

AERC Report
Study No.167

LOW PRODUCTIVITY OF POME AND STONE FRUITS IN HIMACHAL PRADESH

Study sponsored by Directorate of Horticulture,
Government of Himachal Pradesh



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Chapter-I

INTRODUCTION

1.1 Background

The horticulture sector has a unique role in developing countries like India, both in economic and social spheres. Apart from providing fruits for human consumption, horticulture helps in maintaining ecological balance. Horticulture also plays an important role in augmenting the family income of farmers by way of generating additional employment opportunities to human. The adoption of horticulture also results in more efficient use of scarce land resources. Realizing these advantages, thrust has been given to this sector with reasonable investments.

India is gifted with variety of agro-climatic conditions and is the second largest producing country of fruits accounting for about 8 per cent of total world production. The agro-economic conditions in different parts India provide ample opportunities for the regional specialization of the fruit crops. Accordingly some regions have comparative advantages and good potential in production of fruits. An orchard is a long term investment and careful planning is essential to ensure economic success. The gains in production have come essentially from increase in the acreage rather than through intensive cultivation practices. The situation calls for the intensive use of knowledge and skills based farming to realize potential productivity. There exist strong and direct relationship between productivity, hunger and poverty. In the long run, productivity is the only “engine of growth” to the farm economy. An improvement in agricultural productivity enables farmers to grow more food which translates into better diets and higher farm incomes. It is the productivity growth that allows farmers to break out of poverty and low income equilibrium trap and also contribute to overall economic growth.

Himachal Pradesh is situated in Himalayan Ranges in North-West of the country at altitudes ranging from 400 to 7000 meters above mean sea level. With the integration of hilly areas of the erstwhile Punjab in 1966, Himachal Pradesh not only increased the area and population to more than double but also added to its resources. The agro-climatic conditions in Himachal Pradesh are extremely suitable for growing different varieties of pome and stone fruit. The pome fruits (apple and pear, etc.) and stone fruits (apricot peach, and plum etc.) are the most widely grown and eaten, owing to their adaptability. The state has achieved a

significant progress in the production of pome and stone fruits in the country but the productivity of these fruits are far below the desired level. The area, production and export of fruits and its contribution to the Gross Domestic Product of agriculture has increased over the period of time. But the variation in the productivity of fruits in the recent years has become a serious concern of the growers of Himachal Pradesh.

1.2 Research methodology

In this section need and importance of study, objectives, selection of study areas, sampling design, data collection and analytical framework has been discussed.

1.2.1 Need and importance of the study

The present study is planned to highlight the causes and consequences of low productivity of stone and pome fruits in Himachal Pradesh. The results of this study will form an important knowledge input for developing horticulture strategy in Himachal Pradesh. Further, this study will also be helpful to the policy makers and economic planners to understand the reason of low productivity and how to enhance it.

1.2.2 Objectives

1. To study the socio-economic background of the sampled farmers.
2. To examine the trends in area, production and productivity of the selected fruits in the State.
3. To find the productivity of the selected fruits of the sampled households.
4. To find out the factors influencing the productivity of these fruits.
5. Suggestions to increase the productivity of the fruits.

1.2.3 Sampling technique

A Multi-stage purposive-cum-random sampling technique has been used in the selection of districts, blocks, revenue villages and fruit growers. At first stage, two districts having maximum area under fruits (stone and pome fruits) has been selected for the purpose of the study. At second stage, one development block from each of the selected district, on the basis of having largest area under pome and stone fruits has been chosen. Further, from these development blocks, cluster of 2 revenue villages from each selected block were chosen purposely based on area, production and productivity of stone and pome fruits. From these revenue villages a sample of 100 growers has been drawn randomly on the basis of land holdings respectively.

Table-1.1: Details of districts, blocks, villages and fruits selected for the study

| Sr. No. | Particulars | Pome Fruits | Stone Fruits |
|---------|-------------|------------------------|-------------------------|
| 1. | Districts | Shimla | Sirmour |
| 2. | Blocks | Jubal Kotkhai | Rajgarh |
| 3. | Villages | Kalbog, Kharapathar | Rajgarh-II, Shalana |
| 4. | Fruits | Apple and Pear | Plum, Peach and Apricot |

Table-1.2: Sample size

| Sr. No. | Particulars | Pome Fruits Growers | Stone Fruits Growers |
|---------|-------------------|---------------------|----------------------|
| 1. | Marginal Holdings | 32 | 34 |
| 2. | Small Holdings | 12 | 11 |
| 3. | Medium Holdings | 6 | 5 |
| 4. | All | 50 | 50 |

1.2.4 Nature and source of data

In order to achieve the objective of the present study, both primary as well as secondary data were collected and used.

