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Yield of okra as influenced by the different sowing dates and plant spacing

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Abstract

The experiment was conducted to study the yield of okra as influenced by the different sowing dates and plant spacing. Split plot design replicated thrice with four sowing dates as main plots (D₁:- 1st October, D₂:- 15th October, D₃:- 1st November and D₄:- 15th November) and three plant spacing as sub plots (S₁:- 45x10 cm, S₂:- 45x20 cm and S₃:-45x30). The results revealed that the significantly highest plant height (120.82 & 117.53 cm), number of branches (2.07 & 2.02), number of nods per main stem (15.80 & 15.66), number of leaves (10.02 & 10.19), number of pods (12.98 & 12.91), pods weight per plant (128.03 gm & 128.22 gm), number of picking (14.44 & 13.89) and yield per hectare (15.47 & 15.50 q/ha.) were recorded in 1st October sowing during both the year. The plant height, number of branches, number of nods per main stem and number of leaves were found significantly highest with the 45 X 20 cm spacing. Whereas significantly higher number of pods per plant (11.44 & 11.71), pods weight per plant (109.08 gm & 109.60 gm), number of picking (12.08 & 11.58), and yield per hectare (14.75 & 14.30 q/ha) were found in the same treatment (45 X 20 cm) during both the year then other 45X 10 cm and 45 X30 cm spacing.

Keywords: date of sowing, plant spacing, okra, yield

Introduction

Okra (*Abelmoschus esculentus* L. Moench) is an important vegetable crop in tropical and subtropical part of world (Baloch, 1994) [3]. It is a semi woody, fibrous, herbaceous annual plant with an indeterminate growth habit. In India, okra is one of the most important vegetables in term of consumption and production area. It is a nutritious vegetable which plays an important role to meet the demand of vegetables of country. It is used in different ways. The immature pods are consumed as boiled vegetables; they are also dried and used as soup thickeners or in stews. The green fruits are rich sources of vitamins, calcium, potassium and other minerals (Lee *et al.*, 1990) [9]. It is nutritious vegetable which plays an important role in meeting the demand of vegetables in the country when vegetables are scanty (Ahmed, 1995) [1]. Seed can only germinate in relatively warm soils, no germination occurs below 16 °C temperature. A monthly average temperature range of 21 to 30 °C is considered appropriate for growth, flowering and pod developments. Being a warm season crop, it required high day and night temperature for best production, but growers starts its cultivation from October as off season-early crop to get higher prices.

Okra generally takes forty five days for harvestable pods, which extends up to February – Mach. However, the average yield of crop is comparatively low in India as compared to the other developed countries in the world. There are several reasons of poor growth and yield of okra, among these; time of sowing and plant spacing play an important role. Sowing times has a great impact on production and quality of okra. Besides, the time of sowing has a direct bearing on the incidence of YVMV diseases. Plant population or plant density is another factor that affects the okra production. Suitable plant spacing can lead to optimum yield whereas too high or too low plant spacing could results in relatively low yield and quality. Hence, optimum plant spacing can lead to optimum production of crop. The information available so far regarding sowing time and plant spacing for okra fruit production in off season is inadequate under South Gujarat. Gupta *et al.* (1981) [5] studied the response of an okra cultivar- “Pusa Sawani” to date of sowing and plant spacing. They observed that the early sowing date (25th May) generally gave the highest average yield, Later it decreases with each sowing date until 5th November. They also reported that the closest planting spacing (50 cm X 15 cm) and earliest sowing date gave the overall highest yield (110 t/ha). Tribal farmers of south Gujarat

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are sowing okra from October to November end for getting higher price in market due to off season. There is a scanty research work to find out suitable time of sowing in okra during off season cultivation. Therefore, the present investigation was carried out to find out most suitable sowing time and plant spacing to achieve higher yield and quality of okra.

Materials and Method

The experiment was conducted during the *rabi* seasons of year 2007-08 and 2008-09. The design was a split plot replicated three times, with four sowing dates as main plots (D₁:- 1st October, D₂:- 15th October, D₃:- 1st November and D₄:- 15th November) and three plant spacing as sub plots (S₁:- 45x10 cm, S₂:- 45x20 cm and S₃:-45x30). There were 12 treatments combination altogether. The experimental plot was typical alluvial and sandy loam soil in texture having pH 7.8. The total organic carbon, total N and available P and K were 0.34%, 0.040%, 38 kg/ha and 234 kg/ha, respectively. The mean minimum and maximum temperature during the periods of experimentation varies between 11^oC (December) to 28^oC (February). The annual rainfall varies between 1300 to 1500 mm, most of the rain received during June to September. Manures and fertilizers (well decomposed FYM @ 10 t/ha and 100-50-50 kg N, P₂O₅ and K₂O) were applied as per recommended dose. Half dose of recommended nitrogen and full dose phosphorus and potash were applied as basal and remaining nitrogen was top dressed at 30 days after sowing. Seeds (cv. GOH-2) were presoaked in water for 24 hr and it was dibbled 2 seeds /hill at different spacing at fortnight interval starting from 1st October to 15th November of each year. Thinning was done at 15 days after sowing retaining one plant per hill. Irrigation and plant protection measures are followed as per the scheduled package of practice.

