Vegetable Science (2023) 50(2): 316-321
doi: 10.61180/vegsci.2023.v50.i2.08
ISSN- 0970-6585 (Print), ISSN- 2455-7552 (Online)
www.isvsvegsci.in

RESEARCH PAPER

Economic analysis of hybrids vis-à-vis HYVs of okra and bottle guard in Haryana

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Abstract

The economic analysis of hybrid vis-à-vis high-yielding varieties of vegetables (okra and bottle guard) in Haryana was conducted in Nuh (Mewat) and Panipat districts of Haryana. From each district, 40 farmers and a total 80 vegetable growers interacted to extract relevant information pertaining to inputs used, expenses incurred, and output attained during 2022-23. The results of the present study revealed that overall the cost of cultivation of okra hybrid and HYVs was Rs. 211978 and Rs. 184824 ha^{-1}, respectively. Similarly, overall the cost of cultivation of bottle gourd hybrid and HYVs was Rs. 162541 and Rs. 155520 ha^{-1}, respectively. The overall net return from okra and bottle guard hybrids was higher as compared to HYVs. The BC ratio of okra hybrid and HYVs was 1.45 and 1.24, respectively whereas; it was 1.44 and 1.20, respectively for bottle gourd hybrid and HYVs. Seed and sowing were the main items of saving in both HYVs as compared to the hybrid of both crops. But there was a yield penalty of 18.93 and 20.46% in okra and bottle gourd HYVs, respectively.

Keywords: Hybrid, High-yielding variety, Vegetable, Benefit-cost ratio.

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Citation: Sumit., Pawar, N. and Malik, D.P. (2023). Economic analysis of hybrids vis-à-vis HYVs of okra and bottle guard in Haryana. Vegetable Science 50(2): 316-321.

Source of support: Nil

Conflict of interest: None.

Received: 27/09/2023 **Revised:** 29/12/2023 **Accepted:** 30/12/2023

Introduction

Vegetable cultivation offers a promising economic opportunity for reducing rural poverty and surplus unemployment in developing countries like India and considered as key component of farm diversification strategies. Vegetables are mankind's most affordable source of vitamins and minerals required for human health. Increased availability and adoption of improved varieties or hybrids have been recognized as a plausible solution for enhancing the productivity level of vegetables. Commensurate with this view, an increasing trend in the adoption of hybrid seed technology in vegetables like tomato (40.00%), cabbage (68.60%), brinjal (82.00%) and okra (10.00%) has been witnessed during the past two decades (Sudha *et al*., 2006). This technology, though capital-intensive, has improved the profitability of farmers through better productivity. But the increased adoption of technology also warrants increased availability of hybrid seeds to the farmers. Seed production in vegetables, especially hybrids, though a specialized skilled activity has been transformed into a commercial economic activity by the Private Seed Companies way back in the late seventies and was largely undertaken on the farmers' fields. This could be measured a spillover effect of technological advancement in view of the agro-climatic suitability of a specific area, besides the availability of other resource endowments. Okra (*Abelmoschus esculentus* (L) Moench) is one of the world's oldest cultivated crops believed to have originated from India, Pakistan, Burma (Zeven and

Zhukovsky, 1975) and Africa (Thomson and Kelly, 1979), and it still remains the most important vegetable grown in the tropical region (Singh *et al*., 2023). The special taste and nutritional value of this crop has attracted more attention in some tropical and subtropical parts of the world (Kochhar, 1986). In India, okra occupied an area of 5.55 lakh ha with a production of 68.19 lakh tonnes (Agricultural Statistics at a Glance 2022). In Haryana, okra occupied an area of 0.12 lakh ha with a production of 1.01 lakh tonnes (Hort Haryana, 2022-23). Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] also called white-flowered gourd or calabash gourd, running or climbing vine of the gourd family (cucurbitaceous), native to tropical Africa but cultivated in warm climates around the world for its ornamental and useful hard-shelled fruits. It is grown extensively during spring-summer and rainy season in north India. The leading bottle gourd growing states are Utter Pradesh, Punjab, Haryana, Gujarat, Assam, Meghalaya and Rajasthan. In India, Bottle gourd occupied an area of 1.95 lakh ha with a production of 32.38 lakh tonnes (Agricultural Statistics at a Glance 2022). In Haryana, Bottle gourd occupied an area of 0.21 lakh ha with a production of 2.84 lakh tonnes (Hort Haryana, 2022–23). The young fruits are edible and are usually cooked as a vegetable. The mature gourds are made into water bottles, dippers, spoons, pipes, and many other utensils and containers; they can also be fashioned into birdhouses, fancy ornaments, lamps, and musical instruments. Additionally, the vine's showy white flowers and dense foliage make it a popular screen and ornamental plant.

