CHAPTER- II

REVIEW OF LITERATURE

A large number of studies, conducted in various regions, have attempted to analyse the costs and returns, resource use, productivity, and various technological, infrastructural and other constraints in fruit cultivation. Information generated by these studies generally highlights the knowledge gap and provides guidelines for carrying further research on the subject. Keeping all the above in mind, an attempt has been made in this chapter to discuss a brief review of the relevant literature in the chronological order.

Heady (1968) in his book ‘Economics of Agricultural Production and Resource Use’ has quoted the pattern of costs and incomes in apple industry. It was stated that at the outset of an apple orchard, costs were incurred but no revenue was forthcoming from apples. A sale value existed for the trees and land, which was based on the discounted future returns, initial costs were high because of costs of plants and the costs of planting. While both cost and revenue rose as the productivity of trees increased upto 35 or 40 years of age, the annual costs, depending upon the prices exceeded annual revenue
for nearly 12 years. Thereafter, annual revenue rose at a faster rate than cost up to the time the trees were about 30 years of age. Annual undiscounted net income was then at a maximum but began to decrease while costs remained relatively constant and revenue fell below costs somewhere in the neighbourhood of 50 or 60 years, depending upon the level of prices.

Ram et al (1969) studied fertilizer-yield relationship in Aneb-e-Shahi grapes in Ludhiana district. The study examined the least-cost combination of fertilizers for specified yield levels at given fertilizer prices. Production function approach was used to analyse the data, and Cobb-Douglas function was found to be a better fit than Quadratic function. Yield isoquants and isoclines were worked out from the Cobb-Douglas function, and all sets of isoquants indicated decreasing marginal rate of substitution. The sum of regression coefficients was also less than unity, indicating diminishing marginal returns to each factor, holding each of the other factors constant. The marginal value productivity analysis indicated that marginal value productivity of nitrogen and phosphorous was Rs.12.12 (+5.74) and Rs.19.08 (+7.23) respectively. The marginal value productivity of phosphorous was greater than that of nitrogen, indicating higher net returns by increasing the use of phosphorous input.
Gupta and George (1974) evaluated the economic viability of Nagpur ‘santra’ cultivation by using various techniques such as pay-back period, Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit-Cost Ratio (BCR). Stratified random sampling technique was used and the data were collected from 60 orange growers belonging to two talukas of Nagpur district. Excluding the land cost, investment in the project was found to have a pay-back period of 7-9 years. The IRR varied between 29.3 and 45.9 per cent depending upon the size of the grower. The NPV and BCR calculated at the discount rate of 12 per cent varied from Rs. 4,260 to Rs. 7910 per acre and from 1.85 to 2.64 respectively. It was found that the productive life of an orange tree was more than 24 years. The orange grove need not be replanted until it gave fruits yielding Rs. 529 per acre in a grove of upto 1 acre, Rs. 981 per acre in a grove of 1 to 2 acres, Rs. 885 per acre in a grove of 2 to 3 acres, Rs. 713 in a grove of 3 to 5 acres and Rs. 644 per acre in a grove of more than 5 acres (at discount rate of 12 per cent).

Peter (1974) attempted to analyse the input and output relations of banana plantation in Kanyakumari district and to determine the optimum allocation of resources in banana production. The study also aimed at constructing an equation for the banana
production in Kanyakumari district apart from suggesting ways for obtaining a high percentage of profit without increasing the prevailing average total expenditure. A random sample of 20 planters was drawn from different villages of the district by choosing not more than one planter from one village. The data were collected by personal interview method. Cobb–Douglas production function was used to estimate the productivity of various inputs used in the plantation of banana. The total annual gross return was the dependent variable. The three independent variables were labour-use, expenditure on manuring and other expenses. There was highly significant and positive relationship between gross income and expenses on manures. The marginal value product of labour appeared to be less than the wage rate. It highlighted the need for shifting resources to manuring where marginal value product was higher than the rupee expenditure. This could result in more net income as well as gross income with existing level of resources.

Gill et al (1982) conducted a study to examine the trends in area, production and yield of citrus fruits, the area sanctioned by the Irrigation Department and that actually planted by the farmers and the extent of area bearing fruits and its productions pattern. The study was conducted in six blocks, viz. Malout, Lambi, Kot Bhai and
Mukatsar of Faridkot district and Abohar and Fazilka blocks of Firozpur district. A complete list of the orchards in each block was prepared in consultation with the Irrigation, Revenue and Horticulture Departments. The orchards in the list were classified into small, medium and large using the cube-root frequency method. In all, 90 farmers were selected with probability proportion to their number in their respective categories and information was collected from them. Abohar block was found to have the maximum (31.15 per cent) area under fruits followed by Mukatsar (22.63 per cent), Lambi (20.87 per cent) and Malout blocks (19.21 per cent). The area under fruits in Kot-Bhai and Fazilka was only 3.02 and 3.12 per cent of the total area under all fruits. About 71 per cent of citrus production was concentrated in the above four blocks of Faridkot district and 29 per cent in the remaining two blocks of Firozpur district. Citrus fruits occupied 92.76 per cent of the total area under various fruits. The citrus orchards were planted on a large scale as the farmers were attracted by the enhanced canal-water supply provided to the citrus orchards. It was also found that only negligible percentage (0.47) of the sanctioned area was not put under citrus orchards. The farmers, due to the danger of losing the enhanced canal-water supply, planted almost the entire area sanctioned by the Irrigation Department. The
trends in yield levels indicated direct relation with the size of the orchard, i.e. larger the size of the orchard, higher the yields and vice-versa. The highest average yield was obtained in Kot-Bhai block closely followed by Malout, Mukatsar, Fazilka and Lambi. The lowest yield was obtained in Abohar. However the overall average yield at the selected farms was very low due to poor management by the orchardists, practice of inter-cropping by majority of the farmers and poor bearing by old orchards. The study suggested that small and medium orchards need to be provided with latest technological know-how to bring improvement in the production of citrus fruit. The procedures of replacement of old orchards should be simplified and area under high-yielding varieties of citrus, especially kinnow should be encouraged.

Verma and Singh (1982) conducted a study for the estimation of cost of and returns from cultivation of apple in Kotgarh area of Himachal Pradesh. The area was divided into three elevation zones, each zone having five orchards planted with commercial cultivars of apple, mainly Starking Delicious, Red Delicious, Richared and Golden Delicious. The income and expenditure records on all the individual items obtained for these orchards were based on the actual figures provided by the orchardists. It was found that over 75 per cent
of the total recurring expenditure was incurred on harvesting and marketing operations. The study observed that the expenditure on operations such as picking, grading, packing, labelling, strapping, etc. was much less than that on transportation and subsequent handling. The net income (per acre) ranged from Rs. 1,916.67 to Rs. 6,160.00. The average annual expenditure of Rs. 5,339.15 and gross income of Rs. 9,391.30 per acre were calculated, thereby giving annual net profit of Rs. 4,052.15 per acre for all the orchards at different elevation zones taken together. An average annual net profit of Rs. 4,052.15 per acre was obtained.

Sharma (1983) used Cobb-Douglas type of production function to explain the role of number of trees, use of manures, fertilizers and human labour in Shimla district. The results revealed that all the variables had significant positive impact on apple production. The analysis of MVP factor-cost ratio showed that the apple growers should increase investment on tree plantation and the use of manures, fertilizers and human labour. A rupee investment on apple tree and manures and fertilizer was found to yield a return of about Rs. 5.09 and Rs. 5.00 respectively. The average net returns per acre were worked out to be Rs. 30,133. The producer’s share in the consumer’s rupee was less than half of the price paid by the
consumers and about 1/5th of the rupee paid by the consumer was spent on marketing. The study suggested that transportation facilities should be improved in the study area and the Government or Himachal Pradesh Marketing Corporation (HIMACHAL PRADHESH MARKETING CORPORATION) should announce minimum support price like other crops to give a boost to the apple industry.

