course of this study in two seasons 2016 and 2017 were tabulated and subjected to the proper statistical analysis. The differences between various treatment means were compared using new L.S.D. parameter at 5 % (according to **Snedecor and Cochran, 1967 and Mead *et al.* 1993).**

3. Results

1- Some vegetative growth characteristics:-

It is clear from the obtained data in Table (3) that single and combined applications of NPKMgZnFeMnCuB applied via carboxylic acid at 0.05 to 0.4% and wheat seed sprout extract at 0.25 to 0.1 % significantly stimulated the four growth traits namely length and thickness of shoot, number of leaves/shoot and leaf area relative to the control. Combined applications of these materials were significantly favourable than using nutrients or wheat seed sprout alone in this respect. Using wheat seed sprout extract was significantly superior than using NPKMgZnFeMnCuB in enhancing these growth aspects. Increasing concentrations of NPKMgZnFeMnCuB from 0.2 to 0.4 % and wheat seed sprout extract from 0.50 to 1 % had no significant promotion on these growth aspects. The maximum values were recorded on the trees that received NPKMgZnFeMnCuB at 0.4 % plus wheat seed sprout extract at 1 %. The untreated trees produced the lowest values. Similar trend was noticed during both seasons.

2- Leaf chemical composition:-

It is evident from the obtained data in tables (4 & 5) that chlorophylls a & b, total chlorophylls, total carotenoids, N, P, K and Mg in the leaves were significantly enhanced in response to single and combined applications of nutrients applied via carboxylic acid at 0.05 to 0.4 % and wheat seed sprout extract at 0.25 to 1 % relative to the control. The promotion on these photosynthetic pigments and nutrients was associated with increasing concentrations of nutrients and wheat seed sprout extract. Application of wheat seed sprout extract was

significantly superior than using nutrients via carboxylic acid in enhancing these chemical components. Combined applications of these nutrients and wheat seed sprout extract was significantly preferable than using each material alone in enhancing these chemical nutrients. Treating the trees with a mixture of nutrients via carboxylic acid at 0.4 % plus wheat seed sprout extract at 1 % gave the maximum values. The lowest values were recorded on untreated trees. These results were true during both seasons.

3- Percentages of initial fruit setting and fruit retention:-

It is clear from the obtained data in Table (6) that single and combined applications of nutrients and wheat seed sprout extract caused a significant promotion on the percentages of initial fruit setting and fruit retention relative to the control. There was a progressive promotion on such two parameters with increasing concentrations of nutrients and wheat seed sprout extracts. Using wheat seed extract was significantly preferable than using nutrients in improving such two parameters. Combined applications were significantly favourable than using each material alone in this respect. Increasing concentrations of nutrients from 0.2 to 0.4 % and wheat seed sprout extract from 0.5 to 1 % had no significant promotion on such two parameters. The maximum initial fruit setting on such two parameters. The maximum initial fruit setting (8.4 & 8.0 %) and fruit retention (3.0 & 3.6 %) were recorded on the trees that received three sprays of a mixture of nutrients at 0.4 % plus wheat seed sprout extract at 1 % during both seasons, respectively. The untreated trees produced the lowest values of initial fruit setting (3.9 & 4.0 %) and fruit retention (0.5 & 0.6 %) during both seasons, respectively. These results were true during both seasons.

4- Yield:-

It is clear from the obtained data in Table (6) that yield expressed in weight and number of fruits / tree were significantly improved in response to single and combined applications of nutrients applied via carboxylic acid and wheat seed sprout extract relative to the control. The promotion was related to the increase in both materials. Significant differences on such two parameters were observed among all treatments except among the higher two concentrations of nutrients and wheat seed sprout extract. Combined applications were preferable than using each material alone in improving the yield. Using wheat seed sprout extract significantly surpassed the application of nutrients in this respect. Economically point of view, using a mixture of nutrients via carboxylic acid at 0.2 % plus wheat seed sprout extract at 0.5 % gave an acceptable yield (68.7 & 68.1 kg) during both seasons, respectively. The yield of untreated trees reached 35.1 & 35.4 kg during both seasons, respectively. The percentage of increment one the yield due to application of the promised treatment over the control reached 95.7 and 92.4 % during both seasons, respectively.

