Effect of different sowing times on the growth, quality and yield of Bitter gourd (Momordica charantia L.) under low tunnel in Punjab.

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Abstract: Climate of Pakistan provides suitable conditions for vegetable production. Growing of vegetables in tunnels is the efficient way of producing off-season vegetables. Research was executed to see the growth and yield of bitter gourd by planting in low tunnel on different sowing dates. The variety that was used the name is Cobra seed were taken from Sohail sons Dijkot road, Faisalabad. Raised beds were used for sowing of seeds on different dates at vegetable research area UAF. Reproductive and vegetative attributes were analyzed through standard procedures. Experiment was executed according to Randomized Complete Block design with 4 replicates. Data were collected and evaluated by ANOVA techniques and comparison of means were made through LSD test at 5% probability level. Date of sowings were indicated the deviations among vegetively growth like days taking for germination, length of vine, numbers of leaves, and the reproductive growth like weight of fruit, diameter of fruit, and the chemical parameters were also checked like phenolic contents, chlorophyll contents, vitamin C, protein and carbohydrates contents of bitter gourd. Treatment T_3 (24th January) Cobra variety was indicated that improved the vegetatively developments, numbers of leaves and length of vines and also represented that the more reproductive development. So it was decided that the sowing of Bitter gourd is best in January for maximum vegetative and reproductive growth.

[Rashid Iqbal, M. Irfan Ashraf, Shoukat Sajad and Minahil Murtaz. **Effect of different sowing times on the growth, quality and yield of Bitter gourd (Momordica charantia L.) under low tunnel in Punjab.** *Rep Opinion* 2019;11(5):51-55]. ISSN 1553-9873 (print); ISSN 2375-7205 (online). http://www.sciencepub.net/report. 9. doi:10.7537/marsroj110519.09.

Key words: sowing time, growth, quality, yield, low tunnel

Introduction:

Among all cucurbits bitter gourd is also an important vegetable. The family of Bitter gourd is cucurbitaceae. It is Native to China and India but It is widely grown in south Asian countries like Pakistan, India, Bangladash, Sirilanka and Iran. It is also cultivated in malaya, tropical africa and america. Bitter melon is known as vegetable crop and it is grown in March to September on large areas of Pakistan (Tahir and Haider, 2005).

High medicinal compounds are found in bitter gourd. It is used in many traditional medicines and it has taken in formulation of approximately 228 medicinal compounds like lowering the blood glucose level, healing properties, healing of wounds, hepatitis, measles, fever and infection (Islam et al., 2011). For nutrinion, Bitter gourd have a significant source of nutrients as will as a rich source of protein, CH2O, ascorbic acid, P, Mg, Fe and Zn has been identified. Ascorbic acid presents expressively. (Xiang et al., 2000).

Pakistan's climate give us an opportunity for cultivation of condiments and vegetables throughout the year in over all country. There was an increase in yield and area vegetable production from the last three years. The total arable land in Pakistan is 20.43 thousand hectare in which the area the cultivation of vegetable was 0.41 thousand hectare during 2009-10, before the vegetable cultivated area was 0.38 thousand hectare. It is harvested on an area of 5993 hec with production of 5872 tons in Pakistan. (GOP, 2013).

The major producing country of bitter gourd is India at first position with total production 31%of throughout the world production of Bitter gourd, China is at second position with total production (22%) and Pakistan is at third position (9%). The other countries are Philippines, Vietnam, Indonesia, Nepal and Thailand which have significant position. In Pakistan there was a low production of bitter gourd due to some reasons, like unauthentic source of variety, agricultural practices and application of unbalanced fertilizers (Bakhsh et al., 2007). Same as, unavailability of high yielding cultivars, lack of awareness and application of unsuitable pesticides possibly causes the low production of bitter gourd (Ahmad et al., 2000). Cultivar is genetically controlled factor which is independent to environment and also selected after checking the physically, morphologically, chemically measurements like ripening and harvesting suitability status of fertility

and checking the diseases pests resistance. To select a specific variety is difficult task which can overcome demand of consumer among the various varieties (Bakowksi, 1999). The identification and screening is done to select the suitable quality of germplasm and genotype for commercially Bitter gourd production. Any breeding program is done to select the suitable cultivar. The efficiency of selection is depend upon genetic variation and nature of a specified population. The polygenic nature and environmental factors are influenced the yield. It can also create complexity in the selection process and then it gives correlation the information between traits for suitable selection procedure (Choudhary et al.,2008).