Subrahmanyam (1984) analysed area, production and productivity of fruits and vegetables to determine their potential growth and the past growth rate in India. The compound growth rate functions were fitted to the index number data published by the Directorate of Economics and Statistics (Ministry of Agriculture) for the period 1949-50 to 1980-81 for finding out the growth rates of area, production and productivity of fruits and vegetables. The analysis of growth of horticultural crops showed an impressive result but it was not sufficient to meet the requirements based on the suggested levels of consumption. There was a significant growth at all-India level but the position in individual states was not satisfactory and some of the states even recorded a negative growth rate. There was a need to remove some of the economic constraints arising due to the peculiar nature of these crops. The study identified a good
scope for increasing the area as well as productivity by following improved package of practices.

An agro economic research (1985) conducted by Agro-Economic Research Centre, Vallabh Vidyanagar, Gujarat Studied the production and marketing of mangoes in Gujarat. A sample of 120 orchardist households was selected from eight villages from three talukas, viz. Valsad, Gandevi and Umargam belonging to Valsad district. The data were collected from these sample orchardists for reference period 1979-80 and 1980-81. The results showed that the gross value of mango production per hectare for the sample households was Rs. 4,678 and the per hectare yield was 2,990 kgs. during mango season 1980. The farmers spent Rs. 1,018 as input expenditure per hectare and Rs. 0.34 per kg. of mango production and the marketing cost per hectare on an average was Rs. 139 during 1980-81. The net income after deducting both production and marketing costs from gross revenue per hectare worked out to Rs. 3,521 during 1980-81. The net income per orchardist household was Rs. 3,123 during the same period. The study also revealed that income from mango crop constituted one-fourth of the total net annual family income during 1980-81. The study suggested for
replacement of old mango trees by new and vigorous trees to
achieve better mango yield levels.

Sarkar and Mitra (1985) studied the rate of growth of area,
production and productivity of some important horticultural crops
grown in West Bengal. The findings were mainly based on statistics
of government of West Bengal. It was concluded that there was a
need to extend and develop horticulture in the state.

Sikka and Swarup (1985) examined the cost of production and
the economics of citrus orchards; estimated the economic viability of
citrus orchards; analysed the existing marketing system and
efficiency of grading and packaging and listed the problems of citrus
growers. Both primary and secondary data were analysed using
various statistical techniques. It was found that an orange orchard
gave significantly more incremental income (per farm as well as per
hectare) than field crops or other citrus fruits. The maximum payback
period was found to be six years. In addition to higher profitability, the
orange orchard also generated additional employment. The rise or fall
in producer’s share was disproportionate to rise or fall in the price
level because several cost components were not based on value.

Sikka and Swarup (1985) conducted a study on economics of
apple production in Shimla and Kullu districts of Himachal Pradesh
and found that the net present value (NPV) and internal rate of return (IRR) in Shimla and Kullu Districts (at 12 per cent discount) varied from Rs. 21,850 to Rs. 30,504 per hectare and 20.62 to 23.59 percent respectively. The benefit cost ratio at the same discount rate varied from 1.29 to 1.42 for different orchard sizes. The apple cultivation was found to be profitable and financially viable activity in the region.

Subrahmanyam (1985) conducted a study based mostly on published secondary data in order to examine the trend and to identify constraints in export of mangoes. The study showed that India accounted for 63 per cent of the world production of mangoes but its share in the total world exports of mangoes was only 28 per cent. The exports went up from 4,505 tonnes in 1978-79 to 8,043 tonnes in 1982-83, registering an increase of 79 per cent. The share of exports in total production was found to be less than one per cent. The study indicated the existence of vast scope for increasing the export of mangoes. The value of fresh mango exports increased from Rs. 0.85 million in 1965-66 to Rs. 67.4 million in 1982-83. The unit value realization after 1979-80 declined due to stiff competition from other countries. The study suggested for modernization of packing
and grading, strict quality control and modification in the export policy to meet the international market requirements.

Rajagopal (1986) discussed the economics of horticultural crops and found that production of fruits increased at a compound growth rate of 3.19 per cent during 1976-77 to 1982-83. Among the selected fruits, apple recorded maximum increase in the production during the last seven years. Among the three crops studied, apple and mango were found to be the most profitable crops in hilly terrain and in the plains respectively. The producer’s share in the consumer’s rupee was reported to be 71.76, 65.30 and 59.92 per cent for apple, mango and guava respectively. The higher marketing cost and the large price spread had been attributed to post-harvest losses and high storage charges. Lack of infrastructure facilities was considered as the major constraint in the development of horticulture sector. The variation in mango production was observed to be larger followed by guava and apple. The fluctuations in production in perennial crops were not solely based on the area under crop but also on the age of plantation, nature of bearing (annual/biennial), etc.

Randev (1986) carried out a study to examine the input-output relationship and resource use efficiency among various sizes of orchards for the selected horticultural crops (apple and almond). To
achieve the objectives, 151 respondents were selected randomly from the Kinnaur district of Himachal Pradesh by using multistage random sampling technique and 82, 55 and 14 respondents were categorized as small, medium and large orchardists, respectively. The primary data collected from the respondents included various aspects such as operational holding, farm inventory, cropping pattern, average yield, and input-output requirement etc. for the year 1984-85. The average size of holding of small, medium and large orchards worked out to 1.86, 3.76 and 7.87 hectares respectively. The study indicated that the larger farmers were inclined more towards fruit crops. The capital investment on medium and large farms was 2.6 and 5 times as compared to small farms. The operational cost (cost A) on per hectare basis was found to be higher for apple and almond in the medium category. The net income on per farm and per hectare basis was found to be higher in case of apple as the area under almond was proportionately very less. The coefficients of Cobb-Douglas type of production function indicated that all the exogenous variables under consideration were positive and significant except manures and fertilizers in case of large orchards for both apple and almond crops. It was observed that in all the three categories, more
than 71 per cent of the orchardists were going for pre-harvest contracts.

Awasthi et al (1987) conducted a study to analyse the economics of guava orchard at recommended level of inputs in Jabalpur district of Madhya Pradesh. The data were collected from a randomly selected sample of 25 guava orchardists from a cluster of ten villages in Jabalpur block during 1980-86. The study revealed that the establishment cost (all costs incurred by the orchardists from preparation of land upto planting and nursery and fencing) was worked out to be Rs. 2827 per hectare. More than 50 per cent of total establishment cost was on account of the digging of pits and nursery procurement. The operational cost (cost subsequently incurred on its maintenance year after year) varied from Rs. 1525 in the first year to Rs. 2895 per hectare for the orchard in the sixth year of age. In the initial years, the main items of operational costs were irrigation, hoeing and watching while in the later years, the major inputs (manure and fertilizer and plant protection) constituted a share of 30 to 40 per cent in the total operational costs. Although the guava plant started bearing after attaining the age of two years, the costs continued to dominate the gross return for three years. The positive net return started only in the fourth year and reached up to Rs. 5694
per hectare in the sixth year, which was assumed to continue for the next 24 years. The guava farmers were found to incur a net loss ranging from Rs. 69.50 to Rs. 3295 for the first three years. There existed a tremendous scope for improving the income from guava orchard. The study suggested that proper management care in respect of spacing, fertilization, plant protection practices, etc. should be taken.

Jaiswal et al (1987) conducted a study to examine the economics of production and marketing of guava in district Allahabad (Uttar Pradesh). The Chail block of district Allahabad was purposively selected for the study as it had the largest area under guava cultivation. The data pertaining to the agricultural year 1986-87 were analysed based on information provided by ten respondents, each selected randomly from the five randomly selected villages by survey method. The study revealed that the expenditure incurred on guava orchard in the first year was Rs. 2955. There was no income earned from guava during the first three years as guava orchard bears fruit only from the fourth year. In the second and third year, the total expenditure incurred on guava orchard and intercrop of pea was Rs. 3243 and Rs. 3376 respectively. The annual yield of guava orchard in the fourth year was 30 kg per plant and in the seventh year
it rose to as much as 50 kg per plant. The average cost per annum from the fourth to the tenth year was worked out to be Rs. 2500. The average net income per hectare per annum from a guava orchard from the fourth to the tenth year was worked out to Rs. 6080. The producer’s share in the consumer’s price was found to be about 67 per cent. The total marketing cost per quintal of guava was calculated as Rs. 60. The study identified the need to provide facilities for fruit preservation in the guava fruit belt and for increasing the efficiency of the existing marketing system to reduce the cost of marketing.

