



RESPONSE OF OKRA (*Abelmoschus esculentus*) CULTIVARS TO DIFFERENT SOWING TIMES

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ABSTRACT

In order to study the response of okra cultivars to different sowing times, an experiment was conducted at Horticultural Research Farm, Department of Agriculture, Skardu (Northern Areas) during summer 2005. Five cultivars of Okra i.e. Malav-27, Sabz Pari, Super Green, Pusa Sawani and Punjab Selection were sown in three different sowing dates with 10 days interval i.e. 18th May, 28th May and 8th June, 2005. Maximum number of picking (27.80), number of pods per plant (26.22), fruit diameter (1.46cm), plant height (1.48m), yield per hectare (14.57 tons) was recorded in cultivar Malav-27, when sown on 28th May, 2005. Minimum days to emergence (10.93) and days to first picking (75.60) was observed when different okra cultivars sown on 08th June, 2005, whereas the minimum days to emergence (10.89) were observed in cultivar Malav-27 and minimum days to first picking (75.56) was recorded in cultivar Punjab Selection. Okra cultivar Malav-27 should be sown on 28th May, for high yield at the agro climatic condition of Skardu.

Keywords: okra cultivars, sowing time, response, bhindi.

INTRODUCTION

Okra (*Abelmoschus esculentus* L.) is locally known as Bhindi. It is one of the most important summer vegetable crops in Pakistan. Okra, the genus *esculentus* with synonyms *Abelmoschus* belongs to the family Malvaceae or mallow under the order of malvales. This genus contains about 150 known species with *esculentus* as the specie of okra (Thompson and Kelly, 1957). It is also known as lady's finger or gumbo in England (Tindall, 1983).

Okra is one of the world's oldest cultivated crops. The Egyptians made the first recorded reference to okra in 1216 A.D. It is originated in tropical Africa and was also grown in Mediterranean region and its wild forms are found in India. It is now grown in all parts of the tropics and during the summer in the warmer parts of the temperate region (Baloch, 1994). It is a semi woody, fibrous herbaceous annual with an indeterminate growth habit. The plants form a deeply penetrating taproot with dense shallow feeder roots reaching out in all direction in the upper 45cm of the soil. The seeds are dicotyledonous and kidney shaped with epigeal germination (Nonnecke, 1989). Okra is mainly a self pollinated crop however, insects such as honey bees and bumblebees do cross-pollination occasionally.

Okra is adapted to a wide range of soil. A well drained fertile soil with an adequate content of organic matter and reserves of the major elements are generally suitable for cultivation. Some cultivars are sensitive to excessive soil moisture. Others are slightly tolerant to salt. Optimum pH ranges from 6.6 to 8.0. Most cultivars are adapted to high temperature through out the growing period with little seasonal fluctuation. Seed will only germinate in relatively warm soils, no germination occurs below 16°C. A monthly average temperature range of

21°C to 30°C is considered appropriate for growth, flowering and pod development (Tindall, 1983 and Nonnecke 1989).

Different cultivars require different climatic condition as well as different sowing time and a good cultivars sown at improper time give poor yield. Therefore proper and suitable date of sowing is critical to increase the production of crop.

MATERIALS AND METHODS

The experiment was conducted at Horticultural Research Farm, Department of Agriculture, Skardu (Northern Area) during summer 2005. The experiment was laid down in Randomized Complete Block (RCB) design with split plot arrangement and three replications. The total area of 9 x 27 m² was proposed for such experiment having 45 sub plots of 2 x 1.5 m². After field preparation seeds were sown in well-prepared seedbeds in lines with a distance of 50cm, when germination completed thinning was done to maintain the plant to plant distance of 20 cm. Hoeing, weeding and other cultural practices was done uniformly.

There were two factors studied in this experiment:

Factor A: Three sowing times with 10 days intervals i.e. 18th, 28th May and 8th June, 2005 were kept in the main plot.

Factor B: Five different Okra cultivars i.e. Malav-27, Sabz Pari, Super Green, Pusa Sawani and Punjab Selection were studied and kept in the sub plot.

There were fifteen treatments of combination and each was replicated three times to minimize the experimental error. Data was recorded considering following parameters:



- Days to emergence
- Days to first picking
- Total number of pickings
- Number of pods per plant
- Fruit/pod diameter (cm)
- Plant height (m)
- yield per hectare

RESULTS AND DISCUSSION

Days to emergence:

Mean values for sowing dates revealed that maximum days to emergence (13.70) were observed in different cultivars sown on 18th May 2005, while minimum days to emergence (10.93) were recorded in different cultivars sown on 8th June 2005. Okra seeds sown on 8th June took minimum days to emergence, the reason might be due to the availability of an optimum temperature for germination. While the late germination recorded in okra seed sown on 18th May, 2005, was due to low temperature for germination. Same result was also reported by Gadakh et al. (1990) who found that the variation in sowing dates was the main cause of change in seedling emergence, their survival and vigor of the seedlings.