5- Some physical and chemical characteristics of the fruits:-

Table (3): Effect of single and combined applications of some nutrients and wheat seed sprout extract on some vegetative growth aspects of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Shoot length (cm)		Shoot thickness (cm)		No. of leaves/shoot		Leaf area (cm^2)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	15.1	15.4	0.59	0.57	11.0	11.0	78.2	78.3
2. Spraying nutrients at 0.05%	16.0	16.5	0.62	0.60	12.0	12.0	80.0	79.7
3. **Spraying nutrients at 0.1%**	16.9	17.5	0.66	0.63	13.0	13.0	81.2	81.0
4. **Spraying nutrients at 0.2%**	18.8	19.6	0.73	0.71	15.0	16.0	83.6	83.2
5. **Spraying nutrients at 0.4%**	18.9	19.7	0.73	0.71	15.0	16.0	83.6	83.2
6. Spraying wheat seed sprouts at 0.25%	19.9	20.8	0.77	0.75	16.0	17.0	85.0	84.5
7. Spraying wheat seed sprouts at 0.5%	21.9	23.0	0.84	0.84	18.0	19.0	87.3	87.0
8. Spraying wheat seed sprouts at 1%	22.0	23.1	0.84	0.84	18.0	19.0	87.3	87.0
9. Tr 2 + Tr 6	22.8	24.1	0.87	0.87	19.0	21.0	89.0	88.4
10. Tr 3 + Tr 7	24.0	25.1	0.94	0.95	21.0	23.0	91.4	91.2
11. Tr + Tr 8	25.8	26.1	0.94	0.95	21.0	23.0	91.4	91.2
New L.S.D. at 5%	**0.8**	**1.0**	**0.03**	**0.03**	**1.0**	**1.0**	**1.1**	**1.0**

Nutrients= NPK Mg ZnFeMnCuB

It is obvious from the obtained data in Tables (7 to 9) that application of nutrients via carboxylic acid at 0.05 to 0.4 % and/or wheat seed sprout extract at 0.25 to 1 % was significantly very effective in improving

fruit quality in terms of increasing weight, diameter and thickness of fruit, fruit pulp %, T.S.S. %, total reducing and non-reducing sugars and vitamin C and decreasing, total acidity % and total fibre % relative to the control. The promotion on fruit quality was in proportional to the increase in concentrations of nutrients and wheat seed sprout extract. Significant differences on these quality parameters were observed among all the investigated treatments except among the higher two concentrations of nutrients and wheat seed sprout extract. Using wheat seed sprout extract significantly improved fruit quality compared to using nutrients. Combined applications were significantly superior than using each material alone in this respect. The untreated trees produced unfavourable effects on quality of the fruits. Similar trend was noticed during both seasons.

Table (4): Effect of single and combined applications of some nutrients and wheat seed sprout extract on some leaf pigments of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Chlorophyll a (mg/ g FW.)		Chlorophyll b (mg/g FW.)		Total chlorophyll (mg/ g FW.)		Total carotenoids (mg/ g F.W.)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	4.0	4.0	1.3	1.2	5.3	5.2	1.1	1.0
2. Spraying nutrients at 0.05%	4.4	4.3	1.6	1.6	6.0	5.9	11.3	1.2
3. **Spraying nutrients at 0.1%**	4.8	4.7	1.9	1.8	6.7	6.5	1.5	1.5
4. **Spraying nutrients at 0.2%**	5.5	5.2	2.4	2.1	8.0	7.7	1.9	1.8
5. **Spraying nutrients at 0.4%**	5.6	5.3	2.5	2.2	8.1	7.8	2.0	1.9
6. Spraying wheat seed sprouts at 0.25%	6.1	5.6	2.8	2.5	8.9	8.4	2.2	2.1
7. Spraying wheat seed sprouts at 0.5%	6.9	6.2	3.1	2.9	10.1	9.2	2.4	2.5
8. Spraying wheat seed sprouts at 1%	7.0	6.3	3.3	3.0	10.3	9.3	2.5	2.6
9. Tr 2 + Tr 6	7.4	6.6	3.5	3.3	10.9	9.9	2.8	3.0
10. Tr 3 + Tr 7	8.1	7.2	3.9	3.9	12.1	11.2	3.1	3.4
11. Tr4 + Tr 8	8.2	7.3	4.0	4.0	12.2	11.3	3.3	3.5
New L.S.D. at 5%	**0.3**	**0.3**	**0.2**	**0.2**	**0.5**	**0.6**	**0.2**	**0.2**