Objective is to enhance the crop yield and collect the suitable traits and techniques in which the crop is growing. There is many new techniques like tunnel forming because from this technique we get more yield and early marketing and get more profit.

M. R. Chattha et al., (2013) is reported that the diseases weeds and pests are more infested the organic vegetables when these are grown in rainy season (late summer). Early winter season bring short growing period that has negatively affected the yield. However, we can get high yield these vegetables if we can managed properly. Using of walk-in and low tunnel may be more beneficial. But the diseases and pests are affected the growth and yield of plants.

Using tunnel is very successful for off-season production of vegetables. It is necessary to grow the vegetable in their normal season. For this we should produce an artificial atmosphere. The winter vegetable are grown in summer are very expensive although the summer vegetables are grown easily in winter under plastic tunnel. Plastic sheets have capacity to retain the sun energy & give the suitable environment for summer vegetables to grow. The crops which are grow in tunnels are sweet pepper, chillies, bottle gourd, bitter gourd, cucumber and tomatoes. By using plastic tunnel we should produce more vegetables from small area, Due to this we can fulfil our diet requirement as well as export it. It is threatening if cannot produce our basic necessities because our homeland is agricultural country. (Rafique, 2011).

This research will be conducted to explain growth, quality and yield parameters of bitter gourd grown at different sowing times in winter under low tunnel in Punjab. The research will manage to find out the suitable dates of bitter gourd sowing which will usefull to increase the yield and quality of bitter gourd.

Materials and methods

The experiment will be conducted at Vegetable Research Area, Institute of Horticultural Sciences, University of Agriculture, Faisalabad. Bitter gourd cultivar (Cobra) seed purchased from Sohail sons Dijkot road, Faisalabad the sowing will be done on raised beds directly with 100 feet length and 7 feet width. Recommended doses of fertilizers and irrigation will be applied when required. Seeds will be sown on both sides of the beds at different dates. First sowing will be done at 26 november, 2nd sowing at 24 december and 3rd at 24 janurary. Similarly, standard plant protection measures will be applied when needed, the diseases and insects keep away from crop. Fruit will be harvest when they are ready to harvest, 4-5 days duration will be maintained and further quality parameters will be recorded and analyzed. The data will be recorded according to the following vegetative and qualitative parameters of selected Bitter gourd plants Parameters 1. Number of sowings 2. Number of hoeing 3. Date of hoeing 4. Number of irrigations 5. Number of days taken to germination 6. Number of days taken to first flower 7. Number of days taken to first harvest 8. Number of branches per vine at maturity 9. Final vine length (cm) 10. Number of leaves per vine at maturity 11. Fruit weight (g) 12. Fruit diameter (mm2) 13. Fruit yield per vine (kg) 14. Fruit yield per hectare (tones) Chemical parameters 1. Total phenolic Contents (GAE g-1) 2. Chlorophyll Contents (SPAD reading) 3. Vitamin C mg 100-1 4. Protein Content 5. Carbohydrate Content.

Statistical Analysis

The experiment will be laid out according to RCBD Design with 3 treatments and each treatment will be repeated four times. Data will analyze through ANOVA technique and means will be compared by using LSD test (Steel et al., 1997).

Results

Analysis of variance for fruit weight of Bitter gourd in response to different sowing times.

S.O.V	DF	SS	MS	F	P
Treatment	2	46.3050	23.1525	21.4	0.0004*
Error	9	9.7450	1.0828		
Total	11	56.0500			

*= significant

Comparison of Treatment Means for fruit weight of Bitter gourd in response to different sowing times.

