

# Comparative Study on the Performance of Some Exotic Okra Cultivars

MUHAMMAD AMJAD, MUHAMMAD SULTAN, MUHAMMAD AKBAR ANJUM†, CHAUDHRY MUHAMMAD AYYUB AND MUHAMMAD MUSHTAQ

*Department of Horticulture, University of Agriculture, Faisalabad- 38040, Pakistan*

†*University College of Agriculture, Bahauddin Zakariya University, Multan 60800, Pakistan*

†*Corresponding author: E-mail: anjumbzu@yahoo.com; Fax: 92 61 220091*

## ABSTRACT

Four exotic okra cultivars, viz. Pusa Sawani, Parbhani Kranti, Hybrid Bhindi Sakshi and Krishma 51 were evaluated for their performance against a local cultivar Sabz Pari. Maximum seed germination (79.50%) was recorded in Sabz Pari, which was also earliest to flower in 45 days. Plant height at flowering was not affected significantly among the cultivars. Green pod length was the maximum in Hybrid Bhindi Sakshi (12.88 cm) followed by Sabz Pari (12.55 cm) and both were statistically at par. Sabz Pari ousted all the exotic cultivars for average weight per green pod and green pod yields per plant and per hectare. Regarding seed production, maximum number of seeds per pod, highest 1000 seed weight and seed yields per plant and per hectare were also recorded in cv. Sabz Pari.

**Key Words:** *Abelmoschus esculentus*; Exotic cultivars; Growth; Green pod yield; Seed yield

## INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) is one of the most important vegetable crops grown many part of the tropical world. In Pakistan, it is grown through out the country. Although climatic conditions are quite favorable of its cultivation but the average green pod yield per unit area in the country is low as compared with several other countries (Amjad *et al.*, 2001). The major factors, which contribute to the green pod yield include: genetic factors, nutritional factors and space available to the plants.

Different okra genotypes differ significantly for most of the traits like number of green pods, pod length, pod weight and number of seeds per pod etc., ultimately determine overall green pod and seed yields of the cultivar, and also respond differently to the varying environments with respect to their physiological characteristics and ultimately yield components (Shanmugavelu, 1989; Dash and Misra, 1995); Gondane & Bhattia, 1995; Shri-Dhar & Dhar, 1995). Besides the improved cultural practices, there is also need to grow high yielding cultivars to increase green pod yield per unit area. In the present study, four exotic okra cultivars were compared with a local cultivar for their performance and suitability for cultivation in the country.

## MATERIALS AND METHODS

The present studies were carried out at Vegetable Research Area, Department of Horticulture, University of Agriculture, Faisalabad during the year 1999-2000. Four exotic okra cultivars i.e. Pusa Sawani, Parbhani Kranti, Hybrid Bhindi Sakshi and Krishma 51 and one local cultivar i.e. Sabz Pari were evaluated for their comparative yield potential to screen out the best performing cultivar. All the four exotic cultivars were of Indian origin. Seed of Sabz

Pari was procured from the Ayub Agricultural Research Institute, Faisalabad and that of all other cultivars was purchased from local seed market. In one experiment, crop was planted for green pod production and in the other for seed production. Both the crops were sown on 7<sup>th</sup> of April 1999 on both sides of raised beds prepared 90 cm apart, while plant to plant distance was maintained as 30 cm. The experiments were laid out according to RCBD with four replications. The net plot size was 12 x 8 m. Required amount of the recommended dose of fertilizer (112 kg N, 92 kg P<sub>2</sub>O<sub>5</sub> and 110 kg K<sub>2</sub>O ha<sup>-1</sup>) was applied uniformly to each plot in each experiment. Full dose of phosphorus and potash and half dose of nitrogen were applied at the time of sowing. The remaining half dose of nitrogen was applied at the time of flower initiation. All the cultural practices like watering, weeding etc. were standard and uniform for all the plots.