1.2.4.1 Primary data

The primary data on demographic features, age, education, occupation, income, economic parameters (land inventory, buildings, implements, and livestock), age and variety wise production and productivity of fruits, costs, utilization of produce, factors responsible for low productivity of fruits, and orchards suggestions were collected on well designed pre-tested household schedule by adopting personal interview method from the selected households in the study area during the year 2018-19.

1.2.4.2 Secondary data

Secondary data on area, production and productivity of pome and stone fruits of State, Districts, Blocks and Villages were collected from the State Directorate of Horticulture Himachal Pradesh, Block Development offices of respective block and respective revenue offices. Further, to get the basic knowledge about the present research problem, different journals, periodicals, books, published and unpublished thesis and dissertation were also consulted.

1.3 Analytical framework

In order to achieve the objectives a simple tabular analysis has been used to estimate/calculate averages, percentages and ratio etc. Further, the compound growth rates for area, production and productivity were computed with the help of exponential growth function.

$$Y = AB^t$$

Where Y = dependent variable, t = time

By taking logarithms of both sides of the equations it takes the form:

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

If we put $\log A = a$, and $\log B = b$, then equation becomes

$\text{Log } Y = a + bt$, which is linear function with independent variable t and dependent variable Log y. The compound growth rate calculate as $(\text{antilog } b - 1) \times 100$ and represent uniform rate of change from year to year

Chapter-II

GROWTH TRENDS IN AREA, PRODUCTION AND PRODUCTIVITY OF POME AND STONE FRUITS IN HIMACHAL PRADESH

Horticulture industry in Himachal Pradesh has developed as business proposition since independence. But most of development has taken place after the establishment of a separate directorate of horticulture in 1970. The state has made tremendous progress in fruit production, since 1970s.

2.1 Area, production and productivity of pome fruits in Himachal Pradesh

This section deals with area, production and productivity of two major pome fruits i.e. apple and pear fruit in Himachal Pradesh.

2.1.1 Area, production and productivity of apple fruit

Area, production and productivity of apple fruit, is presented in Tables 2.1, 2.2 and 2.3. Table 2.1 shows that during the years 2006-07 to 2015-16, the average area of apple fruit is worked out 102285.72 hectares. The district-wise analysis of data shows that the average area under this fruit, is highest in Shimla district i.e. 35145.59 hectares, which is followed by Kullu (24388.28 hectares), Kinnaur (15722.84 hectares), Chamba (12216.41 hectares), Mandi (9963.37 hectares), Sirmour (3097.44 hectares), Lahual & Spiti (129.72 hectares), Kangra (429.24 hectares), Solan (84.45 hectares), Bilaspur (5.53 hectares), Hamirpur (2.49 hectares) and Una (0.40 hectare) districts of the state. The area under this fruit during the above mention study period in the state is increasing at compound growth rate of 2.12 per cent, per annum.

Table- 2.1: Area under apple fruit in Himachal Pradesh**(Area in Hectares)**

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahul & Spiti | Solan |
|-----------|----------|----------|----------|----------|---------------|--------|
| 2006-07 | 30666.28 | 21824.47 | 8472.60 | 14963.89 | 685.00 | 111.81 |
| 2007-08 | 31323.28 | 23179.47 | 8873.66 | 15134.89 | 734.00 | 108.48 |
| 2008-09 | 32195.36 | 23663.20 | 9670.50 | 15352.89 | 812.29 | 100.70 |
| 2009-10 | 33579.48 | 23870.43 | 9837.00 | 15531.09 | 959.07 | 95.70 |
| 2010-11 | 34612.42 | 24002.41 | 9998.87 | 15687.06 | 1319.57 | 87.40 |
| 2011-12 | 35778.42 | 24503.87 | 10100.43 | 15842.00 | 1409.57 | 85.46 |
| 2012-13 | 37249.64 | 25372.45 | 10116.47 | 16018.00 | 1472.57 | 71.40 |
| 2013-14 | 37542.00 | 25624.21 | 10487.09 | 16077.33 | 1579.00 | 65.40 |
| 2014-15 | 38781.00 | 25813.01 | 10953.09 | 16310.61 | 1653.00 | 59.80 |
| 2015-16 | 39728.00 | 26029.27 | 11124.00 | 16310.61 | 1673.10 | 58.30 |
| Avg. Area | 35145.59 | 24388.28 | 9963.37 | 15722.84 | 1229.72 | 84.45 |
| CGR | 3.04 | 1.8 | 2.72 | 0.99 | 11.79 | -7.63 |

Continued.....

