

## PERFORMANCE OF DIFFERENT OKRA (*ABELMOSCHUS ESCULENTUS* L.) CULTIVARS UNDER THE AGRO-CLIMATIC CONDITIONS OF DERA ISMAIL KHAN.

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**ABSTRACT:** An experiment was conducted to evaluate the performance of five different varieties of Okra viz. Arka Anamika, Puja, Anmol, Sabz-Pari and Sharmeeli under the agro-climatic conditions of Dera Ismail Khan. The experiment was laid out in the Randomized Complete Block Design (RCBD) using 5 different Okra cultivars as main factor. The result showed minimum days to flowering (45.67), days to fruit setting (52.67), maximum plant height (91.33 cm), pods per plant (17.10), pod weight per plant (156.8 gm), yield per plot (477gm/ picking) and the total yield (9.900 t/ha) was found in Arka Anamika cultivar. Whereas, maximum average weight of a single pod (10.13 g) and pod length (9.70 cm) was recorded in cv. Sabz-pari. Thus, Arka Anamika is recommended for its cultivation under the agro-climatic conditions of Dera Ismail Khan.

**Key words:** Okra, (*Abelmoschus esculentus* L.) cultivars, performance plant height, pod, yield.

### INTRODUCTION

Okra (*Abelmoschus esculentus* L.) belongs to the family Malvaceae. It is a fast growing annual summer and immature pods are used as a common vegetable (Osekita and Ariyo, 2000). The plant is cultivated throughout the tropical and warm temperate regions around the world for its fibrous fruits or "pods." The plant bears numerous dark green colored pods measuring about 5-15 cm in length. It takes about 45-60 days to get ready-to-harvest fruits. The pods are among the very low calorie vegetables, containing no saturated fats or cholesterol. Okra contains carbohydrates, proteins and vitamin C in large quantities and also essential and non essential amino acids which are comparable to that of soybean (Adeboye and Oputa, 1996). It is one of the green vegetables with highest levels of anti-oxidants (beta carotenes, xanthin and lutein). In Pakistan, it is grown throughout the country (Baloch, 1994). 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.). There are many reasons for low yield in Okra, including genetic factors, nutritional factors and space available to the plants. Besides the improved cultural practices, there is also need to grow high yielding cultivars to increase green pod yield per unit area. Ashraful and Hossain (2006) observed a wide range of variation as in case of weight of green pod per plant (105-281g), days to first flowering (40-52days) and weight of individual green pod (14-26g), length of green pod (12-19cm), number of green pods per plant (6-11) and yield of green pod (4-13 t/ha) and diameter of green

pod (1-2cm). Chaudhary *et al.*, (2006) observed that number of pods per plant and weight of pods per plant significantly increased the yield of okra hybrids. Hussain *et al.*, (2006) reported that cultivar Malav-27 gave maximum number of picking (27.80), pods per plant (26.22), fruit diameter (1.46cm), plant height (1.48m), yield per hectare (14.57 tons) and took minimum days to emerge (10.89). Sachan (2006) reported Arka Anamika and Saatdhari as the most promising Okra cultivars. Saatdhari recorded the highest pod weight (13.1gm) and green pod yield (119.17 kg/ha). Katung (2007) found that the variety 'White velvet' produced more fruits than 'Ex-Borno'. Jamala *et al.*, (2011) recorded the highest fresh fruit yield of 10.7 tons/ha in improved okra cultivar as compared to local that recorded the lowest fresh fruit yield of 4.9 tons/ha. Falusi *et al.*, (2012) found that the number of leaves/plant and plant height at maturity and number of seeds/pod were significantly highest in V35 and Jokoso than in NH4e47.4. Some local cultivars are cultivated in this area for the last several decades. But these cultivars give no reasonable yields and are also affected by different insects and diseases. So there is an intense need to introduce some new cultivars with higher yield and quality product. In view of the above-mentioned facts, five okra cultivars were tested under the agro-climatic conditions of this area for their yield and quality evaluation.

### MATERIALS AND METHODS

The research project on the "Performance of different cultivars of Okra under the Agro-Climatic Conditions of D.I.Khan" was conducted at the Vegetable

area, Department of Horticulture, Faculty of Agriculture, Gomal University, D. I. Khan. The experiment was laid out in the Randomized Complete Block Design (RCBD) using different Okra cultivars (Arka Anamika, Puja, Anmol, Sabz-Pari and Sharmeeli) as main five treatments and each treatment was replicated thrice. Seeds were sown on each spot to acquire adequate germination. When germination completed thinning, hoeing, weeding and other cultural practices were done to maintain plant-to-plant distance and remained uniform all the experimental plots. The NPK, Nitrogen (Urea), triple super phosphate (TSP) and potassium sulfate (SOP) were applied at the rates of 130+80+80 kg/ha each. Field was irrigated daily until germination was complete and 3-4 intervals thereafter. The parameters studied during this course of study included: days to flowering, days to fruit setting, plant height (cm), pod length (cm), number of pods per plant, average weight of single pod (gm), Weight of pods per plant, yield per plot per picking (gm) and total yield of Pods (t/ha). The data collected were subjected to analysis of variance technique (Steel *et al.*, 1997) while (LSD) test was used to check the differences among various treatments. The analysis performed by "MSTATC" computer program.

