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Impact of mission for integrated development of horticulture (MIDH) in Haryana

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Abstract

During the twelfth five-year plan govt of India has launched mission for integrated development of horticulture with effect from 2014-15 for holistic development of horticulture sector. Horticulture sector has emerged as an important source of farmer's income in Haryana and Kinnow is one of the most important and focused fruit crops under this scheme in Haryana. So, the study was carried out to analyse the trends in area, production and productivity of horticultural crops, to calculate the economics of kinnow and to identify the constraints faced by kinnow growers based on both primary and secondary data. Sirsa district of Haryana was selected as study area as it has highest area under cultivation of kinnow in the state. From the results a positive growth trend in horticulture sector was found. The CGR in area, production and productivity under total horticultural crops in Haryana from 2005-06 to 2017-18 was found to be of 5.08 per cent, 7.55 per cent and 2.34 per cent, respectively. The average total establishment cost, operational cost, NPV, IRR, B: C ratio and payback period for kinnow were found of Rs.122460, Rs. 56662, Rs.747703.64, 26.24 per cent and 7 years, respectively. Major constraints faced by fruits growers were as lack of infrastructure for processing and storage, inadequate infrastructure for post-harvest management, poor marketing facility, lack of good quality planting materials etc.

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Introduction

In India the need for horticulture development was first time felt during the 4th five-year plan, but during that time there was a need to increase the food grain production (Chand et al. 2008). Department of Agriculture, Co-operation and Farmers Welfare of Ministry of

Agriculture was the nodal agency for over viewing horticulture development in the country. Considering the importance of horticulture sector in 2011-12, government of India had announced 2012 as the “Year of Horticulture”. During the 12th five year plan

Department of Agriculture, Co-operation and Farmers welfare has launched Mission for Integrated Development of Horticulture with effect from 2014-15 for wholistic development of horticulture sector by subsuming schemes like National Horticulture Mission (NHM), Horticulture Mission for North Eastern and Himalayan states (HMNEH), National Bamboo Mission (NBM), National Horticultural Board (NHB), Coconut Development board (CDB), Central Institute of Horticulture (CIH), Nagaland. The total outlay for development comprises share of central and states government in the ratio of 85:15 except for North Eastern and Himalayan states.

Haryana produced about 8091.71 thousand metric tones (MT) of horticulture produce from 534.01 thousand ha and accounted for 2.6 per cent of total horticultural production in the country (2017-18). The major share of horticulture produce comprises of vegetables (88.4%) and fruits (9.8%). The total fund allocated for MIDH in 2019-20 for Haryana is 183.33 crores with centre and state contribution of 110 crores and 73.33 crores, respectively. The focused crops under this programme include fruits (guava, kinnow, ber and aonla), vegetables (brinjal, cabbage, cauliflower, okra, onion, peas and potatoes) and flowers (rose, marigold, gerbera, etc). Horticulture sector has emerged as an important source of farmer's income in Haryana and Kinnow is one of the most important and focused fruit crops under this scheme in Haryana.

Materials and Methods

This study is based on both primary and secondary data. The primary data was

collected from 30 kinnow growers from Sirsa district of Haryana as it shares maximum area under kinnow cultivation in the state. Secondary data related to area, production and productivity of total horticultural crops and citrus was collected from department of horticulture, Govt. of Haryana.

Estimation of growth rate

To calculate the trends in area, production and productivity of horticultural crops for a period of 13 years i.e. from 2005 to 2017, CGR was calculated by using the following formula.

$$Y = AB^t U_t,$$

Taking log i.e.,

$$\text{Log } Y = \text{log } A + t \text{ log } B + \text{log } U_t$$

$$\text{i.e. } y = a + bt + u_t$$

Where,

y= area or production or yield,

a= constant,

b= regression coefficient,

u_t = disturbance term

t= time in years starting from the base year 2005-06.

$$\text{CGR} = (\text{antilog } b - 1) * 100$$

Costs and returns from kinnow orchard

Establishment cost, operational cost and various economic tools like net present value (NPV), benefit cost ratio (B:C), internal rate of return (IRR), payback period was used.

Depreciation and interest rate for fruits

For estimating the annual cost, the depreciation has been worked out @ 4 per cent per annum of the fixed investment by applying straight line method or direct method, assuming the productive life as 25 years for kinnow. Further rate the interest has been taken @ 12 per cent per annum on operational cost.

