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Economic Appraisal of Kinnow Production and its Marketing under North -Western Himalayan Region of Jammu

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Abstract

An economic analysis of kinnow has been presented through studying their costs and returns. The average first year establishment costs per acre for kinnow has been worked out to be ₹ 5298, while its total establishment costs has been found as ₹ 12707. The overall per acre per year returns from kinnow orchards have been worked out to be ₹ 6632. The overall economic viability of the kinnow fruit, mainly net present value, internal rate of return, benefit-cost ratio and payback period have been computed as ₹ 7929, 15.42 per cent, 1.52 and 7.6 years, respectively. The average per quintal marketing cost at producers' level has been found to vary to the extent of ₹ 450, ₹ 375, ₹ 303 and ₹ 223 for channels I, II, III and IV, respectively. The average per quintal marketing cost borne by the wholesaler in channel II was ₹ 61, while as it was ₹ 30, ₹ 32 and ₹ 19 in channels I, II and III, respectively at the retailer's level and in channel-IV, whole of the marketing cost was borne by the producer as there was direct marketing of produce. A comparison of price spread through different marketing channels has revealed that producers' share in consumers' rupee was the highest (about 81%) in channel-IV, due to self sale in the local market. The marketing efficiency has been found to be highest in channel-IV. The producer got maximum benefits in channel-IV, therefore this channel should be followed to make producer highest beneficiary; although this channel has its own limitations.

Key words: Kinnow production, Economic analysis of kinnow, Jammu region, Marketing channels of kinnow

JEL Classification: Q13, Q12

Introduction

Under the changing agriculture scenario, it has been realized that the horticultural sector plays a vital role in providing the livelihood security to the farmers globally. The diversification in agriculture for improving sustainability, profitability and productivity will help in not only improving the farm income but also will generate gainful employment. India is the world's second largest producer of fruits (57.73 million tonnes) with its projected value touching 98 Mt by the year 2020-2021 (Banerjee, 2009), whereas for vegetables, it is 129 Mt, each contributing 10.0 per cent and 13.3 per cent, respectively to the total world production (Anonymous, 2009a). The citrus occupies an area of about 0.81 Mha with production of 7.50 Mt and yield of 9.26 t/ha and ranks fifth in its production in the world (Anonymous, 2010). Underlining the importance of horticultural crops, it has been observed that the Jammu region falling in north-west hill region of Jammu and Kashmir state, has large potential for cultivation of citrus fruits as it comprises highest area under its cultivation (0.012 Mha) in the state which is 99.62 per cent of the total area in J&K, whereas its production has been realized to be 0.019 Mt, which is 99.96 per cent of the total production of J&K (Anonymous, 2009b). Among the citrus fruits,

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kinnow fruit cultivation in Jammu is gaining momentum among the fruit growers due to its profitability and good market value.

Kinnow originated as a hybrid of king and willow leaf mandarins (*Citrus nobilis* × *C. deliciosa*) at Riverside, California (Sharma *et al.*, 2007). Kinnow fruits are medium oblate base flattered, deep orange yellow in colour and very juicy (Gangwar *et al.*, 2005) and have lot of market potential, which can help in increasing the farm income. Therefore, there is a need to boost its production as well as expand its area, which is possible only when a detailed cost and marketing analysis is carried out systematically. Therefore, this study was undertaken with the following objectives: (i) to study the cost and net returns from kinnow production, (ii) to find out its economic viability and (iii) to study marketing channels, marketing cost, price spread and marketing efficiency of kinnow production in the Jammu region.

Data and Methodology

A multi-stage sampling was adopted for the selection of districts, blocks, villages and kinnow growers. Jammu, Rajouri, Kathua, and Samba districts of Jammu region were selected because these four districts covered the maximum area under kinnow cultivation. Then three blocks from each district and from each block two villages were selected on the basis of area under kinnow cultivation. The kinnow growers were selected randomly from each village so as to constitute a sample size of 108 growers from the area under study.

The required information was collected through personal interview method, using well-designed and pre-tested schedules. The growers were divided into four groups: marginal (0.01 - 2.50 acres), small (2.51 - 5.00 acres), medium (5.01 - 7.50 acres) and large (> 7.50 acres). Though all the groups of different holding sizes, i.e., marginal, small, medium and large were taken into consideration as per the national standard but practically while surveying, not a single grower was found who had established his orchard on more than 7.50 acres of land. Thus, keeping this constraint in mind, the study could analyse the data only for marginal, small and medium group of landholdings. The data were collected on various aspects of establishment costs, operational/ maintenance costs, average returns as well as marketing of kinnow during the year 2009-2010.

