

## Study the Effect of Identify Superior Variety/Hybrid for Growth, Flowering Parameters in okra (*Abelmoschus esculentus* L.)

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### ABSTRACT

The present investigation entitled “Study the effect of identify superior variety/hybrid for growth, flowering parameters in okra (*Abelmoschus esculentus* L.)” was carried out during Kharif season of 2013-2014 at the Research Farm of Department of Horticulture, College of Agriculture, Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, Indore, (M.P.). The experimental material for the present investigation was comprised of 10 genotypes of the okra. These genotypes were sown in Randomized Complete Block Design with three replications, to observed morphological, phonological, parameters and to estimate the genetic variability and adoptability in “Malwa plateau”. Observations were recorded on the basis of five random competitive plants selected from each variety separately for morphological, phonological, parameters were evaluated as per standard procedure and also work out the economics of varieties.

*Key word:- Variety, Kharif, Genotypes.*

Received 13.12.2018

Revised 28.01.2019

Accepted 11.02.2019

### CITATION OF THIS ARTICLE

Alok Chouhan, Mukesh Meena, Mahendra Jadia, K.S.Verma. Study the Effect of Identify Superior Variety/Hybrid for Growth, Flowering Parameters in okra (*Abelmoschus esculentus* L.). Int. Arch. App. Sci. Technol; Vol 10 [1] March 2019 : 109-114

### INTRODUCTION

Okra (*Abelmoschus esculentus* L. Moench) is a popular green fruit vegetable in Bangladesh. It is commonly known as bhendi or lady's finger in Bangladesh [1]. It is the choicest fruit vegetable grown extensively in tropical, subtropical and warm area of the temperate zones of the world [2, 3]. In India, among fresh vegetables, 60 per cent share of export goes to okra. Okra is widely cultivated in plans of the India with acreage of 530.79 thousand ha. and production 6350.27 thousand mt. (NHB 2012-13). In Madhya Pradesh okra is grown in 25.74 thousand ha area and 297 thousand mt. (NHB 2012-13). Okra is a polyploid, belonging to the family Malvaceae with  $2n = 8x = 72$  or 144 chromosome and a self pollinated crop, occurrence of out crossing to an extent of 4 – 19 percent with the maximum of 42.2 per cent is noticed with the insect assisted pollination [3]. It is the best source of iodine and calcium. Consumption of 100 g of fresh okra fruit provides 20, 15 and 50% of the daily requirement of calcium, iron and ascorbic acid, respectively [4]. Okra is a popular health food due to its high fiber, and vitamin C content. It is also known for being high in antioxidants. It is also a good source of calcium and potassium [5]. It has Ayurvedic medical properties. Its leaves are used for preparing a medicament to reduce inflammation. It is an

excellent source of Iodine for control of goiter. All the genotypes *responded* differently to the environments. Significant and marked variation was noted in the yield components, particularly in yield per plant, plant height, pods per plant and nodes to first pod. The Pusa Sawani and Parbhani Kranti were at par in respect of growth and yields. Under closer spacing had poor growth (plant height, branches per plant) and yield attributes (fruits per plant and seeds per fruit) than wider spacings, seed yield per unit area was markedly higher with it owing to greater plant population and LAI.

## MATERIAL AND METHOD

The experiment was conducted at the Research Farm of Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya, College of Agriculture, Department of Horticulture, Indore during Kharif season, 2013-2014. The minimum and maximum temperature during crop growth period varied 15.5°C to 24°C and from 24.6°C to 34°C, with season's average values of 21.76°C and 28.63°C respectively. The relative humidity ranged between 81.7 to 93.1 % with season's average of 87.99%. The field experiment was laid out in a Randomized Complete Block Design with three replications and the lab experiment was laid out in completely randomized design with three replications. In the beginning of the experiment, seeds were dibbled. After two weeks of sowing, thinning was carried out to maintain plant to plant distance. All the recommended package of practices was followed to raise healthy crop. The Gross plot size was 3.00 X 3.00 sq.m. A dose of 150kg N, 100kg P<sub>2</sub>O<sub>5</sub> and 100kg K<sub>2</sub>O/ha along with 20 tonnes FYM/ha was applied. One third nitrogen and entire quantity of P, K and FYM was applied prior to sowing. Remaining dose of nitrogen was applied in two splits at 30 and 60 days after sowing. Irrigation and other cultural practices were done as and when necessary. The collected data on various parameters were statistically analyzed using MSTAT-C program. The means of different parameters were compared by Duncan's Multiple Range Test (DMRT) at 5% level of probability.