Amortization of fixed cost

Annual amortization on fixed cost was calculated using compound cost formula @12 per cent per annum by assuming 25 years as orchard life.

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

Where,

I = Annual cost,

B = Present fixed cost,

i = Interest rate (12 % per annum), and

n = Economic life of the orchard (in years).

$$\text{IRR} = \frac{\text{(lower discount rate)} + \frac{\text{(difference between two discount rates)} \times \text{(Present worth of the cash flow at lower discount rate)}}{\text{(absolute difference between the Present worth of the cash flow at two discount rates)}}$$

Benefit cost ratio

Ratio between the sum of discounted benefits of returns (R) and the sum of discounted cost (K), i.e. $B = R/K$. If this ratio is greater than 1.00 then the investment in kinnow orchard is considered to be economically viable.

Payback period

It is the period within which the cost of the orchard is fully recovered from its own returns. In other words, it indicates the number of years by which the returns (R) equal, to the cost of orchard (K). For this condition the following relationship must be satisfied. $\sum_{i=1}^n R_i = K$

Where,

i = 1, 2, 3 n year,

R = Indicates the return over a number of year,

Net present value

Future net returns were discounted to their net present value by using the following formula:

$$NPV = \sum_{i=1}^n \frac{R_i}{(1+r)^n}$$

Where R_i = returns from kinnow orchard in the i^{th} year

i = years of orchard life = 1, 2, ..., n

Internal rate of return

Internal rate of return is the discounting rate which makes the NPV zero. So IRR was calculated using the following formula,

K = The cost of orchard.

Identification of constraints

For identifying the production and marketing constraints faced by the farmers Henry Garrett ranking technique was used. The respondents were asked to rank the given constraints. The order of merit thus given by the respondents was converted in to ranks using the following formula

$$\text{Percentage position} = \frac{100 - (R_{ij} - 0.5)}{N_j}$$

Where,

R_{ij} = Rank given for i^{th} item j^{th} individual

N_j = Number of items ranked by j^{th} individual

Results and Discussion

Trends in area, production and productivity of total horticultural crop and citrus in Haryana

From the Table 1 it is evident that the area, production and productivity of total horticultural crops and citrus are increasing over the years. The CGR in area, production and productivity for total horticultural crops was found to be 5.22 per cent, 7.97 per cent

and 2.60 per cent per annum, respectively. Whereas the CGR in area, production and productivity of citrus was found to be 11.69 per cent, 17.67 per cent and 5.36 per cent per annum, respectively. It can be observed that after the implementation of National Horticulture Mission which is now subsumed under the MIDH area, production and productivity of horticultural crops has been significantly increased in Haryana. This study is in conformity with Kondal (2014), Tuteja (2011), Nabi *et al.* (2017) and Jha *et al.* (2019)

Table 1. Trends in area, production and productivity of total horticultural crop and citrus in Haryana

Years	Area ('000 ha)		Production ('000MT)		Productivity (tonnes/ha)	
	Total horticultural crop	Citrus	Total horticultural crop	Citrus	Total horticultural crop	Citrus
2005-06	277.40	5.04	3292.40	69.56	11.87	13.80
2007-08	320.40	8.21	3618.00	66.84	11.29	8.14
2009-10	354.70	13.84	4386.70	98.33	12.37	7.11
2011-12	424.70	17.66	5671.94	214.17	13.36	12.12
2013-14	448.10	19.38	6285.50	235.35	14.00	12.14
2015-16	494.20	19.65	7053.84	301.76	14.27	15.36
2017-18	555.89	20.83	9117.52	335.82	16.40	16.13
Percentage change over 2005-06	92.50	313.13	145.77	382.29	27.66	16.86
CGR (%p.a.)	5.22	11.69	7.97	17.67	2.60	5.36

(Source: Department of Horticulture, Govt. of Haryana)

Establishment cost of Kinnow orchard in Sirsa district of Haryana

The total establishment cost of kinnow orchard was found to be of Rs.1,22,460 per hectare in Sirsa district of Haryana. The major component of establishment costs was Construction of pond (35.59%), Drip irrigation (19.23%), Permanent fencing (10.24%), Preparation of land and lay out

(5.71%) and Cost of plant (5.19%). Gangwar *et al.* (2005), Gangwar and Singh (1998) and Bhat *et al.* (2011) have also found similar kind of results.