Comparison for the mean of cultivars showed that maximum days to emergence (14.28) were recorded in cultivar Super Green followed by Punjab Selection (12.67), Pusa Sawani (12.00) and Sabz Pari (11.56), while minimum days to emergence (10.89) after sowing was noted in cultivar Malav-27. It might be due to the genetic characteristics of the different okra cultivars.

Days to first picking:

Mean values for sowing dates revealed that maximum days to first picking (80.40) were taken by cultivars sown on 18th May 2005, while minimum days to first picking (75.60) were noted in cultivars sown on 08th June 2005. Early picking in 28th May, and 08th June, 2005, sowing dates were due to quick emergence and early flowering, receiving an optimum temperature and day length caused early flowering and took less number of days to first picking.

Mean values for cultivars showed that maximum days to first picking (80.44) were recorded in cultivar Super Green, followed by cultivar Pusa Sawani (77.78), cultivar Malav-27 (77.44) and cultivar Sabz Pari (76.33), while minimum days to first picking (75.56) was observed in cultivar Punjab Selection. The reason might be due to the adaptability of different okra cultivars to local condition as well as receiving the optimum temperature and favourable environmental conditions.

Total number of pickings:

From the mean values of different sowing dates of okra cultivars on the total number of picking, it is concluded that the maximum number of picking (27.80)

were counted in cultivars sown on 28th May 2005, whereas the minimum number of picking (25.53) noted in the different okra cultivars sown on 08th June, 2005. Maximum number of picking in cultivars sown on 28th May, 2005, was due to longer harvest duration for fresh fruits. While less number of picking in cultivars sown on 08th June 2005 was due to lowest harvest duration. These results resembled with the finding of Iremiren and Okiy (1986), who reported that the growing response of okra to different sowing date was not uniform.

Mean values for cultivar showed that maximum number of picking (28.00) was recorded in cultivar Malav-27, while minimum number of picking (24.67) found in Super Green. The reason might be due to the adaptability of the cultivars to the environmental conditions of the area.

Number of pods per plant:

The mean data recorded for sowing dates revealed that the maximum numbers of pods (26.22) per plant were produced by plants sown on 28th May, 2005, whereas, the minimum number of pods (23.17) per plant were obtained in plants sown on 8th June 2005. The reason might be that 28th May, 2005, sowing had longer harvest duration than 08th June, 2005 sowing. These results are in agreement with those of Mondal et al. (1989), who found that the okra sown in April produced highest number of fruits per plant and more yield as compared to the seed sown during the month of June. Similarly Lee et al. (1990) also observed that pod yield of okra decreased with delay in sowing time.

The mean data recorded for cultivars showed that the maximum numbers of pods (26.62) per plant was produced by cultivar Malav-27, while the cultivar Super Green produced the minimum number of pods (20.20) per plant. These facts might be due to the variation in the genetic potential of these different cultivars.

Pod/fruit diameter (cm):

Mean data for cultivars revealed that maximum fruit diameter (1.59 cm) was noted in cultivar Malav-27, while minimum fruit diameter (1.21 cm) was recorded in cultivar Super Green. The reason might be that the cultivar Malav-27 produces more number of leaves than other cultivars, which synthesized more photosynthate due to maximum number of leaves, which ultimately produced maximum fruit diameter.

The mean values of data for different sowing dates of okra cultivars indicated that the plants sown on 28th May, 2005, gave more fruit diameter (1.46cm), whereas, less fruit diameter (1.39cm) was recorded in cultivars sown on 18th May, 2005.

Plant height (m):

The mean for sowing dates indicated that maximum plant height (1.48m) was attained by cultivars sown on 28th May, 2005, while minimum plant height



(1.19m) observed in cultivars sown on 08th June, 2005. It is clear from the mean table that early sowing produced taller plant as compared to later sowing. The results also might be due to more growing duration in early sowing as compare to late sowing. Results of similar finding have been reported by Irimerin and Okey (1986), who reported that the early sowing produced more vigorous plant as compared to late sowing. Similarly Mondal et al. (1989) observed that okra sown in April produced the highest plants, which produce high yield as compared to the seed sown in June.

