

Hybrid Evaluation Trial in Bottle Gourd *Lagenaria siceraria* (Molina) Standl.

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Abstract

The present investigation was conducted during 2006-2007. The experimental design was simple randomized block design consisting of five hybrids and one open pollinated variety with three replications. The observations were recorded on days to first male flower anthesis, days to first female flower anthesis, node number of first male flower appearance, node number to first female flower appearance, days to first harvest, fruit length (cm), fruit diameter (cm), Pulp thickness (cm), fruit weight (kg), number of fruits per plant, fruit yield (q/ha), fruit shape and fruit color. Among all the hybrids, Vikrant, that is (T₄) was found to be superior to the others in terms of fruit length, diameter, weight, yield and also noted maximum net return per hectare cost : benefit ratio.

Key words : Hybrid evaluation, Bottle gourd.

Vegetables play an important role in the balance diet by providing not only energy but also supplying vital protective nutrients either minerals or vitamins. Summer season vegetables like cucurbits are the largest group and extensively grown in tropical, sub-tropical and milder zones of India. Bottle gourd *Lagenaria siceraria* (Molina) Standl is an important cucurbitaceous crop, which thrives well in warm and humid climate, but it can be grown throughout the year in northern Indian plains as off-season vegetable. The young and tender fruits of bottle gourd are mostly used as vegetable preparations. However, the delicious preparations like burfee, rayata, halwa, pathe are also common. India is considered to be secondary centre of diversity for bottle gourd. It exhibits a great range of variability with respect to its morphological traits, maturity period and fruit yield potential. Eastern Uttar Pradesh is one of the rich zones exhibiting diversity of bottle gourd. Since this area remains frost free, bottle gourd cultivation round the year is a common practice, although during winter it is mainly grown on thatches, huts and roof-tops. Thus, this region also exhibits genetic diversity with respect to cool season adaptability. The cultivation of bottle gourd mainly depends on local varieties and land races in eastern Uttar Pradesh. Kumar (1) and Tiwari (2) observed marginal level of yield heterosis, ex-

pressed by the highest yielding F¹ hybrids over the top yielding parent included in their study, in main summer season. The proper evaluation of hybrid is essential for understanding the potentiality of hybrids for large area production under the Allahabad agro-climatic conditions. The present study was therefore planned to find out the most suitable hybrids of bottle gourd under Allahabad Agro-climatic conditions for better growth, yield and economics for the cultivation.

Methods

The field experiment was conducted in Horticulture Department, Allahabad Agricultural Institute-Deemed University, Allahabad, Uttar Pradesh during the *kharif* season of 2006. The source of bottle gourd hybrids/variety are given of the following nomenclature :

Treat-ments	Variety	Source
T ₀	Pusa Summer Prolific Long (Open pollinated variety)	IARI, New Delhi
T ₁	Narendra hybrid-4 (Hybrid)	NDUAT Faizabad
T ₂	Pratima (hybrid)	Sungro seeds
T ₃	Suraiyya (hybrid)	Choice seeds
T ₄	Vikrant (hybrid)	Ankur seeds
T ₅	Warad (hybrid)	Mahyco seeds

Table 1. Performance of different hybrids on yield and yield attributing traits of bottle gourd *Lagenaria Siceraria* (Malina) Standl.