## RESULTS AND DISCUSSION

The analysis of variance showed that the superior variety/hybrid under study differed significantly among themselves for all characters which are presented below:

### Plant height

The plant height of okra plant as affected by different genotypes is given in Table 1. Plant height was recorded at 30, 60 and 90 days after sowing. At 30 days after sowing, the significantly maximum 17.42cm and 16.85cm plant height were recorded in the genotypes Shahiba and Jhilmil respectively and which were at par with each other. While, the minimum 14.8cm plant height was observed in Shan. At 60 days after sowing, the significantly maximum 104.5cm plant height was observed under the genotype Shahiba followed by Jhilmil (104.2 cm) and which were at par with each other. Whereas, the minimum 87.4cm plant height was observed in Shan.

**Table 1: Plant height (cm) as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Plant height (CM)		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	Parbhani Kranti	15.07	96.93	111.33
T <sub>2</sub>	Arka Anamika	16.01	101.4	126.4
T <sub>3</sub>	Shahiba	17.42	104.5	137.07
T <sub>4</sub>	Shan	14.8	87.4	106.53
T <sub>5</sub>	No.55	16.45	101.6	132.27
T <sub>6</sub>	Harita	14.97	99.67	129
T <sub>7</sub>	Jhilmil	16.85	104.2	134.33
T <sub>8</sub>	No.64	16.39	97.53	131.6
T <sub>9</sub>	Sonal	16.64	104.13	133.53
T <sub>10</sub>	Shakti	15.77	99.27	130.8
	<b>SEm±</b>	<b>0.22</b>	<b>2.38</b>	<b>4.82</b>
	<b>C.D. at 5% level</b>	<b>0.65</b>	<b>7.07</b>	<b>14.33</b>

As case of 90 days after sowing, the genotype Shahiba was found significantly superior (137.07cm) and which was followed by Jhilmil(134.33cm), Sonal(133.53cm) and No.55 (132.27cm) as compare to rest of the genotypes. Whereas, genotype Shan was observed minimum (106.53cm) plant height.

#### Number of leaves per plant

The average number of leaves per plant of successive stages of growth (at 30, 60 and 90 days after sowing), depicted in Table 2. The data clearly indicated that the number of leaves per plant of okra plants responded significantly to various genotypes at all the growth stages (30, 60 and 90 days after sowing), under study. At 30 days after sowing, the maximum 6.40 leaves per plant was observed under the genotype Shahiba followed by Jhilmil (6.33) and Sonal(6.2) and which were at par with each other. Whereas, the minimum 5.6 leaves per plant was observed in Shan.

**Table 2: Number of leaves per plant affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Number of leaves per plant		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	ParbhaniKranti	5.8	13.40	19.40
T <sub>2</sub>	ArkaAnamika	5.87	13.67	18.67
T <sub>3</sub>	Shahiba	6.40	14.27	21.00
T <sub>4</sub>	Shan	5.6	11.73	17.27
T <sub>5</sub>	No.55	6.07	13.73	19.80
T <sub>6</sub>	Harita	5.87	12.67	19.47
T <sub>7</sub>	Jhilmil	6.33	13.93	20.40
T <sub>8</sub>	No.64	5.93	12.27	19.07
T <sub>9</sub>	Sonal	6.2	13.80	19.90
T <sub>10</sub>	Shakti	5.87	12.53	19.27
	<b>SEm±</b>	<b>0.14</b>	<b>0.50</b>	<b>0.40</b>
	<b>C.D. at 5% level</b>	<b>0.42</b>	<b>1.48</b>	<b>1.19</b>

At 60 days after sowing, the maximum 14.27, 13.93, 13.80 and 13.73 leaves per plant were recorded in the genotypes Shahiba, Jhilmil, Sonal and No.55 respectively and which were at par with each other. While, the minimum 11.73 leaves per plant was noted in Shan.

As regards to 90 days after sowing, the genotype Shahiba was found significantly superior (21.00) and which was followed by Jhilmil(20.40) and which were at par with each other. Whereas, genotype Shan was observed minimum 17.27 leaves per plant.

#### Number of branches per plant

The average number of branches per plant of successive stages of growth (at 60 and 90 days after sowing), depicted in Table 3.