Table 2. Establishment cost of kinnow in Haryana

Particulars	Value (Rs./ hectare)	Percentage
Preparation of land	6987	5.71

and lay out			Permanent fencing	12543	10.24
Digging and filling	5343	4.36	Cost of equipment	5874	4.80
of pits			Miscellaneous	2387	1.95
Cost of irrigation	1051	0.86	Total	122460	100.00
Cost of plant	6358	5.19	Operational cost of kinnow orchard		
Cost of replacement plant	965	0.79	The operational cost of kinnow orchard increases from 1 st year to 7 th year of orchard establishment. After 7 th years onwards the per hectare operational cost becomes more or less stabilised. In the 7 th year the per hectare operational cost was found to be ₹ 75625. The major components or operational cost are cost of plant protection (20.48%), cost of pruning and cutting (13.65%), cost of intercultural operations (12.37%), cost of watch and ward (12.23%) and cost of irrigation (11.86%).		
Manures and fertilizer	4737	3.87			
Transportation of plant	4659	3.80			
Plantation cost	2963	2.42			
Intercultural operation	1469	1.20			
Construction of pond	43578	35.59			
Drip irrigation	23546	19.23			

Table 3. Operational cost of kinnow orchard in Haryana

S. No.	Particulars	Years							Percentage in total cost of orchard in the 7 th year
		1	2	3	4	5	6	7 th and onwards	
1	Manure and fertilizer	3127	3758	4523	5568	6894	7164	7367	9.74
2	Plant protection insecticides, pesticides	8756	11503	12654	13569	14568	15102	15489	20.48
3	Pruning and cutting		3781	6873	9245	9741	9964	10324	13.65
4	Intercultural and hoeing	4847	5468	6631	7863	8521	9253	9352	12.37
5	Irrigation cost	4498	5120	5961	7546	8276	8791	8967	11.86
6	Replacement and casualty	1437	1654	2145	2754	3124	3396	3758	4.97
7	Watch and ward	4987	5489	6124	6717	7813	8703	9247	12.23
8	Staking	0	0	0	7500	7800	8192	8175	10.81
9	Miscellaneous	1724	1923	2149	2465	2563	2785	2946	3.90
	Total operational cost	29376	38696	47060	63227	69300	73350	75625	100

Costs and returns from kinnow orchard in Haryana

The costs and returns from kinnow orchard are given in Table 4. The total cost was calculated after adding the rental value of land, amortized fixed cost, operational cost, depreciation and interest on working capital. The first 3 years of orchard establishment are the lean periods as no production was seen during these years. The production started

increasing from 4th years and becomes constant after 7th year of orchard establishment. Even after considering the returns from inter cropping the farmer has to bear a loss up to 5th year of orchard life. The net return was found positive in the 6th year. In the 7th year the net return was found to be Rs.257397. This return remains same for the coming years of orchard life.

Table 4. Costs and returns from kinnow orchard in Haryana

Particulars	1	2	3	Years 4	5	6	7 th and onwards
Rental value of land	44256	47234	48563	49671	52874	55963	58796
Amortized fixed cost	15614	15614	15614	15614	15614	15614	15614
Operational cost	29376	38696	47060	63227	69300	73350	75625
Expected depreciation on Fixed Cost investment @4%	4898	4898	4898	4898	4898	4898	4898
Interest on operational cost @12% PA	3525	4644	5647	7587	8316	8802	9075
Total Cost (1-5)	97670	111086	121782	140997	151002	158627	164008
Production (qtls)	0	0	0	43	79	207	311
Price (Rs. per qtls)	0	0	0	1043	1148	1292	1355
Gross returns	0	0	0	44849	90692	267444	421405
Net returns	-97670	-111086	-121782	-96148	-60310	108817	257397
Return from inter cropping	28974	25463	24151	24080	19654	0	0
Total net returns	-68696	-85623	-97631	-72068	-40656	108817	257397

Net present value of kinnow orchard in Haryana

The Net Present Value is given in Table 5. Assuming 25 years as orchard life the

NPV was found to be Rs. 747703.64. This NPV is a high positive value which is showing that kinnow is a highly profitable enterprise.

This study is in conformity with Kumar et al. (2017), Kaur and Singla (2016).