Economic Viability

For the estimation of economic viability, net present value (NPV), pay-back period, internal rate of return (IRR) and benefit–cost ratio (BCR) were assessed using the technique given by Price (1974).

Marketing Analysis

The data were analyzed for examining the marketing cost, margins, price spread and the marketing efficiency. The modified formulae were used for separating the 'post-harvest losses during marketing' at different stages of marketing as well as for estimating the producers' share, marketing margins and marketing loss.

Growers' Net Price

The net price received by the grower was estimated as the difference in gross price received and sum of marketing costs and value loss during harvesting, grading, transit and marketing, expressed mathematically as Equation (1):

$$NP_F = \{GP_F\} - \{C_F\} - \{L_F \times GP_F\} \quad \ldots(1)$$

where, NP_F is the net price received by the farmers (₹ /kg), GP_F is the gross price received by the farmers or wholesale price to farmers (₹ /kg), C_F is the cost incurred by the farmers during marketing (₹ /kg), and L_F is the physical loss in produce from harvest till it reaches assembly market (per kg).

Marketing Margins

The margins of market intermediaries included their profit, which accrued to them for storage, the interest on capital and establishment after adjusting for the marketing loss due to handling. The general expression for estimating the margin for intermediaries is given by Equation (2):

Intermediaries margin = Gross price (sale price) – Price paid (cost price) – Cost of marketing – Loss in value during wholesaling …(2)

Thus, the total marketing margin of the market intermediaries (MM) was calculated as per Equation (3):

$$MM = MM_W + MM_R \quad \ldots(3)$$

Similarly, the total marketing cost (MC) incurred by the producer/ seller and by various intermediaries was calculated by Equation (4):

$$MC = C_F + C_W + C_R \quad \ldots(4)$$

Total loss in the value of produce due to injury/ damage caused during handling of produce from the point of harvest till it reached the consumers was estimated as per Equation (5):

$$ML = \{L_F \times GP_F\} + \{L_W \times GP_W\} + \{L_R \times GP_R\} \quad \ldots(5)$$

Marketing Efficiency

Modified marketing efficiency (ME) formula as given by Acharya and Agarwal (2001) is given below:

$$ME = \frac{NP_F}{MM + MC + ML} \quad \ldots(6)$$

where, NP_F is net price received by the farmers (₹ / kg), MM is the marketing margin, MC is the marketing cost, and ML is the marketing loss.

Results and Discussion

Cost Analysis

The age wise costs and returns from kinnow orchards were calculated on the basis of annual cash inflow and cash outflows. The establishment cost included expenditure on preparation of land, digging, filling and planting, planting material, input cost, etc. The operational cost included human labour cost, investment on manures + fertilizers, expenditure on plant protection chemicals, irrigation charges, training/ pruning charges, etc. Maintenance cost of orchards were obtained by using the quantity of inputs used per plant. The returns from kinnow orchards start from the fifth year and continue beyond 28 years, unlike Nagpur (oranges) mandarins, which give economic returns up to 30 years (Gupta and George, 1974). The total first year establishment costs on kinnow plantation, presented in Table 1, revealed that costs on digging, filling and planting was maximum (₹ 1621/acre), whereas earned value of rented land (EVRL) ₹ 1105/ acre was maximum among the fixed costs. The medium growers were found to have highest first year establishment cost (₹ 5524/acre), followed by small (₹ 5391/acre) and marginal (₹ 5263/acre), which indicated that the first year establishment cost increased with increase in the size of holding due to more application of fertilizers and plant protection chemicals. These results are in conformity with the Gangwar and Singh (1998) and Gangwar *et al*. (2005).

The year-wise establishment cost which was up to four years in kinnow cultivation, presented in Table 2, revealed that establishment cost was maximum for all the size groups during the first year and in the

Table 1. Operation-wise first year establishment cost under different size groups of kinnow orchards

(₹ /acre)

Item	Marginal	Small	Medium	Overall
Preparation of land	1106	1154	1011	1114
Digging, filling and planting	1630	1601	1525	1621
Planting material	342	380	358	351
Irrigation	96	84	105	94
Training/ Pruning	38	38	40	38
Manures + Fertilizers	254	259	433	260
Plant protection	0	11	47	4
Interest on working capital	432	457	441	438
Land revenue	0	0	0	0
Depreciation	125	127	165	127
Earned value of rented land (EVRL)	1094	1129	1231	1105
Interest on fixed capital	146	151	168	148
Total	5263	5391	5524	5298

Note: There was not a single large orchardist in case of kinnow fruit cultivation

Table 2. Year wise establishment cost under different size groups of kinnow orchards

(₹ /acre)

Year	Marginal	Small	Medium	Overall
I	5263	5391	5524	5298
II	2365	2557	2750	2418
III	2445	2570	2848	2484
IV	2475	2573	2821	2507
Total	12548	13091	13943	12707

successive years, 40-50 per cent of the first year cost was required till the plant started bearing. In the second year and onwards costs were low mainly because these were required only for the aftercare. Therefore, the total establishment cost incurred on kinnow orchards was ₹ 12548/acre in marginal orchards, ₹ 13091/acre in small orchards and ₹ 13943/acre in medium orchards, with the overall average of ₹ 12707/acre.