Hybrids	Days to first flower anthesis		Number of nodes to first flower appearance		Days to first harvest	Fruit length (cm)	Fruit diameter (cm)	Number of fruits per plants	Fruit weight (kg)	Pulp thickness (cm)	Fruit yield (q/ha)
	Male	Female	Male	Female							
T ₀	47.93	48.27	9.54	12.54	58.74	52.53	7.22	7.27	1.08	8.03	347.71
T ₁	49.91	50.88	9.70	11.17	60.79	49.51	6.20	8.32	0.84	6.09	309.02
T ₂	47.32	51.05	11.50	12.85	60.71	46.35	6.14	11.57	0.66	7.67	340.44
T ₃	51.52	53.32	12.96	13.68	64.44	50.91	6.40	9.55	1.25	5.75	530.18
T ₄	49.02	51.23	11.06	12.30	63.15	53.95	5.38	9.56	1.42	4.51	602.79
T ₅	50.03	51.10	13.80	13.55	61.04	46.96	6.07	11.91	0.99	6.63	521.76
F-test	S	S	S	S	S	S	S	S	S	S	S
SE (±)	0.24	0.08	0.17	0.10	0.35	0.27	0.03	0.14	0.05	0.10	22.29
CD (P=0.05)	0.53	0.19	0.38	0.21	0.78	0.59	0.07	0.32	0.11	0.22	49.67

The layout of the experiment was conducted in a simple randomized block design with three replications. The crop was sown at a spacing of 1.5 × 1.5m between row to row and plant to plant, in 2 × 2 m plot accommodating 4m² of four plants for all varieties per replication. Total length and breadth of the experimental field was 14.10 m and 9.60 m respectively. All the recommended agronomic practices of the crop were followed for the individual variety/hybrid per plot. From each plot, three plants were randomly selected and their observations were recorded for morphological character at successive stages of growth. The plants were trained on pandal system, which was prepared with the help of angle iron wire and rope. Three plants per plot per replication for each variety/hybrids were selected randomly to access the growth and yield parameters viz., days to first male flower anthesis, days to first female flower anthesis, node number to first male flower appearance, node number to first female flower appearance, days to first harvest, fruit length (cm), fruit diameter (cm), Pulp thickness (cm) fruit weight (kg), number of fruits per plant, fruit yield (q/ha). Average data were statistically analyzed following phanse and Sukhatme (3). The maximum net return per hectare with highest cost : benefit ratio was calculated as :

Net return = Gross return—cost of cultivation

$$\text{Input-Output ratio} = \frac{\text{Gross return (Rs/ha)}}{\text{Cost of cultivation (Rs/ha)}}$$

Results and Discussion

Significant differences for all the growth and yield parameters were noted amongst the five hybrids and one open pollinated variety. Days to first male flower anthesis varied from 47.32 to 51.52 days (Table 1). Maximum days (51.52) required to first male flower anthesis was observed in hybrid Suraiyya followed by Warad (50.03), Narendra Hybrid-4 (49.91), while minimum days (47.32) recorded in Pratima (47.32). Days to first female flower anthesis varied from 48.27 to 53.32 days. Maximum days (53.32) required to first female flower anthesis was recorded in case of hybrid Suraiyya followed by Vikrant (51.23), Warad (51.10) and minimum days (48.27) in Pusa Sammar prolific long. Similar results were reported by Mangal et al. (4), Ramchandran et al. (5) and Mohanty et al. (6).

All the hybrids showed significant difference for number of nodes to first male and female flower appearance. First male and female flowers appearance varied from 9.54 to 13.80 days and 11.17 to 13.68 days respectively. The hybrid Warad (13.80) revealed maximum number of nodes to first male flower appearance while Suraiyya recorded for first female flower appearances. Similar results on first male and female flowers appearance were reported by Singh et al. (7), Ram et al. (8), Kumar et al. (9) respectively. All the hybrids showed significant difference for days to first harvest (Table 1) varied from 58.74 to 64.44 days. The hybrid Suraiyya took maximum days (64.44) to first harvest followed by Vikrant (63.15), Warad (61.04) and minimum days (58.74) in Pusa Summer prolific long.

Table 2. Economics of different hybrids.