Table 5. Net present value of kinnow orchard in Haryana

Year	Negative returns (Rs.)	Positive returns (Rs.)	Discounting factor $1/(1+i)^n$	Present value	
				Negative returns (Rs.)	Positive returns (Rs.)
1	68696		0.8929	61335.29	
2	85623		0.7972	68257.75	
3	97631		0.7118	69491.96	
4	72068		0.6355	45800.52	
5	40656		0.5674	23069.31	
6		108817	0.5066		55130.08
7 to 25		257397	3.7317		960528.38
Total	364673	366214		267954.82	1015658.46

NPV = 1015658.46 – 267954.82 = 747703.64

Internal rate of return of kinnow orchard

In the present study various discounting rates were taken to obtain the net present value zero or a minimum one. Finally, the internal rate of return was found to be a

higher value of 26.24 per cent per annum which is higher than the prevailing interest rate of 12 per cent, indicating high profitability of kinnow orchard in Haryana.

Table 6. Internal rate of return of kinnow orchard in Haryana

Year	Net cash flow (Rs.)	Present Value Coefficient $r = 26\%$ $[1/(1+r)^n]$	Corresponding Value (Rs.)	Present Value Coefficient $r = 27\%$ $[1/(1+r)^n]$	Corresponding Value (Rs.)
1	-68696	0.7937	-54520.25	0.8333	-57246.27
2	-85623	0.6299	-53932.05	0.6944	-59460.08
3	-97631	0.4999	-48806.42	0.5787	-56499.54
4	-72068	0.3968	-28593.04	0.4823	-34755.02
5	-40656	0.3149	-12801.83	0.4019	-16338.73
6	108817	0.2499	27194.02	0.3349	36442.59
7 to 25	257397	0.9493	244346.97	1.6221	417523.67
Total			72887.41		229666.63

IRR = $26 + 1 (72887.41) / (72887.41 + 229666.63) = 26.24$

B:C ratio and payback period of kinnow orchard

In the prevailing interest rate of 12 per cent the B:C ratio was found to be 1:3.79

which implies that for every Rs.1 investment in kinnow orchard the farmer is going to have a return of Rs.3.79 rupees. The payback period of kinnow orchard was found to be 7

years which means the costs were recovered in 7th year of orchard establishment. This result is in conformity with Gangwar et al. (2005), Gangwar & Singh (1998).

Constraints faced by the kinnow growers

Major constraints faced by the MIDH beneficiary kinnow growers are lack of provision of infrastructure for processing and storage, lack of availability of good quality

planting materials, lack of assistance for protected cultivation for nursery, lack of assistance for integrated post-harvest management and inadequate assistance for creation of water resources. Kumar et al. 2004 and Mittal, 2007 also found lack of assistance for infrastructure and post-harvest management as the major constraints faced by the Indian farmers

Table 6. Ranking of constraints incurred in kinnow cultivation through Garrett ranking in Haryana

Constraints	Total score	Average score	Rank
Lack of provision of infrastructure like processing and storage	1844	61.47	I
Lack of availability of good quality planting material	1830	61.00	II
Lack of assistance for protected cultivation for nursery	1709	56.97	III
Lack of assistance for integrated post-harvest management	1700	56.67	IV
Inadequate assistance for creation of water resources	1519	50.63	V
Inadequate facility for rejuvenation with improved cultivars	1434	47.80	VI
Lack of assistance for organic farming	1390	46.33	VII
Inadequate scope for horticulture mechanization	1323	44.10	VIII
Poor marketing facility	1222	40.73	IX
Lack of promotion of INM and IPM	1029	34.30	X

Conclusion

The CGR in area, production and productivity of total horticultural crops in Haryana was found to be of 5.08 per cent, 7.55 per cent and 2.34 per cent, respectively. A positive growth trend was found in growth of horticulture sector after implementation of this scheme. The average total establishment cost, operational cost, NPV, IRR, B: C ratio and payback period for kinnow were found of Rs.122460, Rs.56662, Rs.747703.64, 26.24 per cent and 7 years, respectively. Major constraints faced by fruits growers were as lack of infrastructure for processing and storage, inadequate infrastructure for post-harvest management, poor marketing facility,

lack of good quality planting materials etc. Keeping in view the high profitability and constraints it can be suggested to the government to focus more on infrastructural facilities for post-harvest management, marketing facility. Early maturing and quality planting materials of fruit varieties should be made available to the farmers to get higher prices for sale in the market. Arrangements for export of the product should be made in such a way that it can be made available to the destination of sale within a short period. India can emerge as a far bigger producer and exporter if sufficient emphasis is given to resource allocation, infrastructure development, more R&D, technological

upgradation and better policy framework for horticulture sector. Horticulture sector with strong forward and backward linkages as an organized industry can stimulate and sustain growth.

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