Nutrients= NPK Mg ZnFeMnCuB

Table (5): Effect of single and combined applications of some nutrients and wheat seed sprout extract on the percentages of N, P, K and Mg in the leaves of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Leaf N %		Leaf P %		Leaf K %		Leaf Mg %	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	1.56	1.59	0.12	0.10	1.07	1.08	0.49	0.50
2. Spraying nutrients at 0.05%	1.62	1.64	0.15	0.13	1.11	1.12	0.54	0.55
3. **Spraying nutrients at 0.1%**	1.68	1.70	0.18	0.15	1.15	1.16	0.57	0.60
4. **Spraying nutrients at 0.2%**	1.79	1.80	0.23	0.19	1.22	1.23	0.65	0.67
5. **Spraying nutrients at 0.4%**	1.80	1.81	0.24	0.20	1.23	1.24	0.66	0.68
6. Spraying wheat seed sprouts at 0.25%	1.86	1.87	0.27	0.23	1.27	1.28	0.71	0.70
7. Spraying wheat seed sprouts at 0.5%	1.98	1.99	0.32	0.29	1.35	1.34	0.79	0.75
8. Spraying wheat seed sprouts at 1%	1.99	2.00	0.33	0.30	1.36	1.35	0.80	0.76
9. Tr 2 + Tr 6	2.06	2.04	0.35	0.34	1.41	1.38	0.85	0.80
10. Tr 3 + Tr 7	2.19	2.12	0.40	0.42	1.49	1.46	0.92	0.85
11. Tr4 + Tr 8	2.20	2.13	0.41	0.43	1.50	1.47	0.93	0.86
New L.S.D. at 5%	**0.05**	**0.04**	**0.02**	**0.02**	**0.04**	**0.03**	**0.03**	**0.02**

Nutrients= NPK Mg ZnFeMnCuB

Table (6): Effect of single and combined applications of some nutrients and wheat seed sprout extracton the percentages of initial fruit setting, fruit retention and yield/tree of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Initial fruit setting%		Fruit retention %		No. of fruits/tree		Yield/tree (kg)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	3.9	4.0	0.5	0.6	204.0	206.0	35.1	35.4
2. Spraying nutrients at 0.05%	4.3	4.4	0.7	0.9	215.0	217.0	37.6	38.2
3. Spraying nutrients at 0.1%	4.7	4.8	1.0	1.2	226.0	228.0	40.7	40.1
4. Spraying nutrients at 0.2%	5.4	5.5	1.4	1.7	246.0	249.0	46.8	46.9
5. Spraying nutrients at 0.4%	5.5	5.6	1.5	1.8	247.0	250.0	46.9	47.0
6. Spraying wheat seed sprouts at 0.25%	6.0	6.0	1.8	2.1	260.0	260.0	50.6	49.9
7. Spraying wheat seed sprouts at 0.5%	6.9	6.9	2.1	2.6	279.0	280.0	57.6	56.1
8. Spraying wheat seed sprouts at 1%	7.0	7.0	2.2	2.7	280.0	281.0	57.7	56.2
9. Tr 2 + Tr 6	7.5	7.3	2.5	3.0	290.0	291.0	61.2	60.5
10. Tr 3 + Tr 7	8.3	7.9	2.9	3.5	310.0	312.0	68.9	68.1
11. Tr4+ Tr 8	8.4	8.0	3.0	3.6	311.0	313.0	69.0	68.5
New L.S.D. at 5%	**0.4**	**0.3**	**0.2**	**0.3**	**9.0**	**10.0**	**1.8**	**1.7**

Nutrients= NPK Mg ZnFeMnCuB

Table (7): Effect of single and combined applications of some nutrients and wheat seed sprout extracton weight, height, diameter and thickness of fruit of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Av. Fruit weight (g)		Av. Fruit height (cm)		Av. Fruit diameter (cm)		Av. Fruit thickness (cm)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	171.9	172.0	8.2	8.0	6.6	6.4	5.7	5.5
2. Spraying nutrients at 0.05%	175.0	176.0	8.5	8.2	6.8	6.6	5.9	5.7
3. Spraying nutrients at 0.1%	180.0	180.0	8.8	8.5	7.0	6.8	6.1	6.0
4. Spraying nutrients at 0.2%	189.9	187.9	9.1	8.8	7.4	7.1	6.4	6.3
5. Spraying nutrients at 0.4%	190.0	188.0	9.2	9.0	7.5	7.2	6.5	6.4
6. Spraying wheat seed sprouts at 0.25%	194.5	192.0	9.5	9.2	7.5	7.5	6.7	6.6
7. Spraying wheat seed sprouts at 0.5%	205.9	199.9	9.7	9.5	7.9	7.8	7.1	6.9
8. Spraying wheat seed sprouts at 1%	206.0	200.0	9.9	9.7	8.0	7.9	7.2	7.0
9. Tr 2 + Tr 6	211.0	208.0	10.1	9.9	8.2	9.1	7.4	7.2
10. Tr 3 + Tr 7	221.8	218.9	10.4	10.2	8.5	9.5	7.7	7.5
11. Tr4+ Tr 8	221.9	219.0	10.5	10.3	8.6	9.6	7.8	7.6
New L.S.D. at 5%	**3.1**	**3.0**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**