Nighot et al (1987) conducted a study to examine the per hectare input use, costs and returns and profitability of orange cultivation in Nagpur district of Maharashtra. The study was based on data of 40 orange orchards selected from five villages of the district. The total cost, consisting of establishment cost and annual maintenance cost of orange cultivation amounted to Rs. 11667 per hectare. Human labour, manures, fertilizers, and pesticides were the important items of expenditure in orange cultivation. The total cost per orange tree was worked out to be Rs. 34. The yield of orange per hectare and per tree was observed to be 114.5 thousand fruits and 344 fruits respectively. The gross returns per hectare and per tree were Rs. 28599 and Rs. 86 respectively. The output-input ratio for
orange production was worked out to be 2.56. The study concluded that orange cultivation was a highly profitable proposition under the existing cost-price situation, which gave 156 per cent returns over variable cost.

Patil et al (1987) conducted a study to examine the trends and growth rates in area, production and productivity and the factors responsible for change in acreage under banana crop in Jalgaon district. The secondary data for the years 1950-51 to 1979-80 were collected from published as well as unpublished sources. In all, ten models were developed and the trends in area, production and productivity were estimated by fitting simple linear regression equation. A modified version of adjustment lag model developed by Nerlove was used in linear form. The regression analysis for different time periods (1950-51 to 1964-65 and 1965-66 to 1979-80) was also carried out. The study revealed that the area under banana increased tremendously from 66 hundred hectares (1950-51) to 344 hundred hectares (1970-80) in the district. The production of banana showed a sharp increase by almost 689 per cent during the same period. Farmers were found to be responsive to banana prices. Current area under banana was observed to be highly responsive to lagged price. There appeared no significant effect of previous year’s prices of
sugarcane, cotton, paddy, wheat, groundnut, etc., on the acreage of banana. There was neither any impact of rainfall in determining the acreage under banana nor did wheat and gram have any influence on the acreage under banana under the mixed cropping system. Net irrigated area and one year lagged price of banana jointly explained nearly 97 per cent of the variation in the acreage under banana. Lagged price of banana influenced the acreage under banana in the same direction and magnitude during different periods. There was no influence of net irrigated area on the acreage under banana in the early years, but in later years, farmers’ adjustment to changing circumstances was found to be quick.

Rajagopal (1987) in his paper discussed the various aspects of fruit production and marketing with special reference to apple, guava and mango crops. The study dealt in detail with the production factors such as agronomic conditions, production trend, cost factors and flow of cash in the selected fruit crops. The study revealed that the producer’s share in the final price was highest in apple crop, followed by mango and apple cultivation. It was observed that apple crop was economically viable even to small growers. The production and area of apple crop were found to be continuously increasing since 1976-77 compared to other fruit crops studied, subject to the ecological
conditions. The study recommended promotion of direct and cooperative sales to provide more share to the producers in the final price of fruit crops.

Raju et al (1987) in their study focused on the status of fruit crops development in Andhra Pradesh in the expansion of their area and production over time and space. The study also identified some constraints in the development of these crops and suggested some possible solutions for it. The paper estimated compound growth rates of area for the period 1967-68 to 1982-83 and those for production for the period 1970-71 to 1982-83. The out-turn time-series data were available only for banana, mango, citrus, grapes and cashew crops at the State level. The distribution of fruit crops in Andhra Pradesh over space and time was studied over three time periods, viz. 1972-73, 1977-78 and 1982-83 and over three regions (Coastal Andhra, Rayalseema and Telangana). The results were computed by fitting a semi-log equation of the type, log Y=a+ bt for important fruit crops (‘Y’ refers to area/production). The study found that the important crops that contributed to the total area under fruit crops were mango (55 per cent) followed by citrus (18 per cent), cashew (15.43 per cent) and plantain (8.33 per cent). Mango, citrus and cashew accounted for more than 88 per cent of the area under total fruit crops. The trend in
the out-turn of mango in the early 1980s was at an increasing rate from 1,669 thousand tonnes to 1,766 thousand tonnes. The increase in the production of mango was found be maximum at 35.80 per cent in 1973-74 as compared to the previous year. During the three-year period 1975-78, citrus fruits production declined by 9.51 per cent, 1.72 per cent and 1.36 per cent respectively. In Andhra Pradesh, the growth in the area of all the fresh fruits together was only 0.95 per cent whereas it was 4.15 per cent for dry fruits during 1967-68 to 1982-83. The study concluded that higher growth in the area of dry fruits as compared to fresh fruits was only due to the contribution in the growth of cashew crop.

Reddy (1987) advocated the need to develop horticultural crops so as to improve the economic conditions of farmers in the dry region of Andhra Pradesh. He had worked out economic feasibility of mango, acid lime and sweet lime and compared the economics of these fruit crops with those of the arable crops grown on the area. The benefit-cost ratio had been found higher for horticultural crops than for the competing arable crops. It was advocated that the horticultural development programme in the state be prepared on the basis of land-use capability, nature of commodity in relation to
proximity of market, sound programme of financial assistance and existing marketing infrastructure.

Sharma and Chand (1987) presented establishment cost and age-wise annual operational cost for orange and kinnow based on a survey of twenty-five orchards of lower hills of Himachal Pradesh. It was indicated that returns per hectare from kinnow were more than those of orange orchards and that the producers received less than 60 per cent net share in the consumer's rupee. It was concluded that kinnow production could be extended in the lower hills of the state. Educating the farmers about modern techniques of citrus production, development of infrastructure, fixing the support price and development of efficient communication systems could also enhance the productivity of the existing orchards.

Sharma and Chand (1987) attempted to evaluate the cost and returns of orange and kinnow cultivation in Himachal Pradesh because of the existence of vast potential for citrus growing in low hills of the State. The establishment cost amounted to Rs. 3330 in the case of orange, while it was Rs. 3911 for kinnow orchards at 1985-86 prices. About 42 per cent of the establishment cost was accounted by labour in both the types of orchards. The study found that the kinnow fruit accounted for higher total annual expenditure in all the years
than apple fruit due to high expenditure involved in manure and fertilizers, plant protection and labour-use. The annual cost per hectare was more during the initial (non-bearing) years because the plants required more attention in respect of labour and material used. The per hectare net returns were greater in the case of kinnow as compared to orange due to better tree performance, fruit quality, yield and prices of kinnow plantation. The sales were suggested to be effected through co-operative marketing societies or Himachal Pradesh Marketing Corporation. This could help in minimising the margins of the intermediaries ultimately ensuring better producer’s share in the consumer’s rupee. It was further suggested that the income status of orange and kinnow growers in Himachal Pradesh could be improved by providing assured irrigation, training in orchard management to the growers and timely availability of critical inputs at subsidised rates.

Singh (1987) made use of net present value (NPV), benefit-cost ratio (BCR) and internal rate of return (IRR) along with annuity values as the decision-making criteria for feasibility of kinnow, mango and guava production in the Kandi area of Punjab. Cultivation of these fruits had been found to be financially feasible at 18 per cent of discount rate. The BCR had been found to be more than 1.6 and IRR
as high as 38.91, 46.40 and 48.40 per cent for mango, kinnow and guava production respectively. The study pointed out the importance of kinnow plantation in the area. Apart from tools like NPV, BCR and IRR, an attempt was made to ascertain the range of feasibility of allowing a fall in the returns by varying proportions. The kinnow plantations were found to be a feasible proposition in the area.

Singh et al. (1987) examined the financial feasibility of horticultural development in Kandi area of Punjab by analysing a random sample of 63 beneficiaries of various horticultural development programmes pertaining to years 1980-81 and 1981-82. The area under fruit crops recorded a significant growth rate of 12.95 per cent per annum during the period 1981-85. The annual growth rate of area was found to be significant and positive for all the fruit crops. It was the highest for kinnow (32.20 per cent) followed by ber (14.96 per cent), pear (13.30 per cent), mango (6.75 per cent) and guava (5.44 per cent). The findings indicated that most of the newly established orchards were kinnow plantations followed by mango and guava. Generalised annual costs of and returns from the newly established orchards were developed for the entire economic life period of the fruit crops using five to six years input-output data and were discounted at 10, 12, 15 and 18 per cent for each of these fruit
plantations. The study revealed that all the three fruit species (kinnow, mango and guava) were financially feasible at all the discount rates in terms of net present worth and benefit-cost ratio criteria. The internal rate of return was the highest for guava (48.40 per cent), followed by kinnow (46.40 per cent) and mango (39.71 per cent). Mango plantations having 50-year economic life had the highest benefit-cost ratio (2.58) and the lowest average annuity value (Rs.1910 per year). The average annuity value at 12 per cent discount rate from the kinnow plantations was estimated at Rs. 9574 per year.