Methodology

The present study was conducted in Nuh (Mewat) and Panipat districts of Haryana because both the districts occupied highest area under okra and bottle gourd vegetables. The total area under vegetable cultivation was 343264 hectare and production was 5350803 MT in Haryana. The percentage share of okra in total vegetable cultivation was 3.47% whereas bottle gourd was 6.29% (Hort Haryana, 2022-23). A purposive multistage sampling technique was used to 80 farmers from Nuh (40) and Panipat (40) districts. The selected farmers were further divided into okra (20) and bottle gourd (20) growers. After that, 20 farmers of okra were divided into two groups (10 from okra hybrid and 10 from okra HYVs and 10 farmers of bottle gourd hybrid and 10 of bottle gourd HYVs). Primary data were gathered from 80 farmers through personal contact with the help of a well-defined interview schedule. Data were analyzed using percentage, benefit-cost (B:C) ratio and partial budget analysis techniques to draw meaningful inferences.

Results and Discussion

Cost and returns of hybrids and HYVs of okra

The cost of cultivation of okra hybrid in Panipat and Nuh districts was Rs. 218638 and Rs. 205319 ha^{-1}, respectively (Table 1). The total variable cost was Rs. 126302 and Rs.124632 ha^{-1} in Panipat and Nuh districts, respectively. Expenditure on seed and sowing, picking, plant protection, manure and chemical fertilizers, field preparation and irrigation were the key components of total variable cost. The expenditure incurred on seed and sowing was found highest (17.39 and 18.19%) followed by picking (14.56 and 15.31%) and plant protection (7.26 and 7.70%) in Panipat and Nuh districts, respectively. Similarly, the rental value of land was the major component of fixed cost, which was shared for Rs. 62250 and Rs. 51286 ha^{-1} followed by management and risk factor was Rs. 25260 and Rs. 24926 ha^{-1} in Panipat and Nuh districts, respectively. The gross return of okra hybrid in Panipat and Nuh districts was Rs. 317232 and 295674 ha^{-1} and the net return was Rs. 98594 and Rs. 90355 ha^{-1} per hectare, respectively. The B-C ratio in Panipat and Nuh district was 1.45 and 1.44, respectively. Similar results were also reported by Sivakumar *et al*. (2020).

Similarly, cost of cultivation of okra (HYVs) in Panipat and Nuh districts was Rs. 190082 and Rs. 179567 ha^{-1}, respectively. The total variable cost was Rs. 103995 and Rs.103503 ha^{-1} in Panipat and Nuh districts, respectively. Expenditure on picking, plant protection, seed and sowing, manure and fertilizers, irrigation and field preparation were the important components of total variable cost. The expenditure incurred on the picking was the highest workout (16.32 and 17.12%) followed by plant protection (8.43 and 8.81%), seed and sowing (7.87 and 8.24%) and manure and chemical fertilizers (6.93 and 8.05%) in Panipat and Nuh districts, respectively. Similarly, the rental value of land and management and risk factors were the major items of fixed cost, which constituted Rs. 60750, Rs. 20799, Rs. 51250, and Rs. 20701 ha^{-1} in Panipat and Nuh districts, respectively. The gross return of okra (HYVs) in Panipat and Nuh districts was Rs. 238000 and 221913 ha^{-1} and the net return was Rs. 47918 and Rs. 42346 ha^{-1}, respectively. The B-C ratio in Panipat and Nuh district was 1.25 and 1.24, respectively. Similar results were also reported by Jangde *et al*. (2019)

Overall per hectare cost of cultivation of okra hybrid and HYVs was Rs. 211978 and Rs. 184824 ha^{-1}, respectively. The total variable cost was Rs. 125467 and Rs.103749 ha^{-1}, respectively. In okra hybrid, the expenditure incurred on seed and sowing was highest (17.78%) because per kilogram cost of the hybrid seeds is higher as compared to HYVs and the seeds of hybrid varieties cannot be sown next year. This was followed by picking (14.92%), plant protection (7.47%) and manure and chemical fertilizers (6.03%). Similarly, the rental value of land and management and risk factors were the major constituents of fixed cost accounting Rs. 56768 and Rs. 25093 ha^{-1}, respectively. The gross and net returns of okra hybrid was Rs. 306453 and Rs. 94475 ha^{-1}, respectively. Similarly, in okra HYVs the expenditure incurred on the picking was the highest (16.71%) tracked by plant protection (8.61%), seed and sowing (8.05%) and manure

