An Economic Analysis of Production and Marketing of Kinnow in the State of Rajasthan

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Thesis

Submitted to
Swami Keshwanand Rajasthan Agricultural University, Bikaner
in partial fulfillment of the requirements for
the degree of

Master of Science

in

Agriculture

(Agricultural Economics)

By

Damodar Prasad Meena

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SWAMI KESHWANAND RAJASTHAN AGRICULTURAL UNIVERSITY, BIKANER

S.K.N. COLLEGE OF AGRICULTURE, JOBNER

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Dated: _____2012

This is to certify that this thesis entitled **"An Economic Analysis of Production and Marketing of Kinnow in the State of Rajasthan"** submitted for the degree of **Master of Science** in the subject of **Agricultural Economics** embodies bonafide research work carried-out by **Mr. Damodar Prasad Meena** under my guidance and supervision and that no part of this thesis has been submitted for any other degree. The assistance and help received during the course of investigation have been fully acknowledged. The draft of the thesis was also approved by advisory committee on _____ 2012.

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List of contents

Contd…

Contd…

List of tables

Contd….

List of appendices

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An Economics Analysis of Production and Marketing of Kinnow in the State of Rajasthan

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ABSTRACT

The present investigation was carried out in the Rajasthan to study the economic viability, marketing cost, margins and price-spread in marketing of kinnow. Efforts were also made to know the problems faced by the farmers in production and marketing of kinnow. Sriganganagar district was purposively selected in the study area. The study was conducted in two major kinnow growing tehsils of Sriganganagar district namely Sriganganagar and Srikaranpur. Two villages from each tehsil were selected. Two markets, one large and other small market were selected on the basis of arrival of kinnow in the market. A sample of 80 kinnow cultivators was selected for detailed study. The study relates to the agriculture year 2009-10.

Cost structure revealed by the study shows that the total cost of cultivation of kinnow was estimated as Rs. 48126.24 per hectare with Rs. 2081.68 per hectare per year as establishment cost and Rs. 46044.56 per hectare per year as maintenance cost. Total cost has been estimated to be Rs. 1203156.20 per hectare whereas sum for the stream of gross returns was estimated to be Rs. 2758806 per hectare. Similarly the total net returns and production were estimated to be Rs 1578149.81 and 306534 kg per hectare.

The study of marketing of kinnow revealed that kinnow producers sold their produce through four marketing channels viz., channel-I (Producer - Retailer – Consumer), channel-II (Producer- Wholesaler– Retailer– Consumer), channel-III (Producer - Pre harvest contractor–Wholesaler– Retailer– Consumer) and channel-IV (Producer- Pre harvest contractor – Retailer – Consumer). Among these channels, channel-I was found most important channel for farmers in study area.

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The total marketing cost were Rs. 100.90, 247.85, 280.11 and 132.46 per quintal of kinnow in channel-I, II, III and IV. The items which accounted for a large share in marketing cost were basket and jute palli charges, commission, storage, transportation, mandi fee and value of quantity loss. The producer's share were 71.86, 59.38, 56.58 and 66.23 per cent in channel-I, II, III and IV, respectively.

Result of opinion survey showed that lack of irrigation facilities, marketing, problem of intercultural operations, problems of adverse weather conditions, short supply of labourers, lack of storage facilities, high cost of improved variety seeds, no timely sale of product, high marketing cost, low price of kinnow and fear of thieves and stray animals were the most important problems faced by the farmers.

Chapter – I

INTRODUCTION

Agriculture depends on many factors known as ‘act of god’ over which one has no or very little control. Fruits in human nutrition make balance diet, which tends to the development of sound health and happiness of human beings. Fruits provide vitamins, proteins, minerals like Ca, Fe and P, enzymes and organic acids and therefore, they are considered as protective food. Majority of Indian population is vegetarian and production of fruits is not sufficient to meet the requirements. So, there is a great demand from all the classes of population for fresh fruits and canned fruit products.

India has a wide variety of climate and soils on which a large number of horticultural crops are grown. Fruits vegetables, tropical tubers crops, plantation crops, ornamental plants, medicinal and aromatic plant, species and nut are examples of some of the broad horticultural crop groups grown in India. After attaining independence in 1947, major emphasis was laid by the government of India on achieving self-sufficiency in food production especially on cereals. After green revolution, it was realized that horticulture for which the Indian topography and agro climatic conditions are well suited is one of the ideal activity of achieving income sustainability for small holdings. However, the steps in this direction were started by the Indian government only in mid-eighties for making the agriculture more profitable through efficient utilization of human and natural resources (soils, water

and environment). Today, India is the second largest producer of fruits and vegetables in the world next to China.

Agriculture contribute about 14.2 per cent of the country's GDP and horticulture is an important segment of agriculture in 2010-11. Horticulture contributed nearly 29.5 per cent of the agriculture GDP and 54 per cent of export share in agriculture in 2009-10. It is perhaps the fastest growing sector in agriculture. The economic prosperity brought out by diversification of land from subsistence farming to horticulture resulted in marked changes in the lifestyle and consumption habit of farming community. Consequently, horticulture is set to assume a greater role and importance within the agriculture sector and eventually in the national economy.

Urbanization, changes in life style, growth in economy as well as sizable addition to population increased domestic demand for horticultural products. Recent trade liberalization and substantial increases in investment for horticulture have opened up the prospects for exports as well as the processing industry of fruits and vegetables in the country.

Sriganganagar is in the North-Western plain zone of Rajasthan (zone Ib). It is located between 28.80 to 30.30 North latitude and 72.30 to 75.30 East longitudes. The zone has extreme climatic conditions with scorching summer, cold winter, mild rainy season and dust storms during summer. Frosty winter nights and fog are some of the typical features of weather hazards. The total rainfall in the zone ranged from 185 to 590 mm during the period 1980 to 2010 with the average rainfall of 322 mm per year, 75 per cent of total rainfall is received from June to September. The temperature in the zone fluctuates from as low as 1^0C to as high as 48^0C. The total geographical area of the zone is 20.63 lakh hectares out of which about 74 per cent area is under cultivation. The state of Rajasthan has 30.6 thousand ha area under

fruits, which is 1.95 per cent of the total cultivated area in the state. The quantity of fruit production in the state was 5.01 lakh mt in 2008-09.

Fruits have a great importance in human diet. Fruit production is stated that the standard of living of the people of a country can be judged by its production and per capita consumption. Though India is the second largest producer of fruits (46.60 million tonnes) in the world after china (60 million tonnes), its share in the world fruit production is 10 per cent. Even then, India is unable to cater to the nutritional demands of the ever increasing population. In the present scenario the per capita availability of fruits in the country is 46 gm per day as against 92 gm per day recommended by the ICMR (Indian Council of Medical Research). This may be due to very low productivity and increasing population pressure of the country.

Kinnow is a hybrid between King (citrus nobilis Lourd parent) and Willowleaf (Citrus deliciosa Tenore as ♂ parent) mandarins developed by Dr. H.B. Frost at Citeus Experiment Station, California (USA) in 1915. It was first introduced from virus free budwood and raised on Jatti Khatti (citrus janmbheri) rootstock in 1959 at the PAU Regional Research Station, Abohar under the University of california. It is cultivated in the Punjab, Haryana, lower hills and velly areas of Himachal Pradesh, uttar pradesh, Karnataka (Coorg, Hassan and Chikmangalore district), Kerala (Wynaad and Palghat district), Tamil Nadu (Ootacaund and Madurai districts). In north India, the cultivation of mandarins is limited due to the acidity and puffiness of the fruit. Kinnow has been proved promising in place of mandarins because kinnow has wide adaptability to variable agro-climatic conditions and also comparatively more resistant to insect pests and diseases. Incidence of fruit dropping due to hail storms or other reasons is also comparatively less. Kinnow is usually less prone to bird damage, as almost two thirds of the fruits are known to bear in the interior of the tree.

Kinnow mandarin grows vigoursly. Trees possess dense foliage and lush green in appearance. Kinnow fruit is medium in size and is globosely to oblate in shape. The apex is flattened. The number of segments are 9-10. The axis is semi-hollow. The colour of fruit is attractive shining deep orange at ripening. The peel is thin glossy and also adherent, but can be peeled off easily by hand. Juice is abundant (50%) having good contents of TSS (15%) and sugar (11%) with good flavour. Seeds vary from 14-19 in numbers and are polyembryony.

In Sriganganagar district government agencies like ARS, Additional Director (horticulture) and KVK are engaged in transfer of technical know-how of fruit cultivation. This area has a tremendous potential for orcharding with the present food production scenario of the zone. We may not be able to cater the nutritional demands of ever increasing population. The ray of hope lies in exploring the potential area of the fruit growing and better management of unproductive orchards.

The state of Rajasthan is considered to be the potential area for fruit growing. The fruits like mango, banana, orange, dateplam, ber, grape and guava are grown in various regions of the state. The climatic conditions of state are also suitable for cultivation of these fruits. In Rajasthan, kinnow occupies 5.5 thousand hectare under cultivation and Sriganganagar district is well known for its area and production. Sriganganagar district occupied 4.8 thousand hectare of area under kinnow cultivation in the year 2010-11, which was 86.18 per cent of the total area under kinnow in Rajasthan. The production of kinnow in Sriganganagar was 1.26 lac metric tonnes which was 87 per cent of total production in the state (Krishi Pant Bhawan, Jaipur).

Thus looking to the importance of kinnow in citrus fruits in general and Sriganganagar district in particular, the present

investigation was carried out in Sriganganagar district of Rajasthan'. The specific objectives of the study were as following.

1.1 Objectives

More specially the objectives of the study were:

(i) To work out the economics of kinnow production in the state of Rajasthan.

(ii) To study marketing of kinnow in the state of Rajasthan.

(iii) To study problems in the production and marketing of kinnow in the state of Rajasthan.

1.2 Plan of thesis

The text of this study runs through six chapters including the present one of introduction and objectives of the study. An analytical review of literature is presented in chapter-2. Chapter-3 deals with the methodology adopted, assumptions and limitation realised to achieve the stated objectives. Chapter-4 describes the cultural practices adopted in kinnow cultivation. Chapter-5 deals with the results and discussion of the study. Chapter-6 deals with summary, conclusions and recommendations of the study. Bibliography, abstracts and appendices are given at the end.

Chapter- II

REVIEW OF LITERATURE

The comprehensive review of literature is an essential part of any scientific investigation. Its main functions apart from determining the work done before and assisting in delineation of problem areas, are to provide an insight into the method and procedures adopted by different investigators, suggested changes therein as well as to provide a basis for interpretation of the findings.

Kinnow crop is considered as a perennial crop and the basic idea of its production concerned with review of literature is given below. The review of relevant studies has been presented in a classified way in four sections as follows :

2.1 Economics of kinnow production

2.2 Marketing of kinnow

2.3 Problems in the production and marketing of kinnow

2.1 Economics of kinnow production

Chunni Lal (1991) the study was conducted in Chomu tehsil of Jaipur district. A sample of 30 orchards and 18 market middlemen were selected. The area under mango orchard had been 0.32, 0.64 and 1.15 ha on small, medium and large sized farms, respectively. These accounted 9.7, 10.53 and 17.01 per cent of the total land area. Raising of mango orchards required heavy initial investment. The investment in the first year was 34 per cent of the total establishment cost and remaining 66 per cent had been spread over a period of four years. Mango cultivation is a labour intensive enterprise and the cost of input accounted for more than 25 per cent of the total investment cost. Further, the amount of investment had direct relationship with the size

of orchard. The raising of mango orchards was found to be comparatively more profitable than the field crops as the annual net returns on ha^{-1} of land from the crop rotations were 23.18 to 63.98 per cent less than that from the mango orchards.

Wani et al. (1994) studied the economic viability of apple orchards in Kashmir. A sample of 160 apple growers was drawn randomly from selected villages. In order to find out the economic viability of apple orchards, the samples were collected in such a way that it contained orchards from all years of age. However, orchards of more than 43 years of age also were through exceptionally. The researchers found that the pay back period is 14 years. The net present value was worked out to be Rs. 53417.14 ha^{-1}, benefit cost ratio 2.29 and the internal rate of return 26 per cent. All these measures clearly revealed that the establishment of apple orchards in Kashmir is quite profitable and economically viable.

Chitra et al. (1997) studied the “economics of ber production in and around Hyderabad city of Andhra Pradesh”. The data obtained from 15 farmers during 1994-95, who were selected within 50 km radius around Hyderabad city. They found that the total cost of establishment in the first year was Rs. 7,913 per hectare. The total cost incurred during the maintenance was Rs. 3,483 per hectare. The total cost of production of ber worked out to Rs. 16,737 per hectare. The payback period in ber cultivation was 4.42 years and benefit cost ratio was 5.25, indicating the profitability of ber cultivation. The net present value worked out to Rs. 12,061. The IRR was 73.54 per cent, which was higher than the lending rates of commercial banks. Thus, the economic indicators clearly indicated that the production of ber is economically viable.

Mishra (1998) in his study entitled “Economic analysis of production and marketing of green pea in Jaipur district (Rajasthan)”. It was observed from the study that the average cost cultivation of green pea was Rs. 40652.28 per hectare. This was higher than the competing crops, grown by the farmers in the study area. Among the completing crops, cost of cultivation ranged from Rs. 7189.40 per hectare in taramira to Rs. 21555.24 per hectare in wheat. The cost of production per quintal of green pea was Rs. 404.18. It ranged from Rs. 323.52 for barley to Rs. 806.63 for taramira (competing crops). The cost of production was higher in case of gram, mustard and taramira and lower in wheat and barley as compared to green pea.

Guedgudda et al. (2002) conducted a study on “banana cultivation in Haveri district of Karnataka state”. They observed that the variable cost of cultivation of banana was Rs. 54,502.81 per hectare (65.01 per cent). Among variable cost, the human labour was the major item of cost, which formed 17.61 per cent of the total cost of cultivation. Farmers used more number of labourers for planting, harvesting, weeding and desuckering operations. Next major items of cost incurred by farmers were suckers (Rs. 7,875), fertilizers (Rs. 6,318.94), bullock pair (Rs. 5,775.00) and farmyard manures (Rs. 5,250.00). The farmers incurred on an average Rs. 2,800 on micronutrients. Farmers used less than the recommended level of NPK fertilizers. They used 376.92 kg per hectare of N, 153.80 kg per hectare of P_2O_5 and 398.80 kg per hectare of K_2O, as against the recommended level of 540, 325 and 675 kg of N, P & K per hectare, respectively. The share of fixed cost and marketing cost in total cost was 28.47 per cent and 6.57 per cent, respectively. Among fixed cost the rental value of land constituted more (22.06 %) towards total cost of cultivation of banana. Depreciation accounted for 3.66 per cent and interest on fixed capital and land revenue, respectively contributed 2.69 per cent and 0.31 per cent to

total cost. On an average, farmers got 475 quintals of banana yield. From main product, farmers realised income of Rs. 1,54,375 and by selling of suckers (by product) farmers earned Rs. 30,000. Hence, the gross return from banana cultibation was Rs. 1,84,375 per hectare. The net return realised by farmers was Rs. 1,00,545.96 and the B/C ratio was 2.19:1.

Khunt et al. (2003) studied the “economics of production of pomegranate in Bhavnagar district of Gujarat”. The study revealed that the establishment cost of pomegranate orchard consisted of labour cost, material cost, rent of land, interest and depreciation charges incurred upto bearing stage of orchard i.e. for the period of 1 to 3 years. The results showed that total cost of establishment per hectare amounted to Rs. 39,586. Among the various cost components, the share of material cost was found highest to the tune of 41.05 per cent followed by labour cost (27.71 %), rent of land (24.04 %) and interest on working capital (6.59 %). The share of interest on fixed capital and depreciation was negligible. The total cost incurred per annum was Rs. 43,930 per hectare, which comprised of Rs. 9,592 as amortized cost and Rs. 34,338 as maintenance cost. The average yield per hectare per year was 6,479 kg. which generated the net return of Rs. 15,558 per year.

Mali et al. (2003) worked out the “economics of production of banana in Jalgaon district of Western Maharashtra”. They concluded that the per hectare cost of cultivation (Cost C2) worked out to Rs. 1,33,477.36. The proportion of cost ‘A1’, ‘B1’ and cost ‘C1’ to the total cost was 67.40, 71.34 and 88.11 per cent, respectively. Rental value (16.76 %), human labour (8.58 %), manures (9.54 %), fertilizers (12.49 %) and seed material (12.04 %) were observed to be the major items of cost and these together shared nearly 59.41 per cent of the total cost. Interest on working capital (10.39 %) and irrigation cost (7.93 %)

were other important items of expenditure and they together contributed 18.32 per cent to the total cost of cultivation. The yield per hectare worked out to 533.14 quintals. Relatively better yield was observed on the fields who grown ‘Shrimanti’ variety and adopted a better package of practices. The per hectares gross returns obtained by the cultivators were to the extent of Rs. 2,14,867.24. Hence, the per quintal cost of production came to Rs. 250.36. The per quintal gross price realized was Rs. 369.44 and the net price received by the producer was Rs. 341.89. The per hectare net profit worked out to Rs. 66,761.87.

Lokesh et al. (2004) carried out some investigations on the “economics of cultivation of passion fruit in Karnataka”. The study revealed that the establishment and maintenance cost of passion fruit in planting year (2000-01) was Rs. 71,500, with yield per hectare as 200 quintals in the second year and 250 quintals in the third and subsequent years. Net return per hectare in the third year was worked out as Rs. 81,125. The estimated economic life of passion fruit garden was six years and Net Present Value was Rs. 1,55,395 per hectare yielding a benefit-cost ratio of 2.17 at 15 per cent discount rate and internal rate of return was 67 per cent.

