

PERFORMANCE OF DIFFERENT GENOTYPES OF OKRA FOR GROWTH, YIELD AND QUALITY
IN MALWA REGION OF MADHYA PRADESH

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ABSTRACT

A field experiment was carried out in kharif season of 2014 at College of Agriculture, Indore (M.P.) to study the morphological, phenological, yield and quality parameters of okra genotypes in Malwa plateau. The experimental material was comprised of 10 genotypes with three replications. Results revealed that genotype Sonal produced tallest plant (85.80) followed by Sahiba (80.41 cm). Sahiba proved significantly superior (245.47 cm²) in leaf area followed by Sonal (231.98). Maximum number of nodes (15.67) were noted in genotype Sonal followed by Sahiba (13.67) and highest internodal length (9.12 cm) was recorded in Harita. Genotypes Sonal, Sahiba, Jhilmil, and Hissar Unnat took minimum days for first picking i. e. 50.33, 51.10, 51.83 and 52.48, respectively. Genotype Sonal recorded higher fruit length (15.27 cm) followed by genotype Sahiba (14.00 cm) and Jhilmil (13.15 cm). The maximum fruit yield was recorded in Sonal (142.66 qha⁻¹) followed by Sahiba (137.54 qha⁻¹), Jhilmil (129.57 qha⁻¹) and Hissar Unnat (124.63qha⁻¹). Sonal, Sahiba had good Shelf life (4 days) of fruit at room temperature. Genotypes Sonal and Sahiba were suitable for local and distance market. Also highest benefitcost ratio (3.75) was recorded in Sonal followed by Sahiba (3.58).

Keywords: Okra, picking, fruit length, yield, shelf life, B:C ratio

INTRODUCTION

Okra [*Abelmoschus esculentus* (L.) Moench.] is a polyploid, belonging to the family Malvaceae. Okra is cultivated comprehensively in the tropical, subtropical and warm areas of the world. Edible fresh and mature fruits contain 88% moisture and large number of chemical components including Vit. A 88 IU, Vit. B 63 IU and Vit. C 13 mg/100 g. Unripe okra fruits contain 3100 calorie energy, 1.8 g Protein, 90 mg calcium and 1.0 mg iron. Seeds of okra had the oil content 17.3%. It strikes out the nutritious ingredient of cattle feed. It has Ayurvedic medicinal properties. Its leaves are used for preparing a medicament to reduce inflammation. It is an excellent source of iodine for control of goiter (Chadha, 2001). In India it is being cultivated in 5.33 lakh ha and its annual production is 6346.0 thousand Mt. In Madhya Pradesh okra is grown in 26.51 thousand ha area with the production of 305.91 thousand Mt (Anonymous 2014). It is a hardy crop and can be grown with considerable success on a wide range of soils and under variable environmental conditions. Okra fruits are used as vegetable and seeds have industrial uses. Thus suitable genotypes and proper nutrition with higher yield and quality are

very important. Hence the present study was undertaken to find out the superior genotypes for growth, yield and quality parameters with early and timely maturity having better economic viability.

MATERIALS AND METHODS

The present experiment was conducted at Research Farm, Department of Horticulture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, College of Agriculture, Indore during Kharif season of 2014. The 10 genotypes i.e. Arka Anamika, Arya Mohini, Jhilmil, Hissar Unnat, Harita, No. 55, Pusa A-4, Pusa Sawani, Sonal, Sahiba were tested with three replications in randomized complete block design. The genotypes were evaluated for their comparative growth, yield and quality potential to screen out superior performing cultivars. All the genotypes were of indigenous origin. Seeds were sown in 3.00 X 3.00 m² plot at spacing of 60cm X 50cm. Five plants in each plot were randomly selected and tagged to record various observations as per proposed schedule of 30, 60, 90 days after sowing. The parameters studied during this course of study included morphological parameters (plant height, number of leaves,

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number of branches per plant, leaf area, number of node and internodal length), phenological parameters (days to 50% flowering, days to first picking and days to flower opening to first picking), yield parameters (pedicel length, diameter of fruit, length of fruit, fruit yield per plant and fruit yield per hectare), quality parameters (tenderness of fruit, colour of fruit, fruit surface, fruit shape and shelf life at room temperature). The economics of various genotypes was computed on the basis of prevailing market price of inputs and produce.

