

Research Paper

Cost-Benefit Analysis of Kinnow and Major Traditional Crops (Wheat and Cotton) in Sirsa District of Haryana

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ABSTRACT

The study's objective is to calculate the cost-benefit ratio of horticulture fruit crop (kinnow) and traditional crops (wheat and cotton). The study was conducted in the Sirsa districts of Haryana during the year 2020-21 and cost-benefit ratio and amortization cost were calculated to draw conclusions. The study has revealed that the highest establishment cost of kinnow orchard was found to be as ₹ 210266.00 per hectare without subsidy and ₹ 61075.50 per hectare with subsidy. Cost-benefit ratio of kinnow worked out to be 0.29 with subsidy and 0.15 without subsidy. Besides it, cost-benefit ratio of wheat and cotton was documented as 0.09 and 0.10, respectively. Thus, we may conclude that CB ratio of kinnow crop was higher than cotton and wheat crop which proved that fruit crop (kinnow) were more beneficial than major traditional crops (wheat and cotton).

HIGHLIGHTS

- Fruit growers ingrain one rupee then he secures twenty-nine and fifteen *paisa* in respect of kinnow cultivation with and without subsidy, respectively.
- A fruit grower invested one rupee then he earned nine *paisa* in wheat cultivation and ten *paisa* in cotton cultivation.

Keywords: Kinnow, fruit crops, cost-benefit ratio

The growth of the Indian economy depends on the agriculture sector. With a 19.9 per cent GDP share in the Indian economy, it generates approximately 54.4 per cent employment and occupies up approximately 51.92 per cent of the country's geographical area. The last few decades have seen incredible expansion in this industry. In terms of production of food grains, there have been 55 million tonnes in 1950–1951 which has increased 314.51 million tonnes in 2020–2021 (Statistical abstract of India). The introduction of new technologies, procedures and budgets etc. were the main reason of boosted the growth of this sector. They placed emphasis on increasing the growth of this sector by offering new technology, financial services, policies, and budgets etc. To ensure sustainable growth,

budget for the agricultural and related sectors is always rising. Following the achievement of the green revolution, India achieved food grain self-sufficiency, marking a historical advancement in agricultural production, productivity, high yielding varieties, irrigation facilities, etc. Additionally, India is a major producer of milk, spices, and cashews worldwide. Horticulture is a crucial component of the agriculture sector.

The productivity of horticultural crop productivity has increased from 2012–13 to 2019–20 by 10.5 per cent, while the total area increased from

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23.69 million hectares in 2012–13 to 25.66 million hectares in 2019–20. Furthermore, the production of horticultural crops increased by 19.37 per cent from 268.47 million tonnes in 2012–13 to 320.48 million tonnes in 2019–20 (National Horticulture Board). India is the world's top producer of bananas, papayas, mangoes, and guavas, respectively. All of these crops are becoming more and more prominent. India's exports of fruits seem to be extensive. In Haryana state, horticulture sector has played a crucial role in increasing the income of farmer. The productivity of horticultural crops has increased by

12.93 per cent from 2012-13 to 2019-20, whereas, the area has shown a progress from 434.2 million hectares in 2012-13 to 461.04 million hectares in 2019-20. Further, production of horticulture crop has shown an increase from 5676.1 million tons in 2012-13 to 6803.54 million tons in 2019-20 (19.86 per cent). The area of fruit has increased to 68.52 thousand hectares in 2019-20 (2nd estimate) from 49.5 hectares in 2012-13. Further, production of fruit crop has shown an increase from 516.10 million tons in 2012-13 to 963.41 million tons in 2019-20 (86.67 per cent) (National Horticulture Board). According to Kamei 2014, revealed the comparison of horticulture and non-horticulture income of the farmers and found the horticulture income was eight-nine times highly rewarding and pay-off occupation than that of non-horticulture occupation as regards to survey data of 180 households. One another study Hoc *et al.* 2016, studied the average gross revenue from horticultural crops (vegetable) achieved by each household. The study found that average gross revenue was 852 Baht (2019.24 Indian rupees) and net profit was 619 Baht per day achieved by each household. High productive efficiency of horticultural crops was found with an average net profit on input cost of 2.7:1, which was much greater than rain fed rice. Shaikh, (2013) compared between the two categories of farmers traditional and modern fruit growers. The study revealed that the total cost experienced by the traditional growers were high (74898.74 per acre) as related to modern growers (67634.27 per acre) and the gross yields per acre were higher (₹ 200129) achieved by modern growers as compared to the traditional growers (₹ 167765). Another study found the huge variation in the production costs of groundnut and sunflower