	Varieties/Hybrid	Yield/ha (tonnes)	Rate tonnes (Rs)	Gross return (Rs)	Total cost of cultivation (Rs)	Net return (Rs)	Cost : benefit ratio
T ₀	Pusa prolific long	34.77	4000.00	139080	91247.22	47832.78	1 : 1.52
T ₁	Narendra Hybrid-4	30.90	4000.00	123600	94047.22	29552.78	1 : 1.31
T ₂	Pratima	34.04	4000.00	136160	93784.22	42375.78	1 : 1.45
T ₃	Surraiyya	50.01	4000.00	200040	93872.22	106167.78	1 : 2.13
T ₄	Vikrant	60.27	4000.00	241080	93557.22	147522.78	1 : 2.57
T ₅	Warad	52.17	4000.00	208680	93522.22	115157.78	1 : 2.23

All the hybrids showed significant difference for fruit length and diameter. Fruit length and diameter varied from 46.35 to 53.95 cm and 5.38 to 7.22 cm respectively. Maximum fruit length (53.95 cm) was recorded for hybrid Vikrant followed by Pusa Summer prolific long (52.53 cm), Suraiyya (50.91 cm) and minimum fruit length (46.35 cm) in Pratima hybrid. Maximum fruit diameter (7.22 cm) revealed maximum in Pusa Summer prolific long followed by Hybrid Suraiyya (6.40 cm), Narendra Hybrid-4 (6.20 cm).

Number of fruits per plant varied from 7.27 to 11.91 fruits per plant. The hybrid Warad was statistically differences with all the hybrids for number of fruits per plant. Minimum number of fruits per plant (7.27) observed in Pusa Summer prolific long. Similar results were reported by Tyagi et al. (10), Kanwar et al. Singh et al. (11) and Ramchandra et al. (5). All the hybrids showed significant difference for fruit weight (kg) varied from 0.66 to 1.42 kg. The hybrid Vikrant recorded maximum fruit weight (1.42 kg) followed by Suraiyya (1.25 kg), Pusa Summer prolific long (1.08 kg) and minimum weight (0.66 kg) in Pratima Hybrid. Similar results were reported by Singh et al. (7), Kumar et al. (9), Indiresht et al. (12) and Rana et al. (13).

Pulp thickness (cm) varied from 4.51 cm to 8.03 cm. Maximum thickness (8.03 cm) was received in Pusa Summer prolific long followed by Hybrid Pratima (7.67 cm), Hybrid warad (6.36 cm) and minimum pulp thickness (4.51 cm) in Vikrant Hybrid. Similar results were reported by Vijay (14) and Kanwar et al. (15).

Table 1 shows significant difference for fruit yield (q/ha) of hybrid Vikranta maintained its maximum value (602.79 q/ha) due to higher performances in the parameters like fruit length, diameter and fruit weight (kg). Narendra Hybrid-4 noticed minimum yield (309.02 q/ha) and it was statistically at par with the hybrid Pratima and Pusa summer Prolific Long. Fruit yield (q/

ha) varied from 309.02 q/ha to 602.79 q/ha yield. The results are close agreement of Krevacenko et al. (16) and Panwar et al. (17).

The economics of the bottle gourd hybrids calculated by the summed cost for all the agronomical practices, protection measures and land rent including labor and farm machinery. Generally cost of cultivation for all the hybrids are similar (Rs 93, 872.22 per hectare). Total yield of particular hybrid multiplied with wholesale price of the bottle gourd at a time. The total cost of cultivation subtracted to total income, all the middleman margin and market charges was subtracted to total income for determining the net income (Table 2).

The maximum net income per hectare was obtained by the Hybrid Vikrant (Rs 147, 522.78) and followed by the Hybrid Warad (Rs 115,157.78). The minimum net income per hectare was obtained by Hybrid, Narendra Hybrid-2 (Rs 29,552.78). Among the different hybrids and one open pollinated variety, the Hybrid had a highest cost : benefit ratio (1 : 2.57) followed by Hybrid Warad (1 : 2.23) and the lowest cost : benefit ratio was showed by the Hybrid Narendra Hybrid-4 (1 : 1.31). Therefore, the hybrid Vikrant i.e., (T₄) of Bottle gourd could be commercially cultivated in Allahabad Agro-climatic conditions for better growth, yield and maximum net return per hectare with highest cost : benefit ratio.

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