Singh (1987) examined and compared the profitability of grapes cultivation vis-à-vis other field crops in Andhra Pradesh for the agricultural year 1982-83. The relative profit as reflected by the returns per rupee of cost was more in field crops/crop rotations than in grapes. The cultivation of grapes was found to be highly remunerative. The study suggested for provision of adequate credit, marketing and processing facilities and training services so that even small and marginal farmers could be encouraged to allocate part of their land under grapes cultivation. This could lead to higher income and substitution of labour for capital through selective mechanization in field crops.
Srinivasan (1987) studied the economics of grape cultivation in Dindigul taluk of Anna district in Tamil Nadu. The study was based on the data collected from a random sample of 42 growers pertaining to the year 1983-84. The average total establishment cost worked out to be Rs. 16460 per acre. The expenditure on material cost (pandal erection) and the labour cost on various operations constituted a major share of total establishment cost. The average operation and maintenance costs amounted to Rs. 8208 per acre, which included expenditure on labour, cost of fertilizers and plant protection measures. The total cost of production was calculated at Rs. 12693. The analysis revealed that the net income always remained above the total costs despite the decline in yield as the age of the plant increased. The production function analysis showed that age was the main value determinant of yield. All the six variables together explained 77.50 per cent of the variations in yield. The study also indicated that the pay-back period was less than two years, the benefit-cost ratio was above unity, the net present value was positive and the internal rate of return was above 50 per cent. The study revealed that grape cultivation was highly profitable proposition in the region despite high initial investment.
Subrahmanyam (1987) carried out economic analysis of mango cultivation to determine the costs and returns and the soundness of investment, using investment appraisal techniques. The results showed it profitable to invest in mango cultivation with an internal rate of return around 30 per cent and a benefit-cost ratio above two. The payback period was slightly less than 11 years from planting to recover the investment. The income from mango cultivation was comparatively low due to neglect of orchards because of price and yield fluctuations and existing methods of marketing. The optimum size of orchard was found to be 0.8 hectare.

Sudha and Sharma (1987) attempted to evaluate the economic viability of Aneb-e-Shahi grape in Rangareddy district of Andhra Pradesh. The data for the agricultural year 1982-83 were collected from a sample of sixty farmers selected from the two blocks, namely Rajendranagar and Medchal. From each block, 30 farmers were selected and classified into three categories, viz., small, medium and large. The results of the study showed that 64 per cent of the total investment in the first year was accounted by fixed assets like construction of well, pandal, water-lifting devices, fencing, etc. Manures and fertiliser and irrigation accounted for a major share in the operation costs. About 14 per cent of the total cost of investment
was accounted by land preparation and planting. The rate of return was the highest on medium farms (Rs. 1.80) followed by large farms (Rs. 1.62) and small farms (Rs. 1.60). The average cost of production per quintal worked out to be Rs. 1900, Rs. 1544 and Rs. 1782 on small, medium and large farms, respectively. It was further revealed that the cultivation of Aneb-e-Shahi grape was profitable and economically viable with an average return of Rs. 1.77 on every rupee invested.

Swarup et al (1987) argued that the small, sloppy, stony and scattered holdings in Himachal Pradesh could not be considered economical by depending exclusively on field crops. Fruit cultivation provided a viable alternative to utilize the natural endowments of the state. The state earned the status of “fruit bowl of India” by concentrating more on yield increasing technologies. Supporting role by the Department of Horticulture, well-linked roads, transportation facilities, and high profitability were the major reasons for a significant increase in the area and production of fruit crops in the state. A 40 per cent shift in the area from field to fruit crops was reported in the temperate zone of the state. The fruits accounted for 27 per cent of the area in the state. The establishment of Himachal Pradesh Marketing Corporation was of great help in developing horticulture in
Himachal Pradesh. To ensure the sustainable growth in future, the problems of grading and standardization, quality control, quick transport and safe trans-shipment, statutory control over the use of culled fruits for table purposes, utilization of fruits unfit for table use, storage and regulation of supply to check glut of fruits in the market etc., were needed to be addressed with urgency.

Tewari (1987) critically examined the horticultural development in Himachal Pradesh. He emphasized that besides nutritional advantages fruit cultivation had a positive role in the upliftment of rural masses in the hilly terrain. The area under plantation and production of fruits had grown at the compound rate of 6.08 per cent and 11.57 per cent, respectively, during the last thirteen years. Such a high growth rate had been achieved as a result of developmental policies adopted by the government for horticulture during the last three decades. Fruit cultivation was reported to be more profitable as compared to the cultivation of food crops. It had encouraged the farmers to shift some of their area from annual crops to fruit crops. During the last three decades, 27 per cent of the area from field crops had been shifted to fruit crops. Absence of grading and standardization, quality control, quick transportation, processing facilities and lack of proper marketing were the major constraints in
speedy growth of fruit cultivation. Further development of horticulture could only be possible by adopting short run strategies for regulation of major fruit markets, development of organized marketing channels with maximum utilization of the existing market infrastructure and long run strategies for technological improvement and well-defined national development programmes of action of fruit crops.

Thakur et al. (1987) attempted to evaluate the economic feasibility and profitability of kinnow plantation in Himachal Pradesh. The study was based on primary data collected from 100 randomly selected orchardists from 14 randomly selected villages of Kangra district through personal interview method for the year 1984-85. The economic feasibility and profitability were examined by using different methods like estimating discounted costs and returns, pay-back period, internal rate of return and cost-benefit analysis to meet the objectives of the study. The kinnow plantation was quite profitable with the payback period of six years, the total net returns worked out to be Rs. 1,22,509 per hectare for the entire life of an orchard. The benefit cost ratio worked out to be 3.04 (on gross returns) and 2.04 (on net returns) whereas the internal rate of return was as high as 46 per cent for the kinnow plantations in the area.
Thomas and Gupta (1987) studied the economics of banana cultivation in Kottayam district of Kerala by using the Cobb-Douglas production function. The results showed increasing returns to scale. The expenditure on manures and fertilizers followed by labour cost were the main items of expenditure in the cost of cultivation of banana per hectare. The family labour, which absorbed about 30 per cent of the total labour cost, had a significant contribution. The contribution of family labour was found to be more in small-sized holdings. It was observed that profit of more than Rs. 6,000 per hectare could be obtained by undertaking banana cultivation. The study found that pests and diseases affected 22.7 per cent of the total population of banana and their prevention by suitable plant protection measures could yield an additional income of Rs. 9,000. The response of gross income to an increase in the expenditure on suckers, plant-protection chemicals, propping materials, baskets, transportation and marketing were highly significant and positive. The marginal value products of human labour and manures and fertilizers were lesser than their prices. The study suggested a shift away from these two resources to transportation and marketing to generate a substantial level of additional income with a negligible amount of additional expenditure.
Azad et al. (1988) studied the economics of fruit production in the hill area of Himachal Pradesh. Land use pattern, price levels and marketing arrangements were reviewed. The results showed that farmers were replacing field crops with horticultural crops. This trend was explained by the higher returns from fruit farming.