Nutrients= NPK Mg ZnFeMnCuB

Table (8): Effect of single and combined applications of some nutrients and wheat seed sprout extracton the percentages of fruit pulp, T.S.S. and total and non-reducing sugars in the fruits of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Fruit pulp (%)		T.S.S (%)		Total sugars (%)		Non-reducing sugars (%)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	63.0	64.0	15.1	14.9	9.1	9.0	6.8	6.9
2. Spraying nutrients at 0.05%	64.5	65.2	15.4	15.2	9.5	9.6	7.0	7.1
3. Spraying nutrients at 0.1%	66.0	66.5	15.8	15.6	9.8	9.9	7.2	7.3
4. Spraying nutrients at 0.2%	68.4	70.1	16.4	16.2	10.4	10.5	7.7	7.7
5. Spraying nutrients at 0.4%	68.5	70.2	16.5	16.3	10.5	10.6	7.8	7.8
6. Spraying wheat seed sprouts at 0.25%	70.0	71.7	16.8	16.6	11.1	11.2	8.0	8.0
7. Spraying wheat seed sprouts at 0.5%	72.2	74.0	17.3	17.1	12.2	12.3	8.4	8.5
8. Spraying wheat seed sprouts at 1%	72.3	74.1	17.4	17.2	12.3	12.4	8.5	8.6
9. Tr 2 + Tr 6	74.0	75.2	17.7	17.5	13.0	13.1	8.8	8.9
10. Tr 3 + Tr 7	77.2	77.4	18.3	18.1	14.0	14.1	9.2	9.3
11. Tr4+ Tr 8	77.3	77.5	18.4	18.2	14.1	14.2	9.3	9.4
New L.S.D. at 5%	1.0	1.1	0.3	0.3	0.3	0.2	0.2	0.2

Nutrients= NPK Mg ZnFeMnCuB

Table (9): Effect of single and combined applications of some nutrients and wheat seed sprout extracton some chemical characteristics of the fruits of Ewaise mango trees during 2016 and 2017 seasons.

Treatments	Reducing sugars (%)		Total acidity (%)		Vitamin C (mg/100 ml juice)		Total fibre (%)	
	2016	2017	2016	2017	2016	2017	2016	2017
1. Control	2.3	2.1	0.331	0.340	41.0	39.9	1.01	1.00
2. Spraying nutrients at 0.05%	2.5	2.5	0.311	0.325	42.2	41.2	0.97	0.98
3. Spraying nutrients at 0.1%	2.6	2.6	0.290	0.305	44.0	43.0	0.94	0.95
4. Spraying nutrients at 0.2%	2.6	2.7	0.270	0.279	46.9	46.5	0.87	0.88
5. Spraying nutrients at 0.4%	2.7	2.8	0.268	0.274	47.0	46.6	0.88	0.89
6. Spraying wheat seed sprouts at 0.25%	3.1	3.2	0.230	0.239	48.3	47.3	0.84	0.85
7. Spraying wheat seed sprouts at 0.5%	3.7	3.7	0.213	0.220	49.9	49.9	0.75	0.76
8. Spraying wheat seed sprouts at 1%	3.8	3.8	0.210	0.217	51.0	50.0	0.76	0.77
9. Tr 2 + Tr 6	4.2	4.2	0.180	0.186	52.3	51.4	0.73	0.74
10. Tr 3 + Tr 7	4.7	4.7	0.160	0.171	56.1	55.2	0.67	0.68
11. Tr4 + Tr 8	4.8	4.8	0.157	0.169	56.3	55.3	0.68	0.69
New L.S.D. at 5%	0.2	0.2	0.016	0.014	1.0	1.1	0.02	0.2