**Table 3: Number of branches per plant affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Number of branches per plant	
		60 DAS	90 DAS
T <sub>1</sub>	ParbhaniKranti	4.4	7.6
T <sub>2</sub>	ArkaAnamika	5.13	4.8
T <sub>3</sub>	Shahiba	6.67	9.33
T <sub>4</sub>	Shan	4.13	4.2
T <sub>5</sub>	No.55	6.2	8.27
T <sub>6</sub>	Harita	5.4	6.93
T <sub>7</sub>	Jhilmil	6.47	8.53
T <sub>8</sub>	No.64	4.67	7
T <sub>9</sub>	Sonal	6.33	8.4
T <sub>10</sub>	Shakti	5.8	8
	<b>SEm±</b>	<b>0.44</b>	<b>0.49</b>
	<b>C.D. at 5% level</b>	<b>1.33</b>	<b>1.45</b>

The data clearly indicated that the number of branches per plant of okra plants responded significantly to various genotypes at all the growth stages (60 and 90 days after sowing), under study. At 30 days after sowing, all the genotypes exhibited single stem and no any branch occur at 30 days after sowing. At 60 days after sowing, the maximum 6.67, 6.47, 6.33 and 6.2 branches per plant were recorded in the genotypes Shahiba, Jhilmil, Sonal and No.55 respectively and which were at par with each other.

While, the minimum 4.13 branches per plant was noted in Shan. As regards to 90 days after sowing, the genotype Shahiba was found significantly superior (9.33 branches) and which was followed by Jhilmil (8.53 branches), Sonal (8.4 branches) and No.55 (8.27 branches) as compare to rest of the genotypes. Whereas, Shan was observed minimum 4.2 branches per plant.

#### Leaf length per plant (cm)

The data for various genotypes with respect to the leaf length per plant are summarized in Table 4. As regards to 30 days after sowing, the genotype Shahiba was found significantly superior (12.9 cm) and which was followed by Jhilmil (11.6 cm), Sonal (11.5 cm) and No.55 (11.0 cm) as compare to rest of the genotypes. Whereas, Shan was observed minimum 9.7 cm leaf length per plant. As regards to 60 days after sowing, the genotype Shahiba was found significantly superior (17.45 cm) and which was followed by Jhilmil (15.58 cm), Sonal (15.21 cm) and No.55 (14.73 cm) as compare to rest of the genotypes. Whereas, Shan was observed minimum 12.70 cm leaf length per plant.

**Table 4: Leaf length per plant (cm) as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Leaf length per plant (cm)		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	Parbhani Kranti	10.6	14.17	15.43
T <sub>2</sub>	Arka Anamika	9.8	13.40	15.64
T <sub>3</sub>	Shahiba	12.9	17.45	19.15
T <sub>4</sub>	Shan	9.7	12.70	14.04
T <sub>5</sub>	No.55	11.0	14.73	15.89
T <sub>6</sub>	Harita	11.0	13.98	14.44
T <sub>7</sub>	Jhilmil	11.6	15.58	16.76
T <sub>8</sub>	No.64	10.7	14.19	15.35
T <sub>9</sub>	Sonal	11.5	15.21	16.25
T <sub>10</sub>	Shakti	10.8	14.04	15.43
	<b>SEm±</b>	<b>0.15</b>	<b>0.25</b>	<b>0.46</b>
	<b>C.D. at 5% level</b>	<b>0.43</b>	<b>0.76</b>	<b>1.38</b>

As regards to 90 days after sowing, the genotype Shahiba was recorded 19.15 cm leaf length per plant. However, the minimum 14.04 cm leaf length per plant was observed in Shan.

#### Leaf width per plant (cm)

The average leaf width per plant has been shown in Table 5. It is explicit from the perusal of the Table 5 that this character responded significantly to different genotypes. At 30 days after sowing, the maximum 12.43, 11.08 and 10.97 cm leaf width per plant were recorded in the genotypes Shahiba, Jhilmil and Sonal respectively and which were at par with each other. While, the minimum 9.20 cm leaf width per plant was noted in Shan. At 60 days after sowing, the significantly maximum 18.57, 17.67, 17.45 and 17.33 cm leaf width per plant were recorded in the genotypes Shahiba, Jhilmil, Sonal and No.55 respectively and which were at par with each other. While, the minimum 14.97 cm leaf width per plant was noted in Shan.