crops being cultivated in Karnataka state (Kumar, *et al.* 2022). Net income and return of barley crop were increased while net income of maize crop was decreased and return per rupee invested was increased during the period 2003 to 2005. Thus, it was found that barley crop was profitable to the farmers in Rajasthan state (Verma *et al.* 2022). Another study found that cherry cultivation has proved economically lucrative during all the stages of production because the benefit cost ratio was found greater than 1 and varied from 1.44 to 3.72 (Bali *et al.* 2022). The study revealed that apple cultivation had considered best as compared to field crops in utilization of the natural resources and more remunerative in the hill area (Sharma *et al.* 2021). The gross and net returns had found higher in large farms due to realization higher price because of cultivating early-maturing varieties and exploring other markets. In case of small and marginal farmers, pea crop had found more lucrative because it has been highly labour-intensive crop (Singh *et al.* 2020). Thus, it can be concluded that fruit crops were very lucrative than the traditional crop because the cost of traditional crops was higher and returns were lesser than fruit crops, in most of the studies. Thus, there is a great scope of horticulture sector for future development in India and Haryana state. In the present study, I have tried to find out the cost-benefit ratio of kinnow and major traditional crops in Sirsa district of Haryana.

METHODOLOGY

This study has been conducted in Haryana state during the period of 2020-21 based on primary data. Kinnow crop was selected on the basis of highest production and area under fruit cultivation in Haryana. Further, Sirsa district was selected on the basis of maximum production and area of Kinnow. Furthermore, major traditional crops (wheat and cotton) of Sirsa district were selected to comparison cost-benefit analysis between fruit and major traditional crops. The data were collected from 100 fruit growers of Sirsa district by using convenient sampling method. Out of 100 selected fruit growers, 50 fruit growers have established their orchard in 2013-14 and 50 fruit growers have established their orchard in 2014-15. Cost of kinnow crop has been divided into establishment and operational cost. The annual amortization cost was calculated as per

the investment made on the establishment cost of kinnow crop. The purpose of amortization cost for spreading out the costs of long-term inputs over the expected life of long-term inputs will provide value. The following formula has been employed to calculate the amortization of cost:

$$I = B \frac{i}{1 - (1+i)^{-n}}$$

I = Annual cost (in ₹)

B = Present Fixed Cost (in ₹)

i = Interest rate (12 per cent per annum)

n = Economic life of the orchard (in years)

In order to calculate the cost benefit ratio, the following formula has been employed:

$$CB \text{ Ratio} = \frac{\text{Net return}}{\text{Total cost}}$$

RESULTS AND DISCUSSION

Establishment cost of orchards kinnow crop

The main cost items covered under establishment of orchards are preparation of land and layout, digging of pits, filling of pits, cost of filling materials, cost of plants, cost of permanent fencing, planting cost, establishment of drip, construction of ponds, cost of tools and miscellaneous (watch and ward). All these are non-recurring expenditures incurred by fruit grower throughout the expected life span of these fruit crops. The figures related to establishment costs of the kinnow crop of the districts of Sirsa (kinnow crop) for the year 2013-14 and 2014-15 have been presented in Table 1.

The cost structure for the establishment of kinnow crop has been studied in the both conditions, i.e., with and without subsidy. It was observed through interaction with the respondents that percentage share of subsidy in total cost was 70.95 per cent for kinnow cultivation in district Sirsa district. Amortization cost has also been calculated at the rate of interest (12 per cent) by taking expected age 60, 25 and 30 years for mango, kinnow and guava orchards, respectively (Hort. Haryana). It is revealed by the figures that maximum amortization cost was incurred for establishment of kinnow orchard which

was ₹ 26808.91 per hectare without subsidy and ₹ 7787.12 per hectare with subsidy.

Table 1: Establishment Cost of Kinnow Orchards

Sl. No.	Items (₹ per hectare)	Kinnow	
		With subsidy	Without subsidy
1	Preparation of land and layout	3150.00 (5.15)	3150.00 (1.49)
2	Digging of pits**	00.00 (0.00)	2790.00 (1.33)
3	Filling of pits	1500.00 (2.45)	1500.00 (0.71)
4	Cost of filling materials	2675.00 (4.38)	2675.00 (1.27)
5	Cost of plants**	00.00 (0.00)	19250.00 (9.16)
6	Planting cost	1650.00 (2.70)	1650.00 (0.78)
7	Cost of permanent fencing	9650.00 (15.80)	9650.00 (4.59)
8	Establishment of drip*	30612.50 (50.12)	61225.00 (29.13)
9	Construction of ponds***	00.00 (0.00)	87500.50 (41.61)
10	Cost of tools*	9037.50 (14.79)	18075.00 (8.60)
11	Miscellaneous	2800.50 (4.58)	2800.50 (1.33)
Total		61075.50 (100)	210266.00 (100)
Amortization cost		7787.12	26808.91
Percentage share of subsidy in total cost		70.95	0.00

Source: Field survey.