In the first experiment after recording the seed germination percentage, 10 plants were selected randomly for each cultivar in each replication and following observations were recorded using standard procedures to evaluate the comparative performance of the cultivars; days to first flowering, height at the time of flowering (cm), number of green pods per plant, length of green pod (cm), average weight per green pod (g), yield of green pods per plant (g) and pod yield per hectare (tons). In the second experiment also 10 plants were selected randomly and following observations were recorded: number of mature pods per plant, number of seeds per pod, 1000 seed weight, seed yield per plant (g) and seed yield per hectare (kg). The data collected were analyzed statistically using Fisher's analysis of variance technique and Duncan's multiple range test was employed to compare the difference among the cultivar means at 5% level of probability (Petersen, 1994).

## RESULTS AND DISCUSSION

**Seed germination.** It is obvious from Table I that the highest germination percentage was recorded in Sabz Pari. The lowest seed germination was recorded in Parbhani Kranti and Krishma 51 and both these cultivars behaved statistically alike, while other two cultivars Pusa Sawani and Hybrid Bhindi Sakshi were in between the two limits and were statistically at same level of significance (Table I). Significant differences observed in seed germination were probably because of different seed sources, methods of storage and might be also due to different ages of seeds.

**Days taken to first flowering.** Significant differences were observed among the cultivars for number of days taken to first flowering. Sabz Pari required minimum days to first flowering i.e. earliest to flower. This was followed by Pusa Sawani and Hybrid Bhindi Sakshi and these were statistically at par with cv. Sabz Pari. The maximum number of days to first flowering was recorded in Krishma 51, followed by Parbhani Kranti and both these cultivars were statistically with same level of significance (Table I). The difference in number of days to flowering might be due to the genetic variation among the cultivars because all the cultural practices were kept uniform for all the cultivars. The early flowering may be attributed to the genetic make up of the cultivar. These results of Sabz Pari are in close conformity with Ali (1999), who reported that it requires 47 days to initiate flowering. The result are also in accordance with previous workers (Dash & Misra, 1995; Shri-Dhar & Dhar, 1995), who reported that okra cultivars differed significantly in all the parameter including the days taken to first flowering.

**Plant height at flowering.** Results revealed non-significant differences among the cultivars for plant height at flowering. It indicates that all the cultivars behaved statistically alike and stood at par with each other (Table I), which could be due to uniform fertilizer dose and all other cultural practices.

**Length of green pod.** The maximum length of green pods was recorded in Hybrid Bhindi Sakshi, followed by Sabz Pari, which stood statistically at par with Hybrid Bhindi Sakshi. The minimum pod length was recorded in Krishma 51, which was statistically at par with Parbhani Kranti, Pusa Sawani and also with Sabz Pari (Table I). The difference in green pod length might be due to the differences in genetic

make up of the cultivars and their response to prevailing environmental conditions.

**Number of green pods per plant.** The four cultivars i.e. Pusa Sawani, Parbhani Kranti, Sabz Pari and Hybrid Bhindi Sakshi behaved statistically alike and stood at par with each other but significantly differed with Krishma 51, which gave minimum number of pods per plant (Table I). The results of present study are in good conformity with Jordan-Molero (1986), Gondane and Bhattia (1995) and Shri-Dhar and Dhar (1995), who in separate experiments have already reported variation in number of pods per plant among several okra genotypes/cultivars.

**Average weight per green pod.** The highest average weight of green pods was recorded in Sabz Pari, which significantly differed from all other cultivars. Hybrid Bhindi Sakshi was second in order for average weight of green pods. While the lowest pod weight was recorded in Pusa Sawani, which is statistically at par with Parbhani Kranti and Krishma 51 (Table I). These differences among the cultivars might be due to variation in their genetic make up. Previous workers have also reported differences in pod weight among different okra genotypes (Sadiq *et al.*, 1988; Shri-Dhar & Dhar, 1995).

**Green pod yield per plant.** The highest pod yield per plant was recorded in Sabz Pari, which was significantly higher from all other cultivars. Hybrid Bhindi Sakshi was second in order while the lowest pod yield per plant was recorded in Krishma 51. The cultivars Parbhani Kranti and Pusa Sawani resulted in higher green pod yield than Krishma 51 but lower than other cultivars. The green pod yields of these two cultivars were statistically non-significant with each other (Table I). Gondane and Bhattia (1995) evaluated fifty genotypes and already reported significant and marked variation in yield components among the cultivars. In separate studies, similar results have been reported by Sadiq *et al.* (1988), and Dash and Misra (1995).