Table 1: Cost structure and returns of varietal cultivation of okra in Haryana (Rs. ha^{-1})

S. No.	Particulars	Panipat district		Nuh district		Overall		Saving (%)
		Hybrid	HYV	Hybrid	HYV	Hybrid	HYV	
1.	Field Preparation	12125 (5.55)	12163 (6.40)	11113 (5.41)	11150 (6.21)	11619 (5.48)	11657 (6.31)	-0.32
2.	Seed (kg) and sowing	38025 (17.39)	14960 (7.87)	37350 (18.19)	14800 (8.24)	37688 (17.78)	14880 (8.05)	60.52
3.	Manure and chemical fertilizers	12630 (5.78)	13180 (6.93)	12916 (6.29)	14452 (8.05)	12773 (6.03)	13816 (7.48)	-8.17
4.	Irrigation	11550 (5.28)	13125 (6.90)	11813 (5.75)	13038 (7.26)	11682 (5.51)	13082 (7.08)	-11.98
5.	Plant protection (Weeds, insect pests and diseases)	15863 (7.26)	16025 (8.43)	15800 (7.70)	15813 (8.81)	15832 (7.47)	15919 (8.61)	-0.55
6.	Picking	31838 (14.56)	31025 (16.32)	31425 (15.31)	30750 (17.12)	31632 (14.92)	30888 (16.71)	2.35
	Total (1 to 6)	122031 (55.81)	100478 (52.86)	120417 (58.65)	100003 (55.69)	121224 (57.19)	100241 (54.24)	17.31
7.	Interest on working Capital	4271 (1.95)	3517 (1.85)	4215 (2.05)	3500 (1.95)	4243 (2.00)	3508 (1.90)	17.31
8.	Variable cost	126302 (57.77)	103995 (54.71)	124632 (60.70)	103503 (57.64)	125467 (59.19)	103749 (56.13)	17.31
9.	Management and risk factor	25260 (11.55)	20799 (10.94)	24926 (12.14)	20701 (11.53)	25093 (11.84)	20750 (11.23)	17.31
10.	Transportation	4825 (2.21)	4538 (2.39)	4475 (2.18)	4113 (2.29)	4650 (2.19)	4326 (2.34)	6.98
11.	Rental value of land	62250 (28.47)	60750 (31.96)	51286 (24.98)	51250 (28.54)	56768 (26.78)	56000 (30.30)	1.35
12.	Total Cost	218638 (100.00)	190082 (100.00)	205319 (100.00)	179567 (100.00)	211978 (100.00)	184824 (100.00)	12.81
13.	Gross returns	317232 233.8*	238000 190.4*	295674 230.0*	221913 185.6*	306453 231.9*	229956 188.0*	-18.93
14.	Return over variable cost	190929	134005	171043	118410	180986	126207	
15.	Net return	98594	47918	90355	42346	94475	45132	
16.	Cost of production (Rs./kg)	9.35	9.98	8.93	9.67	9.14	9.83	
17.	B: C	1.45	1.25	1.44	1.24	1.45	1.24	

Note: * Yield quintal per hectare

and chemical fertilizers (7.48%). The rental value of land and management and risk factors were the major components of fixed cost-sharing Rs. 56000 and Rs. 20750 ha^{-1}, respectively. The gross and net returns of okra HYVs was Rs. 229956 and Rs. 45132 ha^{-1}, respectively. Considering the total cost and total variable cost in the cultivation of okra HYVs, there was savings of 12.81 and 17.31% as compared to okra hybrid. Seed and sowing (60.52%) was the major item of saving in okra HYVs as compared to okra hybrid. While there was 18.93% yield loss in okra HYVs. Similar results were also reported by Tegar (2019); and Kant and Singh (2023).

Cost and returns of hybrids and HYVs of bottle gourd

The cost of cultivation of bottle gourd hybrid in Panipat and Nuh districts was Rs. 167439 and Rs. 157643 ha^{-1}, respectively (Table 2). Total variable cost was Rs. 82719 and Rs. 82044 ha^{-1} in Panipat and Nuh districts, respectively. Expenditure on picking, plant protection, field preparation, manure and chemical fertilizers and seed and sowing were the important parts of the total variable cost. The expenditure incurred on the plucking was highest (14.83 and 15.73%) trailed by plant protection (11.03 and 11.43%) and field preparation (6.61 and 6.84%) in Panipat and Nuh districts, respectively.