Results and Discussion

Effect of sowing time

All the growth and yield attributes characters were differed significantly with different sowing dates, except number of days to first flower initiation (Table-1).

The tallest plant height at harvest was recorded at 1st October sowing which was at par with 15th October sowing and found significantly superior over other date of sowing during the year 2007-08 and 2008-09 (Table-1). This was mainly due to prevailing favorable weather condition for their growth. The shortest plant heights (64.33 and 61.42 cm) were recorded at 15th November during both the years. It might be due to prevailing low temperature during growth periods, which ultimately restricted vegetative growth of the plants. These observations were in agreement with Hossain *et al.*, (1999) [6], Moniruzzaman *et al.*, (2007) [10] and Chattopadhyay *et al.*, (2011) [4].

The significantly highest numbered of branches; numbers of nodes per main stem (15.80 and 15.66) number of leaves (10.02 and 10.19) were recorded from 1st October sowing, during the year 2007-08 and 2008-09, respectively. This might be attributed due to the more efficient use of longer days available. However, all these parameter were observed significantly the lowest, when okra sown on 15th November, during both the year of experiment.

Similarly, the number of pods per plant, pod weight per plant and number of picking significantly reduced as sowing was delayed. Okra sown on 1st October recorded the highest number of pods of 12.98 and 12.91, pod weight per plant of

128.03 and 128.22 gm and number of picking of 14.44 and 13.89 during the year 2007-08 and 2008-09, respectively. This might be due to the greater number of branches and number of nodes per main stem and exuberant vegetative growth of plants compared to those planted later. The number of pods, therefore, would depend on the intensity of growth of the plants. This result agreed with finding of Hossain *et al.*, (2001) [7] and Anonymous (2010) [2].

The seed yield of okra decreased significantly with gradually delays the planting date. Significantly the highest pod yield of 15.47 and 15.50 q/ha were recorded when Okra sown on 1st October followed by 15th October, during the year of 2007-08 and 2008-09, respectively. All the growth and yield attributing characters like plant height, number of branches, number of pods per plant, pod weight per plant and number of picking were recorded highest under the same treatment might have contributed to greater yield. Okra sown on 15th November during both the year were found significantly the lowest yield of okra (9.78 and 9.72 q/ha). Similar types of finding were reported by Hossain *et al.*, (2001) [7] and Anonymous (2010) [2], when okra sown delay during the summer seasons.

Effect of Spacing

All the growth and yield characters were found significantly affected due to different plant spacing treatment except, number of days to first flower initiation (Table-1). The plant height recorded significantly the highest due to spacing of 45 2 20 cm over other spacing treatment during both the years. This might be due to optimum temperature and spaces available for the favorable crop growth.

Number of branches, number of nodes per main stem and number of leaves were found significantly the highest with the spacing of 45 2 20 cm, during both the years. However, all these characters reported significantly lowest due to closer spacing (45 2 10 cm). This might be due to competition for nutrients, light and space among the plants owing to maximum plant population.

Maximum number of pods per plant (11.44 and 11.71) and number of picking (12.08 and 11.58) were obtained from the spacing of 45220 cm during both the years because of number of branches and number of nodes per main stem from which pods developed were recorded highest in the same treatments. The lowest number of pods per plant and number of picking were observed under the close spacing (45210 cm). Similarly, pods weight per plant was found highest with the spacing of 45 2 20 cm as compared to other spacing treatments.

The yield of okra differed significantly with the different spacing. Significantly the highest okra yield of 14.75 and 14.30 q/ha were recorded under the spacing of 45 X 20 cm during the year 2007-08 and 2008-09, respectively. The increase in the yield of okra under the spacing of 45 X 20 cm may be due to all the growth and yield attributing characters found superior under the same treatment and more number of plant also found under the same treatment as compare to 45230 cm spacing. The maximum yield of okra achieved by sowing seeds at closer spacing is also reported by Sarnaik *et al.* (1986) [11] and Khan and Jaisal (1988) [8]. The widest spacing (45x30 cm) gave the lowest okra yield per hectare (10.40 and 10.62 q). The wider spacing of plant may get sufficient space, light and nutrient for better growth and development but the number of plant per hectare is reduced. It may result in lower yield. Similarly confirmation with Shukla *et al.* (2013) [12] in cotton.

Conclusion

From the results obtained, it can be concluded that okra crop should be sown on 1st October with the spacing of 45 X 20 cm in order to produced greater plant height, more number of branches and leaves per plant, number of nods per main stem, number of pods per plant, number of picking, pod weight per plant and yield. It is however, recommended that further investigation should be done to evaluate a wider range of sowing times and the spacing for the different growth habited varieties across the different locations in South Gujarat region.

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