



Research Article

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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 vegetative 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 T3, Cobra variety was indicated that improved the vegetative 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.

Keywords: 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, Bangladesh, Sri Lanka 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. 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 [1]. For nutrition, Bitter gourd have a significant source of nutrients as well as a rich source of protein, CH₂O, ascorbic acid, P, Mg, Fe and Zn has been identified. Ascorbic acid presents expressively Xiang [2]. Pakistan's climate gives us an opportunity for cultivation of condiments and vegetables throughout the year in overall 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 hectares in which the area the cultivation of vegetable was 0.41 thousand hectares during

2009-10, before the vegetable cultivated area was 0.38 thousand hectares. It is harvested on an area of 5993 hec with production of 5872 tons in Pakistan GOP [3].

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 [4]. Same as, unavailability of high yielding cultivars, lack of awareness and application of unsuitable pesticides possibly causes the low production of bitter gourd Ahmad [5]. 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 pest's resistance. To select a specific variety is difficult task which can overcome

demand of consumer among the various varieties Bakowksi [6]. The identification and screening are 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 depending 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 [7].

Objective is to enhance the crop yield and collect the suitable traits and techniques in which the crop is growing. There are many new techniques like tunnel forming because from this technique we get more yield and early marketing and get more profit. Chattha [8] 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 manage 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 is 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. 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 useful 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 26th November 2nd sowing at 24 December and 3rd at 24th January. 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.

- a) Number of sowings
- b) Number of hoeing
- c) Date of hoeing
- d) Number of irrigations
- e) Number of days taken to germination
- f) Number of days taken to first flower
- g) Number of days taken to first harvest
- h) Number of branches per vine at maturity
- i) Final vine length (cm)
- j) Number of leaves per vine at maturity
- k) Fruit weight (g)
- l) Fruit diameter (mm²)
- m) Fruit yield per vine (kg)
- n) Fruit yield per hectare (tones) Chemical parameters
 - i. Total phenolic Contents (GAE g⁻¹)
 - ii. Chlorophyll Contents (SPAD reading)
 - iii. Vitamin C mg 100⁻¹
 - iv. Protein Content
 - v. 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 [9].

Results

Treatment means with same letter are statistically non-significant at $P < 0.05$ and different letter statistically significant. Treatment means with same letter are statistically non-significant at $P < 0.05$ and different letter statistically significant. Treatment means with same letter are statistically non-significant at $P < 0.05$ and different letter statistically significant (Tables 1-6).

Discussion

Fruit Weight (g)

The data regarding on fruit weight is showed in (Table 1) 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 T3 (24 January) and minimum fruit weight (76.325g) were taken in T2 (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 stated that January sowing was more fruit weight as compared to other sowing [10-15].

Table 1: +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	46.305	23.1525	21.4	0.0004*
Error	9	9.745	1.0828		
Total	11	56.05			

*= Significant.

Fruit Diameter (mm²)

Table 2: Comparison of Treatment Means for fruit weight of Bitter gourd in response to different sowing times.

Treatment	Means
T3	81.05a
T1	79.475a
T2	76.325b

The data related to fruit diameter is showed in (Table 2) 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 T³ (24 January) and minimum fruit diameter (36.175mm) were taken in T² (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, Mulani.

Fruit Yield per Vine (kg)

Table 3: 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	78.135	39.0675	40.2	0.0000***
Error	9	8.755	0.9728		
Total	11	86.89			

*** = Highly Significant.

The data related to fruit yield per vine are given in (Table 3). 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 T3 (24 January), while minimum fruit yield per vine (0.8713kg) were observed in T2 (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 who indicated that early sowing was maximum fruit yield compare to late sowing of bitter gourd [15-22].

Table 4: Comparison of Treatment Means for fruit yield per vine of Bitter gourd in response to different sowing times.

Treatment	Means
T3	42.4a
T1	39.775b
T2	36.175c

Table 5: 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	0.0000***
Error	9	0.0007	0.00008		
Total	11	0.00533			

*** = Highly Significant.

Table 6: Comparison of Treatment Means for fruit yield per vine of Bitter gourd in response to different sowing times.

Treatments	Means
T ₃	0.919a
T ₁	0.89b
T ₂	0.8713c

Conclusion

The sowing times had highly significant effect on fruit weight. Different sowing times, maximum fruit weight (81.05g) were taken in 24th January (3) and minimum fruit weight (76.325g) were taken in 24th December (T2). Fruit diameter was highly significantly affected by different sowing dates, the maximum fruit Diameter (42.4mm) was recorded in 24th January (T3) sowing and minimum fruit diameter (36.175mm) was observed in 24th Oct (T2) 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 (T3) sowing, while minimum fruit yield per vine (0.8712kg) were observed in 24th December (T2) sowing date.