Table- 2.1: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|------|----------|----------|--------|-----------|
| 2006-07 | 3609.41 | 4.20 | 0.00 | 0.00 | 11022.75 | 443.91 | 91804.32 |
| 2007-08 | 3443.06 | 4.20 | 0.00 | 0.00 | 11472.45 | 452.91 | 94726.40 |
| 2008-09 | 3344.08 | 4.20 | 0.00 | 0.00 | 11841.55 | 454.10 | 97438.87 |
| 2009-10 | 3248.27 | 4.20 | 0.00 | 0.00 | 11989.78 | 450.06 | 99565.08 |
| 2010-11 | 3144.20 | 6.33 | 0.50 | 0.00 | 12195.57 | 430.53 | 101484.86 |
| 2011-12 | 2980.00 | 6.33 | 0.50 | 0.00 | 12508.46 | 429.50 | 103644.54 |
| 2012-13 | 2947.50 | 6.06 | 0.50 | 0.00 | 12765.97 | 419.62 | 106440.18 |
| 2013-14 | 2912.49 | 4.86 | 0.50 | 4.01 | 12996.16 | 392.65 | 107685.70 |
| 2014-15 | 2753.46 | 4.91 | 0.50 | 8.55 | 12817.69 | 396.16 | 109551.78 |
| 2015-16 | 2591.90 | 10.00 | 1.52 | 12.11 | 12553.70 | 423.00 | 110515.51 |
| Avg. Area | 3097.44 | 5.53 | 0.40 | 2.47 | 12216.41 | 429.24 | 102285.72 |
| CGR | -3.33 | 6.72 | - | - | 1.6 | -1.39 | 2.09 |

Source: Directorate of Horticulture, H.P. Shimla.

Further, district-wise analysis of compound growth rates, it is observed that the Lahual & Spiti district has the highest compound growth rate i.e. 12.09 per cent, per annum and which is followed by Bilaspur (6.72 per cent), Shimla (3.04 per cent), Mandi (2.72 per cent), Kullu (1.80 per cent), Chamba (1.6 per cent) and Kinnaur (0.99 per cent) districts of the state. It is also observed that two districts namely Kangra and Sirmour, have negative compound growth rate, which reveals that the area under this fruit has been declined during the years 2006-07 to 2015-16.