Bhat and Dhar (1989) studied the resource-use efficiency of apple in Jammu and Kashmir State. Multistage sampling design was used to select a sample of 85 apple growers from four villages each from two blocks of Baramulla district. The data for the agricultural year 1983-84 were recorded through direct personal investigation with the apple grower by using a detailed pre-tested questionnaire. The allocative efficiency of resources in apple orchards was examined by using Cobb-Douglas production function. Marginal value product was estimated for the various input factors at their geometric mean level while other variables were held constant at their respective geometric mean levels. The regression coefficients turned out to be significant for working capital, land and labour. The elasticity for each variable used in production process was less than unity, indicating the operation of diminishing returns. The ratio of MVP to the acquisition cost was highest for working capital indicating a shift towards this resource to maximize the returns.
Sikka and Swarup (1989) studied the cost of production and economics of peach, plum, apricot and pear orchards raising, worked out the economic viability of these fruits, and examined the existing marketing system. The purposive-cum-stratified random sampling method was used for selection of final sample from Kullu, Solan and Sirmaur districts. The data pertaining to the year 1987 were collected from sample farmers by interviewing them personally with the help of pre-structured and pre-tested schedules. The data were analysed by using tabular analysis and by applying various techniques of project evaluation viz., pay-back period, net present value (NPV), benefit-cost ratio (BCR) and internal rate of return (IRR). The net returns per hectare were observed to be Rs. 4,672 for peach, Rs. 12,530 for plum, Rs. 29,208 for apricot and Rs. 4,603 for pear orchard. The net returns were the highest for the age group of 11-16 years of plum, peach and apricot. The application of project evaluation measures revealed that NPV was Rs. 89,222 for peach, Rs. 1,17,837 for plum, Rs. 1,60,541 for apricot and Rs. 1,17,837 for pear per hectare. The (IRR) was found to be 32.97 per cent for peach, 46.06 per cent for plum, 47.24 per cent for apricot and 25.30 per cent for pear orchards. The BCR was worked out to be 3.87, 4.62, 5.10, 2.05 for plum, peach, apricot and pear, respectively. The maintenance cost was
observed to have direct relationship with age of plants in all the fruits under study. The study revealed that labour and materials were not available in time at desired place and at reasonable price. The inputs were also not available on credit. The farmers reported that they had no storage facility at all and had to face many problems during transportation. The study concluded that investment on raising the fruit crops was profitable and financially viable. It was suggested that State Government should give support price to these fruits on the pattern of apples.

Azad et al (1990) examined the issues pertaining to new land-based enterprises, viz. horticulture; scope and shift from field crops to horticultural crops; dependence of horticulture on forests; infrastructure facilities and policy implications. Large areas under citrus fruits were due to high productivity and consequent profitability in Himachal Pradesh. Financial techniques like payback period, net present value, internal rate of return and benefit-cost ratio were used for examining the economic viability of citrus cultivation. The farmers shifted the area from field crops to horticultural crops in the state because of their higher profitability in relation to general crops.

Chandel and Oberoi (1991) conducted a study to estimate the rate of growth and instability and attempted to measure the trend of
instability in production and productivity of horticultural crops. Time series data from 1969-70 to 1986-87 on area and production of different horticultural crops for Himachal Pradesh and temperate dry areas were collected from statistical outline of Himachal Pradesh-1988 and office of the District Horticultural Officer, Kinnaur. An exponential function of the form $Y = ab^t$ was fitted to the data of different horticultural crops, viz. lemon, orange, kinnow, litchi, peach, pear, mango, grapes, etc., to determine the compound growth rate. The study revealed that the area under all the groups of horticultural crops in Himachal Pradesh increased significantly at one per cent level of probability. The compound growth rate of production was found to be the highest (8.13 per cent per year) and significant only for apples. The highest coefficient of variation in production was observed for citrus (56.88 per cent) followed by apples (56.07 per cent). The coefficient of variation for total fruit production was 47.74 per cent. The increase in production of total fruits in the state (6.02 per cent year) was mainly due to increase in apple production and area under apples and other groups of horticultural crops. The productivity of horticultural crops was found to be more stable in the temperate dry areas than in the state as a whole.
Dahiya et al (1991) have drawn the evidence from Himachal Pradesh’s villages to analyse land-use pattern, changing cropping patterns and productivity level. Secondary data pertaining to the period 1970-71 to 1985-86 indicated that cereal production was not profitable for the region because of low yield and low returns and due to absorbing sub-optimal number of agricultural labour. It was thus recommended that horticultural crops should substitute these crops. An alternative optimization approach was suggested comprising of a marketing policy, crop insurance and price support, technological improvements and export development strategies.

Randev et al (1992) made an attempt to analyze the economic efficiency of the resource use and to compare the intra-farm productivities of various farm inputs in different size-groups and age-groups of apple orchards in Kinnaur district of Himachal Pradesh. Multistage random sampling technique was used to select 107 orchards in the age group of 8-14 years and 55 orchards in the age group of 15-40 years for the detailed study. These orchards were further classified into small, medium and large categories. Cobb-Douglas type of production function was applied for studying the relationship between the output of apple and various input variables. The results showed that the expenditure on human labour led to
higher returns on small and medium orchards and was significantly more than one; indicating the scope for additional absorption of labour on the orchard. The returns to scale on all the three categories were diminishing indicating that the cultivators were operating in the rational zone of production. The study further revealed the possibility of reducing fertilizer consumption by large orchardists. It was suggested that this surplus might be distributed among small and medium orchardists. The management index showed positive impact in enhancing apple production.

Sikka et al (1992) attempted to evaluate the economic viability of apple cultivation in Himachal Pradesh by purposively selecting three districts of Shimla, Kullu and Mandi for detailed study pertaining to the reference year 1989. From each selected district, one tehsil with largest area under apples was selected. Similarly, from each tehsil two patwar circles were selected with the largest area under apples. Thereafter, from each patwar circle, one village was selected randomly and another two villages nearest to the selected village were taken to form a cluster of three villages. From the selected village clusters, all apple growers were included in the final sample thus making the total sample size of 89, 72 and 53 orchardists in Shimla, Kullu and Mandi districts, respectively. Several techniques
were applied for evaluating the economic viability of apple cultivation viz., pay back period, net present value (NPV), internal rate of returns (IRR) and benefit cost ratio (BCR). The overall cost for non-bearing apple orchards varied between Rs. 5,120 and Rs. 12,553 per hectare for various age group. The total cost of non-bearing apple orchards increased with the increase in age of the plants. Overall, cost ranged between Rs. 13,425 in the age of 8 years and Rs. 15,168 per hectare in the age group of 31 and above years. The cost in bearing apple orchard also increased as the age of plants increased. The study suggested that the age group of 16-20 years was more productive and provided more income to the orchardists. The investment in apple cultivation in all the three areas under study was quite profitable and economically viable as well.

Tewari et al (1992) estimated establishment cost of 100 kinnow trees to be Rs.2692 in the initial year. The share of human labour was found to be more than 22 per cent of total establishment cost followed by the cost of plant material. During the non-bearing stage, upto the age of 3 years, various costs accounted for 46.38 per cent of the total economic establishment cost of 100 kinnow trees. The fixed cost showed a declining trend throughout the bearing age of plantation. The study further revealed that the yield increased upto the age of 14
year and declined thereafter. The cost of the production per quintal was maximum in the age group of 4-6 years and minimum in the age group of 13-14 years. The study also reported that the share of initial year cost for one-hectare mango orchard was 12.75 per cent of the total establishment cost. During the non-bearing stage, total annual maintenance cost showed an increasing trend with the increase in age of plantation, while the expenditure on variable cost showed a declining trend. The study found a positive relationship between age and yields up to the age of 24 years and after that if started declining. The average yield per 100 trees, during the economic life of the mango plantation, was worked out to be 63.71 quintals.

Rao et al (1995) attempted to study the establishment cost, maintenance cost and cost of production of mango, the pattern of returns and income and also the capital productivity of mango cultivation in Anantpur district of Andhra Pradesh. Using multistage sampling technique, a sample of five pre-bearing gardens and twenty fruit-bearing gardens under the age groups of 1-4 years were randomly selected from ten villages of Anantpur district pertaining to the year 1993-94. The establishment cost per hectare of mango garden during its first four years (pre-bearing period) was Rs. 3,748, Rs. 2,029, Rs. 2,102 and Rs. 2,452 respectively. The cost of
cultivation per hectare of a mango garden was Rs. 17,828 out of direct costs formed 33 per cent and indirect costs accounted for 67 per cent. The gross returns realized from the output of mango worked out to Rs. 22,083 per hectare. The results of the capital productivity measures indicated that the investment on mango garden in the region was a profitable proposition. The farmers could recover the investment in 11.5 years and the benefit cost ratio was 1.46:1. The positive net present value indicated the soundness of investment made in the mango cultivation. The internal rate of return also indicated favourable nature of returns.