Table 2: Cost structure and returns of varietal cultivation of bottle gourd in Haryana (Rs. ha^{-1})

S. No.	Particulars	Panipat district		Nuh district		Overall		Saving (%)
		Hybrid	HYV	Hybrid	HYV	Hybrid	HYV	
1	Field Preparation	11075 (6.61)	11025 (6.87)	10788 (6.84)	10865 (7.21)	10932 (6.73)	10945 (7.04)	-0.12
2	Seed (kg.) and sowing	9825 (5.87)	5021 (3.13)	10163 (6.45)	5125 (3.40)	9994 (6.15)	5073 (3.26)	49.24
3	Manure and chemical fertilizers	10363 (6.19)	10279 (6.41)	10038 (6.37)	10160 (6.75)	10201 (6.28)	10220 (6.57)	-0.19
4	Irrigation	5346 (3.19)	5508 (3.43)	5468 (3.47)	5427 (3.60)	5407 (3.33)	5468 (3.52)	-1.12
5	Plant protection (Weeds, insect pests and diseases)	18475 (11.03)	18125 (11.30)	18013 (11.43)	17938 (11.91)	18244 (11.22)	18032 (11.59)	1.16
6	Plucking or picking check which one is appropriate word	24838 (14.83)	24813 (15.47)	24800 (15.73)	24825 (16.48)	24819 (15.27)	24819 (15.96)	0.00
	Total (1 to 6)	79922 (47.73)	74771 (46.61)	79269.5 (50.28)	74340 (49.36)	79596 (48.97)	74556 (47.94)	6.33
7	Interest on working Capital	2797 (1.67)	2617 (1.63)	2774 (1.76)	2602 (1.73)	2786 (1.71)	2609 (1.68)	6.33
8	Variable cost	82719 (49.40)	77388 (48.24)	82044 (52.04)	76942 (51.08)	82382 (50.68)	77165 (49.62)	6.33
9	Management and risk factor	16544 (9.88)	15478 (9.65)	16409 (10.41)	15388 (10.22)	16476 (10.14)	15433 (9.92)	6.33
10	Transportation	6750 (4.03)	6680 (4.16)	7015 (4.45)	6865 (4.56)	6883 (4.23)	6773 (4.35)	1.60
11	Rental value of land	61426 (36.69)	60875 (37.95)	52175 (33.10)	51425 (34.14)	56801 (34.95)	56150 (36.10)	1.15
12	Total Cost	167439 (100.00)	160421 (100.00)	157643 (100.00)	150620 (100.00)	162541 (100.00)	155520 (100.00)	4.32
13	Gross returns	237996 360.6*	191070 289.5*	230142 348.7*	181302 274.7*	234069 354.7*	186186 282.1*	-20.46
14	Return over variable cost	155277	113682	148098	104360	151687	109021	
15	Net return	70557	30649	72499	30682	71528	30666	
16	Cost of production (Rs./kg)	4.64	5.54	4.52	5.48	4.58	5.51	
17	BC ratio	1.42	1.19	1.46	1.20	1.44	1.20	

Note: *Yield quintal per hectare

Similarly, the rental value of land and management and risk factors were the major segments of fixed cost, accounting Rs. 61426, Rs. 16544, and 52175 and Rs. 16409 ha^{-1} in Panipat and Nuh districts, respectively. The gross return of bottle gourd hybrid in Panipat and Nuh districts was Rs. 237996 and 230142 ha^{-1} and the net return was Rs. 70557 and Rs. 72499 ha^{-1}, respectively. The B-C ratio in Panipat and Nuh district was 1.42 and 1.46, respectively. Similar results were also reported by Kumar and Kumar (2018). Similarly, the cost of cultivation of bottle gourd (HYVs) in Panipat and Nuh districts was Rs. 160421 and Rs. 150620 ha^{-1}, respectively. Total variable cost was Rs. 77388 and Rs.76942 ha^{-1} in Panipat and Nuh districts, respectively. Expenditure on picking, seed and sowing, plant protection, manure and chemical fertilizers, irrigation and field preparation were the pertinent components of total variable cost. The expenditure incurred on the plucking was highest (15.47 and 16.48%) followed by plant protection (11.30 and 11.91%), field preparation (6.87 and 7.21%) and manure and chemical fertilizers (6.41 and 6.75%) in Panipat and Nuh districts, respectively. Similarly, the rental value of land and management and risk factors were the main components of fixed cost-sharing Rs. 60875, Rs. 15478, Rs. 51425 and Rs. 15388 ha^{-1} in Panipat and Nuh districts, respectively. The gross return of bottle gourd (HYVs) in Panipat and Nuh districts was Rs. 191070 and Rs. 181302 ha^{-1} and the net return was Rs. 30649 and Rs. 30682 ha^{-1},

respectively. The B-C ratio in Panipat and Nuh district was 1.19 and 1.20, respectively. Similar results were also reported by Rajput *et al*. (2020).