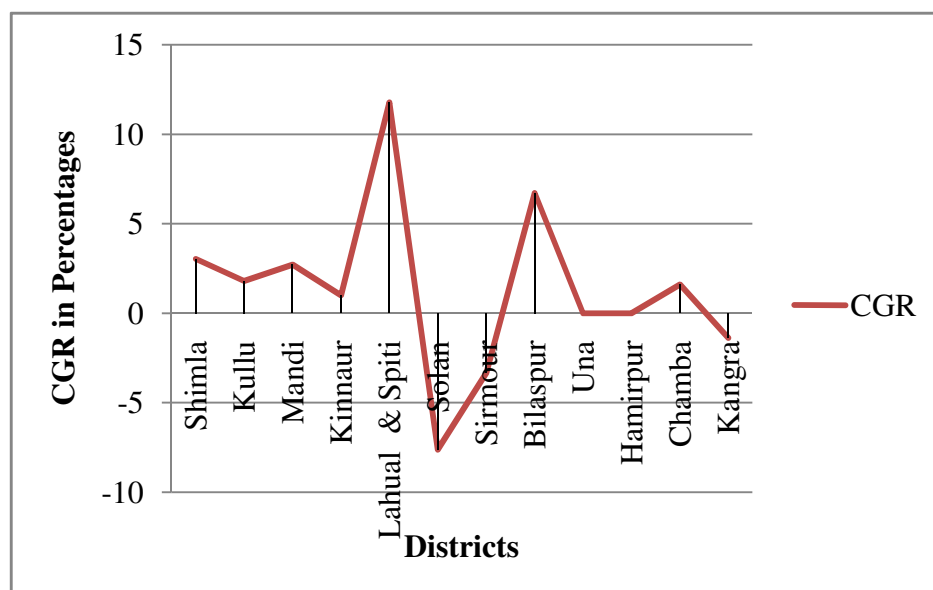


Figure-2.1: Compound growth rate in area under apple fruit in Himachal Pradesh

The average production of apple fruit in Himachal Pradesh, during the years 2006-07 to 2015-16, has been worked out 537773.06 M.T. The average production is observed to be highest in Shimla district i.e. 344191.90 MT, which is followed by Kullu, Kinnaur, Mandi, Chamba, Sirmour, Kangra, Lahual & Spiti, Solan and Bilaspur districts of the state.

Table-2.2: Production of apple fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-----------|-----------|-----------|----------|----------|----------------|-------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 163301.00 | 43730.00 | 16625.00 | 40277.00 | 191.00 | 53.00 |
| 2007-08 | 349262.00 | 160124.00 | 32283.00 | 41550.00 | 473.00 | 27.00 |
| 2008-09 | 336753.00 | 77409.00 | 30300.00 | 55169.00 | 577.00 | 34.00 |
| 2009-10 | 171945.00 | 54385.00 | 8659.00 | 40289.00 | 193.00 | 28.00 |
| 2010-11 | 602684.00 | 191212.00 | 22315.00 | 63781.00 | 194.00 | 38.00 |
| 2011-12 | 168634.00 | 44619.00 | 4417.00 | 53290.00 | 126.00 | 19.00 |
| 2012-13 | 259779.00 | 87906.00 | 9015.00 | 52020.00 | 169.00 | 25.23 |
| 2013-14 | 499422.00 | 152654.00 | 24229.00 | 54044.00 | 200.00 | 18.00 |
| 2014-15 | 407751.00 | 104589.00 | 24709.00 | 59196.00 | 277.00 | 23.00 |
| 2015-16 | 482388.00 | 143475.00 | 48608.00 | 75202.00 | 272.00 | 14.00 |
| Avg. Pro. | 344191.90 | 106010.30 | 22116.00 | 53481.80 | 267.20 | 27.92 |
| CGR | 8.04 | 6.95 | 3.18 | 5.34 | -3.97 | -9.95 |

Continued.....

Table-2.2: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|------|----------|----------|--------|-----------|
| 2006-07 | 245.00 | 4.00 | 0.00 | 0.00 | 3533.00 | 443.00 | 268402.00 |
| 2007-08 | 689.00 | 1.00 | 0.00 | 0.00 | 7744.00 | 423.00 | 592576.00 |
| 2008-09 | 776.04 | 1.40 | 0.00 | 0.00 | 8640.00 | 502.00 | 510161.44 |
| 2009-10 | 242.00 | 1.00 | 0.00 | 0.00 | 3962.40 | 401.00 | 280105.40 |
| 2010-11 | 673.00 | 1.00 | 0.00 | 0.00 | 10789.00 | 425.00 | 892112.00 |
| 2011-12 | 457.00 | 0.00 | 0.00 | 0.00 | 4518.00 | 400.00 | 276480.00 |
| 2012-13 | 481.00 | 1.90 | 0.00 | 0.00 | 7189.00 | 259.20 | 416845.33 |
| 2013-14 | 644.00 | 1.22 | 0.00 | 0.00 | 7189.00 | 322.20 | 738723.42 |
| 2014-15 | 2290.00 | 1.00 | 0.00 | 0.00 | 26054.00 | 309.03 | 625199.03 |
| 2015-16 | 2821.00 | 4.00 | 0.00 | 0.00 | 24018.00 | 324.00 | 777126.00 |
| Avg. Pro. | 931.80 | 1.65 | 0.00 | 0.00 | 10363.64 | 380.84 | 537773.06 |
| CGR | 20.77 | - | - | - | 16.88 | -5.08 | 7.42 |

Source: Directorate of Horticulture, H.P. Shimla.