**Table 5: Leaf width (cm) as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Leaf width (CM)		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	Parbhani Kranti	9.40	17.20	16.85
T <sub>2</sub>	Arka Anamika	9.89	16.99	17.83
T <sub>3</sub>	Shahiba	12.43	18.57	34.34
T <sub>4</sub>	Shan	9.20	14.97	15.51
T <sub>5</sub>	No.55	10.49	17.33	18.01
T <sub>6</sub>	Harita	10.42	16.78	17.69
T <sub>7</sub>	Jhilmil	11.08	17.67	21.74
T <sub>8</sub>	No.64	10.03	15.75	17.15
T <sub>9</sub>	Sonal	10.97	17.45	18.25
T <sub>10</sub>	Shakti	10.21	16.58	17.97
	<b>SEm±</b>	<b>0.14</b>	<b>0.33</b>	<b>0.37</b>
	<b>C.D. at 5% level</b>	<b>0.42</b>	<b>0.97</b>	<b>1.09</b>

As regards to 90 days after sowing, the significantly higher 34.34 cm leaf width per plant was observed in genotype Shahiba which was at par with Jhilmil(21.74cm), Sonal (18.25 cm) and No.55 (18.01 cm). While, the minimum 15.51 cm leaf width per plant was noted in Shan.

#### Leaf area per plant (cm<sup>2</sup>)

The leaf area per plant was recorded and has been presented in Table 6. At 30 days after sowing, the maximum 161.52, 145.44,143.92 and 135.07cm<sup>2</sup> leaf area per plant were recorded in the genotypes Shahiba, Jhilmil, Sonal and No.55 respectively. While, the minimum 85.95 cm<sup>2</sup> leaf area per plant was noted in Shan.

**Table 6:Leaf area per plant(cm<sup>2</sup>)as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Leaf area per plant(cm <sup>2</sup> )		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	ParbhaniKranti	106.52	163.17	185.86
T <sub>2</sub>	ArkaAnamika	133.51	172.41	196.13
T <sub>3</sub>	Shahiba	161.52	198.82	226.90
T <sub>4</sub>	Shan	85.95	160.00	171.81
T <sub>5</sub>	No.55	135.07	173.55	198.68
T <sub>6</sub>	Harita	115.86	164.06	194.98
T <sub>7</sub>	Jhilmil	145.44	196.62	211.06
T <sub>8</sub>	No.64	115.16	161.56	190.17
T <sub>9</sub>	Sonal	143.92	187.07	200.72
T <sub>10</sub>	Shakti	98.96	169.74	197.33
	<b>SEm±</b>	<b>18.54</b>	<b>12.68</b>	<b>12.34</b>
	<b>C.D. at 5% level</b>	<b>55.10</b>	<b>37.67</b>	<b>36.68</b>

At 60 days after sowing. The significantly higher 198.82 cm<sup>2</sup> leaf area per plant was observed under the genotype Shahiba followed by Jhilmil (196.62 cm<sup>2</sup>), Sonal (187.07 cm<sup>2</sup>) and No.55 (173.55 cm<sup>2</sup>) and which were at par with each other. Whereas, the minimum 160.00 cm<sup>2</sup> leaf area per plant was observed in Shan.As case of 90 days after sowing, the genotype Shahiba was found significantly superior (226.90 cm<sup>2</sup>) and which was followed by Jhilmil (211.06 cm<sup>2</sup>) as compare to rest of the genotypes. Whereas, Shan was observed minimum 171.81 cm<sup>2</sup> leaf area per plant.

#### Leaf area index per plant (cm<sup>2</sup>)

The leaf area index per plant was recorded and has been presented in Table 7. At 30 days after sowing, the maximum 161.52, 145.44,143.92 and 135.07 cm<sup>2</sup> leaf area index per plant were recorded in the genotypes Shahiba, Jhilmil, Sonal and No.55 respectively. While, the minimum 85.95 cm<sup>2</sup> leaf area index per plant was noted in Shan.60 days after sowing. The significantly higher 198.82 cm<sup>2</sup> leaf area index per plant was observed under the genotype Shahibafollowed by Jhilmil (196.62 cm<sup>2</sup>), Sonal (187.07 cm<sup>2</sup>) and No.55 (173.55 cm<sup>2</sup>) and which were at par with each other. Whereas, the minimum 160.00 cm<sup>2</sup> leaf area index per plant was observed in Shan.As case of 90 days after sowing, the genotype Shahibawas found significantly superior (226.90 cm<sup>2</sup>) and which was followed by Jhilmil (211.06 cm<sup>2</sup>) as compare to rest of the genotypes. Whereas, Shan was observed minimum 171.81 cm<sup>2</sup> leaf area index per plant.