## RESULTS AND DISCUSSION

**Days taken to flowering:** Statistically similar results were recorded in Sharmeeli, Sabz pari and Anmol with 49.67, 49.33, 49.33 days to flowering, respectively. Whereas, Arka-Anamika took significantly the least days to flowering (45.67), as shown in Table I. This result therefore shows that Anamika matures earlier and stands a better chance of earlier returns than the other cultivars. This, however, may be due to the fact that the soil, prevailing climatic and environmental conditions may have been more conducive to allow for better expression of the genetic potentials of the varieties thereby eliciting their differential performance. These results coincide with the previous findings of Ashraful and Hossain (2006) and Katung (2007), who also found similar behavior amongst the different okra cultivars for days to flowering.

**Days to fruit setting:** Statistical analysis of the data for days to fruit setting showed significant differences amongst different Okra cultivars. Statistically maximum days to fruit setting (58.67) was recorded in Sharmeeli, very closely followed by Sabz pari and Anmol with 57.67 and 57.00 days to flowering, respectively and all these three cultivars showed a non-significant behavior for each other. While, minimum number of days to fruit setting (52.67) was observed in Arka-Anamika. It might be due to the reason that as Arka-Anamika took least days to flowering so it should have taken least days to fruiting and vice versa.

**Plant height (cm):** Results on the plant height (cm) showed significant variations for all the varieties of okra (as shown in Table I). Maximum height (96.83 cm) was recorded in Puja closely followed by Arka-Anamika and Sabz pari with 91.33 and 85.97 cm tall plants, respectively. All these three cultivars were statistically at par. Shortest plant height (63.4 and 64.17 cm) was recorded in Anmol and Sharmeeli, respectively. Similarly, Sachan (2006) also reported Arka-Anamika with maximum plant height (90.62 cm). According to Akinyele and Osekita (2006), days to bud emergence and plant height at maturity, among other morphological traits, are some of the most variable traits of okra that are necessary for selection programs aimed at improving desirable traits. This might indicate that these factors are controlled by the same genetic variables. Similar results were reported by a number of researchers including Chaudhary *et al.*, (2006); Hussain *et al.*, (2006); Desai *et al.*, (2007) and Katung (2007) who also found significant differences amongst different Okra cultivars for plant height.

**Pod Length (cm):** Okra pod is considered as the most economical part of its production and pod length, along with pod number and pod weight are the most important factors determining the its production. Different okra cultivars showed the significant results for their fruit length. Statistically maximum pod length (9.700 and 9.533 cm) was found in Sabz pari and Arka-Anamika and both the cultivars were statistically alike. Statistically alike result of fruit length was found in Anmol, Puja and Sharmeeli with 8.967, 8.83 and 8.70 cm long pods, accordingly. This might be due to the better adoptability of these cultivars to the prevailing environmental conditions of the area. Similar pattern have been reported by Akram and Shah (2002), who reported that Sabz pari has the most promising result for maximum pod length. These results are also supported by a number of researchers including Khan *et al.*, (2000), Ashraful and Hossain (2006) and Bello *et al.*, (2006) who also found statistical different results for different Okra cultivars for green pod length.

**Number of pods per plant:** Significant differences were observed amongst okra cultivars for number of pods per plant. The statistically highest number of green pods (17.1) were recorded in Arka-Anamika, very closely followed by cultivar Sabz pari with 16.13 pods per plant and stood at par with Arka-Anamika, as shown in Table II. Intermediate result was also noted in cv. Puja with 14.33 pods per plant. The lowest number of green pods (11.27 and 11.83) was noted in Sharmeeli and Anmol, respectively and both the cultivars were statistically at par to each other. This might be due to the genetic characteristics and adoptability of these cultivars to the environmental conditions of the area. Similarly, a number of research workers (Bello *et al.*, 2006; Choudhary *et al.*,

2006; Hussain *et al.*, 2006 and Sachan 2006) also found significant results for pod per plant in different Okra cultivars.

**Average weight of single pod (g):** The result depicted highly significant results for average weight of single pod. Heaviest green pod 10.13 g was recorded in cultivar Sabz pari, which was significantly similar to Arka-Anamika and Anmol with 9.733 and 8.967 g pod weight. Sharmeli produced an average single pod weight of 8.663 g. While the minimum pod weight was noted in cultivar Puja with 8.233 g. This performance may not be unconnected with more favorable environmental conditions, prevailing during the summer season. This result collaborates with the previous findings of Katung (2007) who reported changes in environmental conditions influence the growth and performance of Okra. These results are supported by the previous observations of various researchers including Amjad *et al.*, (2001), Akram and Shah (2002), Ashraful and Hossain (2006) and Sachan (2006) who recorded the highest pod weight with 13.1gm.