RESULTS AND DISCUSSION

Morphological parameters

Results on the plant height showed significant variations for all the varieties of okra (Table 1). Maximum plant height (85.80cm) was recorded in Sonal followed by Sahiba (80.41cm) and Jhilmil (76.81cm). Whereas, the minimum plant height (61.12cm) was recorded in Harita. Variation in plant height was due to the inherent genetic makeup of the genotypes, which is in some way influenced by this morphological expression expressed through the activity of endogenous growth regulators. These finding are supported by Hazra and Basu (2000), Kumar and Kuwar (2005) and Singh and Jain (2012). Genotype Sonal was significantly superior (22.87) in number of leaves followed by Sahiba (21.37) as compared to rest of the genotypes. Whereas, genotype Harita had minimum (15.47) leaves per plant. Probable reason for increased

number of leaves may be due to increased rates of photosynthesis and photosynthates supply for maximum growth and apical dominance. These findings are in agreement with the findings of Hazra and Basu (2000), Tiwari and Singh (2003) and Nagre *et al.* (2011). The maximum number of branches (13.53) was recorded in genotype Sonal followed by Sahiba (12.19), Jhilmil (11.50) and Hissar Unnat (10.80). Whereas, minimum was recorded (9.87) in Harita. The increased number of branches may be attributed to increased rates of photosynthesis and photosynthates supply for maximum branches growth or change in endogenous auxin in turn in apical dominance. Tiwari and Singh (2003) and Nwangburuka *et al.* (2012) reported similar results. Genotype Sahiba proved significantly superior (245.47 cm²) in leaf area to rest of the genotypes. Whereas, Harita recorded minimum (195.40 cm²) leaf area. These finding were supported by Nagre *et al.* (2011). The relatively higher number of nodes (15.67, 13.67 and 12.00) were recorded in genotypes Sonal, Sahiba and Jhilmil respectively. The lowest number of nodes was recorded in Harita (6.67). The minimum internodal length of (5.45 cm) was recorded in Sonal and maximum (9.12 cm) in Harita. It may be due to varietal genetical character or it may be due to the increased rates of photosynthesis and photosynthates supply for maximum growth. These findings are in agreement with those of Hazara and Basu (2000), Sachan (2006) and Swamy *et al.* (2014).

Table 1: Morphological and Phenological parameters of different genotypes of okra

| Genotypes | Morphological parameters | | | | | | Phenological parameters | | |
|--------------|--------------------------|----------------|------------------|------------------------------|----------------|--------------------|-------------------------|-----------------------|---|
| | Plant height | Leaves plant-1 | Branches plant-1 | Leaf area (cm ²) | Number of node | Inter-nodal length | Days to 50% flowering | Days to first Picking | Days to flower opening to fruit picking |
| Arka Anamika | 69.45 | 19.07 | 10.22 | 217.87 | 8.67 | 7.92 | 45.74 | 53.08 | 8.00 |
| Arya Mohini | 72.01 | 18.33 | 10.58 | 222.96 | 10.33 | 6.91 | 48.41 | 54.19 | 9.00 |
| Jhilmil | 76.81 | 21.18 | 11.50 | 237.09 | 12.00 | 6.51 | 46.14 | 51.83 | 7.00 |
| Hissar Unnat | 74.03 | 20.67 | 10.80 | 227.54 | 11.00 | 6.72 | 46.54 | 52.48 | 7.33 |
| Harita | 61.12 | 15.47 | 9.87 | 195.40 | 6.67 | 9.12 | 49.69 | 56.59 | 10.00 |
| No. 55 | 65.78 | 19.03 | 10.63 | 202.64 | 7.67 | 8.52 | 48.11 | 54.87 | 9.33 |
| Pusa A-4 | 66.66 | 20.47 | 12.47 | 208.52 | 8.00 | 8.30 | 46.72 | 53.06 | 8.33 |
| Pusa Sawni | 67.93 | 18.60 | 10.41 | 212.98 | 8.33 | 8.14 | 47.17 | 53.13 | 7.67 |
| Sonal | 85.80 | 22.87 | 13.53 | 231.98 | 15.67 | 5.45 | 44.68 | 50.33 | 6.00 |
| Sahiba | 80.41 | 21.37 | 12.19 | 245.47 | 13.67 | 5.85 | 45.74 | 51.10 | 6.33 |
| SEm± | 4.83 | 0.65 | 0.34 | 1.34 | 0.52 | 0.11 | 0.57 | 0.98 | 0.58 |
| CD (p= 0.05) | 4.36 | 1.92 | 1.02 | 3.97 | 1.54 | 0.33 | 1.69 | 2.91 | 1.71 |