The item-wise and concept-wise operational costs of kinnow production (Table 3) indicated that overall per acre cost A, cost B and cost C were ₹ 1142, ₹ 2768 and ₹ 3980, respectively, indicating that all the three costs increased with increase in farm-size. The results also revealed that family human labour was an important factor in the costs incurred on the maintenance of the kinnow orchards which worked out to be 30.46 per cent of the total cost incurred for the whole period. The per acre share of the family human labour (₹ 1212) was the highest among the working costs in all the size groups of kinnow orchards, followed by hired human labour (₹ 732). Among the fixed costs, the costs on EVRL (₹ 1322) were the highest. The total operational costs increased with the increase in the size of orchards.

Returns

The returns from kinnow orchards (Table 4) increased as the age of plant increased. The returns per acre were highest in medium orchards (₹ 7966), followed by small (₹ 7125) and marginal (₹ 6954) orchards after the age of 15 years. The overall per acre returns (₹ 7385) were also highest in the case of medium orchards, followed by small (₹ 6774) and marginal (₹ 6562) orchards. It indicated that larger the size of an orchard, higher would be the returns which implies economies of large scale production. Thakur *et al*. (1986) and Sudha and Reddy (1988) had also reported similar findings.

Table 3. Item-wise and concept-wise operational costs under different size groups of kinnow orchards

(₹ /acre)

Sl. No.	Item	Marginal	Small	Medium	Overall
1	Hired human labour	711	804	741	732
2	Irrigation	0	0	0	0
3	Training/ Pruning	93	140	196	106
4	Manures + fertilizers	118	295	195	159
5	Plant protection	17	39	36	22
6	Interest on working capital	113	153	140	122
7	Land revenue	0	0	0	0
8	Depreciation	124	142	165	129
9	EVRL*	1310	1349	1427	1322
10	Interest on fixed capital	172	179	191	174
11	Family human labour	1250	1087	1196	1212
12	Cost A (1-6)	1051	1430	1308	1142
13	Cost B (1-10)	2657	3101	3092	2768
14	Cost C (1-11)	3907	4188	4288	3980

Note: * Earned value of rented land

Table 4. Average returns under different age groups of kinnow orchards

(₹ /acre/ year)

Age of plants	Marginal	Small	Medium	Overall
Up to 10 years	5526	5863	6236	5621
11th to 15th year	6785	6954	7257	6836
Above 15th year	6954	7125	7966	7020
Overall	6562	6774	7385	6632

Economics of Kinnow Production

The benefit-cost ratio (B-C ratio), net present value (NPV), pay-back period and internal rate of return of orchards have been presented in Table 5. Since NPV and B-C ratio are the functions of discount rate, these measures were calculated at 8 per cent, 10 per cent and 12 per cent discount rates.

The NPV at 8 per cent, 10 per cent and 12 per cent discount rates varied from ₹ 14636 to ₹ 22831 per acre, ₹ 10529 to ₹ 16425, ₹ 7468 to ₹ 11649, respectively, depending upon the size of orchards; it indicated that NPV was highest in medium orchards and lowest in marginal orchards. The internal rates of return ranging from 14.75 per cent in marginal orchards to 16.00 per cent in medium orchards indicated that kinnow growing was a profitable enterprise and the average rate of return per year for the whole period of the orchard will be 14.75 per cent for marginal, 15.50 per cent for small and 16.00 per cent for medium orchards. The benefit-cost ratio calculated at cost C ranged from 1.07 in small orchards to 1.65 in marginal and medium orchards, indicating that the marginal and medium orchardists could get ₹ 1.65 for each rupee they invested. The pay-back period ranged from 7.2 years to 7.8 years. These findings are in close conformity with the results of Gangwar and Singh (1998).