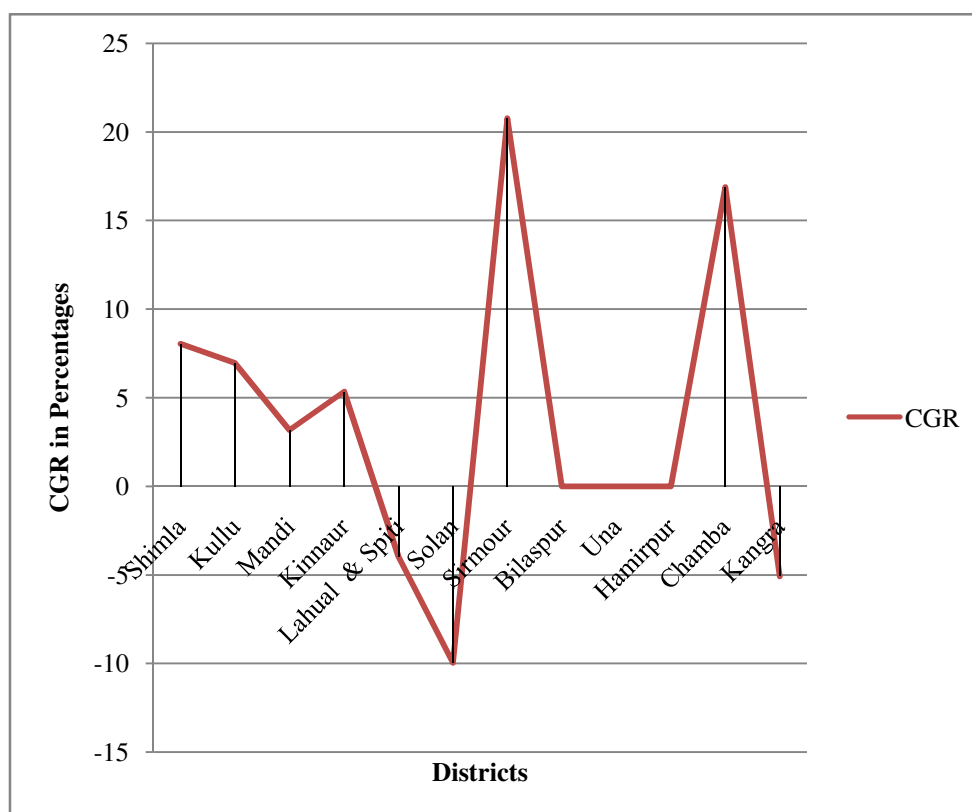


Figure-2.2: Compound growth rate in production of apple fruit in Himachal Pradesh

The production of this fruit, at state level, has been observed to increase at compound growth rate of 7.42 per cent, per annum. District-wise analysis of compound growth rate, during the above mention period, it is found that the Sirmour district has highest compound growth rate in apple production i.e. 20.77 per cent, per annum, and which is followed by Chamba (16.88

per cent), Shimla (8.04 per cent), Kullu (6.95 per cent), Kinnaur (5.34 per cent), Mandi (3.18 per cent) districts of the state. Further, three districts viz; Solan, Kangra and Lahual & Spiti have been registered a negative compound growth rate in apple production during the years 2006-07 to 2015-16.

Table-2.3: Per hectare productivity of apple fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-------------------|--------|-------|-------|---------|----------------|-------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 5.33 | 2.00 | 1.96 | 2.69 | 0.28 | 0.47 |
| 2007-08 | 11.15 | 6.91 | 3.64 | 2.75 | 0.64 | 0.25 |
| 2008-09 | 10.46 | 3.27 | 3.13 | 3.59 | 0.71 | 0.34 |
| 2009-10 | 5.12 | 2.28 | 0.88 | 2.59 | 0.20 | 0.29 |
| 2010-11 | 17.41 | 7.97 | 2.23 | 4.07 | 0.15 | 0.43 |
| 2011-12 | 4.71 | 1.82 | 0.44 | 3.36 | 0.09 | 0.22 |
| 2012-13 | 6.97 | 3.46 | 0.89 | 3.25 | 0.11 | 0.35 |
| 2013-14 | 13.30 | 5.96 | 2.31 | 3.36 | 0.13 | 0.28 |
| 2014-15 | 10.51 | 4.05 | 2.26 | 3.63 | 0.17 | 0.38 |
| 2015-16 | 12.14 | 5.51 | 4.37 | 4.61 | 0.16 | 0.24 |
| Avg. Productivity | 5.33 | 2.00 | 1.96 | 2.69 | 0.28 | 0.47 |
| CGR | 4.85 | 5.07 | 0.47 | 4.30 | -14.12 | -2.51 |

Continued.....