Nutrients= NPK Mg ZnFeMnCuB

4. Discussion

1- Crop seed sprouts:

Germination or sprouting of seeds in various crops may change all complex substances such as proteins, carbohydrates and fats to simple ones and stimulates the occurrence of soluble sugars, amino acids, natural hormones and antioxidants. The higher content of sprouts from amino acids like cysteine, cysteine, methionine, tryptophan, glutamic acid, arginine, aspartic acid, thiamin, alanine, leucine and isolcucin, vitamins A, B & B_2 & B_6, C and E and nutrients such as N, P, K, Mg, Ca, Fe, Mn and Cu is accompanied with protecting the trees from aging and unfavourable conditions and enhancing cell division

and biosynthesis of carbohydras and plant pigments (**Cazuola*et al.*, 2004**). The results regarding the beneficial effects of rocket and fenugreek seed sprouts on growth and fruiting of Superior grapevines are in harmony with those obtained by **El-Khawaga and Mnsour (2014); Refaai (2014a and 2014b); Abd El-Rahman (2015); and Ahmed-Habasy-Randa (2017).**

Nutrients are essential in many plant metabolic processes. They play many important regulatory roles in plant development. Functions of nutrients are activate various enzymes involved in plant growth, enhance the biosynthesis of carbohydrates, fats, proteins and natural hormone, and movement of carbohydrates. They are also responsible for stimulating cell division, cell enlargement, water and nutrient transport and building of amino acids (**Nijjar, 1985**).

The results with regard to the promoting effect of nutrients on growth and fruiting of Ewaise mango trees are in harmony with those obtained by **Ahmed *et al.*, (2001); Ebeid- Sanaa (2007); El- Sayed - Esraa (2007); Ibrahiem*et al.*, (2007); El- Sayed– Esraa (2010); Abd El-Rady (2015) and Oraby, (2018)**.

5. Conclusion

Treating Ewaise mango trees grown under Upper Egypt conditions with NPKMgZnFeMnCuB in carboxylic acid form at 0.1 % plus wheat seed sprout extract at 0.5 % gave the best results with regard to yield and fruit quality.

References

1. Abdelaziz; F.H.; Mohamed, M.A. and Abd El-Rady, S.E.M. (2015). Relation of Fruiting In Ewaise Mango Trees to Foliar Application of Royal Jelly, Magnesium and Boron. World Rural Observ: 7(2):85-92.
2. Abd El-Rady, S.E.M. (2015): Fruiting of Ewaise mango tree in relation to spraying royal jelly, magnesium and boron. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
3. Abdel- Rahman M.M.A. (2015): Yield and fruit quality of Washington Navel oranges as influenced by foliar application of fenugreek and rocket seed sprouts World Rural Observations s 7(2): 99-104.
4. Abd El-Wahab, H.A.M. (2015): Response of succary mango trees to foliar application of silicon and boron. M.Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
5. Ahmed, F.F. and Habasy- Randa, E.Y. (2014): productive performance of Washington navel orange trees in relation to foliar application of barley seed sprout and royal jelly. World Rural Observations 6(4): 109-114.
6. Ahmed, F. F. and Morsy, M. H. (1999): A new method for measuring leaf area in different fruit species. Minia J. of Agric. Res. & Develop., Vol. (19) pp 97-105.
7. Ahmed, M.Y.A. (2014): Effect of spraying fenugreek and sprout and some nutrients on fruiting of Keitte Mango trees grown under Aswan region conditions. World Rural Observations: 6(14): 103-108. ISSN: 1944-6543.
8. Cazuola, I., V. Marsili, and Gianfranceshi, G.LK. (2004). Synthesis of antioxidants in wheat sprouts. J. Agric. Chen. 52: 5201-5206.
9. Association of Official Agriculture Chemists (A.O.A.C.) (2000): Official Methods of Analysis (A.O.A.C), 12thEd., Benjamin Franklin Station, Washington D.C.,U.S.A. pp.490-510.
10. Ahmed, F.F.; Ahmed, A. M. and Morsy, M. A. (2001): Studies onthe influence of spraying some nutrients and ascorbicacid on inflorescence malformation and fruiting of Taimour mangoes. 6th Inter. Symp.on Fruit. Nut and Vegetable Production Eng. Postdam Sept. 2001. pp. 10 -20.
11. Chapman, H.D. and Pratt, P.E. (1975): Methods of Analysisfor Soil, Plant and Water. Univ. of Calif. Division of Agric. Sci. 172- 173.
12. Ebeid – Sanaa.M: (2007): The promotive effect of seaweed extract and boron on growth and fruiting of Hindy Bisinnara mango trees. Minia J. of Agric. Rev & Develop. Vol. (27) No. 3 pp 579-594.
13. El- Khawaga, A.S. and Mansour, A.G.M. (2014): Promoting productivity of Washington navel orange trees by using some crop seed sprout Extracts, silicon and Glutathione. Middle East Journal of Applied Sciences, 4(3): 779-785.
14. El-Sayed- Esraa, M. H. (2007): Response of Ewaise mango trees to foliar application of boron. M. Sc. Thesis Fac. of Agric. Minia Univ. Egypt.
15. El-Sayed- Esraa, M. H. (2010): Behaviour of Ewaise mango trees to foliar application of some nutrients and seaweed extract. Ph. D. Thesis Fac. of Agric. Minia Univ. Egypt.
16. Hiscox, A. and Isralstam B. (1979): Method for the extraction of chlorophyll from leaf tissue without maceration. Can. J. Bot. 57:1332-1334.
17. Hulme, A. C. (1971): The Mango. Biochemistry of Fruits and their Products. CABI Publishing Vol. 1, London pp 95 – 103.
18. Ibrahiem, H.I.M. and Al- Wasfy, M.M. (2014): The promotive impact of using silicon and selenium with potassium and boron on fruiting of Valencia orange trees grown under Minia region conditions. World Rural Observations s s 5(1): 1-14.