Note: The figures in the parentheses are the percentage of the total.

*Represent 50 per cent subsidy on drip, spray drum, carats and rotavators; **represent the 100 per cent subsidy is being given to fruit grower for establishment of orchards by government; ***represent subsidy of ₹ 125000 on pond per hectare.

In case of establishment of kinnow orchard in district Sirsa, the highest establishment cost was found to be as ₹ 210266.00 per hectare without subsidy and ₹ 61075.50 per hectare with subsidy. 50.00 per cent subsidy was given on appliances of the drip system, carat, rotavators and spray drums. Further, a subsidy of ₹ 125000.00 per hectare was given for construction of pond/community tank as an incentive for the establishment of kinnow fruit crops. Farmers availed the subsidy for construction

of community tanks and installation of drips in district Sirsa. The underground water level was very low and mostly water was saline which the main reason to construct the pond so that canal water could be stored and used as per the requirement of plants.

Apart from this cost, cost of permanent fencing was ₹ 9650.00 (15.80 percent) in case of orchards with subsidy and 4.59 per cent in case of orchards without subsidy. It was followed by cost of tools that was ₹ 9037.50 (14.79 per cent) per hectare with subsidy and ₹ 18075.00 (41.61 per cent) without subsidy. The highest subsidy was availed for construction of ponds. It was followed by cost of establishment of drip system and cost of purchasing plant with ₹ 30612.80 and ₹ 19250.00 respectively.

Total cost of kinnow crop

The findings related to total cost kinnow crop in district Sirsa have been presented in Table 2. The total cost of kinnow cultivation was documented as ₹ 209623.67 and 234681.38 per hectare with and without subsidy respectively. Total operational cost of kinnow plantation was recorded as ₹ 84297.01 per

hectare which was 40.21 and 35.92 per cent in case of orchards with and without subsidy respectively. It was also revealed that in operational cost, highest expenditure was incurred on picking, grading and packing. It accounted for ₹ 35000.00 per hectare which was 16.70 and 14.91 per cent in orchards with and without subsidy respectively. The expenditure on manures and fertilizers was ₹ 16421.42 per hectare which was 7.84 and 6.99 per cent in orchards with and without subsidy respectively. To find out the total cost, some other costs were included in operational cost such as managerial charges (10 per cent), Interest on working capital (12 per cent), Risk factor (10 per cent), Expected depreciation on fixed investment (4 per cent), Rental value of land and Transportation cost. As far as the calculated cost of rental value of land is concerned, it turned out to be an expensive component of total cost amounting to ₹ 74166.66 per hectare. In percentage terms, it worked out to be 35.39 and 31.60 per cent with and without subsidy respectively. The amount of transportation cost was found same in both cases but in percentages form, it was different. Transportation cost was recorded 5.72 and 5.11 per cent in kinnow crop with and without subsidy respectively.

Table 2: Total Cost of Kinnow Crops in Sirsa District

Sl. No.	Cost Items (₹ per hectare)	Cost for kinnow with subsidy	Cost for kinnow without subsidy
1	Manures and fertilizers	16421.42 (7.84)	16421.42 (6.99)
2	Interculture	2023.21 (0.96)	2023.21 (0.86)
3	Irrigation	11630.36 (5.54)	11630.36 (4.96)
4	Pruning	7935.00 (3.79)	7935.00 (3.38)
5	Insecticides and pesticides	4262.00 (2.03)	4262.00 (1.83)
6	Watch & ward	6584.45 (3.14)	6584.45 (2.81)
7	Replacement cost	440.57 (0.21)	440.57 (0.18)
8	Picking, grading and packing cost	35000.00 (16.70)	35000.00 (14.91)
9	Total operational cost (sub-total of 1 to 8)	84297.01 (40.21)	84297.01 (35.92)
10	Interest on working capital @ 12 per cent	10115.64 (4.82)	10115.64 (4.31)
11	Total variable cost (sub-total of 9 and 10)	94412.65 (45.03)	94412.65 (40.23)
12	Management charges @ 10 per cent	9441.26 (4.50)	9441.26 (4.02)
13	Risk factor @ 10 per cent	9441.26 (4.50)	9441.26 (4.03)
14	Expected depreciation on fixed investment @ 4 per cent	2374.72 (1.14)	8410.64 (3.58)
15	Amortized fixed cost	7787.12 (3.72)	26808.91 (11.43)
16	Rental value of land	74166.66 (35.39)	74166.66 (31.60)
17	Transportation cost	12000.00 (5.72)	12000.00 (5.11)
18	Total cost (sub-total of 11 to 17)	209623.67 (100)	234681.38 (100)

Source: Field survey.