Phenological parameters

The values of early 50% flowering (44.67, 45.00 and 45.67 days) were recorded in genotypes Sonal, Sahiba and Jhilmil, respectively (Table 2). The late 50% flowering was recorded in Harita (49.33 days). This variation may possibly be due to the variation in level of gibberellins in the plant. The higher level of gibberellins has been reported to promote early flowering in

crop plant. These findings were also supported by Oppong-Sekyere *et al.* (2011). Maximum days to first picking (57.33 days) was recorded in Harita and minimum (50.67 days) in Sonal (Tiwari and Singh 2003). Maximum days to flower opening to first picking (10 days) were recorded in genotype Harita and minimum (6.00 days) in genotype Sonal.

Table 2: Yield and yield attributing parameters and economics of okra genotypes

| Genotypes | Pedical length (cm) | Diameter of fruit (cm) | Length of fruit (cm) | Fruit yield plant ⁻¹ (Kg) | Fruit yield (qha ⁻¹) | Net income (ha ⁻¹) | B:C ratio |
|---------------|---------------------|------------------------|----------------------|--------------------------------------|----------------------------------|--------------------------------|-----------|
| Arka Anamika | 3.13 | 2.83 | 11.38 | 0.32 | 105.01 | 112515 | 2.50 |
| Arya Mohini | 3.17 | 2.64 | 11.97 | 0.33 | 112.17 | 123255 | 2.73 |
| Jhilmil | 3.30 | 3.20 | 13.15 | 0.39 | 129.57 | 179355 | 3.31 |
| Hissar Unnat | 3.21 | 2.95 | 12.16 | 0.37 | 124.63 | 141945 | 3.15 |
| Harita | 3.01 | 2.41 | 11.05 | 0.27 | 90.63 | 90945 | 2.02 |
| No. 55 | 3.08 | 2.49 | 11.91 | 0.29 | 95.83 | 98745 | 2.19 |
| Pusa A-4 | 3.09 | 2.59 | 11.16 | 0.32 | 118.13 | 132195 | 2.93 |
| Pusa Sawni | 3.09 | 2.68 | 11.47 | 0.31 | 102.45 | 108675 | 2.41 |
| Sonal | 3.54 | 3.44 | 15.27 | 0.43 | 142.66 | 168990 | 3.75 |
| Sahiba | 3.41 | 3.32 | 14.00 | 0.41 | 137.54 | 161310 | 3.58 |
| SEm± | 0.07 | 0.08 | 0.45 | 0.01 | 2.17 | | |
| CD (p = 0.05) | 0.21 | 0.22 | 1.33 | 0.03 | 6.43 | | |