**Weight of pods per plant (g):** Statistical analysis of data revealed significant differences among the various treatment means of the Okra cultivars. Maximum pod weight per plant (156.8 gm) was recorded in Arka Anamika, very closely followed by Sabz Pari with 150.5 gm pod weight and both the treatments were statistically alike to each other. An intermediate result (126.8) for average weight of pods per plant was recorded in cv. Puja. Whereas, the minimum pod weight (99.17 g) was observed in Sharmeli, closely followed by Anmol with 101.5 g green pod weight and both these cultivars were statistically at par. The difference in weight of pods per plant (g) might be due to the differences in genetic make of the cultivars and their response to prevailing environmental conditions. These results are also supported by the previous findings of Ashraful and Hossain (2006) who also reported the significant results amongst the 50 cultivars of okra. Similarly, Satish and Kanwar (2005) and Chaudhary *et al.*, (2006) also found significant results for Okra pod weight per plant.

**Yield per plot per picking (g):** Similar trend of results was obtained for yield per plot per picking, as was observed in number of pods per plant and weight of pods per plant. Highly significant data regarding yield per plot per picking (g) showed that the statistically maximum yield (477 g) was recorded in cultivar Arka-Anamika and it was closely followed by Sabz Pari with 426 g green pod yield per plot per picking (g), as shown in Table II. Intermediate response was also reported in Puja with 372.5 g yield per plot per picking. Significantly lowest pod yield (309.1 and 310.1 g) per plot per picking was obtained in Sharmeli and Anmol, respectively. The

reason might be due to the genetic potential of the cultivars. Similarly, Katung (2007) also reported that Okra cv White Velvet produced more fruits.

**Yield of Pods (t/ha):** The data revealed significant differences among the cultivars and statistically Arka-Anmika occupied the top ranking position with highest yield (9.900 t/ha). It was followed by Sabz pari and Puja with 8.833 and 7.083 t/ha, respectively, as shown in Table II. While minimum yield of green pod (5.583 t/ha) was noted in Sharmeli and it was statistically alike to Anmol with 6.00 t/ha yield of green pods. It was obvious that Arka Anamika showed its superiority over all the other cultivars for its yield, as it produced maximum number of pods, weight of pods per plant and yield per plot per picking. It might be due to its genetic makeup and more adaptability towards the climatic conditions of the area. These results got support from the previous work done by Khan *et al.*, (2000), Amjad *et al.*, (2001), Ashraful and Hossain (2006) and Hussain *et al.*, (2006) who also reported variations in pod yield per t/ha in different okra cultivars.

**Table 1. Days to flowering, fruit setting, plant height (cm) and pod length (cm) of different okra cultivars.**

Cultivars	Days to Flowering	Days to fruit setting	Plant height (cm)	Pod length (cm)
Arka Anamika	45.67 <sup>c</sup>	52.67 <sup>c</sup>	91.33 <sup>a</sup>	9.533 <sup>a</sup>
Puja	47.33 <sup>b</sup>	54.00 <sup>bc</sup>	96.83 <sup>a</sup>	8.833 <sup>b</sup>
Anmol	49.33 <sup>a</sup>	57.00 <sup>ab</sup>	63.40 <sup>b</sup>	8.967 <sup>b</sup>
Sabz Pari	49.33 <sup>a</sup>	57.67 <sup>a</sup>	85.97 <sup>ab</sup>	9.700 <sup>a</sup>
Sharmeli	49.67 <sup>a</sup>	58.67 <sup>a</sup>	64.17 <sup>b</sup>	8.700 <sup>b</sup>
<b>LSD Value at 5%</b>	<b>1.263</b>	<b>3.036</b>	<b>25.04</b>	<b>0.5457</b>

Means followed by different letters show significant result at 5 % level of probability.

**Table 2. Number of pods per plant, average weight of a single pod (g), weight of pods per plant (g), yield per plot per picking (g) and total yield of pods (t/ha) of different okra cultivars.**

Cultivars	Number of pods per plant	Av. weight of single pod (g)	Weight of pods per plant (g)	Yield per plot per picking (g)	Total yield of pods (t/ha)
Arka Anamika	17.10 <sup>a</sup>	9.733 <sup>ab</sup>	156.8 <sup>a</sup>	477.0 <sup>a</sup>	9.900 <sup>a</sup>
Puja	14.33 <sup>bc</sup>	8.233 <sup>c</sup>	126.8 <sup>b</sup>	372.5 <sup>b</sup>	7.083 <sup>c</sup>
Anmol	11.83 <sup>cd</sup>	8.967 <sup>abc</sup>	101.5 <sup>c</sup>	310.1 <sup>c</sup>	6.000 <sup>d</sup>
Sabz Pari	16.13 <sup>ab</sup>	10.13 <sup>a</sup>	150.5 <sup>a</sup>	426.0 <sup>ab</sup>	8.833 <sup>b</sup>
Sharmeli	11.27 <sup>d</sup>	8.633 <sup>bc</sup>	99.17 <sup>c</sup>	309.1 <sup>c</sup>	5.583 <sup>d</sup>
<b>LSD Value at 5%</b>	<b>2.633</b>	<b>1.359</b>	<b>7.814</b>	<b>7.814</b>	<b>0.9656</b>

Means followed by different letters show significant result at 5 % level of probability.

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