Burhan, Ahmad and Khalid Mustafa (2006) the production of Kinnow has considerably increased during the past years due mainly to an increased demand for the fruit both in the domestic and international markets. Despite greater demand, the potential of Kinnow export was not been fully reaped. Pakistan has comparative advantage in the production of Kinnow and enormous potential exists for its export in the vast Middle East market. The present study was undertaken to estimate the trend in the production of Kinnow and to forecast production of Kinnow. The log lin. model was applied to estimate the past trend in production. ARIMA model was used to forecast the

production of Kinnow for twenty years. The forecast value of production of Kinnow for 2022 - 23 worked out to be 2617.45 thousand tons, which suggest that an increased output of Kinnow would be available for consumption. The paper suggests the need for taking measure to increase export of Kinnow to potential international markets by improving quality, packaging and following the international standards required under various agreements of World Trade Organization (WTO).

Bakhsh et al. (2006) conducted a study on “cost and profitability in growing mango orchards in Pakistan”. Cost of production and returns in growing mango orchard were estimated in different ways compared to annual crops. The study was designed to investigate cost of production and returns per acre over the life time of mango trees. A sample of 20 mango growing farmers was taken purposively from various villages of Multan district. The objective was to work out benefits cost ratio and net present worth of growing mango orchard. Net present worth of Rs. 1,55,607.16 per acre was estimated for the sample respondents which indicated that mango cultivation fetched higher returns whereas benefit/cost ratio was reasonably high (1:2.61). These results indicated that investing in mango orchard would bring huge returns to the farmers on one hand and for the country in the forms of foreign earning on the other hand.

Rane and Bagade (2006) in their study entitled “Economic of production and marketing of Banana in Sindhudurg District of Maharashtra” Banana crop has been useful for diversification of agriculture in Konkan. The less remunerative crop could be replaced by this crop in future. So as to know the production marketing scenario and profitability of banana cultivation in Sindhudrug district was undertaken. The crop was grown as a sole crop in Dodamarg and Swarntwadi tehsil. Therefore, Dodamarg and Sawantwadi tehsils were

selected purposively for this study. The overall sample was consisted of 60 farmers. The data were collected through interview method by filling specially prepared questionnaire for the purpose the data were analysed to draw inferences. The data pertained to the year 2003-04. Average area under banana was 0.82 ha. The marketing channel the existed for city wholesale market was Produce > City market wholesaler > Retailer > Consumer. On an average per bunch marketing cost was Rs. 50.06 in this channel. The producer's share in consumer's rupees in city market and in village market was 63.78 per cent and 78.35 per cent, respectively. The per hectare profit at cost 'C' in Dodamarg and Sawantwadi was Rs. 1.52 lakh and Rs. 1.53 lakh, respectively. In Dodamarg tahsil Banana were grown as a sole crop where per hectare cost of cultivation was Rs. 1.25 lakh and in Sawantwadi the per hectare cost of production was 1.15 lakh. The benefit cost ratio at Dodamarg and Sawantwadi were 2.20 and 2.33 respectively. The average benefit cost of banana cultivation was 2.27. Banana cultivation in Sindhudrug district was profitable therefore area under Banana could increased wherever irrigation facilities were available.

Gondalia and Patel (2007) the economic viability of aonla plantation in Gujarat had been studied through a sample of 120 aonla growers spread over 12 selected villages of the Kheda and Anand districts for the agricultural year 2003-04. It was found that establishment of aonla orchard involves high investment, but the annual net returns were also quite high, after the third year of plantation. The values of economic parameters, viz. NPV, BCR, IRR and PBP had been found to be Rs 652652, 5.25, 65.03 per cent and 55 months, respectively at 10 per cent discount rate. Under varying cost and return situations, values of all these feasibility parameters had satisfied the acceptance rules for the investment proposition. It was

confirmed the economic viability, stability and certainty of investment on aonla orchard. The study had suggested that financial institutions should give credit to aonla producers in the area.

Kalathiya et al. (2007) studied the “cost and return in different size of coconut holding in Valsad district (South Gujrat)”. The study carried out during the year 1996-97 and 1997-98. In all, 50 farmers were selected from 36 villages of six talukas of Valsad district. A size of holding wise analysis of cost of cultivation was done for bearing coconut plantation and it indicated that the cost of investment (including maintenance) was Rs. 7,896.43, Rs. 7,159.37, Rs. 8,220.00 and Rs. 13,413.50 per hectare for marginal, small, medium and large farmers, respectively. The average total cost was also worked out to the tune of Rs. 7365.33/ha and profit Rs. 12,702.97/ha. Input wise cost of cultivation showed that more than 50 per cent of the cost was incurred by manures and fertilizers followed by labours. The lowest yield of 5,317 nuts/ha was observed in medium size and highest yield of 6,446 nuts/ha in marginal size of holding.

Kareemulla et al. (2007) studied the “Production and marketing of Indian Gooseberry- Aonla (Emblica offecinalis Gaertn.) in Pratapgarh district of Uttar Pradesh. Indian Gooseberry cultivation is getting popular in the country. With almost one-third area in Uttar Pradesh, Aonla is spreading to non-traditional areas also because of its adaptability and profitability. Aonla is being grown as an agro-forestry species in combination with the normal cropping pattern in Eastern Uttar Pradesh. The area occupied by aonla has increased from 47329 to 82690 ha. in the reference period at a growth rate of 5.2% and the average productivity increased from 5.7 to 6.5 tonne per ha. The aonla arriavals grew at 21.31% in Pratapgarh APMC with average arrivals of 9017 t with almost seven fold increase in a decade consequently the

price fell from Rs 630 per q to Rs 396 per q in 2001-04. This obviously seems due to higher arrivals of aonla due to area expansion.

Gangwar et al. (2008) conducted a study on the “production constraint and economics of peach (prunus persica (L) Batsch.) in Punjab and Uttarakhand”. The investment in peach orchards was a profitable business. The internal rate of return (IRR) was found to vary from 20.98 percent to 23.80 percent, depending on the size of peach orchards. The net present value, benefit/cost ratio and IRR at 12 percent discount were reported as Rs. 44,807, 1.681 and 22.20 per cent, respectively for the overall category of the orchard. The economic productive life of peach orchard in Punjab and Uttarakhand was worked out to 24 years. The optimum size of peach orchards was above 2.0 ha. It was also observed that the peach orchards were worth retaining as long as they give the income of Rs 5,713 over the maintenance cost.

Naphade and Tingre (2008) worked out the “economics of production of guava in Buldhana District of Maharashtra”. They found that the per hectare cost of establishment of guava orchard was Rs. 34,333. The per hectare cost of production was Rs. 22,522. Per hectare average yield estimated was 372 quintals with a profit of Rs. 82,036 per year. It was found that profit increased with the age of orchard. The input output ratio at cost C was 4.9 and 4.3 for Group-II and Group-III, respectively. The major problems faced by the guava growers were lack of market information, lack of appropriate grader and high market commission.

Sharma et al. (2008) Integration of trees with agricultural crops was an age old practice. However, little information was available regarding quantification of production and profitability of different agroforestry models. Present studies deal with microclimate,

production and economics of agroforestry system integrating kinnow (Citrus reticulata) with wheat (Triticum aestivum) var. PBW 343 and gobhi sarson (Brassica campestris) var. Neelam (HPN-3). Microclimatic conditions improved under the tree-crop combination, however, light interception by kinnow plants was 67.4 to 84.5 per cent revealing that light received by wheat and gobhi sarson under kinnow plants was only 15.5 to 32.6 per of the total sun light. Average yields (q/ha) of wheat (18.68) and gobhi sarson (10.34) under kinnow plants were less in comparison to that of wheat (22.34) and gobhi sarson (12.01) grown in open. However, overall returns from agri-horticulture system were higher in comparison to sole crops. Cultivation of gobhi sarson with kinnow was observed to be more profitable than wheat. The maximum returns per hectare (Rs. 56407.55) were realized under kinnow-gobhi sarson combination.

Chaudhary and Patil (2009) studied the “economics of custard apple production in Akola district of Maharashtra”. The study showed that the total cost of establishment of custard apple orchard was worked out to Rs. 39,615 per hectare. In establishment of orchard, highest share of expenditure was on account of material cost (57.78 %), followed by labour cost (29.77 %). The over all cost of cultivation of custard apple was worked out to Rs. 24,745 per hectare, while it was Rs. 24,743 per hectare and Rs. 25,949 per hectare for group-II and III, respectively. This indicated that per hectare cost of cultivation showed increasing trend with age of orchard. In cost of cultivation, highest share of expenditure was on account of human labour (44.81 %), followed by material cost (21.83 %). The average yield obtained was 64.71 quintals per hectare. The highest gross income, net income and input-output ratio was worked out to Rs. 69,352 per hectare, Rs. 43,673 per hectare and 2.67 in group III, respectively. At overall level input-output ratio was 1.92 per hectare.

Kanaujia et al. (2009) analysed the productivity and profitability of agri-horti system in sub-tropical region at Khadakhar village of district Hamirpur, Utter Pradesh in four year old aonla (Emblica Officinalis G.) orchard. The study revealed that under agri-horti system, the highest net return (Rs. 52,540 per hectare) with high benefit/cost ratio was found in aonla+chickpea, followed by aonla+wheat (Rs. 43,440 per hectare) and the lowest under aonla+mustard (Rs. 41,444 per hectare) cropping system in third fruiting year. During first and second fruiting year, the profitability from aonla and associated crops was lesser than sole crops due to poor yield of aonla but during third year, economics of agri-horti system was rapidly improved due to very high yield of aonla.

Sharma et al. (2010) studied on “Production and marketing of walnut in Budgam district of Jammu and Kashmir. The present study was undertaken to examine the production of walnut and to assess share of producer in consumer’s price. Maximum producer’s share was received while walnut sale was done through retailers directly by the quantum moved by the channel was only 10 per cent of total produce. Producer’s share was significantly reduced when the produce sold through those channels in which number of middle man involved was large. The high marketing cost was associated with the poor market infrastructure in terms of storage, transport, grading and processing facilities. It was observed that significant price spreads exist which indicate the potential to enhance the walnut growers income. A majority of farmers were reported about the lack of market information in time as well as about the numbers of processing unit to earn the global economy through golden revolution.

Rauf et al. (2011) studied on “Economics of production and marketing of apple in Himachal Pradesh and Jammu and Kashmir – A comparative study”. present study was conducted in Kullu district of

Himachal Pradesh and Baramulla district of Jammu and Kashmir due to higher concentration of area under apple cultivation in these areas. MVP-MFC ratio revealed that, on average situation human labour and plant protection chemicals were being used efficiently by orchardists in both the states. However, there exists a scope for increasing the levels of manures and fertilizers, expenditure on fixed assets and irrigation since currently they were used sub-optimally on the sampled orchards of Himachal Pradesh. In Jammu and Kashmir sample orchards, however, manures and fertilizers, fixed assets and irrigation revealed significant inefficiencies. Marketing aspect indicated that channel – A (Producer- Pre-harvest contractor – Commission agent – Retailers – Consumer) was patronized by about 11 per cent of the sample orchardists in Himachal Pradesh and more than 17 per cent growers in Jammu and Kashmir. Channel- C (Producer-commission agent – wholesaler –retailers – consumer) is largest channel through which 56 per cent of produce in HP and 64 per cent in J and K is routed. This channel was found most popular among apple producers both the study regions.

2.2 To study the marketing of kinnow

Toor and Poonia (1995) conducted a study on “Marketable surplus and price spread in the marketing of kinnow in Hoshiarpur district of the Punjab state.” The study was taken up during 1990-91. It was found that the large farmers per cent contributed the major part of the product i.e. about 58 and the small and medium farmers together shared rest of the production. The average marketable surplus on small, medium and large farms worked out at 96.34 per cent, 97.72 per cent and 98.70 per cent, respectively of total kinnow production. The pre-harvest contract system was pre-dominant method of marketing kinnow fruits and about 70 per cent of the marketable surplus were sold through this system. The producer received maximum share of the

consumer rupee (50.86 per cent) by selling the produce of Punjab agro-industries corporation.

Satihal and Hiremath (1995) in their study entitled “Price Spread and Marketing Margins for Ber in Karnataka : A Spatial Analysis” examined the marketing channels and ascertained the share of producer and the margins of intermediaries involved in the case of ber fruits in the three important markets, viz.; Bijapur, Hubli and Banglore of Karnataka state. Only one marketing channel was observed in all the three markets viz., producer–commission agent cum wholesaler–retailer–consumers. The producer’s share in the consumer's rupee was the highest in Bijapur market (58.82 per cent) followed by Hubli (49.33 per cent) and Banglore market (48.11 per cent) in spite of receipt of lower net prices of Rs. 487.92 q^{-1} by the producers in Bijapur market as compared to Rs. 505.65 and Rs. 553.27 q^{-1} received by the producer in Hubli and Banglore markets, respectively.

Maurya et al. (1995) revealed that in q^{-1} guava marketing, marketing cost come to Rs. 124.50 of which Rs. 6350 was borne by the contractors, Rs. 35.5 by wholesalers and Rs. 25.50 by retailers. Transportation cost contributed maximum to the total marketing cost (32.13 per cent). The processing cost q-1 in making guava jelly was worked out to Rs. 2755.25. Sugar contributed maximum in the processing cost (36.29 per cent) followed by packing, labour, row materials and over head costs. The producer’s share in the consumer’s rupee was very low being only 48.75 per cent. The guava grower’s get only 8.81 per cent share in the price paid by the consumer.

Singh et al. (1997) studied the “cost structure and economic potentials of horticultural crops in district Farrukhabad, Utter Pradesh”. The study revealed that the cost structure of different enterprises showed a great variation on account of their input requirements. In the

case of horticultural crops like guava the cost per hectare per annum worked out to Rs. 11,667, for mango Rs. 13,255 and for roses Rs. 14,205 (average for the first three years). In all the three crops human labour accounted for the highest share (nearly 27 per cent) in their respective total cost. In the case of potato and vegetable crops group, the per hectare cost (C) was worked out to Rs. 25,920 and Rs. 8,110, respectively.

Pujari (1998) conducted a study on “Marketing of pomegranate and ber in Maharastra”. He concluded the cultivation of pomegranate and ber covered full the working, capital, managerial and marketing costs and in addition, provided considerably higher than 20 per cent surplus over and above the aggregate cost of production. As such, growing of pomegranate and her has been quite a lucrative activity for the farmers in the drought prone areas.

Singh et al. (1999) analysed the “Price spread in marketing of mango in district Samastipur, Bihar”. The study revealed that generally, the mango produced in the project area is either sold at distant markets through pre harvest contractor or it is marketed through wholesaler in the local markets. The analysis further revealed that the producer’s share in the consumer’s rupee varied between 43.17 to 62.20 per cent in the identified channels and the rest 36.80 to 56.83 per cent was absorbed in meeting out the various costs and margins of marketing. The analysis also indicated that expenses on transportation accounted between 27.98 to 48.62 per cent of the total marketing cost in the identified channels followed by cost on packaging boxes and plucking charges. It further revealed that retailers obtained highest margin followed by pre-harvest contractors and wholesalers in the identified channels of marketing. The study concluded that the mango marketing in the project area is highly disorganized resulting in immense loss to the mango growers and suggested that proper facility and

transportation be created and the producer – farmers be encouraged to market their produce themselves to earn economic returns for their produce.

Tripathi and Sharma (1999) conducted a study in Uttar Pradesh hills with objective to “Examine the Existing Marketing System of Apple”. The system of marketing of apple included, picking, assembling, grading, packing and transportation. Picking was generally done manually. The average charges paid for picking, assembling, grading, packing and stitching were Rs, 13.47 for 18 kg wooden box and Rs. 13.29 for 60 kg gunny bagged fruits. The transportation was done only through road in the study area. The average freight from the forwarding point to the mandi was Rs. 5.23 and Rs, 14.17 per box and per bag.

Gandhi and Namboodiri (2004) the study seeks to examine different aspects of their marketing, focusing particularly, on the wholesale markets for fruits and vegetables which had been established to overcome deficiencies and improve the marketing efficiency. Results indicate that in Ahmedabad the direct contact between commission agents and farmers was very low. For vegetables this was 50 percent and for fruits only 31 percent. Further, in the system of transaction, secret bidding and simple transaction dominate and open auction was relatively rare. In KFWVM, Chennai, the wholesalers act as commission agents and receive consignments directly from producing centers through agents or producers. By and large the system of transaction remains traditional and open auction was rarely seen. This is one major reason for poor efficiency. However, in the small AUS market in Chennai, the farmers sell directly to consumers. The share of farmers in the consumer rupee in Ahmedabad was 41.1 to 69.3 percent for vegetables and 25.5 to 53.2 percent for fruits. In Chennai KFWVM, the farmers share was 40.4 to

61.4 percent for vegetables and, 40.7 to 67.6 percent for fruits. In the small AUS market in Chennai, where the farmers sell directly to the consumers, the share of farmers was as high as 85 to 95.4 percent for vegetables. This indicates that if there were few or no middlemen, the farmers' share could be much higher. In the Kolkata market the share of farmers ranged from 45.9 to 60.94 percent for vegetables and 55.8 to 82.3 percent for fruits. Thus, the shares are frequently very low, but somewhat better in Chennai, lower in Kolkata and even lower in Ahmedabad. The margin as a percentage of farmer-consumer price difference (an efficiency measure) shows that in Ahmedabad, the margins were very high and range from 69 to 94 percent. In Chennai they range from 15 to 69 percent, and in Kolkata they range from 46 to 73 percent. The high percentage of margin to farmer-consumer price difference was indicative of large inefficiencies and relatively poor marketing efficiency. There is great need to improve the marketing of fruits and vegetables. One important measure would be to bring more markets under regulation and supervision of a well-represented market committee. Another measure would be the promotion and perhaps enforcement of open auctions in the markets. Yet another measure could be efforts to bring more buyers and sellers into the markets, bringing them closer to perfect markets. The direct participation of farmers should be increased. Market infrastructure should be improved through storage (go-down) facilities, cold storages, loading and weighing facilities. Improvement in the road network, and cold-chain facilities were also of substantial importance. Greater transparency of the operations through supervision and systems can also help substantially. The market integration and efficiency can also be improved by making up-to-date market information available to all participants through various means, including a good market information systems, internet and good telecommunications facilities at the markets.