19. Ibrahiem, H.I.M.; Ahmed, Y.M. and Ahmed, F.F. (2007): Relation of fruiting in Hindy Bisinnara mangoes to foliar nutrition with Mg, B and Zn and some antioxidants African Crop Sci. Conf. Proc.8:411-415.
20. Kassim, H. A. and Marzouk, H. A. (2004): Fruit retention, yieldand postharvest fruit quality of mango in relation to timeand number of potassium nitrite, zinc and boron foliarsprays. J. Alex. Res. (Fac. Agric. Saba Basha) 9 (2):299-311.
21. Lane, J. H. and Eynon, L. (1965): Determination of reducing sugars by means of Fehlings solution with methylene blue as indicator A.O.AC. Washington D.C.U.S.A. pp.490- 510.
22. Mead, R.; Currnow, R. N. and Harted, A. M. (1993): Statistical Methods in Agricultural and Experimental Biology. 2nd Ed. Chapman and Hall, London pp. 10- 44.
23. Mohamed, M.A.; El- Sayed, M.A. and Abd El-Wahab, H.A.M. (2015): Response of succary mango trees to foliar application of silicon and boron. World Rural Observations s 7(2):93-98.
24. Nijjar, G.S. (1985): Nutrition of Fruit Trees. Mrs. Usha Raj Kumar for Kalyaninpublishers; New Delhi, pp. 10- 52.
25. Oraby, A.F. (2018): Response Of Ewaise Mango Trees Grown Under Upper Egypt Conditions To Foliar Application of Some Nutrients, Plant Extracts, Silicon And Selenium. Ph.D. Thesis Fac. of Agric. Minia Univ. Egypt.
26. Refaai, M. M. (2014a). Impact of Spraying Extracts of Fenugreek and Rocket Seed Sprouts on Fruiting of Keitte Mango Trees. *World Rural Observations s s*, *6*(4), 75-80.
27. Refaai, M.M. (2014b): Response of Zaghloul date palms grown under Minia region conditions to spraying wheat seed sprout extract and nano-boron.Stem Cell 5 (4): 22-28.
28. Snedecor, G. and Cochran, W. G. (1980): Statistical Methods. Oxford and J. B. H. Publishing Corn.7th edition.
29. Summer, M.E. (1985): Diagnosis and Recommendation. Integrated System (DRIS) as a Guide to Orchard Fertilization. Hort. Abst. 55(8): 7502.
30. Von- Wettstein, D. V. (1957): Chlorophyll-Lethale under submikroshopischeformilkechrel der plastidenceli, prp. Trop. Res. Amer. Soc. Hort. Sci. 20 pp. 427 – 433.
31. Wilde, S.A.; Corey, R.B.; Iyer J.G. and Voigt, G.K. (1985): Soil and Plant Analysis for Tree Culture. Oxford and IBH publishing co., New Delhi pp. 9-100.

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