Note: The figures in the parentheses are the percentage of the total.

Total cost of major traditional crops

The findings related to total cost of major traditional crops (wheat and cotton) in district Sirsa have been presented in Table 3.

To find out the total cost, some other costs were also included in operational cost of wheat and cotton crops such as managerial charges (10 per cent), Interest on working capital (12 per cent), Risk factor (10 per cent), Rental value of land and Transportation cost. The total cost of wheat and cotton were ₹ 90160.62 and 113363.86 per hectare respectively. In addition to it, total joint cost of wheat and cotton were ₹ 203524.48 per hectare (i.e., less than cost of kinnow cultivation). Apart from this, the expenditure on rental value of land was ₹ 37083.33 (41.13 per cent) and ₹ 37083.33 (32.72 per cent) per hectare respectively. Total operational cost was ₹ 39008.40 per hectare (43.26 per cent of total cost of wheat crops) and ₹ 55678.30 per hectare (49.11 per cent of total cost of cotton crops). But in respect of wheat, the highest cost (₹ 11125.00 per hectare) was recorded on harvesting 12.33 per cent of total cost followed by preparation of land (₹ 7083.50 per hectare) which was 7.86 per cent of total cost. On the behalf of cotton, maximum outlay was recorded on harvesting which was

₹ 23674.50 per hectare (20.88 per cent of total cost) followed by expenditure on Hoeing ₹ 6083.75 per hectare (5.37 per cent of total cost). It was revealed through interaction with the fruit grower that the cost on hoeing was not accounted in wheat crops because the spray was used to eliminate the weeds in wheat crops. Transportation cost was accounted ₹ 650.00 and 1450.00 per hectare in cultivation of wheat and cotton crops, respectively.

Cost-Benefit ratio of kinnow and major traditional crops

The findings related to cost-benefit ratio of the selected fruit crop (kinnow) and major traditional crops (wheat and cotton) in district Sirsa have been presented in table 4. It can be seen by the depicted values that there was more profit in the cultivation of kinnow as compared to major traditional crops (wheat and cotton).

The benefit in cultivation of kinnow was due to subsidy provided by government under the national horticulture mission which played influential role and helped in decreasing the cost in outlay of kinnow grove. It was clear from the big divergence in total cost of kinnow cultivation in both instances (i.e., with and without subsidy). In case of cotton

Table 3: Total Cost of Major Traditional (wheat and cotton) Crops in Sirsa District

Sl. No.	Items (₹ per hectare)	Cost for wheat	Cost for cotton
1	Preparation of land	7083.50 (7.86)	4861.65 (4.29)
2	Sowing and seeds	4750.00 (5.26)	4921.65 (4.34)
3	F. Y. M.	3750.00 (4.16)	3750.00 (3.31)
4	Fertilizers	5708.25 (6.33)	4583.25 (4.04)
5	Irrigation	4350.00 (4.83)	2344.75 (2.07)
6	Hoeing	0.00 (0.00)	6083.75 (5.37)
7	Insecticides and pesticides	2241.65 (2.49)	5458.75 (4.81)
8	Harvesting	11125.00 (12.33)	23674.50 (20.88)
9	Operational cost (sub-total of 1 to 8)	39008.40 (43.26)	55678.30 (49.11)
10	Interest on working capital @ 12 per cent	4681.01 (5.20)	6681.39 (5.90)
11	Total variable cost (sub-total of 9 and 10)	43689.41 (48.46)	62359.69 (55.01)
12	Management charges @ 10 per cent	4368.94 (4.84)	6235.96 (5.50)
13	Risk factor @ 10 per cent	4368.94 (4.84)	6235.96 (5.50)
14	Transportation cost	650.00 (0.73)	1450.00 (1.27)
15	Rental value of land	37083.33 (41.13)	37083.33 (32.72)
16	Total cost (sub-total of 11 to 15)	90160.62 (100)	113363.86 (100)

Source: Field survey.

Note: The figures in the parentheses are the percentage of the total.