Gangwar et al. (2005) studied “An economic evaluation of kinnow mandarin cultivation in Punjab”. This study has evaluated the economics of production in kinnow cultivation in Punjab. This study has revealed that investment in kinnow orchards is a profitable business from the producer’s point of view. The internal rate of return varying from 22.41 to 25.65 per cent, depending upon the size of orchards. The internal rate of return was 24.48 at the 12 per cent discount rate. The net present value worked out as Rs. 1,10803 and the benefit cost ratio as 1.435 at the 12 per cent discount rate. The economic productive life of kinnow orchards is 25 years. The results obtained that the kinnow trees are worth retaining as long as they give an income of Rs. 13,877 over maintenance cost. Regarding the method of economic appraisal of investment in kinnow orchards, the annual amortization method seems to be preferable because of its simplicity, equal efficiency and closeness to real situation to fulfill the objective of citrus fruit production, priority should be given to the establishment of kinnow waxing, grading and packaging plants in Punjab.

Radha et al. (2006) conducted a study to analyse the economics of production and marketing of grape in Andhra Pradesh, specifically the study sought to (i) analyse the cost of establishing a grape orchard (ii) estimates the cost of producing grapes (iii) identify the marketing channels and efficiency as well as the price spread of grape and (iv) to study the profitability of grape production. The data were collected during 1998-99 from 126 farmers from Ranga Reddy district. Results showed that the cost of establishing a grape orchard was Rs. 316174/ha. In the total production cost of Rs. 176503/ha direct cost incurred by applying manures and fertilizers (Rs. 20768/ha) and fixed cost due to renting land (Rs. 92956/ha) contributed major shares of 11.76 and 52.66%, respectively. Among the three channels identified for marketing of grapes, Channel I (producer – commission agent –

retailer – consumer) was the most popular. However, the most efficient marketing channel was channel II (producer / grape growers association consumer) with 7.45 efficiency, followed by channel III (producer – retailer – consumer) with 6.65 efficiency and channel I with 2.85 efficiency. All the parameters of profitability : pay back period (1.35 years), cost benefit ratio (1:1.45), net present value at 15% (Rs 143804) and internal rate of returns (49.45%), measures were positive, which indicated that economic viability of a grape orchard for 50 years.

Saraswat et al. (2006) studied the production of peach fruit in Rajgarh area of district Sirmour in Himachal Pradesh. The study revealed that the average maintenance cost of peach orchard was worked out to Rs. 65,227 in which per hectare fixed cost was Rs. 43,299 and variable cost was Rs. 21,928. The higher fixed cost was due to higher prorated establishment cost. Peach production was found to be economically viable on all size of farms. Overall per hectare net return were worked out to Rs. 8558, which were Rs. 2347, Rs 6117 and Rs 12734 on marginal, small and medium size of farms, respectively.

Gondalia and Patel (2007) studied “Marketing of Aonla (Emblica officnalis) in Gujarat”. The present investigation was undertaken in Gujarat with a view to study the disposal pattern, marketing cost and marketing efficiency in aonla marketing. A sample of 120 aonla growers as well as wholesalers and retailers were randomly selected from Kheda and Anand districts. The results revealed that among the various marketing channels, channel-I (Producers – wholesalers – retailers – consumers) was the most popular among the farmers as about 91 per cent aonla was marketed through this channel. The gross price received by growers was Rs. 1147.15 per quintal (64.04 % of retail price). The total marketing cost incurred by aonla growers amounted to Rs. 103.45 per quintal. The total expenses incurred by

wholesaler came to Rs. 80.28 per cent quintal. The net realisation of wholesaler was found to be Rs. 196.39 per quintal. The total expenses incurred by retailers was Rs. 56.64 per quintal. The net realisation of retailers was Rs. 310.94 per quintal. In total, marketing costs and marketing margins came to Rs. 240.37 and Rs. 507.33 per quintal respectively. The producer's share in consumer's rupee was 58.26 per cent. This implies that aonla marketing system has been working at reasonable efficiency looking to the perishable nature of the crop. Thus, there is a scope to reduce the marketing costs and margins of intermediaries by establishing aonla growers co-operatives in this region along with adoption of suitable regulatory measures.

Anchal and Sharma (2009) conducted a study was "Price spread of litchi in Punjab". The present study was undertaken in Gurdaspur district of Punjab with a view to examine various marketing channels and price spreads of litchi in the study area. The primary data from 40 litchi growing farmers have been collected from two randomly selected blocks. The results of the study showed that the producer revived the maximum share in the consumers rupee whereas the consumer paid the minimum price when the litchi was sold as well bought in the local market. The margins of the middlemen between producer and consumer was found to be at the tune of Rs. 255.80 in the channel producer –retailer – consumer in local market, Rs. 524.80 in the channel of producer – pre-harvest contractor –retailer – consumer in Amritsar market and Rs. 910.49 per quintal in the channel producer – pre-harvest contractor- retailer – consumer in Delhi market. This increase in the margins of middlemen and costs of litchi per quintal led to the higher price spread in the marketing of litchi form local to Amritsar and further to Delhi market. Thus from the economic point of view the local market was the most suitable channel in respect to litchi growers of Punjab.

Karutagi et al. (2009) studied on marketing of Sapota in Northern Karnataka. Present study was conducted in Belgaum and Dharwad districts of Northern Karnataka due to higher concentration of area under sapota cultivation. From both the districts as a whole ten commission agent – cum – wholesalers and ten retailers were selected for the study with the objectives to identify the marketing channels, to workout marketing cost and price spread as well as to identify constraints in sapota marketing. Two marketing channel namely channel I: Producer – commission agent – retailer – consumer; and channel II : producer – pre-harvest contractor – cum-wholesaler-retailer – consumer were found. Major items of marketing cost incurred by producers was commission charges @ 10 per cent of the value constituting more than 52 per cent of the total marketing cost. Sapoto was a non-notified commodity. Producer's share in consumer's rupee in channel I was higher (59.58%) than in the channel II (48.14%). Similarly, price spread in channel I was less (26.32%) compared to channel II (42.11%). Major marketing problems were higher commission charges, lack of nearest markets and lack of storage facilities.

Kaur and Singh (2010) conducted a study on "Marketing of kinnow in Sri Ganganagar district of Rajasthan state. The study deals with evaluation of various aspects of marketing of kinnow in the Sri Ganganganar district of Rajasthan state. The main focus of this study is to comprehensively compare the economic efficiency of different marketing channels especially in terms of producer's share in consumer rupee in domestic market. The kinnow orchardists were seen to market their produce either through pre-harvest contractor in wholesale markets or through commission agents or directly to the wholesaler or retailer. The per quintal total marketing cost was estimated to be highest when the produce was sold through

commission agent to wholesaler in the wholesale market compared to produce sold through other marketing channels. As for producer's share in consumer rupee, the average category of kinnow orchardists had an overall average of 61.71 per cent share in the consumer rupee in the domestic market. Channel III (producer – retailer – consumer) was the best channel for local marketing where as channel I (producer – pre-harvest contractor – wholesaler – retailers – consumer) was found to be the best channel from consumer's point of view. An improvement in the efficiency of marketing system encompassing kinnow was suggested in this study.

Kurkute et al. (2010) studied on "Marketing of banana in Pune district of Maharashtra" An attempt has been made to identify the channel and to estimate the marketing cost, market margins and price spread, trends in arrivals and prices in major markets in marketing of banana in Junnar tehsil of Pune district. The time series data on monthly arrivals and prices of banana from Mumbai and Pune markets for the period of 15 years (i.e. 1991-92 to 2005-06) were collected from the office of respective APMCs. Besides, 24 market intermediaries were also interviewed. The per quintal marketing cost was higher in Mumbai market (Rs 135.80) and in channel I (Rs 117.61). The producer's share in consumer's rupee was higher in Junnar market (51.13%). Across channels, Channel II had relatively higher share (46.50%). The seasonal indices of arrivals and prices of banana in Mumbai market are higher during July to January, whereas, February to June are characterized by low prices with low arrivals. In Pune market, higher arrivals with low prices was during August to January and vice- versa during the month February to July. There was significant growth in prices in both Pune and Mumbai market. But significant increase in arrivals was seen only in Pune market during the fifteen years period. In order to take advantage of higher prices the

banana growers should sell their produce during March to August in Pune market and August to December in Mumbai market by adjusting their planting time.

Kumar and Singh (2010) studied “Price spread of mango in Lucknow district of Uttar Pradesh”. Data were collected from different marketing channels of mango marketing which were identified by observing the flow of mango from producers to ultimate consumers. The charges borne by the pre-harvest contractor in channel 1, 2 and 3 was Rs. 303 and in channel 4 was 209. In channel 1 and 3 the per quintal expense on transportation, loading and unloading and mandi charges of the wholesaler were Rs. 235.60 and Rs. 85.60. The total expenses made by the retailers (on transportation, loading and unloading and mandi charges) were Rs. 47.50, 35.00, 32.00 and 22.00 in channel 1, 2, 4 and 3, respectively. The margin of pre-harvest contractor in consumer’s rupee was the highest at Rs. 131.44 /q (7.73 per cent) in channel 4. The margin of the commission agent for their service was Rs. 46.30 (2.28 per cent) and Rs. 52.30 (3.11 per cent) per quintal in the channel first and second respectively. The margin of the retailer was the highest in channel 4 (Rs. 447.80/ q). The purchase price of the consumer was the highest (Rs. 2029.46) in channel 1.The total marketing cost was the highest in channel-1(Rs. 597.00/q) and the lowest in channel 4 (Rs. 241.00/q) The percentage share of the total marketing margin was also worked out to be highest in channel 4 (34 per cent). The profit margin of the functionaries also affect the producer’s share in consumer rupee which was inversely related to each other.

Bhat et al. (2011) studied the “Economic appraisal of kinnow production and its marketing under North-Western Himalayan region of Jammu”. 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 Rs. 5298, while its total establishment costs has been found as Rs. 12707. The overall per acre per year returns from kinnow orchards have been worked out to be Rs. 6632. The overall economic viability of the kinnow fruits, mainly net present value, internal rate of return, benefit- cost ratio and payback period have been computed as Rs. 7929, 15.42 per cent, 1.52 and 7.6 years, respectively. The average per quintal marketing cost at producer's level has been found to vary to the extent of Rs. 450, Rs. 375, Rs. 303 and Rs. 223 for channels I, II, III and IV, respectively. The average per quintal marketing cost borne by the wholesaler in channel II was Rs. 61, while as it was Rs. 30, Rs. 32 and Rs. 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 producer's share in consumer's 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.

2.3 Problems in the production and marketing of kinnow

Putto and Razdan (1989) studied the "constraints in the production of walnut in India". The constraints that account for the productivity and quality of walnut in India can grouped as: 1. Production constraints, 2. Protection constraints, 3. Processing constraints. The constraints related with low production was that non-availability of suitable root stocks, superior walnut strains and their multiplication, lack of standard propagation techniques, inadequate knowledge about the cultural practices, manuring, fertilization and pollination, etc. Problems with protection was that of non-availability of proper plant

protection machinery, non-availability of water, provision of irrigation and carrying out plant protection measures need water, non-availability of suitable granular systemic insecticides or fungicides, gaps in knowledge about the biology of important pest and disease of walnut. At last the constraints associated with the processing comprised with lack of knowledge about the proper stage of maturity on tree, proper methods of bleaching and removing of stain from walnut shell and non-remunerative usage of walnut shells, hulls and other by products, adds to the low returns.

Sikka and Swarup (1989) conducted a study on the “economics of fruit production in Himachal Pradesh”. They observed certain specific problems in fruit marketing. These problems started with grading and packing. The labour and materials were not available in time at desired place at reasonable price. The inputs were also not available on credit. The farmers reported that they had no storage facility at all and hence fruit cannot be retained even for short duration. Farmers also faced many problems during transportation such as vehicles were not available in time, absence of link roads and high cost of transportations. The farmers also reported that they received late information of prices and supplies, etc. The coverage of such information were very limited. While marketing the produce, the commission agent generally quoted lower than actual prices and deducted undue charges. Thus, the orchardists of Himachal Pradesh faced lot of problems in marketing their stone fruits and pears. The authors suggested that the net returns of farmers could be increased by efficient marketing system.

Bhogal (1994) in his study entitled “Apple Marketing in Uttar Pradesh – Channels, Margins and Problems”. The data pertains to year 1986-87. The study explained 7 marketing channels. The most prevalent marketing channels in apple trade were channel–V

(producer–commission agent cum wholesaler-retailer in distant market-consumer in distant market) and channel–VI (producer–local agent of wholesaler–wholesaler in distant market–retailer in distant market–consumer in distant market) contributing 37.95 per cent and 29.96 per cent, respectively in the marketing of produce, market respectively. The maximum margin (85.91 per cent price) for producer was observed under channel–I for table purpose variety as there is no market intermediaries. Next to channel–I is Channel–VI which provide maximum net margin to the producer amounting Rs. 39.12 per half case i.e. 61.52 per cent of wholesaler price. The marketing expenses incurred per half case by the producer in these channels were Rs. 8.62 for channel–I, Rs. 14.74 for channel–II, Rs. 15.26 for channel–V and Rs. 24.47 for channel–VI. Net margin of the producer per half case was also maximum in channel–I and next in order was channel–VI.

Atibudhi H.N. (1997) conducted a study on the constraints associated to horticultural development in Orissa and identified constraints such as non-availability of planting material, lack of marketing support and price incentives in the producing areas, poor management, non-adoption of package of practices recommended and shortage of disease free planting materials. The study emphasized the need for replacement of very old fruit trees with new ones, adoption of improved cultivars from consumer's point of view.

Rani et al. (1997) studied the "problems associated with pineapple production in Andhra Pradesh". The main problem identified was that of non-availability of good variety of pineapple suckers as expressed by 74 per cent of the sample farmers. Presence of excess calcium content in the soils of the study area was a problem as expressed by all the selected farmers. Coming to the credit aspect, cent per cent of the farmers were denied to the opportunity of availing the institutional credit, as the loan for this fruit crop was not included in

the list of crop enterprises for which loans were advanced. Consequently the farmers were solely dependent on private tenders with whom the rate of interest was very high. Lack of technical know-how on pineapple cultivation and maintenance of hedgehogs were another problems complained by 85 per cent of the sample farmers.

Singh et al. (1997) studied the “prospects of fruits cultivation in canal command area of Bikaner, Rajasthan”. They revealed constraints faced by the farmers in regard to the cultivation of fruit crops such as problems relating to soil salinity, technical know-how, post-harvest handling, marketing and financial assistance.

Sivanathan and Jahanmohan (1999) in their study entitled “Constraints in Banana Marketing: A Study in Cauvery Delta Zone of Tamil Nadu”. Conducted a study on banana marketing in Cauvery Delta Zone of Tamil Nadu and concluded that the practice of opting pre-harvest contractors at the time of 50 per cent of maturity of the crop was commonly prevalent in the study area. The prime constraint in banana marketing was wide fluctuation (400 percent) in price of banana. Non institutial agencies and their marketing practices were ranked as a second constraints Banana market. Deduction of two bunches per 100 harvested bunches as profit bunches, bombing two small bunches as one bunch during price fixation, non-harvest of small size bunches and delay of balance amount after harvest were some of market practices followed by the pre-harvest contractors. Violation of contract i.e. abandoning the harvest at the time of price slump was not uncommon and these practices inflicted heavy loss to the farmers. Non-availability of any intuitional agency for processing, perishability of banana and non-availability of any viable preservation or storage method and non-existence of any institutional marketing agency like regulated market for Banana, cooperative Banana marketing agency

and farmer's association were other constraints in marketing of banana.

Guledgudda et al. (2002) conducted a study on banana cultivation in Haveri district of Karnataka state and identified the problems faced during production were lack of technical know-how, lack of adequate credit facility, scarcity of water etc. The farmers in the study area also expressed marketing problems like involvement of intermediaries, lack of storage facilities and inadequate transportation.

Khunt et al. (2003) studied the "economics of production of pomegranate in Bhavnagar district of Gujarat". The study revealed that the problem of might in pomegranate was the most severe problem felt by majority of growers (88.46 per cent). About 86 per cent of the growers faced the problem of dying of young plant. Inadequacy of irrigation water was felt by 80.77 per cent of total growers. About 75 per cent growers faced the problem of poor quality water. Short supply of electricity was also felt by 63.46 per cent growers. About 23.08 per cent growers have experienced that prices they received were not remunerative.

Mali et al. (2003) studied the "economics of production of banana in Jalgaon district in Western Maharashtra". They observed that the banana growers were exploited especially in harvesting season for transplanting the bunches from field to road by demanding higher charges. The cultivation of banana was highly capital intensive and presently the primary agricultural co-operative credit society was not giving the crop loan in time as per requirement. As a result the banana growers have to depend for external assistance from private traders and commission agents. The grade wise loading of wagons was not followed by the co-operative fruit marketing societies. As a

result all produce was valued at an average rate ignoring the higher price for quality grade.