**Table 7:Leaf area index per plant(cm<sup>2</sup>)as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Leaf area index per plant(cm <sup>2</sup> )		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	ParbhaniKranti	106.52	163.17	185.86
T <sub>2</sub>	ArkaAnamika	133.51	172.41	196.13
T <sub>3</sub>	Shahiba	161.52	198.82	226.90
T <sub>4</sub>	Shan	85.95	160.00	171.81
T <sub>5</sub>	No.55	135.07	173.55	198.68
T <sub>6</sub>	Harita	115.86	164.06	194.98
T <sub>7</sub>	Jhilmil	145.44	196.62	211.06
T <sub>8</sub>	No.64	115.16	161.56	190.17
T <sub>9</sub>	Sonal	143.92	187.07	200.72
T <sub>10</sub>	Shakti	98.96	169.74	197.33
	<b>SEm±</b>	<b>1.10</b>	<b>0.77</b>	<b>0.66</b>
	<b>C.D. at 5% level</b>	<b>3.26</b>	<b>2.28</b>	<b>1.95</b>

**Days to 50% flowering**

The data for various genotypes with respect to the days to 50% flowering are summarized in Table 8. Early 50 per cent flowering 49.33, 47.57 and 46.67 days were observed in genotypes Shahiba, Jhilmil and Sonal respectively and which were at par with each other. Whereas, late 50 percent flowering was recorded Shan (43.67 days).

**Days to first picking**

The average days to first picking has been shown in Table 8. It is explicit from the perusal of the Table 4.7 that this character responded significantly to different genotypes.

**Table 8: Days to 50% flowering, days to first picking and Days to flower opening to fruit picking as affected by different genotypes of okra.**

Treat. Sym.	Genotypes	Days to 50% flowering	Days to first picking	Days to flower opening to fruit picking
T <sub>1</sub>	Parbhani Kranti	46.33	52.00	8
T <sub>2</sub>	Arka Anamika	47.57	52.67	10
T <sub>3</sub>	Shahiba	43.67	49.34	6
T <sub>4</sub>	Shan	49.33	56.33	11
T <sub>5</sub>	No.55	45.00	50.59	9
T <sub>6</sub>	Harita	46.67	52.25	8
T <sub>7</sub>	Jhilmil	44.00	50.67	7
T <sub>8</sub>	No.64	45.00	52.67	9
T <sub>9</sub>	Sonal	44.67	50.55	8
T <sub>10</sub>	Shakti	45.33	53.00	7
	<b>SEM±</b>	<b>0.91</b>	<b>1.13</b>	<b>0.77</b>
	<b>C.D. at 5% level</b>	<b>2.70</b>	<b>3.37</b>	<b>2.29</b>

Significantly maximum days to first picking (11 days) were observed in genotype Shan. While, the minimum days to first picking 49.34, 50.67, 50.55 and 50.59 days were recorded in genotypes Shahiba, Jhilmil, Sonal and No.55 respectively and which were at par with each other.

**10. Days to flower opening to fruit picking .**

The average days to first picking has been shown in Table 8. It is explicit from the perusal of the Table 8. that this character responded significantly to different genotypes. Significantly maximum days to first picking (56.33 days) were observed in genotype Shan. While, the minimum days to first picking 6, 7, 8 and 9 days were recorded in genotypes Shahiba, Jhilmil, Sonal and No.55 respectively and which were at par with each other.

**CONCLUSION**

On the basis of present investigation, it is concluded that the okra genotypes Shahiba and Jhilmil responded well in terms of growth and phenological characters. The plant height increased significantly with the increase in crop growth stages. At 30, 60 and 90 days after sowing, the genotype Shahiba was found significantly superior and which was followed by Jhilmil, Sonal and No.55 as compare to rest of the genotypes. Whereas, the minimum plant height was observed in genotype Shan. The data clearly indicated that the number of leaves per plant of okra plants responded significantly to various genotypes at all the growth stages (30, 60 and 90 days after sowing), under study. At 30, 60 and 90 days after sowing, the genotype Shahiba was found significantly superior and which was followed by Jhilmil and which were at par with each other. Whereas, genotype Shan was observed minimum leaves per plant.

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