Marketing

Four important channels identified for kinnow marketing in the study area include:

Channel-I : Producer → Forwarding/ Commission agent → Retailer → Consumer

Channel-II : Producer → Wholesaler → Retailer → Consumer

Channel-III : Producer → Retailer → Consumer

Channel-IV : Producer → Consumer

The detailed cost of marketing and price spread of kinnow production are given in Tables 6 and 7, respectively. It could be observed from Table 6, that on an average, marketing expenses were maximum in channel-I (₹ 450), followed by channel-II (₹ 375), channel-III (₹ 303) and channel-IV (₹ 223). In the marketing cost, expenditure was highest on

Table 5. Economic viability under different size groups of kinnow orchards

Measures of investment worth	Size of orchards (n=108)			
	0.01 to 2.50 acres	2.51 to 5.00 acres	5.01 to 7.50 acres	Overall
Pay back period (years)	7.5	7.8	7.2	7.6
Net present value (₹)				
At discount rate of 8%	14636	18399	22831	15541
At discount rate of 10%	10529	13237	16425	11180
At discount rate of 12%	7468	9388	11649	7929
Internal rate of return (%)	14.75	15.50	16.00	15.42
Benefit-cost ratio				
At discount rate of 8%	1.88	1.24	1.86	1.73
At discount rate of 10%	1.81	1.16	1.80	1.62
At discount rate of 12%	1.65	1.07	1.65	1.52

Table 6. Channel-wise decomposition of marketing cost components for kinnow in Jammu region

(₹ /q)

Sl. No.	Functionary	Channel – I	Channel – II	Channel – III	Channel – IV
1	Marketing cost incurred by the producer	450	375	303	223
		(93.75)	(80.34)	(94.10)	(100.0)
	i) Picking, filling, etc.	91	91	91	91
		(18.96)	(19.4)	(28.26)	(40.81)
	ii) Depreciation of container	128	124	95	39
	(Tokri/ Crate/ Gunny bags)	(26.67)	(26.50)	(29.50)	(17.49)
	iii) Transportation cost	156	149	106	75
		(32.50)	(31.84)	(32.92)	(33.63)
	iv) Loading/ unloading charges	10	10	10	10
		(2.08)	(2.14)	(3.11)	(4.48)
	v) Miscellaneous charges	3(0.63)	2(0.43)	2(0.62)	8(3.59)
	vi) Commission	63	0	0	0
		(13.13)	(0.0)	(0.0)	(0.0)
2	Marketing cost incurred by the wholesaler	0	61	0	0
		(0.0)	(13.03)	(0.0)	(0.0)
3	Marketing cost incurred by the retailer	30	32	19	0
		(6.25)	(6.84)	(5.90)	(0)
	i) Transportation cost	6	7	0	0
		(1.25)	(1.50)	(0.0)	(0.0)
	ii) Loading/ unloading charges	10	10	5	0
		(2.08)	(2.14)	(1.55)	(0.0)
	iii) Shop/ rehri charges	4	4	4	0
		(0.83)	(0.85)	(1.24)	(0.0)
	iv) Cost of plastic bags	10	10	10	0
		(2.08)	(2.14)	(3.11)	(0.0)
	Total marketing cost (1+2+3)	480	467	322	223

Note: Figures within the parentheses are the percentages of total marketing cost of their respective channels.

transportation, followed by depreciation of container and picking & filling in all the channels. The channel-I also involved a commission of ₹ 63 per quintal. Marketing cost borne by the wholesaler in channel-II was ₹ 61/q, which comprised transportation cost (₹ 51) and loading/ unloading (₹ 10). At the retailers' level, the expenditure was on transportation, loading and unloading, shop/ rehri charges and plastic bags. The total marketing costs incurred by the retailer was ₹ 30, ₹ 32 and ₹ 19 in channels I, II and III, respectively. In channel-IV, the producer had borne the whole marketing cost (₹ 223) as there was no intermediary in this channel and producer sold the produce directly to the consumer. Thus, the total marketing cost involved in marketing of kinnow was ₹ 480, ₹ 467, ₹ 322 and ₹ 223 for channels I, II, III and IV, respectively. These findings are in close conformity with those of Lepeha *et al*. (1993).

The results of the Table 7 for the price spread of kinnow under different marketing channels in the Jammu region indicated that producers' share in consumers' rupee was highest in channel-IV (81%), followed by channel-III (59%), channel-I (50%) and channel-II (45%), which revealed that direct sale in the local market provided a higher share to producer in the consumers' rupee. In this channel (IV), both producers and consumers gained because the net price received by producers was highest and price paid by the consumer was lowest. The margin of the retailer was highest in channel-I (18.75%), followed by channel-III (18.33%) and channel-II (14.92%). The total marketing margin was highest in channel-II due to the

Table 7. Price spread of kinnow under different marketing channels in Jammu region

(₹ /q)