Sreenivasa Murthy (2007) explicit evaluation of the post-harvest losses at different stages of marketing and their impact on farmer's net price, marketing costs, margins and efficiency had been presented. It was found that the existing method tend to overstate the farmers net price and marketing margins of intermediaries. In fact, the margin of the retailers after taking into account the physical loss during retailing had found to be negative (loss), which otherwise, was positive (profit) in the conventional estimation. Similarly, the producers net share and wholesalers margins also decrease substantially. It had been shown that marketing efficiency was inversely proportional to the marketing losses. The co-operative marketing had been found to be a more efficient system in terms of both operations and price. Marketing cost had been identified as the major constraint in the wholesale marketing channel and bringing down the costs, particularly the commission charges as demonstrated in the co-operative channel, would help in reducing the price-spread and increasing the producers margin. The need for specialized transport vehicles for perishable commodities had been highlighted.

Gangwar et al. (2007) this studied undertaken in Punjab on kinnow mandarin had suggested to include marketing loss in the estimation of marketing margins, price spread and efficiency and was used a modified formula for it. It had been observed that a majority of kinnow producers sell their orchards to the pre-harvest contractors/ traders at different stages. The aggregate post-harvest losses from orchards to consumers in kinnow in two different markets range from 14.87 per cent in Delhi market to 21.91 per cent in Bangalore market. It has indicated the necessity of establishing kinnow processing industries for development of value-added ready-to-serve (RTS) quality

products, minimizing post-harvest losses and providing remunerative price to the producers. The results had emphasized that efforts should be made to adopt improved packaging techniques, cushioning material and cold storage facilities at the retail level. The producer share in consumer price as estimated by old method had been found higher in local market than Bangalore and Delhi markets, largely because of lower marketing costs and profit margins of traders. The inclusion of marketing loss in the estimation of marketing margins, price spread and efficiency has indicated that the old estimation method unduly over-states the farmer's net price and profit margins to the market middlemen. It was appropriate to use modified method for the estimation of marketing margins and price spread.

Chapter- III

METHODOLOGY

In this chapter, attempt has been made to describe the methodology adopted for the study viz., Selection of district, tehsil, farmers and market functionaries, method of data collection and techniques used for the analysis of the collected data. This chapter is divided in following sub-heads.

3.1 Sampling framework

3.2 Collection of data and

3.3 Analysis of data

3.1 Sampling framework

3.1.1 Selection of study area

For the present study, Sriganganagar district of Rajasthan was selected purposively as it ranked first in area and production of kinnow in the state. Besides, the researcher had the advantage of acquaintance in the study area. The district wise area and production of kinnow in the state are given in table 3.1.1.1.

Table 3.1 Area, Production and Productivity of Kinnow in various District of Rajasthan (2009-10)

District	Area (ha.)	Production (mt)	Productivity (mt/ha.)
Sriganganagar	5490.00	136689.00	24.89781
Hanumangarh	969.00	17573.00	18.13519
Bikaner	45.00	816.0836	18.13519
Alwer	2.00	28.3	14.15
Rajasthan state	6506.00	155106.4	23.84051

Source: Krishi Pant Bhawan

3.1.2 Selection of tehsil

Sriganganagar district consists of 8 tehsils (Sriganganagar, Srikaranpur, Padampur, Sadhulsahar, Suratgarh, Raisinghnagar, Anupgarh and Garsana). Out of these, two tehsils namely, Sriganganagar and Srikaranpur were selected purposively, because these two tehsils were first and second in both area and production of kinnow and hence better all representative of the kinnow production.

Table 3.2 Area and Production of Kinnow in different Tehsils of Sriganganagar District (2009-10)

Tehsil	**Area (ha.)**	**Production (mt)**
Sriganganagar	2268	56468.24
Srikaranpur	1622	40384.25
Padampur	356	8863.622
Sadhulsahar	318	7917.505
Suratgarh	312	7768.118
Raisinghnagar	245	6099.964
Anupgarh	204	5079.154
Garsana	165	4108.139

3.1.3 Selection of villages

A list of villages belonging to the selected tehsils were prepared along with area under kinnow in each village. On the basis of highest area under kinnow. Four villages, two from each selected tehsils were selected randomly i.e. baktana and

mirjevala in Sriganganagar tehsil, kesrisinghpur and lakhima in srikaranpur tehsil.

3.1.4 Selection of markets

Two markets, one large and another small market were selected on the basis of arrival of kinnow in the market. The large market with highest arrival of kinnow was Sriganganagar and the small market having low arrival of kinnow was Srikaranpur .

3.1.5 Selection of Kinnow growers

In the selected villages, a complete enumeration of kinnow orchards along with area under kinnow was done. These orchards were pooled and arranged in ascending order of area under kinnow the cumulative total method was used in order to divide them into different size groups i.e. small, medium and large. The orchardists from the top of the list accounting for one-third of the total cultivated under kinnow were termed as small orchardists. The farmers from the middle of the list accounting for next one-third of the total area were termed as the large orchardists. The size group classification of orchardists is presented in table 3.1.5.1

Table 3.3 Classification of Orchardists into Different Size Holdings

Category	Size holding (ha.)
Small	Up to 3.75
Medium	3.76 to 7.50
Large	7.51 and above

A sample of 80 orchards was drawn with proportional to number of orchards in each size group. Table 3.1.5.2 shows the distribution of total number of orchardists of different size groups and selected orchardists from each tehsil.

Table 3.4 Village wise distribution of kinnow growers in Sriganganagar district.

Tehsil	Villages	Farm size			Total
		Small	Medium	Large	
Sriganganagar	Baktana	5	8	7	20
	Mirjevala	9	6	5	20
Srikaranpur	kesrisinghpur	8	4	8	20
	Lakhima	9	6	5	20
Total		**31**	**24**	**25**	**80**

3.2 Collection of data

Both primary and secondary data were used in the study. Primary data were collected through personal interview with the help of a set of specially developed schedules for the purpose. Information regarding marketable and marketed surplus, method of disposal, price received and cost incurred in marketing and margins received were collected from orchardists and intermediaries. Secondary data were collected from the Vital Horticulture Statistics published by Directorate of Economics and Statistics, Pant Krishi Bhawan, Jaipur, District records of the Sriganganagar and market records of the selected market etc.

3.3 Analysis of data

3.3.1 Economics of kinnow

(i) Payback period

It means the length of time required to recover the initial outlay. In this study investment does not give a uniform annual return. Therefore, the computation of payback period was done with the help of annual returns. The annual returns or cash inflows were cumulated and the time by which cash inflows equal to the investment was recovered was the payback period of the kinnow cultivation.

$$P = \frac{I}{E}$$

Where

P = Payback period of the project in years

I = Investment of the project in rupees

E = Annual net cash revenue in rupee

(ii) Benefit cost ratio (BCR)

It measures the returns or benefits per unit cost of investment. It is the ratio of the discounted value of all cash inflows to the discounted value of all cash outflows.

$$BCR = \sum_{i=1}^{n} \frac{Bn}{(1+i)^n} \Big/ \sum_{i=1}^{n} \frac{Cn}{(1+i)^n}$$

Where

BCR = Benefit cost ratio

i = Rate of interest used for discounting

C_n = Cost in the year n

Bn = Benefit in the year n.

n = 1, 2, 3, 4 …….n

(iii) Net present worth (NPW) also called/net present value

It is the present value of all cash associated with the investment including the outlay.

$$NPW = \sum_{i=1}^{n} \frac{Bn - Cn}{(1+i)^n}$$

Where

NPW = Net present worth

i = Rate of interest used for the discounting

Bn = Benefit in the year

Cn = Cost in the n^{th} year

n = 1, 2, 3, 4 …….n

(iv) Internal rate of return (IRR)

It is the rate of discounting which makes the present value of the investment zero. It gives the earning power of investment.

$$IRR = \sum_{i=1}^{n} \frac{Bn}{(1+i)^n} - \sum_{i=1}^{n} \frac{Cn}{(1+i)^n} = 0$$

Where

IRR = Internal rate of returns

i = Rate of interest to be estimated at which NPV = 0

Bn = Benefit in the year

Cn = Cost in the n^{th} year

n = 1, 2, 3, 4 …….n

3.3.2 Cost of Cultivation

Concepts and definitions of terms and variables:

The concepts and definitions of economic variables used in this study are outlined in this section.

(a) Land:

(i) Operational holding for kinnow: Total cultivated area under kinnow – leased out area under kinnow + leased in area under kinnow.

(ii) Cultivated area: Area under kinnow.

(iii) Net sown area: The area under kinnow crop.

(b) Labour:

(i) Hired/casual/permanent labour: This category included the hired/casual/permanent labour employed in kinnow production. The payment made in cash and kind was considered.

(ii) Family labour: It included actual work carried out by family members for kinnow crop. This labour was valued on the basis of prevailing rates paid to the hired labour for the same category and nature of work.

(iii) Bullock labour: Owned bullock labour was accounted as per the rates of hired bullock labour prevailing in the locality.

(c) Plants, manures (FYM) & fertilizers, plant protection chemicals and staking charges:

Home produced manure was valued at the prevalent village price while purchased plants, manures & fertilizers, bamboo and plant protection chemicals were valued at the actual prices paid by the kinnow growers.

(d) Irrigation charges:

Owned irrigation water charges were accounted at per the rates of hired irrigation water charges prevailing in the locality. For hired irrigation water charges, the amount actually paid by the kinnow growers was considered.

(e) Land revenue:

Land revenue actually paid to revenue department was considered.

(f) Rental value of owned land: Rental value of own land was calculated on the basis of prevailing rates in the sample villages.

(g) Interest on fixed capital:

Interest on present value of fixed assets (excluding land) such as implements, machinery, buildings and well (if any) was calculated at the rate of 12 per cent per annum.

(h) Interest on working capital:

Interest on working capital had not been charged due to the reason that the interest on income accrued has also not been considered during the total life period of kinnow crop.

(i) Depreciation :

It is a decline in the value of a given asset as a result of the use, wear and tear, accidental damage and time obsolescence. Straight line method was used for computing the depreciation.

$$\text{Depreciation} = \frac{\text{Purchase price of the asset – Junk value}}{\text{Number of useful years of life (expected life)}}$$

Cost concepts:

Since the structure of cost for the cultivation of kinnow is quite different to the traditional crop farming, the following cost concepts were used.

(A) Establishment cost: All the costs incurred by the kinnow growers from preparation of land upto planting of plants were devoted as establishment costs. We have not included the cost of land in the establishment cost. Establishment cost pertains to the cost incurred on land preparation, planting material, tools, etc.

Establishment cost = Land preparation (Pit digging + Layout) + Cost of plants + Cost of planting of plants + Tools and other costs

(B) Fixed cost = Establishment cost + Land revenue + Rental value of owned land + Depriciation + Interest on fixed investment

(C) Variable cost = Cost of manures and fertilizers including labour cost + Irrigation charges including labour cost + Labour cost of training and pruning and weeding + Plant protection

chemical charges including labour cost + Staking charges + Harvesting of kinnow

(D) Total cost = Fixed cost + Variable cost

(E) Total cost of cultivation: The cost of cultivation of kinnow was worked out using various cost concepts defined below:

The cost of cultivation of kinnow was worked out by considering the following cost items:

- Value of hired human labour
- Value of owned bullock labour
- Value of hired bullock labour
- Value of owned machine labour
- Value of hired machine labour
- Value of owned seed
- Value of purchased seed
- Value of owned farm yard manure
- Value of purchased farm yard manure
- Value of fertilizers and insecticides
- Irrigation charges
- Land revenue
- Interest on working capital
- Depreciation
- Miscellaneous expenses
- Rent paid for the leased in land

- Interest on fixed capital
- Rental value of owned land, and
- Imputed value of family labour

3.3.3 Marketable surplus

The marketable surplus of kinnow was worked out using the following formula : -

MS = P-C

MS = Marketable surplus

P = Total production

C = Total requirements (family and farm)

3.3.4 Price spread

To study the price spread in marketing of kinnow, the marketing costs and margins was worked out as under :-

3.3.5 Marketing cost

Total cost of marketing was calculated as under : -

$C = C_F + C_{m1} + C_{m2} + C_{m3} + \ldots\ldots\ldots\ldots + C_{mn}$

Where,

C = Total cost of marketing

C_F = Cost borne by the orchardists in marketing his produce

C_{mi} = Cost incurred by the i^{th} middleman in the process of buying

and selling

3.3.6 Absolute and per cent margin

Absolute margin = $P_{Ri} – (P_{Pi} + C_{Mi})$

Percentage margin $= \frac{P_{Ri} – (P_{Pi} + C_{Mi})}{P_{Ri}}$ x 100

Where,

P_{Ri} = Total value of receipts (sale price)

P_{Pi} = Total purchase value of goods (purchase price)

C_{Mi} = Cost incurred in marketing

3.3.7 Producer's share in consumer's price

The producer's share in the consumer rupee was worked out as under :-

$$P_S = \frac{P_F}{P_C} \times 100$$

Where,

P_S = Producer's share in consumer's rupee

P_F = Price of the produce received by the farmers

P_C = Price of the produce paid by the consumer

3.3.8 Limitations of the study

Though all possible efforts have been made to make the study objective and comprehensive, certain limitations do remain, the important ones are :

1. The investigator faced many difficulties in proper and exact recording of data on income and costs.
2. Though it is a perennial crop having five years of gestation period and an economic life spawn spreading over 20-25 years. Only one year data have been taken into consideration to find out its cost and returns due to paucity of time and resources with the investigator, illiteracy and lack of information with the farmers as well as with the other institutions of the locality.
3. Due to the availability of limited time and funds the study was confined to a sample of 80 farmers from 6 villages of two tehsils of the district.

3.3.9 Assumptions

1. The economic life of kinnow is considered to be 20-25 years.
2. The kinnow starts economic return from fifth year onwards.
3. In the study of farmers, current year data on cost and returns of kinnow crop was taken for analysis.
4. Technology for production of kinnow remains the same over the period.

5. Studies on marketing aspect of kinnow and the problems faced by the farmers are limited hence studies carried out on other fruits have been reviewed.

Chapter -IV

CULTURAL PRACTICES ADOPTED IN KINNOW CULTIVATION

In this chapter an attempt has been made to study the cultural practices followed in kinnow cultivation.

Kinnow is one of the most important citrus fruit crops grown in India. It is perennial shallow rooted shrubs of Rutaceae family, probably native of tropical and sub-tropical regions of south-east Asia, particularly India and China and in the region between these two countries. Though kinnow is grown in every state, certain belts/pockets have emerged as the lending producers. It is chiefly grown in Satpura hills of central India. In south India Wynad, Nilgiri, Palney and Shevroy hills are major kinnow growing belts. In north western states of India like Punjab, Rajasthan and Haryana kinnow is being grown successfully. In Rajasthan it is chiefly cultivated in Sriganganagar district.

Soil and climate

Medium or light loamy soils with slightly heavy sub soils, well drained soils having pH of 6.0-8.0 are ideal. The soils of Sriganganagar district are broadly black, black barda and red. The soils in the district are deep and favour the commercial cultivation of kinnow.

Kinnow is grown successfully in all frost free tropical to sub tropical regions of the country. They are well adopted in sub mountainous tracts laying 370-1500 m above mean sea level and temperature 10-30^{0}C.The area around Sriganganagar with an

elevation of 370 m, average temperature of 29^0C and annual rainfall of 300-322 cm provides an excellent climate for the cultivation of world famous kinnow.

Propagation

Kinnow is propagated by both seeds and budding. For commercial cultivation in study area, T-budding method followed. Selection of suitable rootstock and proper mother plant are important steps. Many rootstocks have been used for different kinnow cultivars. Out of which Rough lemon (Jattikhatti and Jambheri), Rangpur lime and Karna Khatta are potential rootstocks in study area.

Seeds of identified rootstock for a particular area should be extracted from fully matured healthy fruits. They are sown in lines (10-15 cm deep) on raised seed-begs inside a polyethylene house. About 1-2 months old seedlings are shifted to secondary beds. These are finally budded when they attain a height of 25-30 cm and 1-2 cm diameters. Scion should be selected from healthy, vigorous, mature, virus free and high yielding trees. Optimum time for budding is September-November.

Field preparation

The field is generally prepared by giving three to four ploughings with a mould board plough. These ploughings are spread out over the year, some during the summer and some in rainy season. This brings the soil into good condition. A good planking and breaking of clods in the field is essential before the planting of plant in the study area.

Planting

Planting is done during monsoon season in the study area. Kinnows are planted in pits of 50 cm x 50 cm x 50 cm size in a square system with a spacing of 6 m x 6 m,accommodating 280 plants/ha.Before planting, the farmers filled pits with 20-25 kg decomposed farm yard manure mixed with surface soil. As per the observation on an average, 280 kinnow plants per hectare were observed in the study area.

Training and pruning

Training of kinnow tree provides a strong frame work and scaffold of branches suitable for bearing a heavy remunerative crop. To the young kinnow plants, staking should be given to help them grow, upright and straight. All dead, diseased, crowded growths and suckers coming up from the base and sides of the framework should be pruned back annually. The sample farmers of the study area were followed the training and pruning once in a year at the time of early in the spring after the danger of frost has passed and before the tree started a new growth cycle.

Crop regulation

Most of the kinnow growers of study area have taken Ambe bahar (Feb.-March) because of better irrigation facilities available with them and higher productivity of it as compared to Mrig bahar (May-June). Majority of selected cultivators were growing the crop with the traditional practices, which they inherited from their ancestors, but some of these farmers were using standard practices for the cultivation of this perennial cash crop.The total economic life span of kinnow is 22 to 25 years.

