



Growth and Yield of Okra (*Abelmoschus esculentus* L) as Affected by Date of Sowing and Spacing under north Gujarat Condition

B R Morwal* and M C Patel

College of Agriculture Sardarkrushinagar, Dantiwada-385 506 (Gujarat)

ABSTRACT

A field experiment was carried out during kharif season of 2010- 11 at Dantiwada Agricultural University, Sardarkrushinagar to study the effect of sowing dates and spacing on growth and yield of okra (*Abelmoschus esculentus* L.) var. Parbhani Kranti. The experiment was laid out in split plot design with three replications and sixteen treatment combinations consisted of four dates of sowing viz., 15th August (D1), 1st September (D2), 15th September (D3) and 1st October (D4) and four plant spacing 30 cm X 30 cm (S1), 45 cm X 30 cm (S2), 45 cm X 45 cm (S3) and 60 cm X 30 cm (S4). The growth and yield attributes like plant height (cm), stem girth, leaf area index, average length of internodes, flower parameters, number of fruits per plant and fruit yield per hectare were significantly higher under sowing on 15th August with plant spacing 30 cm X 30 cm (S1) but fruit yield per plant was significantly higher on 15th August at 45 cm x 45 cm.

Key Words: Fruit yield, Okra, Sowing dates, Spacing.

INTRODUCTION

Okra [*Abelmoschus esculentus* (L.) Moench.] belong to the family Malvaceae is one of the important vegetable crops of subtropical and tropical regions of India. Among agronomic factors, known to augment crop yield, the sowing dates and plant spacing are considered to be the most productive inputs. The sowing date is known to influence the performance of genotypes due to interaction with weather conditions that prevail at different period of growth. Birbal *et al* (1995) observed that okra cv. Varsha Uphar was found tallest and maximum number of fruits per plant under closer spacing whereas, number of pods and pod weight per plant was found highest at wider spacing. Thus, to get highest yield and good quality green fruit, okra is required to be sown at optimum plant spacing. With regard to okra cultivation optimum number of plant per unit area is required to utilize efficiently the available production factors such as water, nutrients, light and CO₂. The growth and yield of okra are greatly influenced by sowing dates and plant spacing. Hence, a field experiment was

conducted to study the effect of sowing dates and spacing on growth and yield of okra under north Gujarat conditions.

MATERIALS AND METHODS

The experiment was conducted at the Sardarkrushinagar located at 72.190 East longitudes and 24.190 North latitude during kharif season of 2010-11. The experiment was laid out in split plot design with three replications and sixteen treatment combinations consisted of four dates of sowing viz., 15th August (D1), 1st September (D2), 15th September (D3) and 1st October (D4) and four plant spacing 30 cm X 30 cm (S1), 45 cm X 30 cm (S2), 45 cm X 45 cm (S3) and 60 cm X 30 cm (S4). It is mentioned that for this region, the recommended optimum sowing time for okra was June-July at plant spacing of 45 cm x30 cm with seed rate of 10 kg/ha. in rainy season. In the experiment, well rotted farm yard manure @ 20 t/ha was incorporated 20 d before sowing. The fertilizers were applied as per the treatments. The recommended dose of fertilizers 80-50-50 NPK kg/

Corresponding Author's Email: morwalhorti@gmail.com

ha applied equally to all treatments. Observations, with respect to vegetative growth and fruit yield characters were recorded. Five plants were selected randomly from each plot for immature fruit yield, plant height, stem girth, leaf area index (LAI) and average length of internodes, days taken to flower initiation and number of fruit per plant, fruit yield per plant and yield per hectare.

RESULTS AND DISCUSSION

Effect of sowing date

Growth yield parameters of okra such as plant height stem girth (cm), leaf area index (LAI) at 30, 60, and 90 DAS and average length of internodes (cm) at 60 DAS days taken to flower initiation (days) and viz., number of fruits per plant, fruit yield per plant and fruit yield per hectare were significantly affected by sowing dates. The data (Table 1) indicated that highest plant height (20.82, 68.72 and 96.40 cm), stem girth (1.82, 4.71 and 6.67 cm), leaf area index (LAI) 0.23, 0.76 1.34 respectively at 30,60 and 90 DAS, average length of internodes/plant (6.09 cm), minimum days taken to flower initiation (36.23 d) and maximum number of fruits/plant 23.03, fruit yield/plant (0.16 kg), and fruit yield (94.54 q/ha) okra were observed in treatment D1 whereas, lowest plant height (12.83, 38.16 and 39.67 cm), stem girth (1.34, 3.65 and 5.07 cm), leaf area index (LAI) 0.15, 0.51 and 0.41 respectively at 30,60 and 90 DAS, average length of internodes/plant (4.75 cm) and maximum days taken to flower initiation (44.95 d) were observed in treatment D4. This might have resulted due to the maintenance of optimum plant population and favorable weather conditions during plant vegetative growth and development. Similar results were reported by Bajpai *et al* (2004), Hussain *et al* (2006) and Firoz *et al* (2008) in okra.