Chand (1996) examined the scope for raising income and employment by diversification through off-season vegetables and fruit cultivation in Himachal Pradesh. The study attempted to analyse the impact of infrastructural, institutional and socio-economic factors on crop diversification through horticultural crops. Multistage purposive sampling procedure was followed and the data were collected from 75 farm households spread over three farm size categories viz. marginal (below 1 acre), small and other farms (more than 2 acres). The results showed that the vegetable crops were grown on more than two-third of the irrigated and less than one-fifth of the unirrigated cropped area. The factors affecting crop diversification in the study
region were categorized in two categories. Access to irrigation and its reliability, nearness to motorable road and proximity to marketplace were the most important crop factors. The factors of secondary importance were structure of landholdings and level of socio-economic development of the area. It was found that the diversification through fruits has been quite a success in temperate areas. It has not been rewarding in non-temperate zone. Climatic factors and technological changes in fruit cultivation of mango and grapes which competed for resource use with traditionally grown fruit crops like stone fruits have rendered fruit cultivation unattractive in mid-hill areas of Western Himalayas. The study also showed that where economic incentives were available, the farmers allocated area under horticultural crops on the basis of relative profitability irrespective of the foodgrain requirement of the family, which could easily be met through purchases. It was emphasized that the strategy of agricultural diversification should be location specific.

Gopalappa (1996) studied crop diversification and income levels in Karimnagar district of Andhra Pradesh. An attempt was made to analyse the effect of agricultural diversification on the income and standard of living of the farmers overtime in Gopalpur village in Elakathurthi Mandal of Karimnagar district of Andhra
Pradesh. The study was based on the primary data collected from Gopalpur, a revenue village relating to the agricultural years 1984-85 and 1991-92 to 1993-94. Purposive sampling method was followed for the study. The diversification of farm activities resulted into a significant change in income levels and standard of living of the farmers. The sanctioned loans were observed not to reach the needy farmers. The bank authorities were disbursing only subsidy portion to the beneficiaries and the principal amount was being adjusted against the repayment of the loans. It had been noted in the survey that there was good scope to increase the income through crop diversification. Appropriate cropping patterns along with some suitable supplementary enterprises were to be identified for diversifying the farming systems. All these needed to go hand in hand with suitable infrastructure and institutional support.

Prasad et al (1996) attempted to examine the scope of horticultural crops for diversification of agriculture and explored the opportunities for exports of horticultural products by analyzing their economic potential and export performance. Diversification with horticultural crops was possible within agriculture with comparatively small investment and had the potential of generating higher income and employment on the farms. The economic analysis revealed that
mango and guava orchards in their fruit bearing stage gave an average net income of Rs. 20,640 and Rs. 16,690 per hectare per annum respectively. Against this situation, food crop of one-year rotation i.e. paddy-wheat and maize-wheat yielded a net income of only Rs. 5,775 and Rs. 4,075 per hectare respectively. The output-input ratio was also found higher in horticultural crops, which varied from 1:2.77 to 1:3.03 than that of food crop ratio 1:1.30.

Thorve et al (1996) tried to study the labour requirements for horticultural crop vis-à-vis conventional crops and compared the performance of horticultural and other crops in terms of gross income and profitability in Vidarbha region of Maharashtra. The crops selected for the study were banana and orange among horticultural crops and hybrid cotton, soybean and paddy among conventional crops. The data on cost of cultivation for these crops were collected from 325 farmers under the agricultural prices scheme of the government of Maharashtra pertaining to the year 1995-96. The data were analysed using simple tabular methods. The study revealed that the horticultural crops required 129 labour adult days per hectare as against 35 adult labour days per hectare for the other crops. Female labour used for horticultural crops was however low being 48 days per hectare as against 74 days per hectare for other crops. The
profitability of horticultural crops vis-à-vis the other crops was studied through the net returns and output-input ratio. The results indicated that the cultivation of horticultural crops was more profitable than the other crops. Horticultural crops being labour-intensive have better potential to create more employment opportunities in the rural areas.

Tripathi (1996) attempted to examine and compare the economics of apple production i.e. costs, returns and benefit-cost ratio with those of off-season vegetables, pea-potato and millet-wheat rotations and also estimated the productivity of important input resources used for the production of these crops at the existing level of production technology and resource-use pattern of hill farming system in Uttar Pradesh. All the farmers cultivating apple, off-season vegetables like peas and potatoes on a commercial basis and cereal crops were selected from the two villages for the agricultural year 1994-95. Regression analysis depicted that returns from apple production could be raised through increased use of improved seed materials and more human labour on the orchards. Application of the minimum required quantity of plant protection measures and fertilizers would certainly improve the yield and returns of the fruit. There is tremendous scope to increase the returns from vegetables.
through higher investments on manures, fertilizers, seeds and seed materials whereas returns from the cereal crops could be increased by increasing the investment on plant protection, seeds and human labour at the prevalent farming system of the high hills. The study also suggested that due importance be given to develop at least a minimum supporting infrastructure, institutional arrangements and availability of inputs supply services in the area.

Chitra et al (1997) recognized the importance of production of ber in and around Hyderabad city of Andhra Pradesh. It was attempted to study the economics of ber cultivation, the data for which was obtained from 15 farmers during 1994-95. These were selected within a 50 km radius around Hyderabad city covering three districts of Rangareddy, Mehhobnagar and Nalgonda. The profitability of ber cultivation was evaluated with the help of different investment appraisal techniques, viz. pay back period, net present value, benefit cost ratio, annuity value and internal rate of returns. The total cost of establishment in the first year was found to be Rs. 7,913 per hectare and during the maintenance was Rs. 3,483 per hectare. The total cost of production of ber worked out to be Rs. 16,737 per hectare. The pay back period was 4.42 years and the benefit cost ratio was 5.25, indicating the profitability of ber cultivation. The net present
value worked out to be Rs. 12,061 and the IRR was 73.54 per cent, which was higher than the lending rates of commercial banks. The results showed that even though ber cultivation required relatively higher initial capital investment compared to other fruit crops, the returns are higher during the bearing period and the profits are also relatively higher indicating the economic viability of the production of ber.

Dhawan et al (1997) attempted to look at the future prospects of fruit cultivation and its potential impact on crops and dairying. The study was conducted in sub-mountainous region of Punjab state because its climate is conducive for fruit cultivation. Besides the appraisal of existing production pattern of the sample farmers, normative programmes were computed for different farm-size categories with the existing as well as with relaxed resource constraints. Linear Programming technique was used to develop the rational programmes. Dairying and fruit orchards generate income over a number of years, so discounting cash flow technique was used to bring the returns of various activities on the same denominator. The findings of the study pointed out that the existing returns from both kinnow and mango failed to warrant their entries in the optimum plans of the farmers both at the existing and at relaxed resource constraints.
constraints. Kinnow and mango fruits at given cost-price-yield spectrum were relatively less profitable and could not figure in normative production programmes of the farmers even at the enhanced resource supply. Further, more fruit orchards could be included in the production programmes with at least 25 per cent increase in returns on the large farms only whereas a 50 per cent increase in return was required to include orchards in the production programmes of the small and medium sized farms. It was suggested that there should be availability of cheaper inputs and improvement and development of adequate infrastructure for the marketing of fruits in the country. The fruit growers should be educated about the latest package of fruit cultivation practices.

Jugale (1997) attempted to study the trends, dispersion and magnitude of horticultural production in Maharashtra state. The objectives of the study were to identify the market constraints involved in the adoption of pre-harvest and post-harvest technologies in the marketing of horticultural products. The trend in the cultivation of horticultural crops indicated that the major fruit crops grown in the state are mango, grapes, oranges, ber, papaya, banana and pomegranate. The study stressed that the pre-harvest technology should focus on improving the quality of the products accompanied
by the improvement in the yield rate. There was a need to develop the horticultural production on scientific lines with the professional outlook based on economic approach. There was an increase in the interest in horticultural exports, which went up by 10 to 13 per cent as compared to 1975 to 1985. Mango was found to have a share of 64 per cent in the total export of India followed by banana with a share of 10.6 per cent in the world production. The study suggested that the constraints involved in the pre-harvest and post-harvest technologies should be removed.