References

- Islam MR, Hossain MS, Bhuiyan MSR, Husna A, Syed MA, et al. (2011) Genetic Variability and Path-Coefficient Analysis of Bitter Gourd (*Momordica charantia* L). Inter J Sus Agric 1: 53-57.
- Xiang CP, Wang LP (2000) Analysis and utilization of nutrient composition in bitter gourd (*Momordica charantia*). J Huazhong Agr Univ 19(4): 388-390.
- GOP (2013) Fruit, Vegetables and Condiments Statistics of Pakistan. Government of Pakistan, Ministry of Food and Agriculture. (Economic Wing), Islamabad p. 11-12.
- Bakhsh K (2007) An analysis of technical efficiency and profitability of growing potato, carrot, radish and bitter gourd: A case study of Pakistani Punjab. Ph.D. Dissertation, Department of Environmental and Resource Economics, University of Agriculture, Faisalabad, Pakistan.

5. Ahmed MS, Rasul MG, Bashir MK, Mina ASM (2000) Variability and heterosis in snake gourd. (*Trichosanthe sanguine L*). Bang J P Breed Gen 13: 27-32.
6. Bakowski FC (1999) Influence of different local cultivars selection on the morphology of carrot (*Daucus carota L*). Food Nutria Bullentien 12: 110-114.
7. Choudhury BD, Bhat PN, Singh VP (2008) Genetic diversity in cluster beans. Indian J Agric Sci 45: 530-535.
8. Chattha MR, Anjum AS, Khan MA, Imran M, Kassana MI (2013) Synergistic efficacy of organic vegetables under tunnels and field conditions. Pak J Biochem Mol Biol 46(2): 62-64.
9. Steel RGD, Torrie JH, Dicky DA (1997) Principles and Procedures of Statistics. A Biological Approach. 3rd ed. McGraw Hill Book., New York.
10. Abraham RK, Sarathi MP, Manna MC (2017) Yield Performance and Profitability of Bitter Gourd Cultivation as Influenced by Drip Irrigation, Fertigation and Plastic Mulching. Int J Curr Microbial App Sci 6(10): 638-645.
11. Aidy FEL, Zawely AEL, Hassan N, Sawy MEL (2007) Effect of plastic tunnel size on production of cucumber in delta of Egypt. Applied Ecol Environ Res 5: 11-24.
12. Bacha MR, SA Hussain, A Rab, D Wadan. (2005) Effect of phosphorous levels and sowing dates on the growth and production of bitter gourd CV. Land Race. Sarhad J Agric 21: 291-241.
13. Bakhsh K (2007) An analysis of technical efficiency and profitability of growing potato, carrot, radish and bitter gourd: A case study of Pakistani Punjab. Ph.D. Dissertation, Department of Environmental and Resource Economics, University of Agriculture, Faisalabad, Pakistan.
14. El Batran SAS, El Gengaihi SE, El Shabrawya OA (2006) Some toxicological studies of *Momordica charantia L*. on albino rats in normal and alloxan diabetic rats. J Ethnopharm 108(2): 236-242.
15. Kamali S, Moaveni P, Valadabadi SA, Meharban A (2016) Effect of Sowing Dates on the Morphological Traits and Fruit Yield of Bitter Ground. ARNP Journal of Agriculture and Biological Science 11(12): 458-462.
16. Latifi M, Barimavandi A, Sedaghatthoor S, Lipayi SR (2012) Sowing Date and Plant Population effect on seed yield of *Cucurbita pepo*. Int J Agric Biol 14: 641-644.
17. Mahmood N, Anees M, Ahmad S, Zakauallah (2011) Effect of mulching on vegetables production in tunnel farming. Mycopath 9(1): 21-24.
18. Rafique MR (2011) Off-season vegetable production. Pakistan's first science and technology blog.
19. Rahman MS, Islam MN, Shaheb MR, Sarker PC, Nessa A (2014) Influence of sowing date on quality seed production of bitter gourd. Int J Sustain Crop Prod 9(2): 17-22.
20. Reyes MEC, BH Gildemacher, GJ Jansen (1994) *Momordica L*. In: Siemonsma JS, Piluek K (Eds.). Plant resources of South-East Asia: vegetables. Pudoc Scientific Publishers, Wageningen, Netherlands pp. 206-210.
21. Sharma SK, Mehta BS, Rastogi KB (1997) Effect of planting dates and nitrogen level on yield and quality attributes of cucumber. Ind J Hort 54(2): 160-162.
22. Tahir M, Haider MS (2005) First report of Tomato leaf curl New Delhi virus Infecting bitter gourd in Pakistan. Plant Pathology 54: 807.



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