Effect of different spacing

Plant geometry i.e. 30 cm X 30 cm (S1), 45 cm X 30 cm (S2), 45 cm X 45 cm (S3) and 60 cm X 30 cm (S4) significantly influenced the different

growth attributes (Table 1) Maximum plant height (cm) and Leaf area index at 30, 60 and 90 DAS (17.95cm, 63.43 cm and 76.80 cm) and (0.29, 0.98 and 1.18) were recorded, respectively, when crop was sown at 30 cm x 30 cm spacing .However, maximum stem girth (1.89, 4.20 and 6.23 cm) were observed in crop sown at 45 cm x 45 cm at 30, 60 and 90 DAS, respectively and maximum average length of internodes/plant (5.92 cm) at 60 DAS, in crop sown at 30 cm x 30 cm plant spacing. Plant behavior observed under closer plant spacing was in close conformity with the findings of Soni *et al* (2006).

Yield character

It was observed that yield characters of okra such as number of fruit/plant, fruit yield/plant (kg) and fruit yield (t/ha) were significantly affected by plant spacing (Table 2). The maximum number of fruit/plant (21.60) and fruit yield (12.72 q/ha) were recorded with closer plant spacing at 30 cm X 30 cm (S1) whereas, minimum number of fruit/plant (17.08) and fruit yield (3.32 q/ha) were recorded at wider plant spacing of 60 cm x 45 cm (S4) and maximum fruit yield/plant (0.15 kg) was recorded with plant spacing i.e. 45 cm X 45 cm (S3) but minimum fruit yield/ plant (0.11kg) were recorded with closer plant spacing i.e. 30 cm X 30 cm (S1). This might be due to the plant grown at wider spacing comparatively received more nutrition and light for vegetative growth and development crop but number of fruit per plant and fruit yield per hectare might have helped for more vegetative growth and development of crop. Similar results were reported by Poonam *et al* (2006), Soni *et al* (2006).Bharad *et al* (2006) and Moniruzzaman *et al* (2007).

CONCLUSION

From the experimentation, it can be concluded that for securing higher yield okra should be sown on 15th August (D1) with (S1) 30 cm X 30 cm plant spacing in North Gujarat Agro - climatic conditions.

Table 1: Effect of sowing dates and spacing on plant growth attributes of kharif okra

Treatment	Plant height			Stem girth (cm)			Leaf area index			Average length of internodes/plant (cm)
	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	60 DAS
D1 (15th August)	20.82	68.72	96.40	1.82	4.71	6.67	0.23	0.76	1.34	6.09
D2 (1st September)	16.00	63.28	81.18	1.66	3.84	5.74	0.20	0.66	1.11	5.44
D3 (15th September)	14.39	52.12	62.79	1.58	3.65	5.07	0.17	0.59	0.93	5.36
D4 (1st October)	12.83	38.16	39.67	1.34	3.18	4.51	0.15	0.51	0.41	4.75
S.Em.±	0.43	1.48	1.66	0.04	0.10	0.16	0.01	0.02	0.03	0.15
C.D. at 5%	1.50	5.12	5.73	0.15	0.34	0.57	0.02	0.06	0.11	0.51
Spacing(S)										
S1 (30cm x30cm)	17.95	63.43	76.80	1.61	3.88	5.70	0.29	0.98	1.18	5.92
S2 (45cm x 30cm)	16.44	57.86	73.38	1.56	3.80	5.26	0.21	0.70	1.04	5.50
S3 (45cm x 45cm)	15.82	52.99	66.75	1.89	4.20	6.23	0.15	0.49	0.83	5.34
S4 (60cm x45cm)	13.81	48.00	62.62	1.34	3.49	4.79	0.11	0.36	0.74	4.88
S.Em±	0.42	1.45	1.49	0.06	0.10	0.14	0.01	0.02	0.03	0.13
C.D. at 5%	1.21	4.21	4.34	0.18	0.29	0.41	0.02	0.05	0.08	0.39
Interaction										
S.Em±	0.83	2.89	2.99	0.12	0.20	0.28	0.01	0.03	0.05	0.27
C.D. at 5%	NS	NS	NS	NS	NS	NS	0.03	0.10	0.15	NS
C.V. %	9.01	9.01	7.39	13.26	8.85	8.86	9.53	9.35	9.54	8.50

Table 2. Effect of sowing dates and spacing on fruit yield (kg/ plot) and fruit yield (t/ha) in kharif okra.

Treatment	Number of fruits per plant	Yield of fruits per plant (kg)	Fruit yield (t ha-1)
Date of Sowing			
D1 (15th August)	23.03	0.16	9.45
D2 (1st September)	21.08	0.13	8.25
D3 (15th September)	17.54	0.13	7.61
D4 (1st October)	15.38	0.10	6.71
S.Em.±	0.53	0.00	0.34
C.D. at 5%	1.84	0.02	1.17
C.V. %	9.60	13.09	1.47
Spacing			
S1 (30cm x30cm)	21.60	0.11	12.72
S2 (45cm x 30cm)	19.80	0.13	9.10
S3 (45cm x 45cm)	18.54	0.15	6.91
S4 (60cm x45cm)	17.08	0.13	3.32
S.Em.±	0.46	0.00	0.18
C.D. at 5%	1.33	0.01	0.53
Interaction (D x S)			
S.Em. ±	0.91	0.01	3.63
C.D. at 5%	NS	NS	10.57
C.V. %	8.22	9.68	7.85

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