Khodaskar (1997) compared the economic performance of horticultural crops and other crops in terms of factor productivity, profitability, stability and labour use. Thirteen case studies were selected randomly from Varhedarna village of Niphad taluka in Nasik district of Maharashtra. The village was found to be progressive, with the population having better educational status, irrigated land and availability of credit facility to farmers. Farmers used improved seeds/variety, applied chemical fertilizers and protected the crops from pests and diseases. The average size of the holding of the selected small, medium and large orchards was 1.23 hectares, 2.38 hectares and 5.15 hectares, respectively. The average size of the family was 5.7 adult units. It was suggested that the farmers should
put more area under horticultural crops and satisfy their food grain needs by purchasing them from open market. Such a policy could maximize their total farm profits per year. Similarly, constraints like shortage of funds and labour could be solved by scientific credit management practices i.e. mainly by spending the borrowed amount for productive purposes and repaying the loan in time.

Sharma (1997) in his paper dealt with some aspects of fruit production and consumption in various regions of the world and in India and some implications for increasing fruit production in the country were drawn. It was found that in terms of per capita fruit production the world average was 66.9 kg per annum and for India it was 37.8 kg for triennium ending 1993 i.e. about 57 per cent of the world per capita production. The growth in fruit production during 1980-90 had been relatively faster in India than in other regions of the world. The major fruits grown in India were mango, banana, citrus, apple, guava, pineapple and grapes. The per capita consumption of fruits was estimated to be about 16.6 kg per annum based on National Sample Survey data for 1987-88. The fruit consumption was found to be about 44 per cent of per capita fruit production. The transition from production to consumption was found to be governed by various factors such as prices, incomes, trade, infrastructural
facilities like transport and storage, tastes and preferences. The study emphasized the role of adequate marketing infrastructure including storage and transport along with productivity increasing methods of fruit production.

Sharma (1997) attempted to work out the district-wise trends in the production of all fruits and apples in Himachal Pradesh during 1970-71 to 1995-96. The study also identified the factors responsible for the development of this sector in the state. The secondary data were collected from the Directorate of Horticulture, Government of Himachal Pradesh. During the study period, it was found that the state had achieved an impressive progress in the production of fruits. The area and production of all fruits increased at compound growth rate of 6.28 per cent and 4.43 per cent per annum respectively. Lahaul Spiti and Kinnaur districts indicated impressive trends in the development of all fruits besides Shimla and Kullu district. The growth rate of area and production of apples was 3.96 and 5.39 per cent respectively for the state as a whole. It was comparatively high in Lahaul Spiti and Kinnaur districts. The productivity of apples was found to be about 15 tonnes per hectare, which was low as compared to the international standards. Three districts- Kangra, Solan and Sirmaur registered a negative trend in the production of apples.
because of cultivation of off-season vegetables, potato and flowers, which were more profitable than apple cultivation.

Singh et al (1997) examined the comparative advantage of different horticultural crops with other crops grown by farmers in Farrukhabad district of Uttar Pardesh. The study was based on the primary data collected from 60 farmers from six villages of three blocks of the selected district and pertained to the year 1995-96. The annual per hectare cost of guava, mango and roses worked out to Rs. 11,667, Rs. 13,255 and Rs. 14,205 respectively. It was found that in all the three crops share of human labour was the highest (nearly 27 per cent) in their respective total annual cost. The study of the cost structure further revealed that the share of variable cost for fruits was lower than that of fixed cost (41- 42 per cent). The mango, roses and guava production had an edge over cereals and vegetable crops, as far as their income-cost ratio and net returns per hectare were concerned.

Singh (1997) studied the economics of pear and plum production in Himachal Pradesh. A sample of 68 pear and 91 plum orchards from Kullu and Mandi district was selected for the present study. Detailed information pertaining to crop year 1995-96 was gathered from the respondents regarding farm resources, cropping
system, costs and returns from crops and orchards. The secondary
data were obtained from the Directorate of Horticulture and Land
Records. The initial costs of raising one hectare of pear and plum
orchards were estimated to be Rs. 16,304 and Rs. 16,142
respectively. The per hectare annual maintenance cost of I stage (1-8
years), II stage (9-19 years), III stage (20-40 years) and IV stage
(above 40 years) of pear orchards were estimated to be Rs. 1,527,
Rs. 46,430, Rs. 46,815 and Rs. 48,444, respectively. The net returns
from one hectare of pear were estimated to be Rs. 1,17,776 in Kullu
district and Rs. 99,107 in Mandi district. The per hectare annual
maintenance cost of I stage (1-7 years), II stage (8-16 years), III
stage (17-20 years) and IV stage (above 20 years) of plum orchards
were estimated to be Rs. 16,055, Rs. 53,215, Rs. 52,353 and
Rs. 53,395 respectively. The net returns from one hectare of plum
varied from Rs. 9,757 from II stage orchards to Rs. 24,243 from III
stage orchards. The producer’s share in consumer’s rupee was 51.43
per cent in pear and 42.96 per cent in plum.

Singhal and Aggarwal (1997) examined the costs and returns of
selected mango orchards in Rampur district of Uttar Pradesh. The
study also analyzed the marketing pattern, marketing channels,
marketing costs and returns in mango fruits produced and the
problems and constraints in their production and marketing and suggested alternatives to increase the income from the orchards. The study was based on data collected from a sample of 46 major orchards (15 small, 18 medium and 13 large) selected from two Nyaya Panchayats of Saidnagar block of Rampur district in Uttar Pradesh. The average size of holdings of mango orchards was 5.65 hectares of which an area of 3.69 hectares was under fruit bearing orchards and the remaining area was under non-fruit bearing orchards. The per hectare cost of establishing new mango orchard was Rs. 2,610, Rs. 2,761 and Rs. 2,990 for small, medium and large orchards respectively. The per hectare average annual cost (for the 15 year period) excluding intercropping, per hectare was Rs. 2,713, Rs. 3,102, Rs. 3,322 and Rs. 4,230 for small, medium, large and horticultural research center, Pantnagar orchards respectively. The average annual cost with intercropping was Rs. 3,039, Rs. 3,458, Rs. 3,719 and Rs. 5,040 per hectare for the corresponding size groups of orchards. The average annual returns excluding intercropping were Rs. 12,525, Rs. 14,226, Rs. 16,071 and Rs. 22,948 per hectare for small, medium, large and horticultural research center, Pantnagar orchards respectively. The average annual returns (per hectare) with intercropping were Rs. 13,472,
Rs. 15,239, Rs. 17,218 and Rs. 24,890 for the respective categories. The study suggested that better management practices such as application of recommended doses of fertilizers, chemical and adequate irrigation facilities and timely operation of pruning etc., could bring about a 50 per cent increase in the existing levels of incomes from the orchards.

Kaur (1998) conducted an economic analysis of general crops vis-à-vis fruit cultivation in Hoshiarpur district of Punjab by obtaining the data on resource availability, resource use and other constraints from the selected respondents by personal interview method. Linear Programming technique was used to analyse the data of two categories based on size of holdings viz. category-I with an average size of holding of 8.22 acres and category-II with an average size of holding of 18.78 acres. The results revealed that on both the categories fruit crops were grown but on small area. Returns per acre as well as cropping intensity were high on category-I than that on category-II. All the resources i.e. labour, capital, tractor and irrigation had unused capacity on both the farm categories. General crops were found to be more profitable than the fruit crops on both the categories. An inclusion of fruit crops in the optimal plan reduced the requirement of human labour. The study found that overall fruit crops
do not have bright future under the existing cost-price-yield scenario in the Hoshiarpur district of Punjab.