Table-2.3: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-------------------|---------|----------|------|----------|--------|--------|------|
| 2006-07 | 0.07 | 0.95 | 0.00 | 0.00 | 0.32 | 1.00 | 2.92 |
| 2007-08 | 0.20 | 0.24 | 0.00 | 0.00 | 0.68 | 0.93 | 6.26 |
| 2008-09 | 0.23 | 0.33 | 0.00 | 0.00 | 0.73 | 1.11 | 5.24 |
| 2009-10 | 0.07 | 0.24 | 0.00 | 0.00 | 0.33 | 0.89 | 2.81 |
| 2010-11 | 0.21 | 0.16 | 0.00 | 0.00 | 0.88 | 0.99 | 8.79 |
| 2011-12 | 0.15 | 0.00 | 0.00 | 0.00 | 0.36 | 0.93 | 2.67 |
| 2012-13 | 0.16 | 0.31 | 0.00 | 0.00 | 0.56 | 0.62 | 3.92 |
| 2013-14 | 0.22 | 0.25 | 0.00 | 0.00 | 0.55 | 0.82 | 6.86 |
| 2014-15 | 0.83 | 0.20 | 0.00 | 0.00 | 2.03 | 0.78 | 5.71 |
| 2015-16 | 1.09 | 0.40 | 0.00 | 0.00 | 1.91 | 0.77 | 7.03 |
| Avg. Productivity | 0.07 | 0.95 | 0.00 | 0.00 | 0.32 | 1.00 | 2.92 |
| CGR | 24.83 | - | - | - | 14.97 | -3.71 | 5.23 |

Source: Directorate of Horticulture, H.P. Shimla.

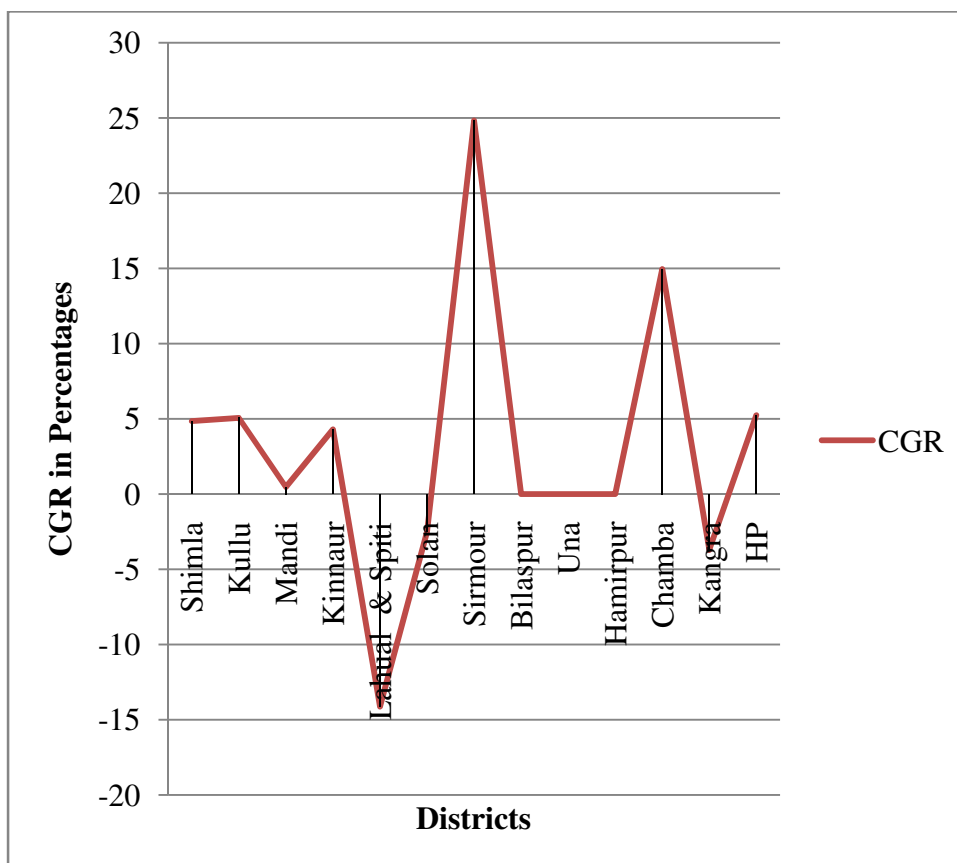


Figure-2.3: Compound growth rate in per hectare productivity of apple fruit in Himachal Pradesh