Manuring and fertilization:

Kinnow tree requires a judicious supply of plant nutrients for proper growth and regular harvest of high quality fruits. The application of manures and fertilizers were observed in the study area by sample farmers for kinnow cultivation, manures include decomposed farm yard manure and fertilizer includes single super phosphate.

In the study area the sample farmers followed the manuring before rainy season and fertilization in two equally split doses i.e. first in January and another in August. Farm yard manure ranging from 5 to 20 kg per pit, single super phosphate ranging from 200 to 250 gm per pit were applied by the most of the sample kinnow growers.

Intercropping

In order to utilize the vacant land to generate income till the plants become productive, intercropping is recommended. In kinnow cultivation upto 4 years of crop plant intercropping can be practiced. As per the observation recorded in the study area the selected kinnow growers mainly took leguminous crops such as moong, cowpea and gram and some times other crops like mustard and wheat.

Irrigation

Kinnow plants hardly require any irrigation during rainy season. In general kinnow tree require watering during March to June at weekly and fortnightly irrigation interval to secure higher fruit set and reduce fruit drop. Irrigation during the period of monsoon was given whenever required. But in the study area the sample farmers followed the irrigation interval of 15-18 days in

winter and in summer 7-8 irrigations were given in a month till monsoon sets in.

Weed control

In rainy season, weed becomes a problem for kinnow crop. Two to three hand weedings are profitable for crop growth. Weeding should be done 2 to 3 times in rainy season with the help of khurpi. Some commonly identified weeds affecting the kinnow crop were Motha (*Cyprus rotundus)* and Dub grass *(Cynodon dactylon)*.

The results obtained from the sample kinnow growers showed that two to three hand weedings were done in the study area.

Diseases, pests and plant protection measures:

A number of pests and diseases have been identified for the kinnow. Some of the major pests of kinnow are citrus psylla (Diphornia citri), citrus leaf minor (Phyllocnists citrella), white or black fly (Dialeurodes citri), citrus leaf folder (Psorosticha zizyphi) and mites. Citrus psylla is more active in March-April and June-July. The pest is more active during spring and early autumn. The important diseases found in the study area were canker (Xanthomonas citri), and anthracnose or die back or whiter tip (Colletotrichum glocosporioides). In the study area the crop gets damaged due to lack of control measures and incidence of pest and disease. Preventive measures such as removal and destruction of diseased leaves, twigs and flowers are the best method to prevent the insect pest and disease attack.

The results of the study showed that the overall use of plant protection measures was 500 ml of endosulphan/rogor per hectare.

Staking

Generally to prevent kinnow crop from breaking of the branches and to support the stem, staking was done in the entire field in the study area. This practice required straight and tough bamboo sticks. In the study area staking was practiced from 6th year of crop growth as this was the starting of the peak year of kinnow production and it lasts till 24nd year.

Harvesting, yield and post harvest management

Kinnow trees require 5-6 years to bear fruits which are greenish yellow in colour. The fruits should be harvested when they are fully ripen. Kinnow fruits develop their characteristic flavour and aroma at fully ripe stage. Harvesting by shaking the tree is discouraged due to early fruit drop and half ripe fruit drop. On the sample farmers, it was observed that plucking was generally practiced by hand and started after 6 years of crop growth. Sample kinnow growers also practiced the plucking at appropriate ripened stage (i.e. greenish yellow) of fruit for better market value.

Kinnow start bearing from the fifth year having 25-30 fruits/plant. However, when plant attain the level of full bearing at the age of 9-10 years, yields 400-500 fruits/plant in the study area.

Kinnow are graded according to their size and appearance. Fruits are usually packed in wooden boxes for distant markets, while for local marketing basket of split bamboo is used. The fruits

should be cleaned and polished lightly with a piece of cloth, before wrapping them in tissue paper or newspaper.

Storage life of kinnow is influenced by many pre-and post harvest factors. Green or fully ripe kinnows can be stored successfully at 8-10^{0}C with 85-90% relative humidity.

Chapter – V

Result and Discussion

In this chapter efforts have been made to discuss the economics of *kinnow* production, its marketing as well as problems in the production and marketing of *kinnow* in the state of Rajasthan. The collected data were classified, tabulated and analyzed in the light of objective of the study. The result are presented and discussed under the following three sections:

Section A: Economics of *kinnow*

Section B: Marketing of *kinnow*

Section C: Problems in the production and marketing of *kinnow*

Section-A

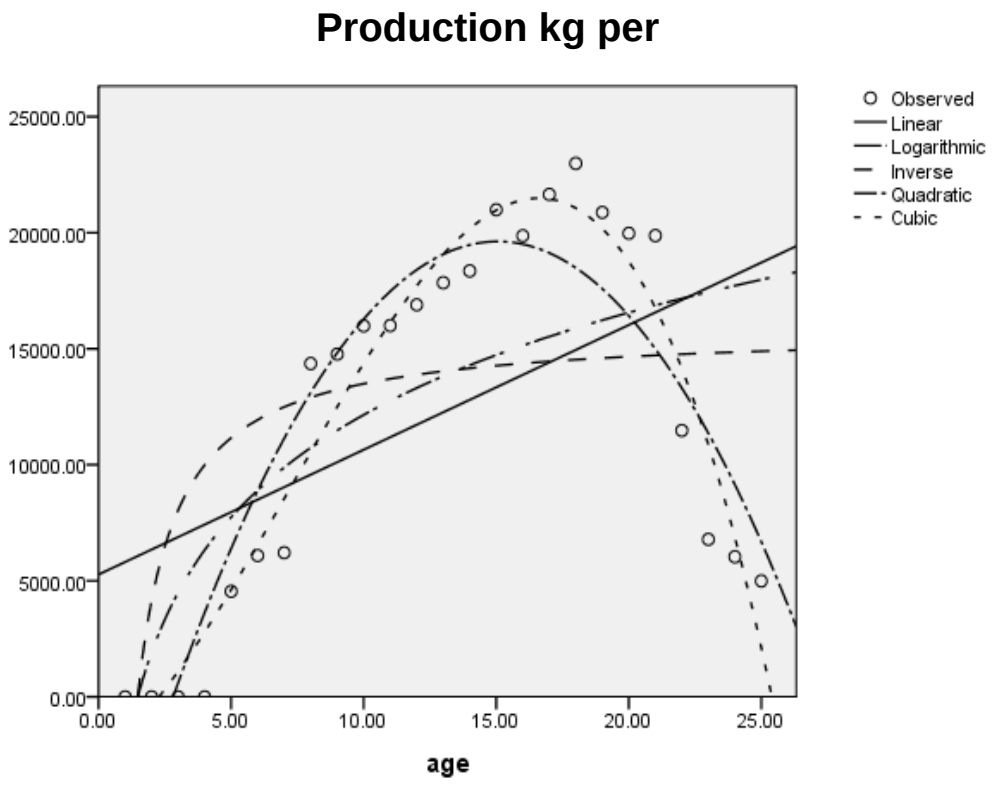
In this chapter, an attempt has been made to present the economics of *kinnow* cultivation. This has been achieved by detail study of the investment incurred in establishment of orchards and maintenance cost of the orchards as well as the returns from the *kinnow* orchards. The economic viability of *kinnow* orchards was tested with the help of the economic evaluation criterion viz., pay back period, benefit: cost ratio, internal rate of return and net present worth.

This section has been divided in to following two sections:

1. Investment analysis of kinnow orchard.
2. Economic viability of *kinnow* orchard.

5A.1 INVESTMENT ANALYSIS OF KINNOW ORCHARD

The total life of *kinnow* orchards can be divided into two important stages, i.e. establishment period and maintenance period. The figure given shows that up to four years no production takes place. Fifth year onwards production starts. Productivity first increases and then decreases is again clear from the graph. Various functions were tried to estimate relations between age and productivity and it was found that cubic and quadratic functions showed R^2 0.93 and 0.85 respectively.



5A.1.1 Establishment Cost

The period from preparation of the field to bearing of fruit in known as establishment period. The *kinnow* orchardists have to invest considerable amount of money on establishment of the orchards from the initial year to the age of bearing. During this gestation period (Usually 4 years) the orchardist does not get any return from the tree in the form of fruits. The investment made by the farmer in the establishment of orchard from the pre planting stage to the first flowering stage is categorized as capital investment.

The item-wise cost for various items of establishment was estimated details are presented in table 5.1.

The establishment cost is divided in to two parts i.e. variable cost and fixed cost. The total establishment cost amounted Rs. 52042, of which the variable cost accounted for Rs. 37738.66 (i.e. 72.52 per cent of total establishment costs) and the fixed cost accounted for Rs. 14303.34 (i.e. 27.48 per cent of total establishment cost).

It is evident from the table 5.1 that the planting costs estimated to be Rs.9000 ha^{-1} or 17.29 per cent of the establishment cost. The planting cost included expenditure on ploughing, farm layout, digging of pits, filling of pits and costs of plant. The table 5.1 revealed that interest on fixed capital accounted highest share in costs incurred during the establishment period. It has been accounted for Rs. 10748 (20.65 per cent of total establishment costs) followed by manure and fertilizer Rs. 7295.33 ha^{-1} (14.02 per cent of establishment costs), planting cost Rs. 9000 ha^{-1} (17.29 per cent), irrigation charges Rs. 4416.66 ha^{-1} (8.49 per cent) hoeing and weeding Rs. 5283.33 ha^{-1}

(10.15 per cent), depreciation on farm equipment and machinery Rs. 3555.34 (6.83 per cent of total establishment cost).

5A.1.2 Maintenance Cost

The grower has to invest on the maintenance of the orchards every year from the first bearing year to the last year of the life of the tree. The maintenance cost of the *kinnow* tree per annum varies due to factors like age of the tree, insect and pest intensity, variety of the tree, canopy of the tree, source of irrigation, distance from the market etc. Similar to the establishment cost the maintenance cost is also divided in to two parts i.e. variable cost and fixed costs.

The table 5.2 revealed that, out of total maintenance cost of Rs 1151114.19 ha^{-1}, the variable cost and fixed cost comprised Rs. 501760.66 ha^{-1} (43.59 per cent of the maintenance cost) and Rs. 649353.53 ha^{-1} (54.41 per cent of maintenance cost), respectively. The rental value of land in the total maintenance cost accounted to be as high as Rs. 574261.2 ha^{-1} (49.89 per cent of maintenance cost) followed by cost of manure and fertilizer Rs. 36628.67 ha^{-1} (3.18 per cent of maintenance cost). The watching and harvesting cost to be Rs. 336455 ha^{-1} (29.23 per cent of maintenance cost), respectively. Interest on fixed capital accounted Rs. 56427 ha^{-1} (4.90 per cent) and irrigation charges Rs. 23560 ha^{-1} (2.05 per cent). The table 5.2 revealed that plant protection charges was Rs. 29074.15 ha^{-1} (2.53 per cent), training and pruning Rs. 45671.67 ha^{-1} (3.97 per cent) and hoeing and weeding Rs. 22475 ha^{-1} (1.95 per cent). The cost of depreciation and transportation accounted 1.62 per cent and 0.69 per cent, respectively.

5A.1.3 Total Cost

On the whole, the total cost was calculated to be Rs. 1203156.19 ha^{-1}, of which variable cost accounted for Rs. 539499.32 ha^{-1} (44.84 per cent of total cost) and fixed cost accounted for Rs. 663656.87 ha^{-1} (55.16 per cent of total cost).

5A.1.4 Costs and Returns of Kinnow orchards

The age wise costs and returns have been presented in table 5.4. The table shows the stream of total cost, gross returns, net returns and production.

The sum of the stream of cost has been estimated to be Rs. 1203156.20 ha^{-1} whereas sum for the stream of gross returns was estimated to be Rs. 2758806 ha^{-1}. Similarly the sum of the stream of net returns and production were estimated to be Rs 1578149.81 ha^{-1} and 306534 kg ha^{-1}, respectively.

5A.2 ECONOMIC VIABILITY OF KINNOW ORCHARDS

The economic viability test of the kinnow orchard was designed to aid the decision-maker in deciding whether or not the economic benefits that occur from an investment were at least as high as the cost involved in the investment. The investment analysis was help in assigning the economic viability of investment under consideration for deciding whether or not the investment should be made.

Kinnow cultivation requires high capital investment for the establishment and maintenance of orchards. This high investment calls for the need to quantify the benefits and also evaluate the economic viability of such investment.

In order to asses the capital productivity for kinnow orchards, the costs and benefits were discounted at the interest rate of 12 per

cent, the prevailing bank rate. The different techniques were used for finding comparative economic viability of kinnow cultivation. Further the comparative viability of kinnow orchards was analyzed by working out the four different methods viz. pay back period, net present worth, internal rate of returns and benefits: cost ratio.

Benefit: Cost Ratio

B: C ratio is the ratio between the present worth of net cash inflows and present worth of net cash out flow. The B: C ratio must be more than or at least equal to unity. On the basis of available data it was calculated as 1.90 for kinnow orchards.

Net Present worth (NPW)

The net present worth of kinnow orchards of study area was estimated as Rs. 268800.35 ha^{-1}. On the basis of this, the total discounted costs and total discounted returns observed as Rs. 300098.92 ha^{-1} and 568899.27 ha^{-1}, respectively.

Internal Rate of Return

The yield of project is defined as the discount rate at which the net present value is equal to zero. The decision rule says that accept the project, if the yield from investment or IRR is higher than or equal to minimum desired level (prevailing rate of interest) of yield from investment otherwise reject the project.

The IRR shows the earning power of investment. It considers the cash flow stream in it's entirety. The IRR takes into account the time value of money. The IRR was calculated to be 36 per cent for kinnow orchards.

Pay Back Period

As the name suggested it is defined as the time period within which the initial investment of project recovered in the form of yearly benefits. The pay back period of investment for kinnow orchards was worked out to be 8 years. The pay back period of kinnow was found to be high in the study area because the productive age of kinnow orchards is 25 years and production of kinnow was found to be *lower in the beginning of the years. The pay back period ignore the time value of money. Cash inflows in the pay back calculation were simply added without suitable discounting.*

Table 5.1 Establishment Cost of Kinnow Orchards

S. No.	Particulars	Cost (Rs. /ha.)	Percentage of total establishment cost
1	**Variable cost**		
A.	Planting cost*	9000.00	17.29
B.	Hoeing and weeding	5283.35	10.15
C.	Training and pruning	5146.65	9.89
D.	Manure and fertilizer	7295.33	14.02
E.	Irrigation charges	4416.66	8.49
F.	Plant protection charges	4530.00	8.70
G.	Transportation	2066.67	3.97
	Total of variable cost	**37738.66**	**72.52**
2	**Fixed cost**		
A	Interest on fixed capital	10748.00	20.65
B	Depreciation	3555.34	6.83
	Total fixed cost	**14303.34**	**27.48**
3	**Total establishment cost**	52042.00	100.00

*Planting cost included expenditure on ploughing farm layout, digging of pits, filling of pits and cost of plants.

Table 5.2 Maintenance Cost of Kinnow Orchards

S. No.	Particulars	Cost (Rs. /ha.)	Percentage of total maintenance cost
1	**Variable cost**		
A.	Hoeing and weeding	22475.00	1.95
B.	Training and pruning	45671.67	3.97
C.	Manure and fertilizer	36628.67	3.18
D.	Irrigation charges	23560.00	2.05
E.	Plant protection charges	29074.15	2.53
F.	Transportation	7896.17	0.69
G.	Watching and harvesting cost	336455.00	29.23
	Total variable maintenance cost	501760.66	43.59
2	**Fixed cost**		
A	Interest on fixed capital	56427.00	4.90
B	Depreciation	18665.33	1.62
c	Rental value of land	574261.20	49.89
	Total fixed cost	649353.53	56.41
3	**Total maintenance cost**	1151114.19	100.00

Table 5.3 Total Cost of Kinnow Orchards

S. No.	Particulars	Cost (Rs. /ha.)	Percentage
1	**Variable cost**		
A.	Planting cost*	9000.00	0.75
B.	Hoeing and weeding	27758.35	2.31
C.	Training and pruning	50818.32	4.22
D.	Manure and fertilizer	43924.00	3.65
E.	Irrigation charges	27976.66	2.33
F.	Plant protection charges	33604.15	2.79
G.	Transportation	9962.84	0.83
H.	Watching and harvesting cost	336455.00	27.96
	Total variable cost	539499.32	44.84
2	**Fixed cost**		
A	Interest on fixed capital	67175.00	5.58
B	Depreciation	22220.67	1.85
C	Rental value of land	574261.20	47.73
	Total fixed cost	663656.87	55.16
3	**Total cost**	1203156.19	100.00

*Planting cost included expenditure on ploughing farm layout, digging of pits, filling of pits and cost of plants.