Treatment	Means
T_3	81.05a
T_1	79.475a
T_2	76.325b

Treatment means with same latter are statistically non-significant at P <0.05 and different latter statistically significant

Analysis of variance for fruit diameter of Bitter gourd in response to different sowing times.

S.O.V	DF	SS	MS	F	P
Treatment	2	78.1350	39.0675	40.2	0.0000***
Error	9	8.7550	0.9728		
Total	11	86.8900			

*** = highly significant

Comparison of Treatment Means for fruit diameter of Bitter gourd in response to different sowing times.

Treatment	Means
T_3	42.4a
T_1	39.775b
T_2	36.175c

Treatment means with same latter are statistically non-significant at P <0.05 and different latter statistically significant

Analysis of variance for fruit yield per vine of Bitter gourd in response to different sowing times.

S.O.V	DF	SS	MS	F	P
Treatment	2	0.00463	0.00232	29.6	0.0001***
Error	9	0.00070	0.00008		
Total	11	0.00533			

***= highly significant

Comparison of Treatment Means for fruit yield per vine of Bitter gourd in response to different sowing times.

Treatments	Means
T3	0.919a
T1	0.89b
T2	0.8713c

Treatment means with same latter are statistically non-significant at P <0.05 and different latter statistically significant

Discussion

Fruit Weight (g):

The data regarding on fruit weight is showed in Table (4.11a) and analysis of variance is presented in ANOVA Table. The statistically analysis showed that sowing dates treatment had highly significant effect on fruit weight.

In sowing dates, maximum fruit weight (81.05g) were taken in T_3 (24 January) and minimum fruit weight (76.325g) were taken in T_2 (24 December).

Maximum fruit weight was obtained in the month of January and minimum fruit weight was obtained in the month of December because sowing of Bitter gourd is best due to the favorable climatic conditions but not good for harsh or unfavorable climatic conditions.

Abd-El-Baky (2010) stated that January sowing was more fruit weight as compared to other sowing.

Fruit Diameter (mm^2):

The data related to fruit diameter is showed in Table (4.12a) and analysis of variance is presented in ANOVA Table. The statistically analysis showed that sowing date had highly significant effect on fruit Diameter.

In sowing dates, maximum fruit diameter (42.4mm) were taken in T_3 (24 January) and minimum fruit diameter (36.175mm) were taken in T_2 (24 December).

Maximum fruit diameter was obtained in the month of January due to favorable environment condition. The minimum fruit diameter was obtained in the month of December due to unfavorable climatic conditions.

Our results are matching with Nasreen *et al.,* (2013). Mulani *et al.,* (2005).

Fruit Yield per Vine (kg):

The data related to fruit yield per vine are given in Table (4.13a). Whereas analysis of variance is presented in ANOVA Table. The statistically analysis revealed that different sowing dates had significant effect on fruit yield per vine.

In sowing dates, the maximum fruit yield per vine (0.919kg) were recorded in T_3 (24 January), while minimum fruit yield per vine (0.8713kg) were observed in T_2 (24 December).

Fruit yield per vine was maximum in the month of January and minimum fruit yield per vine in the month of December because sowing of Bitter gourd is best due to the favorable climatic conditions but not good for harsh or unfavorable climatic conditions.

Palada et al, (2003) who indicated that early sowing was maximum fruit yield compare to late sowing of bitter gourd.

Conclusion

The sowing times had highly significant effect on fruit weight. Different sowing times, maximum fruit weight (81.05g) were taken in 24th January (T_3) and minimum fruit weight (76.325g) were taken in 24th December (T_2).

Fruit diameter was highly significantly affected by different sowing dates, the maximum fruit Diameter (42.4mm) was recorded in 24th January (T_3) sowing and minimum fruit diameter (36.175mm) was observed in 24th Oct (T_2) sowing.

Sowing time had highly significant effect on fruit yield per vine, the maximum fruit yield per vine (0.9750kg) were recorded in 24th January (T_3) sowing, while minimum fruit yield per vine (0.8712kg) were observed in 24th December (T_2) sowing date.

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5/25/2019