Sl.No.	Particulars	Channel - I	Channel - II	Channel - III	Channel - IV
1.	Net price received by producer	799	747	889	952
2.	Marketing cost incurred by producer	450 (28.13)	375 (22.37)	303 (20.20)	223 (18.98)
3.	Producers' sale price	1249 (78.06)	1122 (66.95)	1192 (79.47)	1175 (100.0)
4.	Marketing cost incurred by wholesaler	0 (0.0)	61 (3.64)	0 (0.0)	0 (0.0)
5.	Marketing loss incurred by wholesaler	0 (0.0)	16 (0.95)	0 (0.0)	0 (0.0)
6.	Margin of wholesaler	0 (0.0)	175 (10.44)	0 (0.0)	0 (0.0)
7.	Wholesalers' sale price/ retailers' purchase price	0 (0.0)	1374 (81.98)	0 (0.0)	0 (0.0)
8.	Marketing cost incurred by retailer	30 (1.88)	32 (1.91)	19 (1.27)	0 (0.0)
9.	Marketing loss incurred by retailer	21 (1.31)	20 (1.19)	14 (0.93)	0 (0.0)
10.	Margin of retailer	300 (18.75)	250 (14.92)	275 (18.33)	0 (0.0)
11.	Retailers' sale price	1600 (100.00)	1676 (100.00)	1500 (100.00)	0 (0.0)
12.	Price paid by consumer	1600 (100.00)	1676 (100.00)	1500 (100.00)	1175 (100.0)
13.	Producers' share in consumers' price	0.50 (50.0)	0.45 (45.0)	0.59 (59.0)	0.81 (81.0)
14.	Total marketing margin	300	425	275	0.00

Note: Figures within the parentheses are the percentages of price paid by consumer

Table 8. Marketing efficiency of different channels for kinnow in Jammu

Particulars	Channel-I	Channel-II	Channel-III	Channel-IV
Net price received by farmer (₹/q)	799	747	889	952
Marketing margin (₹/q)	300	425	275	0
Marketing cost (₹/q)	480	467	322	223
Marketing loss (₹/q)	21	36	14	0.00
Marketing efficiency	1.00	0.80	1.45	4.27

presence of one more intermediary i.e., wholesaler. It was also revealed that as the number of intermediaries decreased, the retailers' sale price also decreases and was lowest in channel-III. The marketing loss incurred by the retailer was ₹ 21/q (1.31%), ₹ 20/q (1.19%) and ₹ 14/q (0.93%) in channels I, II and III, respectively.

The marketing efficiency (Table 8) was found maximum (4.27) when farmer sold his produce directly to consumer. When the fruit was sold through intermediaries, the marketing efficiency was lower — 1.00 in channel-I, 0.80 in channel-II and 1.45 in channel-III. These results are in conformity with those of Ajani (2005) and Ladaniya *et al*. (2005). Further marketing loss was nil/negligible in channel-IV because orchardists sold fruits immediately after harvesting and that too in the nearby market, so loss due to perishability, handling and transportation was almost nil. The producer got

maximum benefits in channel-IV, therefore this channel should be followed to make producer highest beneficiary; although this channel has its own limitations.

Conclusions and Policy Implications

This study has revealed that investment in kinnow orchards is a profitable enterprise for the orchardists of Jammu region. The first year establishment cost of kinnow plantation has been worked out to be ₹ 5298/ acre on overall basis. The total establishment cost on kinnow plantation have been found to be ₹ 12707/acre on overall basis. The returns from kinnow orchards have been found as ₹ 6632/acre/year on overall basis. The IRR, net present value, benefit-cost ratio and payback period of kinnow have been observed to vary from 14.75 per cent to 16.00 per cent, ₹ 7468 to ₹ 11649 per acre, 1.07 to 1.65 and 7.2 to 7.8, respectively, depending on the size of the orchards.

The price spread in marketing of kinnow in Jammu has indicated producers' share (81%) in consumers' rupee to be highest when the produce is sold directly to consumers. Price spread analysis has revealed that different market intermediaries are the major beneficiaries in the marketing channels. However, the marketing efficiency has been found high in channel-IV (4.27), followed by channel-III (1.46), channel- I (1.00) and channel-II (0.80).

The study has worked out that kinnow is a profitable commercial crop with average returns of ₹ 6632/acre/ year against the per year operational cost of ₹ 3980. This will help policy makers and horticultural department to encourage the orchardists for kinnow plantation on a large scale. It is, therefore strongly advocated that production of kinnow in addition to other fruits should be given consideration.

The producer got maximum benefits in channel-IV, therefore this channel should be followed to make producer highest beneficiary; although this channel has its own limitations.

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