Table 5.4 Costs and Returns of kinnow orchards

Age in year	Production of kinnow (kg. /ha.)	Total costs of cultivation (Rs. /ha.)	Gross returns (Rs. /ha.)	Net returns (Rs. /ha.)
1	0.00	22529.62	0.00	-22529.62
2	0.00	10428.16	0.00	-10428.16
3	0.00	10293.49	0.00	-10293.49
4	0.00	8791.15	0.00	-8791.15
5	4543.00	46223.56	40887.00	2763.44
6	6085.00	46472.16	54765.00	15492.84
7	6208.00	45110.56	55872.00	17961.44
8	14362.00	54875.09	129258.00	74382.91
9	14765.00	54616.33	132885.00	78268.68
10	15983.00	55926.89	143847.00	87920.11
11	15998.00	56955.89	143982.00	87026.11
12	16890.00	58606.83	152010.00	93403.18
13	17845.00	58234.16	160605.00	102370.84
14	18354.00	61111.03	165186.00	104074.98
15	20987.00	63692.09	188883.00	125190.91
16	19867.00	60995.76	178803.00	117807.24
17	21649.00	64829.03	194841.00	130011.98
18	22987.00	67779.43	206883.00	139103.58
19	20876.00	64573.79	187884.00	123310.21
20	19974.00	61822.53	179766.00	117943.48
21	19876.00	63977.13	178884.00	114906.87
22	11478.00	48932.56	103302.00	54369.44
23	6784.00	40771.69	61056.00	20284.31
24	6034.00	39087.94	54306.00	15218.06
25	4989.00	36519.36	44901.00	8381.64
Total	306534.00	1203156.20	2758806.00	1578149.81

Table 5.5 Discounted benefit cost ratio and net present value of kinnow orchard.

(In Rupees)

Year	Cost	Benefit (Gross return)	Net benefit (Net return)	Discounted cost at 12% discounted rate	Discounted benefit at 12% discounted rate	Discounted net return at 12% discounted rate
1	22529.62	0.00	-22529.62	20115.73	0.00	-20115.7
2	10428.16	0.00	-10428.16	8313.265	0.00	-8313.27
3	10293.49	0.00	-10293.49	7326.703	0.00	-7326.7
4	8791.15	0.00	-8791.15	5586.935	0.00	-5586.93
5	46223.56	40887.00	2763.44	26228.49	23200.38	-3028.11
6	46472.16	54765.00	15492.84	23544.24	27745.65	4201.411
7	45110.56	55872.00	17961.44	20405.73	25273.66	4867.929
8	54875.09	129258.00	74382.91	22163.13	52205.14	30042.01
9	54616.33	132885.00	78268.68	19695.2	47919.66	28224.47
10	55926.89	143847.00	87920.11	18006.96	46314.88	28307.92
11	56955.89	143982.00	87026.11	16373.46	41391.38	25017.93
12	58606.83	152010.00	93403.18	15042.91	39017.18	23974.27
13	58234.16	160605.00	102370.84	13345.77	36806.52	23460.75
14	61111.03	165186.00	104074.98	12504.53	33800.33	21295.8
15	63692.09	188883.00	125190.91	11636.31	34508.22	22871.91
16	60995.76	178803.00	117807.24	9949.73	29166.64	19216.91
17	64829.03	194841.00	130011.98	9441.981	28377.49	18935.51
18	67779.43	206883.00	139103.58	8814.009	26902.98	18088.97
19	64573.79	187884.00	123310.21	7497.455	21814.61	14317.15
20	61822.53	179766.00	117943.48	6408.942	18635.76	12226.82
21	63977.13	178884.00	114906.87	5921.698	16557.43	10635.74
22	48932.56	103302.00	54369.44	4043.91	8537.14	4493.227
23	40771.69	61056.00	20284.31	3008.46	4505.20	1496.738
24	39087.94	54306.00	15218.06	2575.196	3577.79	1002.598
25	36519.36	44901.00	8381.64	2148.19	2641.23	493.0358
Total	1203156.20	2758806.00	1578149.81	300098.92	568899.27	268800.35

Table 5.6 Payback period (PBP), Net present worth (NPW), internal rate of return (IRR) and Gross benefit cost ratio (GBCR) of kinnow cultivation

S. No.	Indicators	Value
1	Net present worth (Rs.)	268800.35
2	Internal rate of return (%)	36
3	Gross benefit cost ratio	1.90
4	Payback period (Years)	8

Section-B

COSTS, MARGINS AND PRICE-SPREAD IN MARKETING OF *KINNOW* FRUITS

In this section an attempt has been made to present the marketing costs, margins and price spread in marketing of kinnow in Sriganganagar district. The efficiency of marketing system for an agricultural produce in general is assessed by size of share which a farmer-producer gets in the price paid by the consumer for a unit of the commodity. The difference between price paid by the ultimate consumer and price received by the farmer/ producer for an equivalent quantity of produce exists due to the costs of various marketing functions performed in the process of movement of the produce and also due to the margins of various agencies associated in the process of movement of the commodity.

In this section, marketing costs, margins and price spread in marketing of kinnow through different channels have been presented based on the data collected from producers- farmers and market functionaries.

5B.1 MARKETING CHANNELS

The followings were the common marketing channels adopted by the farmers in marketing of *kinnow* in the study area.

I. Producer - Retailer – Consumer.

II. Producer - Wholesaler – Retailer – Consumer.

III. Producer - Pre harvest contractor– Wholesaler– Retailer– Consumer.

IV. Producer - Pre harvest contractor – Retailer – Consumer.

Marketing Channel – I

(Producer – Retailer – Consumer)

In this channel, producer sales his produce through the retailer to the consumer. As such only one middleman exists in this channel. This channel contributes only 25.57 per cent to the total marketed surplus.

Marketing Channels – II

(Producer –Wholesaler – Retailer – Consumer)

This is the most common marketing channel as 43.60 per cent of total *kinnow* produce was observed to be marketed through this channel. In channel-II there exist two-market middlemen viz., wholesaler and retailer between producers and consumers.

Marketing Channel – III

(Producer–Pre harvest contractor– Wholesaler–Retailer–Consumer)

This i**4**s another important marketing channel existing in the fruit crop in Srikaranpur and Sriganganagar. The contract is leased out at two stages i.e. at pre harvest stage and post harvest stage. The only pre harvest contractor existed in the marketing of *kinnow* in the area under study. The amount of contract is finalized by bargaining between producer and contractor. The amount of contract is affected by various factors like age of orchards, varietal status of *kinnow*, fruiting position and location of orchards. In channel-III *kinnow* produce reached to consumer through four market middlemen i.e. pre harvest contractor, commission agent, wholesaler and retailer. The 25.70 per cent of total *kinnow* produce marketed through this channel.

Marketing Channel-IV

(Producer – Pre harvest contractor – Retailer – Consumer)

This channel has been existed on the kinnow orchards. The *kinnow* produce of the kinnow orchards followed the chain including pre harvest contractor and retailer only. The pre harvest

contractor sold the *kinnow* directly to retailer on the kinnow orchards. No wholesaler existed in this channel. The 5.13 per cent of total *kinnow* produce marketed through this channel.

5B.2 MARKETING COSTS, MARGINS AND PRICE-SPREAD

Marketing charges paid by different agencies in marketing of *kinnow* as prescribed by the fruit and vegetable market committee of Srikaranpur and Sriganganagar and other charges of marketing are presented below:

Table 5.7 Marketing Charges for Sale of *Kinnow* in Srikaranpur and Sriganganagar Mandi

S.No.	Particulars	Unit	Rate (In Rs.)	Born by
1	Mandi fee	Per 100 rupee worth of produce	1.60	Buyer
2	Commission	Per 100 rupee worth of produce	6.00	Buyer
3	Loading charges	Per quintal	5.00	Buyer
4	Unloading charges	Per quintal	5.00	Seller
5	Weighing charges	Per quintal	0.50	Buyer

1. Transportation Charges

The cost of transportation on the movement of the produce between places is one of the important marketing costs. The farmer-seller on the basis of weight and distance pays transportation cost from farm to mandi. Further transportation of the commodities from the mandi, it is born by the respective buyer.

2. Loading and Unloading Charges

It is the payment made to the laboures for rendering services of loading and unloading of the produce from transportation mode. The producer does loading of produce at their farm but unloading is done by palledars in the mandi. The charges for unloading were born by producer- farmer in the mandi. Further loading and unloading activities were done by palledars in the mandi and charges were born by concerned buyers.

3. Weighing Charges

This charge is borne by the buyer. Weightment charges vary with type of container (boxes) of fruits.

4. Mandi Fee

The Krishi Upaj Mandi Samiti for rendering various services in the market area collects this charge. The rate of mandi fee in case of fruit Rs 1.60 per Rs. 100 worth of produce, and it is borne by the buyer of the produce.

5. Commission

It is the charge paid to commission agent for the services rendered by him in the disposal of the produce. The present rate of commission prescribed by the market committee is Rs. 6 per Rs. 100 worth of the produce and is charged from the buyer.

6. Packing Charge

This is the cost of container (boxes) used to carry the produce from farm to the retailer’s shop.

7. Value of Quantity Loss

In fruits marketing, loss in quantity is common due to drainage or spoilage, caused by slow means of transportation, poor packing, fluctuation of temperature and delay in the sale of the produce.

8. Margins

This is the profit obtained by the market functionaries after meeting the cost of the function performed.

5B.3 Channel-wise Marketing Costs

The marketing costs incurred in marketing of *kinnow* through different channels are presented in this section.

Channel – I

(Producer – Retailer – Consumer)

The marketing costs incurred by market functionaries in channel-I are presented in table 5.8.

Table 5.8 Marketing Cost Incurred in Channel – I (Producer – Retailer – Consumer)

(Rs. /quintal)

S.No.	***Particulars***	***Cost paid by***		**Total cost**
		Producer	**Retailer**	
1.	Transportation charges	20.50 (20.32)	10.85 (10.75)	31.35 (31.07)
2.	Basket and jute palli charges	15.50 (15.36)	-	15.50 (15.36)
3.	Loading and unloading charges	5.00 (4.96)	4.85 (4.81)	9.85 (9.76)
4.	Weighing charges	1.50 (1.49)	2.70 (2.68)	4.20 (4.16)
5.	Value of quantity loss	-	8.50 (8.42)	8.50 (8.42)
6.	Filling charges	1.50 (1.49)	-	1.50 (1.49)
7	Storage	-	30.00	30.00

			(29.73)	(29.73)
	Total	**44.00 (43.61)**	**56.90 (56.39)**	**100.90 (100.00)**

Note: Figures in the parentheses are percentage of respective column total.

The total costs incurred in sale of *kinnow* produce comes Rs. 100.90 q^{-1}. The transportation charges, charges for storage, charges for basket and jute palli used and loading and unloading were the main cost items as these together accounted for 85.93 per cent. Individually these cost items accounted 31.07 per cent, 29.73 per cent, 15.36 per cent, and 9.76 per cent of the total marketing costs, respectively. The break-up of the cost on agency basis indicated that producer cum seller and retailer incurred Rs. 44.00 (43.61 per cent of total costs) and Rs. 56.90 (56.39 per cent of total costs), respectively.

Channel – II

(Producer – Wholesaler – Retailer – Consumer)

The marketing costs in the sale of *kinnow* produce through channel-II are presented in table 5.9.

Table 5.9 Marketing Cost Incurred in Channel – II

(Producer – Wholesaler- Retailer – Consumer)

(Rs. /quintal)

S.No.	***Particulars***	***Cost paid by***			**Total cost**
		Producer	**Wholesaler**	**Retailer**	
1.	Transportation charges	20.50 (8.27)	7.75 (3.13)	10.85 (4.38)	39.10 (15.78)
2.	Basket and jute palli charges	15.50 (6.25)	11.00 (4.44)	-	26.50 (10.69)
3.	Loading and unloading charges	5.00 (2.02)	2.95 (1.19)	4.85 (1.96)	12.80 (5.16)
4.	Weighing charges	1.50 (0.61)	1.30 (0.52)	2.70 (1.09)	5.50 (2.22)

5.	Value of quantity loss	-	7.20 (2.90)	8.50 (3.45)	15.70 (6.33)
6.	Filling charges	1.50 (0.61)	6.25 (2.52)	-	7.75 (3.13)
7	Commission	-	42.00 (16.95)	-	42.00 (16.95)
8	Mandi fees	-	31.00 (12.51)	-	31.00 (12.51)
9	Grading	-	7.50 (3.03)	-	7.50 (3.03)
11	Storage	-	30.00 (12.10)	30.00 (12.10)	60.00 (24.21)
	Total	**44.00** (17.75)	**146.95** (59.29)	**56.90** (22.96)	**247.85** (100.00)

The total marketing costs were Rs. 247.85q^{-1}, when *kinnow* marketed through channel II. Storage, transportation, commission and mandi fee are the major items of costs which together accounted 69.45 per cent of total marketing cost. Individually these items of cost accounted Rs. 24.21, 15.78, 16.95 and 12.51 per cent of total marketing costs, respectively. The agencies-wise costs incurred indicated that producer–saler incurred Rs. 44.00 (17.75 per cent of total marketing cost), wholesaler incurred Rs. 146.95 (59.29 per cent of total marketing cost) and Rs. 56.90 (22.96 of total marketing costs) was incurred by the retailer.

Channel-III

(Producer– Pre harvest contractor – Wholesaler – Retailer – Consumer)

The marketing costs incurred in the sale of *kinnow* produce through channel-III are shown in table 5.10.

The total marketing costs incurred in the sale of kinnow produce were amounted to be Rs. 280.11 q^{-1}. The storage, commission, transportation charges and mandi fee charges were the major items of costs in the sale of kinnow through channel-III. Individually these items of cost accounted 21.42 per cent, 14.99 per cent, 13.83 per cent and 11.07 per cent respectively. To break-up the total cost, the agency-wise costs incurred were accounted as Rs 75.56 q^{-1} (26.98 per cent of total marketing cost) by the pre harvest contractor, Rs 147.65 q^{-1} (52.71 per cent of total marketing cost) by the wholesaler and Rs. 56.90 q^{-1} (20.31 per cent of total marketing costs) by the retailer.

Table 5.10 Marketing Cost Incurred in Channel – III

(Producer –Pre harvest contractor- Wholesaler- Retailer – Consumer)

(Rs. /quintal)

S.No.	***Particulars***	***Cost paid by***			Total cost
		Pre harvest contractor	**Wholesaler**	**Retailer**	
1.	Picking	14.87 (5.31)	-	-	14.87 (5.31)
2.	Basket and jute palli charges	8.97 (3.20)	11.00 (3.93)	-	19.97 (7.13)
3.	Loading and unloading charges	4.05 (1.45)	2.95 (1.05)	4.85 (1.73)	11.85 (4.23)
4.	Weighing charges	1.00 (0.36)	1.30 (0.46)	2.70 (0.96)	5.00 (1.89)
5.	Value of quantity loss	-	7.20 (2.57)	8.50 (3.03)	15.70 (5.60)
6.	Filling charges	1.40 (0.50)	6.25 (2.48)	-	8.35 (2.98)
7	Commission	-	42.00 (14.99)	-	42.00 (14.99)
8	Mandi fees	-	31.00 (11.07)	-	31.00 (11.07)
9	Grading	-	7.50 (2.68)	-	7.50 (2.68)
10	Storage	-	30.00 (10.71)	30.00 (10.71)	60.00 (21.42)
11	Watching	11.00 (3.93)	-	-	11.00 (3.93)
12	Transportation charges	20.15 (7.19)	7.75 (2.77)	10.85 (3.87)	38.75 (13.83)
13	Labour charge	8.67 (3.10)	-	-	8.67 (3.10)
14	Rough material and nail	5.45 (1.95)	-	-	5.45 (1.95)
	Total	**75.56 (26.98)**	**147.65 (52.71)**	**56.90 (20.31)**	**280.11 (100.00)**

Channel – IV

(Producer – Pre harvest contractor – Retailer – Consumer)

The marketing costs incurred in marketing of *kinnow* are presented in table-5.11. The total marketing cost incurred in the sale of *kinnow* produce on kinnow orchards was Rs. 132.46 q^{-1}. The transportation charges, storage, picking charges and watching charges were the major items of cost accounted together 65.58 per cent of total marketing cost. Individually these items of cost accounted 23.40 per cent, 22.65 per cent, 11.23 per cent and 8.30 per cent of total marketing cost, respectively. To break-up the total cost, the agency-wise costs incurred were accounted as Rs 75.56 q^{-1} (57.04 per cent of total marketing cost) by the pre harvest contractor and Rs. 56.90 q^{-1} (42.96 per cent of total marketing costs) by the retailer.

Table 5.11 Marketing Cost Incurred in Channel – IV

(Producer–Pre harvest contractor- Retailer– Consumer)

Rs. /quintal)

S.No.	***Particulars***	***Cost paid by***		**Total cost**
		Pre harvest contractor	**Retailer**	
1.	**Picking**	14.87 (11.23)	-	14.87 (11.23)
2.	Basket and jute palli charges	8.97 (6.77)	-	8.97 (6.77)
3.	Loading and unloading charges	4.05 (3.06)	4.85 (3.66)	8.90 (6.72)
4.	Weighing charges	1.00 (0.75)	2.70 (2.04)	3.70 (2.79)
5.	Value of quantity loss	-	8.50 (6.42)	8.50 (6.42)
6.	Filling charges	1.40 (1.06)	-	1.40 (1.06)
7	Storage	-	30.00 (22.65)	30.00 (22.65)
8	Watching	11.00 (8.30)	-	11.00 (8.30)

9	Transportation charges	20.15 (15.21)	10.85 (8.19)	31.00 (23.40)
10	Labour charge	8.67 (6.55)	-	8.67 (6.55)
11	Rough material and nail	5.45 (4.11)	-	5.45 (4.11)
	Total	**75.56 (**57.04**)**	**56.90 (**42.96**)**	**132.46 (100.00)**

5B.4 Price -spread in Marketing of *Kinnow*

The price spread reflects the percentage share of producers and different functionaries as well as the cost of the services performed in the price paid by the consumer per 100 rupee worth of a commodity.