Overall the cost of cultivation of bottle gourd hybrid and HYVs was Rs. 162541 and Rs. 155520 ha^{-1}, respectively. Total variable cost was Rs. 82382 and Rs. 77165 ha^{-1}, respectively. In the cultivation of bottle gourd hybrid, the expenditure incurred on plucking was maximum (15.27%) tailed by plant protection (11.22%), field preparation (6.73%) and manure and chemical fertilizers (6.28%). Similarly, the rental value of land and management and risk factors were the major parts of fixed cost constituting Rs. 56801 and Rs. 16476 ha^{-1}, respectively. Gross and net returns attained from cultivation of bottle gourd hybrid were Rs. 234069 and Rs. 71528 ha^{-1}, respectively. Similarly, in the case of bottle gourd HYVs cultivation, the expenditure incurred on the plucking was greater (15.96%) followed by plant protection (11.59%), field preparation (7.04%) and manure and chemical fertilizers (6.57%). Similarly, the rental value of land and management and risk factors were the major components of fixed cost, which accounted for Rs. 56150 and Rs. 15433 ha^{-1}, respectively. Gross and net returns of bottle gourd HYVs were Rs. 186186 and Rs. 30666 ha^{-1}, respectively. Considering the total cost and total variable cost involved in the cultivation of bottle gourd HYVs, there were savings of 4.32 and 6.33% as compared to bottle gourd hybrid. Seed and sowing (49.24%) was the major item of saving in bottle gourd HYVs as compared to hybrid. But there was a yield penalty of 20.46%. Similar results were also reported by Kadivar *et al*. (2020).

Conclusion

The present study concluded that the overall cost of cultivation of okra and bottle guard hybrids was higher as compared to HYVs in Haryana. The overall net return from okra hybrid and HYVs and bottle gourd hybrid and HYVs was Rs. 94475 and Rs. 45132 and Rs. 71528 and Rs. 30666, respectively. The B-C ratio of okra hybrid and HYVs was 1.45 and 1.24, respectively whereas; it was 1.44 and 1.20 for bottle gourd hybrid and HYVs. Considering the total cost of okra and bottle gourd HYVs, a saving of 12.81 and 4.32% was reported as compared to their hybrid seed cultivation. Seed and sowing were the major items of saving in HYVs cultivation of both crops as compared to hybrid. However, there was a yield penalty of 18.93 and 20.46% in the cultivation of HYVs of okra and bottle gourd, respectively.

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सारांश

सब्जियों की अधिक उपज देने वाली किस्में (भिन्डी और लौकी) की तुलना में संकर का आर्थिक विष्लेशण हरियाणा के नूंह (मेवात) और पानीपत जिलों में किया गया। प्रत्येक जिले से 40 सब्जी उगाने वाले किसानों का और कुल 80 सब्जी उत्पादकों से 2022दक23 के दौरान उपयोग किए गए निवेष तथा प्राप्त उत्पादन से संबंधित प्रासंगिक जानकारी निकालने के लिए सर्वेक्षण किया गया ।वर्तमान अध्ययन के पुनः परिणामों से पता चला कि कुल मिलाकर भिंडी संकर और भिंडी की अधिक उपज देने वाली किस्मों की खेती, लागत 211978 रूपये प्रति हेक्टेयर एवं 184824 रूपये प्रति हेक्टेयर क्रमषः थी । इसी तरह, लौकी संकर और लौकी की अधिक उपज देने वाली किस्मों की खेती की कुल लागत क्रमषः 162541/दक रूपये प्रति हेक्टेयर एवं 155520/दक रूपये प्रति हेक्टेयर थी । भिंडी और लौकी संकर से कुल षुद्ध लाभ अधिक उपज देने वाली किस्मों की तुलना में अधिक था। भिंडी संकर और भिंडी की अधिक उपज देने वाली किस्मों का लाभदकलागत क्रमषः 1.45 और 1.24 था । लौकी संकर और लौकी की अधिक उपज देने वाली किस्मों के लिए यह क्रमषः 1.44 और 1.20 था । दोनों फसलों की संकर फसल की तुलना में बीज और बुआई दोनों अधिक उपज देने वाली किस्मों में बचत के मुख्य बिन्दु थे । लेकिन भिंडी और लौकी अधिक उपज देने वाली किस्मों में क्रमषः 18.93 और 20.46 प्रतिषत की उपज कम थी ।