Among various cultivars used in this trial, maximum plant height (1.46m) was obtained by cultivar Malav-27, followed by cultivar Pusa Sawani (1.39m), cultivar Sabz Pari (1.33m) and cultivar Punjab Selection (1.24m), while minimum plant height (1.12m) were recorded for cultivar Super Green. The reason might be

that the cultivar Malav-27 is more adoptable to the local condition as compare to other cultivars.

Yield per hectare (tons):

The data pertaining to yield per hectare is presented in Table-7 and the analysis of variance placed in Table-7a. The analysis of variance showed that different cultivars of okra were significantly affected the yield per hectare, while the various sowing dates and interaction had non significant effect on yield per hectare.

Mean values for cultivars showed that maximum yield (15.81 tons) per hectare was recorded for cultivar Malav-27, followed (14.49 tons) produced by Pusa Sawani, while minimum yield (11.44 tons) per hectare was observed in Super Green cultivar. The reason might be due to the genetic potential of the cultivars.

Table-1. Effect of various sowing dates on days to emergence of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	12.00	11.00	9.67	10.89c
Sabz Pari	12.33	11.17	11.17	11.56bc
Super Green	15.50	14.33	13.00	14.28a
Pusa Sawani	14.33	12.17	9.50	12.00bc
Punjab Selection	14.33	12.33	11.33	12.67b
Mean	13.70a	12.20ab	10.93b	

LSD value at 5% for sowing dates = 1.885

LSD value at 5% for cultivars = 1.455

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

Table-2. Effect of various sowing dates on days to first picking of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	80.67	76.67	75.00	77.44b
Sabz Pari	78.67	75.67	74.67	76.33b
Super Green	83.00	79.00	79.33	80.44a
Pusa Sawani	81.33	77.33	74.67	77.78b
Punjab Selection	78.33	74.00	74.33	75.56b
Mean	80.40a	76.53b	75.60b	

LSD value at 5% for sowing dates = 3.123

LSD value at 5% for cultivars = 2.471

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

**Table-3.** Effect of various sowing dates on total number of pickings of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	27.67	29.33	27.00	28.00a
Sabz Pari	27.00	28.00	26.00	27.00ab
Super Green	25.00	26.00	23.00	24.67c
Pusa Sawani	28.00	28.33	26.33	27.56ab
Punjab Selection	26.33	27.33	25.33	26.33b
Mean	26.80ab	27.80a	25.53b	

LSD value at 5% for sowing dates = 1.368

LSD value at 5% for cultivars = 1.355

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

Table-4. Effect of various sowing dates on number of pods per plant of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	25.47	29.17	25.26	26.62a
Sabz Pari	25.08	27.27	24.71	25.68a
Super Green	19.41	22.57	18.66	20.20c
Pusa Sawani	25.68	27.63	25.66	26.33a
Punjab Selection	21.46	24.53	21.55	22.52b
Mean	23.43b	26.22a	23.17b	

LSD value at 5% for sowing dates = 0.8994

LSD value at 5% for cultivars = 2.068

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

Table-5. Effect of various sowing dates on average fruit diameter (cm) of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	1.58	1.61	1.59	1.59a
Sabz Pari	1.37	1.44	1.41	1.41b
Super Green	1.19	1.27	1.16	1.21c
Pusa Sawani	1.28	1.45	1.51	1.42b
Punjab Selection	1.53	1.54	1.44	1.50ab
Mean	1.39	1.46	1.43	

LSD value at 5% for cultivars= 0.1066

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

**Table-6.** Effect of various sowing dates on average plant height (m) of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	1.37	1.63	1.37	1.46a
Sabz Pari	1.31	1.50	1.18	1.33 bc
Super Green	1.06	1.27	1.03	1.12d
Pusa Sawani	1.30	1.57	1.28	1.39ab
Punjab Selection	1.18	1.42	1.11	1.24cd
Mean	1.25b	1.48a	1.19b	

LSD value at 5% for sowing dates = 0.1014

LSD value at 5% for cultivars = 0.1269

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

Table-7. Effect of various sowing dates on average yield per hectare (tons) of different Okra cultivars.

Cultivars	Different Sowing Dates			Mean
	18/05/2005	28/05/2005	08/06/2005	
Malav-27	15.04	16.64	15.75	15.81a
Sabz Pari	12.90	13.98	13.30	13.39b
Super Green	10.90	12.10	11.32	11.44c
Pusa Sawani	13.54	15.55	14.38	14.49ab
Punjab Selection	12.52	14.58	12.84	13.34b
Mean	12.98	14.57	13.52	

LSD value at 5% for cultivars = 1.776

Means followed by at least one common letters are not significantly different statistically at 0.05 level of probability according to LSD test.

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