Channel – I

The table-5.12 revealed that average price paid by consumer for *kinnow* producer in channel-I was Rs. 1358.87 q^{-1}. The total marketing costs incurred by various functionaries constituted 7.43 per cent of the consumer price. The marketing cost incurred by producer and retailer were 3.24 per cent and 4.19 per cent of consumer price, respectively. The marketing margin accounted 20.72 per cent of consumer price. The retailer in this channel obtained the whole marketing margin.

Table 5.12 Price-spread in Marketing of *Kinnow* Through channel–I

(Producer – Retailer – Consumer)

S.No.	**Particulars**		

1.		976.44	71.86

2.			

	(a) Producer	44.00	3.24
	(b) Retailer	56.90	4.19
	Total cost	100.90	7.43
3.		281.53	20.72

4.	Consumer price	1358.87	100.00

The producer got Rs. 976.44 q^{-1} (71.86 per cent of consumer price). The total margin in this channel was low, as only one middleman was involved in the process.

Channel – II

The ultimate consumer paid Rs. 1358.87 q^{-1} of *kinnow* produce in channel II (Producer – Wholesaler – Retailer – Consumer). Table-5.13 represents that producer - farmer got only Rs. 806.92 q^{-1} which accounted for 59.38 per cent of the consumer rupee. The costs incurred by the producer – farmer, wholesaler and retailer jointly accounted 18.24 per cent of the price paid by consumer. In the sale process the producer, wholesaler and retailer incurred marketing cost were 3.24 per cent, 10.81 per cent and 4.19 per cent of consumer price, respectively. The margin earned by wholesaler and retailer jointly was Rs. 304.10 (22.37 per cent of consumer's price). Out of this, wholesaler and retailer got 3.29 per cent and 19.08 per cent of consumer price, respectively.

5.13 Price-spread in Marketing of *kinnow* through channel–II

(Producer – Wholesaler- Retailer – Consumer)

S.No.	**Particulars**		

1.		806.92	59.38

2.	Cost incurred by		
	(a) Producer	44.00	3.24
	(b) Wholesaler	146.95	10.81
	(c) Retailer	56.90	4.19
	Total cost	247.85	18.24

3.			
	(a) **Wholesaler**	44.70	3.29
	(b) **Retailer**	259.31	19.08

		304.10	22.37
4.	Consumer price	1358.87	100.00

Channel – III

In channel – III (Producer – Pre harvest contractor – Wholesaler – Retailer – Consumer), the ultimate consumer paid Rs. 1358.87 q^{-1}. As shown in table 5.14, producer-farmers got mearly Rs. 768.87 q^{-1} cost, which accounted 56.58 per cent of consumer's price. Total marketing cost jointly incurred in this channel by pre harvest contractor, wholesaler and retailer was Rs. 280.11 q^{-1} (20.61 per cent of consumer price). Individually the cost contributed by pre harvest contractor, wholesaler and

retailer were 5.56 per cent, 10.87 per cent and 4.19 per cent of consumer price, respectively. The margins earned by all middlemen were a sum of Rs. 309.89 q^{-1} that is 22.80 per cent of the consumer's price. The wholesaler and retailer got margin it as in channel-II. The pre harvest contractor got margins 5.65 per cent of consumer price. In this channel, market middleman got highest margin in compared to other channel.

5.14 Price-spread in Marketing of *kinnow* through channel–III (Producer –Pre harvest contractor- Wholesaler- Retailer – Consumer)

S.No.	Particulars	s. /quintal	hare in consumer's rupee (percentage)
1.	**Producer's net price**	768.87	56.58
2.	Cost incurred by		
	(a) **Wholesaler**	147.65	10.87
	(b) Pre harvest contractor	75.56	5.56
	(c) Retailer	56.90	4.19
	Total cost	280.11	20.61
3.	**Margin**		
	(a) **Wholesaler**	110.29	8.12
	(b) **Pre harvest contractor**	76.78	5.65
	(c) **Retailer**	122.82	9.04
	Total margin	309.89	22.80
4.	**Consumer price**	1358.87	100.00

Channel – IV

In channel – IV (Producer – Pre harvest contractor —– Retailer – Consumer), the ultimate consumer paid Rs.

1358.87 q^{-1}. As shown in table 5.15, producer-farmers got mearly Rs. 900 q^{-1} cost, which accounted 66.23 per cent of consumer's price. Total marketing cost jointly incurred in this channel by pre harvest contractor and retailer was Rs. 132.46 q^{-1} (9.75 per cent of consumer price). Individually the cost contributed by pre harvest contractor and retailer were 5.56 per cent and 4.19 per cent of consumer price, respectively. The margins earned by all middlemen were a sum of Rs. 326.41 q^{-1} that is 24.02 per cent of the consumer's price. The retailer got margin it as in channel-II. The pre harvest contractor got margins 8.14 per cent of consumer price.

Table 5.15 Price-spread in Marketing of *Kinnow* through Channel–IV

(Producer–Pre harvest contractor- Retailer– Consumer)

S.No.	***Particulars***	***Rs. /quintals***	**Share in consumer's rupee (percentage)**
1.	**Producer's net price**	900	66.23
2.	Cost incurred by		
	(a) Pre harvest contractor	75.56	5.56
	(b) Retailer	56.90	4.19
	Total cost	132.46	9.75
3.	Margin of		
	(a)Pre harvest contractor	110.56	8.14
	(b) Retailer	215.85	15.88
	Total margin	326.41	24.02
4.	Consumer price	1358.87	100.00

Section C

PROBLEMS FACED BY THE KINNOW PRODUCERS

In this section an attempt has been made to identify the problems faced by *kinnow* growers in Sriganganagar district. The problems responsible were divided into the following four categories:-

1. Technical
2. Infrastructural
3. Economic
4. Social

1. Technical problems

Technical constraints are the lack of know-how or skill required for adoption of particular recommended production and marketing technology. The table 5.16 shows 9 technical problems in production and marketing of kinnow. 50 farmers out of 80 (62.50 per cent) faced the problem of marketing of their produce. Among various technical problems, the problem of marketing stood at the top. The second major problem faced by the farmers was related with the lack of technical persons for kinnow cultivation. Out of total sample farmers, 56.25 per cent farmers faced the problem of the lack of technical persons for kinnow cultivation. The third major technical problem faced by the farmers was related to no direction and encouragement from local administration for kinnow cultivation (45 per cent). The four, five, six, seven, eight and nine major technical problems were do not protected crop from adverse weather conditions (43.65 per cent), lack of irrigation facilities (28.75 per cent), problems of intercultural operations (22.50 per cent), do not know the name, proper method and doses of

pesticides and insecticides (20 per cent), lack of technical knowledge about kinnow cultivation (18.75 per cent) and do not know the name and proper doses of manures and fertilizers (15 per cent) faced by the sample farmers, respectively.

Finally, it can be concluded that out of all the technical problems of mandarin growers, it was observed that marketing of produce, lack of technical persons and no direction and encouragement from local administration for kinnow cultivation, which ranked Ist, IInd and IIIrd out of the various problems faced by the mandarin growers.

2. Infrastructural problems

Infrastructural problems have been defined as problems pertaining to organization in production and marketing of kinnow. Table 5.17 revealed 7 infrastructural problems in production and marketing of kinnow. 31 farmers out of 80 (38.75 per cent) faced the problem of storage facilities. Among various infrastructural problems, the problem of storage facilities stood at the top. The second major problem faced by the farmers was related with the short supply of labourers. Out of total sample farmers, 26.25 per cent farmers faced the problem of the Short supply of labourers. The third major infrastructural problem faced by the farmers was related to lack of transportation means (23.75 per cent). The four, five, six and seven major infrastructural problems were market distance is too long (20 per cent), dominance of traders in market (11.25 per cent), lack of processing units (6.25 per cent) and lack of proper guidance by agricultural department (3.75), respectively.

Finally, it can be concluded that out of all the infrastructural problems of mandarin growers, it was observed that storage facilities, short supply of labourers and lack of transportation means, which

ranked Ist, IInd and IIIrd out of the various problems faced by the mandarin growers.

Table 5.16 Technical problems in production and marketing of kinnow faced by the sample farmers

(Sample size=80)

S. No.	Problems	Number of cultivators faced the problem	Percentage to total number of sample farmers	Ranking of problems
1.	Lack of technical knowledge about kinnow cultivation	15	18.75	VIII
2.	No direction and encouragement from local administration for kinnow cultivation	36	45.00	III
3.	Lack of technical persons for kinnow cultivation	45	56.25	II
4.	Lack of irrigation facilities	23	28.75	V
5.	Do not know the name and proper doses of manures and fertilizers	12	15.00	IX
6.	Do not know the name, proper method and doses of pesticides and insecticides	16	20.00	VII
7.	Problems of intercultural operations	18	22.50	VI
8.	Do not protected crop from adverse weather	35	43.75	IV

	conditions			
9.	Problems in marketing of kinnow	50	62.50	I

Figures in parentheses are the percentage of total number of farmers

Table 5.17 Infrastructural problems in production and marketing of kinnow faced by the sample farmers

(Sample size=80)

S.No.	Problems	Number of cultivators faced the problem	Percentage to total number of sample farmers	Ranking of problems
1.	Lack of proper guidance by agricultural department	3	3.75	VII
2.	Market distance is too long	16	20.00	IV
3.	Short supply of labourers	21	26.25	II
4.	Dominance of traders in market	9	11.25	V
5.	Lack of transportation means	19	23.75	III
6.	Lack of processing units	5	6.25	VI
7.	Lack of storage facilities	31	38.75	I

Figures in parentheses are the percentage of total number of farmers

3. Economical problems

These problems related to the finance and profitable operations were found to be 8 in numbers (Table 5.18). 55 farmers out of 80 (68.75 per cent) faced the problem of prices of kinnow are low. Among various economical problems, the prices of kinnow are low stood at the top. The second major problem faced by the farmers was related with no timely sale of product. Out of total sample farmers, 61.25 per cent

farmers faced the problem of no timely sale of product. The third major economical problem faced by the farmers was related to marketing cost of kinnow is high (42.50 per cent). The four, five, six seven and eight major economical problems were market cost of fertilizers is high (32.50 per cent), high cost of improved variety seeds (31.25 per cent), cost of transportation of kinnow is high (23.75 per cent), non-availability of loan from bank or Govt. Agencies (15 per cent) and high cost of irrigation water (2.50 per cent), respectively.

Finally, it can be concluded that out of all the economical problems of mandarin growers, it was observed that prices of kinnow are low, no timely sale of product and marketing cost of kinnow is high, which ranked Ist, IInd and IIIrd out of the various problems faced by the mandarin growers.

Table 5.18 Economic problems in production and marketing of kinnow faced by the sample farmers

(Sample size=80)

S.No.	Problems	Number of cultivators faced the problem	Percentage to total number of sample farmers	Ranking of problems
1.	Non-availability of loan from bank or Govt. agencies	12	15.00	VII
2.	High cost of irrigation water	2	2.50	VIII
3.	High cost of improved variety seeds	25	31.25	V
4.	Cost of fertilizers is high	26	32.50	IV
5.	Cost of transportation of kinnow is high	19	23.75	VI
6.	Marketing cost of kinnow is high	34	42.50	III
7.	Prices of kinnow are low	55	68.75	I
8.	No timely sale of	49	61.25	II

	product			

Figures in parentheses are the percentage of total number of farmers

4. Social problems

These problems related to the social customs, habits and mental acceptance in the production and marketing of kinnow were included in this section. Table 5.19 revealed 2 social problems. Among these fear of thieves and stray animals prohibits farmers to take kinnow crop were more acute and faced by 72.50 per cent farmers of the sample farmers in the study area. Low consumption tendency of kinnow in study area was reported by 67.50 per cent of total selected farmers.

Table 5.19 Social problems in production and marketing of kinnow faced by the sample farmers

S.No.	Problems	Number of cultivators faced the problem	Percentage to total number of sample farmers	Ranking of problems
1.	Fear of thieves and stray animals prohibits farmers to take kinnow crop	58	72.50	I
2.	Low consumption tendency of kinnow in study area	54	67.50	II

Figures in parentheses are the percentage of total number of farmers

Chapter-VI

Summary, Conclusion and recommendations

6.1 SUMMARY

This study relates to the economic analysis of kinnow cultivation in Sriganganagar district of Rajasthan. Kinnow has good content of vitamin-C and copper. Kinnow is cultivated in Satpura hills of central India and Wynad, Nilgiri and Shvroy hills of South India. In Assam, Brahmputra velly and Dibrugarh district are famous for kinnow production. In Rajasthan, kinnow is chiefly cultivated in Sriganganagar district. The total area in Sriganganagar was 4.8 lac hectares with total production of 1.26 metric tonnes in the year 2010-11.

Kinnow is mainly cultivated on commercial scale in Sriganganagar district but kinnow growers are confronted with a number of problems like lack of efficient marketing system, higher cost of marketing, lack of storage facilities, fluctuations in their prices, etc. Further, most of the rural markets do not have the basic necessary facilities such as auction plate forms, godowns, cold storage, etc. Thus, keeping this in view, the present study entitled “An economic analysis of production and marketing of kinnow in the state of Rajasthan” has been under taken with the following objectives:

(iv) To work out the economics of kinnow production in the state of Rajasthan.

(v) To study marketing of kinnow in the state of Rajasthan.

(vi) To study problems in the production and marketing of kinnow in the state of Rajasthan.

The study was conducted in two major kinnow growing tehsils of Sriganganagar district namely Sriganganagar and Srikaranpur. Two villages from each tehsil were selected. Two markets, one large and other small market were selected on the basis of arrival of kinnow in the market.

The primary data required for the study were collected through personally interviewing the respondents kinnow growers with the help of schedule. Secondary data were collected from the Vital Horticulture Statistics published by Directorate of Economics and Statistics, Pant Krishi Bhawan, Jaipur, District records of the Sriganganagar and market records of the selected market etc. The economics of kinnow observed by the payback period, BCR, IRR, NPW and cost of cultivation.

Kinnow is a perennial crop, since the cost structure of kinnow cultivation was studied under two sub heads *viz*., establishment cost and maintenance cost. All the costs incurred by kinnow growers from preparation of land to just before the first cutting were termed as establishment cost and the subsequent cost as the maintenance cost. Costs and returns per hectare for kinnow crop on different group of farmers were analyzed by developing the enterprises budget. The costs, margins and price spread in marketing of kinnow through different channels were analyzed by expressing the data in simple percentage term. Marketing agencies and channels involved in marketing of kinnow

were identified based on the information obtained from the respondents.

The opinion survey was under taken to know the problems faced by the sample farmers in production and marketing of kinnow at the time of data collection. These problems were studied under four sub-heads viz., technical, infrastructural, economic and social problems.

The cultural practices adopted in kinnow cultivation was well drained and light loamy soils with slightly heavy sub- soils and tropical to sub-tropical climate is suitable for kinnow cultivation. Kinnow is propagated by budding and seedlings. Field is prepared by ploughing. The planting is done during monsoon season at 6 x 6 m spacing. The nutritional requirement is about 5-20 kg per pit FYM and 200-250 gm per pit SSP is applied. The training and pruning done once in a year at the time of early in the spring. Most of kinnow growers in study area takes Ambe bahar (Feb-March) crop of kinnow because of better irrigation facilities available with them. Whenever irrigation required, the crop is usually irrigated at an interval of 15-18 days in winters and in summer at the interval of 7-8 days. Weeding and hoeing are essential to consume soil moisture in the field. The economic production of kinnow starts from the fifth year onwards which continue for the next 22 years.

The establishment cost of kinnow crop on an average, was estimated Rs. 52042 per hectare. Out of this, variable and fixed costs accounted for Rs. 37738.66 (72.52 per cent) and Rs.

14303.34 (27.48 per cent), respectively. Component wise, the cost or earned value of interest on fixed capital accounted highest share in costs incurred during the establishment period. It has been accounted for Rs. 10748 (20.65 per cent) followed by manure and fertilizer (14.02 per cent), planting cost (17.29 per cent), irrigation charges (8.49 per cent), hoeing and weeding (10.15 per cent), depreciation on farm equipment and machinery (6.83 per cent), respectively.

Out of total maintenance cost of Rs 1151114.19 ha^{-1}, the variable cost and fixed cost comprised Rs. 501760.66 ha^{-1} (43.59 per cent) and Rs. 649353.53 ha^{-1} (54.41 per cent). The rental value of land in the total maintenance cost accounted to be as high as Rs. 574261.2 ha^{-1} (49.89 per cent) followed by cost of manure and fertilizer (3.18 per cent), watching and harvesting cost (29.23 per cent), interest on fixed capital (4.90 per cent), irrigation charges (2.05 per cent), plant protection charges (2.53 per cent), training and pruning (3.97 per cent) and hoeing and weeding (1.95 per cent), respectively. The cost of depreciation and transportation accounted 1.62 per cent and 0.69 per cent, respectively.

The total cost was calculated to be Rs. 1203156.19 ha^{-1}, of which variable cost accounted for Rs. 539499.32 ha^{-1} (44.84 per cent of total cost) and fixed cost accounted for Rs. 663656.87 ha^{-1} (55.16 per cent of total cost). The sum of the stream of cost has been estimated to be Rs. 1203156.20 ha^{-1} whereas sum for the stream of gross returns was estimated to be Rs. 2758806 ha^{-1}. Similarly the sum of the stream of net returns and production

were estimated to be Rs 1578149.81 ha^{-1} and 306534 kg ha^{-1}, respectively.