Table 4: Cost-Benefit Ratio of Kinnow and Major Traditional (wheat and cotton) Crops (₹ per hectare)

Sl. No.	Items	Kinnow		Wheat & cotton		
		Cost with subsidy	Cost without subsidy	Items	Cost forwheat	Cost forcotton
1	Total cost	209623.67 (100)	234681.38 (100)	Total cost	90160.62 (100)	113363.86 (100)
2	Gross return	270000.00	270000.00	Gross returns	97920.50	124740.00
3	Net return (2- 1)	60376.33	35318.62	Net returns (2-1)	7759.88	11376.14
4	CB ratio (3÷1)	1:0.29	1:0.15	CB ratio (3÷1)	1:0.09	1:0.10

Source: Field survey; *Note:* The figures in the parentheses are the percentage of the total.

cultivation, the returns were ₹ 11376.14 per hectare. The intermix value of both major crops (i.e., wheat and cotton) was ₹ 19136.02 per hectare which was very less as compared to net returns of kinnow. It is pertinent to mention here that factors other than operational cost in the production of wheat and cotton were also taken into consideration. All these factors were responsible for non-profitability of wheat and cotton as compared to kinnow.

Cost-Benefit ratio of kinnow worked out to be 1:0.29 with subsidy and 1:0.15 without subsidy. It implies that when a farmer ingrains one rupee then he secures twenty-nine and fifteen *paisa* in respect of kinnow cultivation with and without subsidy respectively. Besides it, cost-benefit ratio of wheat and cotton was documented as 1:0.09 and 1:0.10 respectively. So, it can be concluded that when a farmer invested one rupee then he earned nine *paisa* in wheat cultivation and ten *paisa* in cotton cultivation. Thus, we may conclude that CB ratio of kinnow crop was higher than cotton and wheat crop which proved that fruit crops were more beneficial than major traditional crops (wheat and cotton).

CONCLUSION

Cost-benefit ratio of kinnow and major traditional crops was calculated. It was found that percentage share of subsidy in total cost was 70.95 per cent for kinnow cultivation in Sirsa district. In case of establishment of kinnow orchard in district Sirsa, the highest establishment cost was found to be as ₹ 210266.00 per hectare without subsidy and ₹ 61075.50 per hectare with subsidy. The total cost of kinnow cultivation was documented as ₹ 209623.67 and 234681.38 per hectare with and without subsidy respectively. On the other hand, the total cost of wheat and cotton were ₹ 90160.62 and 113363.86 per hectare respectively. In addition to it, total joint cost

of wheat and cotton was ₹ 203524.48 per hectare (i.e., less than cost of kinnow cultivation). Cost-Benefit ratio of kinnow worked out to be 1:0.29 with subsidy and 1:0.15 without subsidy. Besides it, cost-benefit ratio of wheat and cotton was documented as 1:0.09 and 1:0.10 respectively. Thus, we may conclude that CB ratio of kinnow crop was higher than cotton and wheat crop which proved that fruit crops were more beneficial than major traditional crops (wheat and cotton). It's suggested that government should provide subsidy for high cost of input, fencing etc. The government has also taken mandatory actions for building cold storages for providing cold storage facilities at reasonable prices.

REFERENCES

- <http://nhb.gov.in/> (Last access Date: 25-08-2022).
- Arya, R., Awasthi, O.P., Singh, J. and Singh, B. 2011. Cost Benefit Analysis Under Fruit Based Multiple Cropping System. *Progressive Horti*, **43**(1): 72-75.
- https://www.researchgate.net/publication/237046646_Cost_benefit_analysis_uner_fruit_based_multiple_cropping_system (Last access date: 14-12-2022).
- Hoc, N. D., Timsuksai, P. and Rambo, A.T. 2016. Cost-Benefit Analysis of Vegetable Production in Thai-Vietnamese Homegardens in Northeast Thailand. *KhonKaen Agricultural J.*, **44**(3): 527-536.
- Kamei, P. The Statistical Analysis of Households Survey of Horticulture crops in Tamenglong District of Manipur State. *Crops (In acres)*, **180** (4.7356): 1-72036.
- Kumar, P., Mehta, G., and Chander, R. 2013. An economic analysis of cost of cultivation of horticultural crops vis-à-vis traditional crops in Haryana. *Ind. J. Econ. Dev.*, **9**(1): 83-88.
- <https://www.indianjournals.com/ijor.aspx?target=ijor:ijed1&volume=9&issue=1&article=009>
- Shaikh, Sarfaraz K., Murthy, C. and Naik, Manjunatha C. 2013. Traditional and modern turmeric cultivation management in Belgaum district. *Int. J. Com. & Bus. Manage.*, **6**(2): 297-300.