**Green pod yield per hectare.** As the data regarding green pod yield per hectare was derived from green pod yield per plant and number of plants in a hectare, therefore, the data per hectare presented the same picture. The highest green pod yield per hectare was recorded in Sabz Pari, followed by Hybrid Bhindi Sakshi, which was second in order. The lowest pod yield per hectare was recorded in case of Krishma 51 (Table I). Rao and Raj (1974) compared 15 okra hybrid varieties with standard variety Pusa Sawani, 10

**Table I. Growth and green pod yield of different cultivars of okra**

Characteristics	Sabz Pari	Pusa Sawani	Parbhani Kranti	Hyb. Bhindi Sakshi	Krishma 51
Seed germination (%)	79.50 a*	76.00 b	72.50 c	75.25 b	72.50 c
Days taken to first flowering	45.00 c	48.50 bc	52.25 ab	48.75 bc	54.00 a
Plant height at flowering (cm)	28.40 a	34.55 a	35.18 a	31.23 a	30.05 a
Length of green pod (cm)	12.55 ab	11.00 b	10.98 b	12.88 a	10.85 b
Number of green pods/plant	20.68 a	20.87 a	20.87 a	19.32 a	13.58 b
Average weight/green pod (g)	16.08 a	10.99 c	10.32 c	14.23 b	11.40 c
Green pod yield/plant (g)	332.53 a	229.36 c	236.25 c	274.92 b	154.81 d
Green pod yield/hectare (t)	23.41 a	16.15 c	16.63 c	19.35 b	10.90 d

\*Means in each row sharing same letter (s) are non-significant at 5% probability (DMR test)

**Table II. Variation in seed yield components of different cultivars of okra**

Characteristics	Sabz Pari	Pusa Sawani	Parbhani Kranti	Hyb. Bhindi Sakshi	Krishma 51
Number of mature pods/plant	15.75 a*	15.72 a	15.55 a	14.20 a	11.35 b
Number of seeds/pod	47.33 a	38.85 b	36.40 b	39.10 b	38.94 b
1000 seed weight (g)	56.39 a	52.48 c	53.58 bc	55.50 ab	55.36 ab
Seed yield/plant (g)	42.06 a	32.05 b	30.33 b	30.81 b	24.47 c
Seed yield/hectare (kg)	2959.3 a	2256.4 b	2135.0 b	2169.4 b	1722.5 c

\*Means in each row sharing same letter (s) are non-significant at 5% probability (DMR test)

of which out-yielded the Pusa Sawani by 10-14%. Variation in yield among different okra cultivars has also been reported by other workers (Shaikh *et al.*, 1987; Baloch *et al.*, 1990; Arora *et al.*, 1991; Somkuwar *et al.*, 1997).

**Number of mature pods per plant.** The four cultivars i.e. Sabz Pari, Pusa Sawani, Parbhani Kranti and Hybrid Bhindi Sakshi behaved statistically alike and stood at par with each other but significantly differed with Krishma 51, which gave minimum number of pods per plant (Table II). This is interesting that number of mature pods per plant in the second experiment was lower than the number of green pods for vegetable purpose in first experiment for all the cultivars studied. The results of present study are in accordance with Jordan-Molero (1986), who has already reported variation in number of pods per plant among several okra genotypes/cultivars. He also reported that the number of pods decreased significantly when harvested for seed purpose.

**Number of seeds per pod.** Maximum number of seeds per pod was recorded in cv. Sabz Pari, which significantly differed from all other cultivars tested. All other cultivars behaved statistically alike and stood at par with each other with lower seed number per pod as compared to Sabz Pari (Table II). The results of present study are in close conformity with the findings of Jordan-Molero (1986), who has already reported variation in pod number among six okra cultivars.