The B: C ratio must be more than or at least equal to unity. On the basis of available data it was calculated as 1.90 for *kinnow* orchards. The net present worth of *kinnow* orchards of study area was estimated as Rs. 268800.35 ha^{-1}. On the basis of this, the total discounted costs and total discounted returns observed as Rs. 300098.92 ha^{-1} and 568899.60 $ha^{-1.}$ The IRR takes into account the time value of money. The IRR was calculated to be 36 per cent for *kinnow* orchards. The payback period of investment for *kinnow* orchards was worked out to be 8 year. The payback period of *kinnow* was found to be high in the study area because the productive age of *kinnow* orchards is 25 years and production of *kinnow* was found to be lower in the beginning of the years, respectively.

For marketing of kinnow, farmers were found to be adopting four marketing channels in sale of their produce, viz., channel-I (Producer -Retailer – Consumer), channel-II (Producer-Wholesaler– Retailer– Consumer), channel-III (Producer - Pre harvest contractor–Wholesaler– Retailer– Consumer) and channel-IV (Producer- Pre harvest contractor – Retailer – Consumer). Channel-I, II, III and IV contributes of marketed surplus was 25.57, 43.60, 25.70 and 5.13 per cent, respectively.

The total costs of channel-I incurred in sale of *kinnow* produce comes Rs. 100.90 q^{-1}. The transportation charges, charges for storage, charges for basket and jute palli used and loading and unloading were the main cost items as these together

accounted for 85.93 per cent. Individually these cost items accounted 31.07 per cent, 29.73 per cent, 15.36 per cent, and 9.76 per cent of the total marketing costs. The total marketing costs were Rs. 247.85q^{-1}, when *kinnow* marketed through channel II. Storage, transportation, commission and mandi fee are the major items of costs which together accounted 69.45 per cent of total marketing cost. The total marketing costs incurred in the sale of *kinnow* produce were amounted to be Rs. 280.11 q^{-1}. The storage, commission, transportation charges and mandi fee charges were the major items of costs in the sale of *kinnow* through channel-III. Individually these items of cost accounted 21.42 per cent, 14.99 per cent, 13.83 per cent and 11.07 per cent. The total marketing cost of channel-IV incurred in the sale of *kinnow* produce on kinnow orchards was Rs. 132.46 q^{-1}. The transportation charges, storage, picking charges and watching charges were the major items of cost accounted together 65.58 per cent of total marketing cost. To break-up the total cost, the agency-wise costs incurred were accounted as Rs 75.56 q^{-1} (57.04 per cent) by the pre harvest contractor and (42.96 per cent) by the retailer, respectively.

The average price paid by consumer for kinnow producer in each channel was Rs. 1358.87. The total marketing cost of various functionaries constituted channel wise, channel-I, II, III and IV was 7.43, 18.24, 20.61 and 9.75 per cent. Total marketing of margin of channel-I, II, III and IV was 20.72, 22.37, 22.80 and 24.02 per cent, respectively.

The total marketing cost were Rs. 100.90, 247.85, 280.11 and 132.46 per quintal of kinnow in channel-I, II, III and IV, respectively. The items which accounted for a large share in marketing cost were basket and jute palli charges, commission, storage, transportation, mandi fee and value of quantity loss. The producer's share were 71.86, 59.38, 56.58 and 66.23 per cent in channel-I, II, III and IV, respectively.

Results of opinion survey under taken to know the problems faced by the farmers in production and marketing of kinnow revealed that, lack of irrigation facilities, problem of intercultural operations, problem of adverse weather conditions were the technical problems faced by majority of sample farmers. Short supply of labourers, lack of storage facilities, lack of processing units were the infrastructural problems faced by the farmers. Higher cost of irrigation water, high cost of improved variety seeds, higher marketing cost of kinnow, low price of kinnow were the major economic problems faced by majority of sample farmers. Fear of thieves and stray animals prohibits farmers to take kinnow crop was the social problem faced by cent per cent sample farmers.

6.2 CONCLUSIONS:

Following conclusions may be drawn on the basis of the study results:

1. The establishment cost of kinnow crop on an average, was estimated Rs. 52042 per hectare. Out of this, variable and fixed costs accounted for Rs. 37738.66 (72.52 per cent) and Rs. 14303.34 (27.48 per cent), respectively.

2. Out of total maintenance cost of Rs 1151114.19 ha^{-1}, the variable cost and fixed cost comprised Rs. 501760.66 ha^{-1} (43.59 per cent) and Rs. 649353.53 ha^{-1} (54.41 per cent).

3. The total cost was calculated to be Rs. 1203156.19 ha^{-1}, of which variable cost accounted for Rs. 539499.32 ha^{-1} (44.84 per cent of total cost) and fixed cost accounted for Rs. 663656.87 ha^{-1} (55.16 per cent of total cost). The sum of the stream of cost has been estimated to be Rs. 1203156.20 ha^{-1} whereas sum for the stream of gross returns was estimated to be Rs. 2758806 ha^{-1}. Similarly the sum of the stream of net returns and production were estimated to be Rs 1578149.81 ha^{-1} and 306534 kg ha^{-1}, respectively.

4. The B: C ratio must be more than or at least equal to unity. On the basis of available data it was calculated as 1.90 for *kinnow* orchards. The net present worth of *kinnow* orchards of study area was estimated as Rs. 268800.35 ha^{-1}.

5. The IRR was calculated to be 36 per cent for *kinnow* orchards. The payback period of investment for *kinnow* orchards was worked out to be 8 year.

6. The average price paid by consumer for kinnow producer in each channel was Rs. 1358.87. The total marketing cost of various functionaries constituted channel wise, channel-I, II, III and IV was 7.43, 18.24, 20.61 and 9.75 per cent. Total marketing of margin of channel-I, II, III and IV was 20.72, 22.37, 22.80 and 24.02 per cent, respectively

7. The total marketing cost were Rs. 100.90, 247.85, 280.11 and 132.46 per quintal of kinnow in channel-I, II, III and IV, respectively. The items which accounted for a large share in

marketing cost were basket and jute palli charges, commission, storage, transportation, mandi fee and value of quantity loss.

8. The producer's share were 71.86, 59.38, 56.58 and 66.23 per cent in channel-I, II, III and IV, respectively.

9. Farmers reported to have the most important problems of lack of irrigation facilities, marketing, problem of intercultural operations, problems of adverse weather conditions, short supply of labourers, lack of storage facilities, high cost of improved variety seeds, no timely sale of product, high marketing cost, low price of kinnow and fear of thieves and stray animals to the crop.

6.3 RECOMMENDATIONS:

Based on the conclusions drawn from the results of the study following recommendations may be made:

1. It was observed in the study area, that most of the farmers of the area don't know about the improved cultivation practices for kinnow. The new cultivation technology of the kinnow adopted by farmers was very low. Hence, efforts should be made to educate the farmers about the improved practices through extension experts or agencies.

2. It was observed in the study area that some of the sample kinnow farmers faced the problem of credit, because at the time of the establishment of kinnow orchard, it was costly phenomenon and till the fifth years, there was no production obtained from the orchard. Thus, efforts should

be directed towards expansion and strengthening of the institution to meet farmers need.

3. It was observed in the study area that most of the farmers faced the problem of marketing. There was no big fruit market in the district so only two options remaining with the farmers that either produce was sold in local kinnow mandi or to sell the produce at other place or mandi that is very far from the place of production. Government should provide better marketing facilities to the farmers of the region by opening of more regulated markets.

4. Kinnow is a perishable commodity which requires immediate disposal. In the study area, it was observed that basic facilities for storage do not exist and at the time of its peak production, there was a very high demand of storage which was not available with farmers. Due to the absence of this facility, farmers were distressed to immediately sell their produce on prevailing market rates. Hence, looking to its increasing production over the years the creation of storage facilities in the study area is fully justified.

5. It was also observed in the study area that there was no processing unit. So, the government should take up initiative to establish the processing facilities in the nearby tehsil or district level to safeguard the interest of the farmers.

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APPENDIX – I

DEPARTMENT OF AGRICULTURAL ECONOMICS
S.K.N. College of Agriculture, Jobner

Title of Research : An Economic Analysis of Production and Marketing of Kinnow in the State of Rajasthan.

Name of Investigator : **Damodar Prasad Meena**

Reference Year : 2009-10
Date of Interview :

SCHEDULE FOR FARMERS

1. General Information

Name of the Farmer's :
S/O Sh. :
Caste :
Village :
Tehsil :
District :
Size of land holding (in bigha/hectare) :
Area under kinnow orchards :
Year of establishment :
Number of trees in the orchard :

2. Land:

(a) Operational holding (cultivated area in ha. /bigha)

Sr. No.	Particulars	Irrigated	Unirrigated	Total	Present value (Rs)
1.	Owned land				
2.	Rented in				
3.	Rented out				
	Grand total				

(b) Land Rent/ Revenue

(c) Rental value of owned land _____ Rs.

3. Fixed Assets:

Farm Machinery/ Building

S. No.	Particulars	No.	Purchased year	Costs (Rs)	Expected future life	Present value
1.	M.B. Plough					
2.	Desi Plough					
3.	Pata					
4.	Spades					
5.	Sickle and khurpi					
6.	Chaff cutter					
7.	Bullocks and bullocks cart					
8.	Sprayers & Dusters					
9.	Tube-wells					
10.	Thresher					
11.	Tractor					
12.	Diesel Engine /EM					
13.	Building and tank					
14.	Hoe and digger					

4. Irrigation

S.No.	Source	Share	Water lifting device	Time taken irrigate a bigha (Hrs.)	Electricity or Diesel charges (Rs.)	Repair charges (Rs.)	Net present value of source (Rs.)

5. Existing cropping pattern

S.No.	Crops	Area under crop in the year 2009-10						Total
		Kharif		*Rabi*		*Zaid*		
		Irrigated	Un-irrigated	Irrigated	Un-irrigated	Irrigated	Un-irrigated	
1.	**Foodgrains**							
a								
b								
2.	**Vegetables**							
a								
b								
3.	**Oil seeds**							
4.	**Fruits**							
a	Kinnow							
b	Aonla							
c	Lime							
d	Mango							
e	Others							

APPNEDIX – II

DEPARTMENT OF AGRICULTURAL ECONOMICS
SKN College of Agriculture, Jobner

Title of Research : **An Economic Analysis of Production and Marketing of Kinnow in the State of Rajasthan**

Name of Investigator: **Damodar Prasad Meena**
Reference Year : 2009-10

Date of Interview :

SCHEDULE OF FARMERS FOR THE STUDY OF PROBLEMS

Name of the Farmer's :
S/O Sh. :
Caste :
Village :
Tehsil :
District :

S. No.	Particulars	Yes/No
(A)	**Technical problems**	
1.	**Lack of technical knowledge about kinnow cultivation**	
2.	No directives and encouragement from local administration for kinnow cultivation	
3.	Lack of technical persons of kinnow cultivation	
4.	Availability of kinnow plants at nurseries are scares	
5.	Lack of irrigation facility to supply water to kinnow plants	
6.	Do not know the name and proper doses of manure and fertilizer required in kinnow cultivation	
7.	Kinnow plants deplete the soil from essential nutrients and absorb more water	
8.	Do not know the proper method and doses of pesticides and insecticides application to protect the crop from pests and diseases	
9.	Kinnow plant is host of pests, diseases and birds which cause serious losses to other crops	
10.	Problem of inter cultural operation	
11.	Do not protected plant from adverse weather condition	
12.	Problem in marketing of kinnow	
(B)	**Infrastructural problems**	
1.	Agricultural Department does not provide proper guidance	
2.	Difficulties in purchasing agricultural inputs from market	

	and co-operative societies	

Contd…

S.No.	Particulars	Yes/No
3.	The inputs needed for kinnow production are not timely available in the market	
4.	The machinery spray equipments made available through Agric. Deptt. for dusting spraying are not available at the time	
5.	Distribution of seedling at nurseries is paralyzed by personal baisness	
6.	Market distance is too long	
7.	Short supply of both skilled and unskilled labour	
8.	Scarcity of packing cases	
9.	Malpractices in the market	
10.	Dominance of trader in market	
11.	Non-availability of cold storage	
12.	Lack of transportation means	
13.	Non-availability of regulated market	
14.	Lack of road facility	
15.	Quality of water	
(C)	**Economic problems**	
1.	Non-availability of loan from banks or Govt. agencies	
2.	Availability of irrigation water too costly	
3.	One can not afford the cost of fancying, boundary wall which is essential for kinnow orchard	
4.	Kinnow plant give fruits for only few days without any regular commercial product	
5.	Production of the kinnow tree from animals and insects pest at earlier stage is costly	
6.	Cost of improved variety seedling is high	
7.	Cost of fertilizer is high	
8.	Cost of transportation of kinnow product is high	
9.	Marketing cost of kinnow is high	
10.	Prices of kinnow are low	
11.	No timely sale of product	
(D)	**Social problems**	
1.	Fear of thieves and stray animal prohibits farmer to take kinnow crop	
2.	Is there any social restriction on kinnow cultivation	
3.	Low consumption tendency of kinnow in study area	

APPENDIX – III

SCHEDULE FOR MARKET FUNCTIONARIES

Date of interview
Name of Functionaries :
S/O Sh. :
Address :
Category :

Purchase of Kinnow Product by Middlemen

S.No.	Date	From whom purchased	Place of Purchased	No. of basket purchased	Weight	Price at which purchased	Value (Rs.)
1.							
2.							
3.							
4.							
5.							

A. Cost Incurred by the Middleman in Purchase of Kinnow

S.No.	Particulars of Cost	Number	Quantity	Rate	Amount
1.	Sales tax				
2.	Mandi fees				
3.	Commission				
4.	Octri				
5.	Loading charges				
6.	Unloading charges				
7.	Charges for sorting				
8.	Charges for grading				
9.	Weighing charges				
10.	Cost for basket/crates/ palli used				
11.	Transportation cost				
12.	Quantity losses during the period of purchase				
13.	Storage charges				
14.	Others				

Disposal of Kinnow

S.No.	Date of sale	To whom sold	Place of sale	Quantity sold	Rate (Rs./Qtl)	Amounts (Rs.)
1.						
2.						
3.						
4.						
5.						

Net Price Received (Rs.)

6. Cost incurred in Raising of kinnow Orchards and Identification of Production Technology.

S	Operations	Time	Methods/		Material used							Labour																								Total
No.			system		Owned				Purchased			Human labour							Bullock labour							Machine labour												Cost
												Family				Hired			Owned				Hired				Owned				Hired					
					Q	R	C		Q	R	C	T	R	C		T	R	C	T	R	C		T	R	C		T	R	C		T	R	C			
1	Removal of grasses and old bushes																																			
2	Preparation of land																																			
3	Farm layout (Planting system)																																			
4	Digging of pits																																			
i	Distance of planting																																			
ii	No. of pits																																			
iii	Size of pits																																			
5	Filling of pits																																			
i	Soil treatment																																			
	Name of insect and chemicals																																			
ii	Manure																																			
iii	Fertilizers																																			
a																																				
b																																				
c																																				
6	Planting																																			

Contd…

S No.	Operations	Time	Methods/ system	Material used								Labour																										Total Cost
				Owned				Purchased				Human labour								Bullock labour								Machine labour												
												Family				Hired				Owned				Hired				Owned				Hired						
				Q	R	C		Q	R	C		T	R	C		T	R	C		T	R	C		T	R	C		T	R	C		T	R	C				
7	Interculture																																					
i	Hoeing & weeding																																					
ii	Training & pruning																																					
iii	Mulching																																					
8	Manuring																																					
i	Fym/ Compost																																					
9	Fertilizer																																					
i																																						
10	Plant protection																																					
11	Repair of basins																																					
12	Irrigation																																					
13	Fencing and repair of fencing																																					
14	Watching																																					
14	Harvesting																																					
16	Other cost																																					
i	Grading																																					
ii	Packing																																					
iii	Storage																																					
iv	Transportation																																					

Note: Q = Quantity T = Time R = Rate C = Cost

7. Production

S.No.	Month	Production kg/orchard	Production kgs/plant	Production kgs/bigha	Price Rs./kg	Value (Rs.)
1	Returns from kinnow					
i						
ii						
2	Returns from intercrop					
i						
ii						

8. Disposal Pattern of the Product

S.No.	Stages of picking	Qty. hold kgs.	Qty. sold kgs.	Price at which sold Rs/kg	Amount Rs.	To whom sold	Place of sale
i							
ii							
iii							
iv							
v							

9. Marketing of kinnow

A. Grading and Packing Cost

S.No.	Particulars	No.	Qty. of produce	Material cost						Labour						Total			Remark
				Owned			Purchased			Family			Hired						
				Q	R	C	Q	R	C	T	R	C	T	R	C	T		C	
1	Grading																		
2	Packing																		
i	Wooden crates or straw boxes																		
ii	Bamboo basket																		

Note : T = Time R = Rate Q = Quantity

Cost of Transportation

S.No.	Mode of transportation	Distance (kms.)	Transportation means		Time	Qty. transported	Per unit charges	Qty. spoilage	Total amount (Rs.)	Per unit cost (Rs.)	Cost paid by whom
a	From field to storage point										
b	From storage point to market										
c	From field to market directly										

B. Labour, Weighing and Commission Charges

S.No.	Particulars	Qty. sold	Name of market	Per unit charges	Total amount (Rs.)	Charges paid by whom
1	Labour charges for					
i	Loading					
ii	Unloading					
2	Weighing charges					
3	Commission charges					
4	If any other					

C. Marketing Agencies/Channels Followed by Orchadist in Marketing of Product

S.No.	Agencies/channels	Quantity sold	Percentage of quantity
1	Producer to consumer		
2	Sale to contract basis		
i	Pre riping contract		
ii	Post riping contract		
3	Sale to wholesaler at village		
4	Sale to retailer at village		
5	Sale to commission agent at market		
6	Sale to wholesaler at market		
7	Sale to retailer at market		
8	Any other		