Yield and yield attributing parameters

Genotype Sonal recorded the higher marketable fruit length (15.27 cm) followed by genotype Sahiba (14.00 cm), Jhilmil (13.15 cm) and Hissar Unnat (12.16 cm). Whereas, the lower marketable fruit length (11.05 cm) was recorded in the genotype Harita. These findings are in agreement with those of Reddy *et al.* (2013). They found that increase in fruit length was largely determined by cultivar characteristics. Highest (3.44 cm) diameter of fruit was recorded in the genotype Sonal followed by Sahiba (3.32 cm), Jhilmil (3.20 cm) and Hissar Unnat (2.95 cm). However the genotype Harita exhibited minimum diameter of fruit (2.41 cm). This may be due to inherent genetic makeup of the genotypes and increased supply of major plant nutrients which are required in larger quantities for growth and development of plants. Nitrogen accelerates the development of growth and reproductive phases and protein synthesis, thus promoting fruit diameter. These findings are in agreement with Nwangburuka *et al.* (2012). The higher values (3.96, 3.51, 3.30 and 3.21 cm) of pedicel length of okra were exhibited in the genotypes Sonal, Sahiba, Jhilmil, and Hissar Unnat respectively. However, the minimum pedicel length of fruit was recorded in Harita (3.01 cm). These

finding are also supported by Singh and Jain (2012). Genotype Sonal produced significantly higher fruit yield per plant (0.43 kg) followed by Sahiba (0.41 kg), Jhilmil (0.39 kg) and Hissar Unnat (0.37 kg). While, the lowest (0.27 kg) fruit yield per plant was noted in genotype Harita. Significantly higher fruit yield (142.66 qha⁻¹) was recorded in the genotype Sonal and which was statistically superior to Sahiba (137.54 q ha⁻¹), Jhilmil (129.57 qha⁻¹) and Hissar Unnat (124.63 qha⁻¹). However, the minimum fruit yield (90.63 q ha⁻¹) was recorded in genotype Harita. The enhanced fruit yield may be due to inherent genetic makeup of the genotypes. These findings corroborate with the results obtained by Sachan (2006) and Senapati *et al.* (2011) (Table 2).

Economics

The highest marketable fruit yield of 142.66 qha⁻¹ and net return of Rs.1,68,990 ha⁻¹ along with benefit:cost ratio (3.75) were obtained from genotype Sonal followed by Sahiba which gave fruit yield of 137.54 qha⁻¹ and net return of Rs. 1,61,310 ha⁻¹ with benefit:cost ratio of 3.58. The lowest marketable fruit yield (90.63 qha⁻¹) and net return of Rs. 90, 945 ha⁻¹ along with benefit cost ratio 2.02 were recorded in genotype Harita (Table 2). The higher net returns and benefit: cost ratio under these genotypes

was mainly owing to more fruit yield. These results got support from the work reported by Sharma *et al.* (2011) and Maurya and Pal (2012).

Qualitative parameters

The qualitative parameters studied during study are presented in Table 3.

Table 3: Qualitative parameters of different genotypes of okra

| Genotype | Tenderness of fruit | Colour of fruit | Fruit Surface | Fruit shape | Shelf life at room temperature |
|--------------|---------------------|-----------------|---------------|----------------------|--------------------------------|
| Arka Anamika | Semi hard | Dark green | Smooth | Medium slender shape | Poor (2 days) |
| Arya Mohini | Soft (tender) | Green | Hairy | Finger shaped | Good(4 days) |
| Jhilmil | Soft (tender) | Dark green | Smooth | Long slender shape | Good(4 days) |
| Hissar Unnat | Semi hard | Light green | Hairy | Medium slender shape | Poor(2 days) |
| Harita | Soft (tender) | Green | Smooth | Finger shaped | Poor(2 days) |
| No. 55 | Soft (tender) | Green | Smooth | Medium slender shape | Medium(3 days) |
| Pusa A-4 | Semi hard | Light green | Hairy | Medium slender shape | Poor(2 days) |
| Pusa Sawni | Semi hard | Light green | Hairy | Medium slender shape | Medium(3 days) |
| Sonal | Soft(tender) | Dark green | Smooth | Long slender shape | Good(4 days) |
| Sahiba | Soft (tender) | Dark green | Smooth | Long slender shape | Good(4 days) |

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