Singh (1998) conducted a study to estimate the economics of selected horticultural crops in Himachal Pradesh. An attempt was made to identify the major horticultural crops of the region in terms of growth and instability in area and production and to assess the impact of these crops on income and employment. The production and marketing problems and prospects of horticultural crops in the state were also studied. The sample of apple orchardists was selected randomly from Naggar village of Kullu district, Kiari village of Shimla district and Churag village of Mandi district for the indepth study. The data were collected by personal interview method for the crop year 1995-96 on the pre-tested schedules prepared for the purpose. The results showed that during last two decades the area under fruit crops had recorded a compound growth rate of 3.18 per cent per annum and during the same period the production had increased at a compound growth rate of 3.64 per cent per annum. Apple alone accounted for largest share (more than 85 per cent) out of total fruits produced in the state registering a compound growth rate of 3.60 per cent per annum. More than 50 per cent orchardists belonged to marginal category and large category accounted for 3.20
per cent only. The land holding size of sample orchardists varied from 0.58 hectares on marginal farm to 5.28 hectares on large farm, the average being 1.28 hectares. The initial cost of plantation of apple for Shimla and Mandi districts was estimated to be Rs. 10,340 per hectare and it was observed slightly low (Rs. 9,548 per hectare) in Mandi district. The small farmers were getting more yield (259 quintals per hectare) as compared to average yield of 222 quintals per hectare. The per hectare incremental income from raising fruit crops was Rs. 32,411 in Kullu district and average being Rs. 34,957. The returns from per rupee investment from all the bearing age groups were estimated to be Rs. 1.50, Rs. 1.58 and Rs. 1.66 in Mandi, Shimla and Kullu districts respectively and for the State as a whole the return rate was Rs. 1.57. The study concluded that fruit crops gave much higher income from the same land as compared to other crops.

Chopra (1999) examined the performance, problems and prospects of the horticultural sector in India at the instance of the Ministry of Agriculture. The data and information were collected from a number of sources for the conduct of the study. Time series data were used for the period 1980-81 to 1996-97. The commodities in the category of plantation exports were tea and coffee, whereas
horticultural exports selected for analysis were mangoes, grapes, apple, banana and onion. It was found that output growth rates for the fruit crops had increased in the eighties as compared to seventies. While mango output remained almost stagnant during the nineties, grape output increased at a rate of 12 per cent, banana at 8.4 per cent and apple output at only 2.1 per cent. Export demand in case of grapes had risen to about 3 per cent of production. It was observed that in the nineties Maharashtra contributed about 52 per cent of the production of grapes followed by 23 per cent from Karnataka. About 29 per cent of the production of mango came from Andhra Pradesh followed by Uttar Pradesh and Bihar accounting for about 45 per cent of its production.

Kumar (1999) in his study estimated the costs of production and returns associated with the cultivation of high-value crops in Himachal Pradesh. The study also evaluated the economic rationale of resource use. Two-stage random sampling technique was used to select the final sample. The primary data on demographic features, economic parameters, cost of production, yield and problems faced by the growers were collected on pre-tested schedules by personal interview method during the year 1996-97 and 1997-98. Both tabular and functional analysis was used to analyse the data. The study
found that for farmers categorized as fruit growers nearly 18, 11, 30, and 20 per cent of gross cropped area in Zone-I, Zone-II, Zone-III and Zone-IV, respectively was under fruits indicating the dominance of cereal crops in all the zones under study. Initial investment in various fruit crops in different zones was more than Rs. 4,945. The maintenance cost of all fruit crops increased with the increase in age and then declined in later stages of their productive life. The labour requirement for performing various operations increased with increase in the age of fruit plantation. The elasticity coefficients associated with labour, FYM and fertilizer, pesticides, and management index worked out to be significant for most of the fruit crops. It was observed that the orchardists did not optimally utilize farm inputs particularly labour and pesticides as indicated by the marginal value product- factor cost ratio. Optimal utilization of these two inputs to increase the profits of the orchardists was suggested.

Singh and Dahiya (2000) conducted an economic analysis of profitability and growth of horticultural crops in Himachal Pradesh. The paper focused on the growth in area, production and productivity of horticultural crops in Himachal Pradesh as well as the costs and returns during the last one decade. The percentage change in area and production of various fruit crops grown in Himachal Pradesh were
calculated from triennium ending 1977-78 to triennium ending in 1995-96. The results showed that the area under all fruits increased by about 174 per cent during the period under study. The area under other sub-tropical fruits and citrus fruits increased by about 392 and 244 per cent during the last 20 years. The percentage share of apple and other temperate fruits in total fruits decreased while citrus and other sub-tropical fruits share in total area increased in the state during triennium ending in 1995-96 over triennium ending in 1977-78. The production of all fruits increased by about 52 per cent during the study period. The yield of all fruits had shown decreasing trends over time. The reason for negative trend in productivity of fruits may be the larger area under new plantation of fruit crops in the recent years. The study revealed that the profitability of horticultural crops was relatively much higher than that of cereal crops despite decrease in productivity. The stepping up of research efforts was emphasized for increasing productivity of horticultural crops. It was also suggested that government should take necessary steps in reducing the marketing cost and provide better market facilities to marginal and small growers so as to reduce the total production costs. The state was also suggested to initiate measures to increase the productivity and profitability of the fruit crops grown in midhill and low hill zones.
for an equitable development of horticulture in Himachal Pradesh. The study also revealed that in the absence of systematic scientific data on cost of production it was not possible to formulate and implement the horticulture price policy and stressed upon the need for introduction of comprehensive cost of cultivation study for the horticultural crops in Himachal Pradesh.

Shah (2000) in his study dealt with evaluation of various aspects of production and marketing of grapes in the state of Maharashtra. The study attempted to evaluate comprehensively various components of production and marketing costs. Stratified random sampling procedure was adopted for the selection of villages and grape orchardists in Niphad taluka of Nasik district of Maharashtra and the primary data on the relevant aspects were collected from these sample orchardists for the reference year 1995-96. A sample of 50 grape orchardists from five villages was selected for the study of grape orchardists. The number of selected grape orchardists was four in marginal category (less that one hectare), sixteen in small (1-2 hectare), fourteen in medium (2-4 hectares) and sixteen in large category (above 4 hectares). To assess the profitability and economic viability in grape cultivation various components of costs were estimated. The grape orchards in the
study area were either under increasing production stage or under constant or decreasing production stage. The study showed a sharp increase in per acre annual gross maintenance cost as well as returns of grape orchardists during the phase the production rose before leveling off to a constant stage and, thereafter, these were seen to decline. About 67 per cent of the gross maintenance cost of grape production was spent on various production related operations and the remaining 33 per cent owed it to investment on various marketing functions. It was also observed that considerably a large number of orchardists adopted the practice of pre-harvest contract as it not only facilitated risk-free finance for the orchardists but also spared them of the botheration of looking after the crop through to the harvest and marketing. However, the profitability in grape cultivation was found to be considerably high in the state of Maharashtra.

Singh (2002) while evaluating the post harvest losses in apple in Himachal Pradesh also studied the existing production and marketing systems of apple in the selected producing areas. The trends in area, production and export of apple were also analyzed. Multi-stage purposive-cum-random sampling technique was used in the selection of district, block, village, and farm households. The required primary data pertaining to the agricultural year 1999-2000 were collected on
pre-tested well designed schedule by personal interview with 120 sample farm households selected in Shimla district having largest area and production of apple in the State. The analysis indicated that Shimla, Kullu and Mandi were the leading districts in terms of acreage under the apple whereas in terms of production Shimla, Kullu and Kinnaur were the leading districts. Shimla district alone accounted for 39 per cent of area and 73 per cent of total production in the state. About 60 per cent of the total apple export from the State was from Shimla district alone. The analysis also indicated that about 14.48 per cent of total production was post-harvest loss in marketing of apple. The reasons for losses in apple reported by the framers and traders were poor management of orchard, lack of knowledge about proper packing of fruits and lack of cold storages in producing as well as consuming markets.

In nutshell, it comes out clearly from the above review that a thorough investigation into the costs and returns, pattern of production and resource use, productivity and different constraints faced by the fruit cultivators is essential to give a boost to the horticultural sector in any particular region. The increasing need for diversification of Punjab agriculture due to socio-economic and environmental problems and huge potential of horticultural crops in
the diversification makes a strong base for such study. An exploration in the past studies also indicates a dearth of any such studies undertaken in the context of Punjab in the recent past.