**1000 seed weight.** The highest seed weight of 1000 seeds was recorded in cv. Sabz Pari, followed by Hybrid Bhindi Sakshi and Krishma 51. These three cultivars were statistically alike with same level of significance. The lowest 1000 seed weight was recorded in Pusa Sawani followed by Parbhani Kranti and both these cultivars were statistically at par for the parameter under study (Table II). This difference in 1000 seed weight is possibly due to the genetic variation among the cultivars and their interaction with the environment.

**Seed yield per plant.** The highest seed yield per plant was obtained from the cv. Sabz Pari, which significantly differed from all other cultivars tested. The lowest seed yield per plant was recorded in Krishma 51. While, the other cultivars i.e. Pusa Sawani, Hybrid Bhindi Sakshi and Parbhani Kranti were in the middle and behaved statistically alike (Table II). The seed yield depends upon the pod number, seed number and average seed weight per pod. As the cultivars differed for these parameters, therefore, seed yield per plant also varied among the cultivars.

**Seed yield per hectare.** The data regarding seed pod yield per hectare was derived from green pod yield per plant and number of plants in a hectare, therefore, it presented the same picture as seed yield per plant. The data reveal significant differences among the cultivars and Sabz Pari occupied the top ranking position with highest seed yield per hectare. Pusa Sawani, Hybrid Bhindi Sakshi and Parbhani Kranti were in the middle, while Krishma 51 remained at the bottom (Table II). Variation in seed yield per unit area among different cultivars has already been reported by Baruah (1995).

## REFERENCES

- Ali, A., 1999. Response of okra (*Abelmoschus esculentus* L. Moench) to phosphorus and spacing. *M.Sc. Thesis*, Dept. of Horticulture, University of Agriculture, Faisalabad.
- Anjad, M., M.A. Anjum and S. Hussain, 2001. Effect of different sowing dates and various doses of fertilizers on juvenility and productivity of okra. *Pakistan J. Agri. Sci.*, 38: 29-32.
- Arora, S.K., N. Kumar and B.R. Sharma, 1991. Effect of nitrogen and phosphorus fertilization on growth and yield components in okra (*Abelmoschus esculentus* L. Moench). *Haryana J. Hort. Sci.*, 20: 261-6.
- Baloch, A.F., S.M. Qayyum and M.A. Baloch, 1990. Growth and yield performance of okra (*Abelmoschus esculentus* L.) cultivars. *Gomal Univ. J. Res.*, 10: 91-4.
- Baruah, G.K.S., 1995. Effect of varieties and plant spacing on seed yield of okra. *Hort. J.*, 8: 119-24.
- Dash, G.B. and P.K. Misra, 1995. Variation and character association of fruit yield and its component characters in okra. *Curr. Agric. Res.*, 8: 123-7.
- Gondane, S.U. and G.L. Bhattia, 1995. Response of okra genotypes to different environments. *PKV Res. J.*, 19: 143-6.
- Jordan-Molero, F.L., 1986. Behaviour of six okra cultivars as vegetable and as a grain. *J. Agric. Univ. Puerto Rico*, 70: 57-61.
- Petersen, R.G., 1994. *Agricultural Field Experiments - Design and Analysis*. Marcel Dekker, Inc., New York.
- Rao, T.S. and K.G. Raj, 1974. Hybrid variety in bhindi. *Curr. Res.*, 3: 97-8.
- Sadiq, W.M., N.U. Amin and Shahzoor, 1988. Performance of okra cultivars under soil and climatic conditions of Peshawar. *Sarhad J. Agric.*, 4: 633-6.
- Shaikh, M.A. A.H. Ansari, S.M. Qayyum and M.A. Baloch, 1987. Okra cultivars: Tandojam experts' study of vegetative behaviour in okra. *Pakistan Agric.*, 9: 40-2.
- Shanmugavelu, K.G., 1989. *Production Technology of Vegetable Crops*, pp: 663-4. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
- Shri-Dhar, and S. Dhar, 1995. Performance of okra cultivars in South Andaman. *Curr. Res.*, 9: 169-71.
- Somkuwar, R.G., K.G. Mahakal and P.G. Kale, 1997. Effect of different levels of nitrogen on growth and yield in okra cultivars. *PKV Res. J.*, 21: 22-4.

(Received 20 July 2001; Accepted 18 August 2001)