During the years 2006-07 to 2015-16 the per hectare productivity of apple at State level is worked out 2.92 M.T. The highest average productivity of this fruit is observed to be in Shimla district i.e., 5.33 M.T. per hectare and which is followed by Kinnaur, Kullu, Mandi, Kangra, Bilaspur, Solan, Lahual & Spiti and Sirmour districts of the state, respectively. Further, at state level per hectare productivity of this fruit, during the above mention period, is increasing at a growth rate of 5.23 per cent, per annum. By analyzing the district-wise growth rates, it is found that, Sirmour district has highest compound growth rate i.e. 24.83 per cent, per annum, and which is followed by Chamba, Kullu, Shimla, Kinnaur and Mandi districts of the state, respectively. It is also observed that Kangra, Solan and Lahual & Spiti districts have negative compound growth rate in apple productivity, which is also evident from Figure 2.3.

2.1.2 Area, production and productivity of pear fruit

Pear is the second major pome fruit crop in Himachal Pradesh. The average area under this fruit, at state level, during the years 2006-07 to 2015-16 has been estimated 7331.20 hectares. The highest average area under this fruit during the above mention years has been observed in Mandi district i.e. 1811.22 hectares, and which is followed by Shimla (1584.42 hectares), Solan (1006.07 hectares), Una (581.76 hectares), Bilaspur (479.53), Kullu (478.05 hectares), Sirmour (446.43 hectares), Kangra (402.92 hectares), Chamba (357.88 hectares), Hamirpur (105.89 hectares), Kinnaur (67.57 hectares), and Lahaul & Spiti (9.47 hectares) districts of the state.

Further, it is found that, at the state level, the area under this fruit, during the years 2006-07 to 2015-16, has been observed to decrease, at a compound growth rate of -0.88 per cent, per annum. Though, three districts namely Lahual & Spiti, Kinnaur, Shimla, and Mandi district of the state have been observed to increase the area under pear fruit at the compound growth rate of 5.5, 3.94, 1.03 and 0.03 per cent, annually. But eight district viz; Chamba, Kullu, Kangra, Bilaspur, Solan, Sirmour, Una and Hamirpur districts of the state had been shown a decline in area under this fruit by registering a growth rates of -0.07, -1.13, -1.23, -1.35, -2.17, -3.44, -3.98 and 3.98 per cent, per annum, during the years 2006-07 to 2015-16 (Table 2.4).

Table- 2.4: Area under pear fruit in Himachal Pradesh

| Years | (Area in Hectares) | | | | | |
|-----------|--------------------|--------|---------|---------|----------------|---------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 1481.14 | 483.01 | 1800.84 | 53.30 | 6.40 | 1119.39 |
| 2007-08 | 1505.19 | 483.01 | 1806.84 | 60.82 | 7.40 | 1081.39 |
| 2008-09 | 1531.56 | 477.30 | 1812.00 | 63.92 | 9.40 | 1047.72 |
| 2009-10 | 1581.89 | 493.94 | 1814.37 | 65.53 | 9.40 | 1029.35 |
| 2010-11 | 1618.84 | 492.48 | 1816.13 | 65.48 | 9.40 | 1016.47 |
| 2011-12 | 1637.26 | 507.10 | 1817.00 | 65.48 | 9.40 | 997.98 |
| 2012-13 | 1631.92 | 491.22 | 1818.00 | 65.48 | 10.40 | 980.20 |
| 2013-14 | 1618.58 | 489.12 | 1808.00 | 77.47 | 10.30 | 953.90 |
| 2014-15 | 1615.83 | 466.26 | 1811.00 | 78.23 | 11.30 | 932.55 |
| 2015-16 | 1622.00 | 397.02 | 1808.00 | 80.00 | 11.30 | 901.70 |
| Avg. Area | 1584.42 | 478.05 | 1811.22 | 67.57 | 9.47 | 1006.07 |
| CGR | 1.03 | -1.13 | 0.03 | 3.94 | 5.50 | -2.17 |

Continued.....

Table- 2.4: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|--------|----------|--------|--------|---------|
| 2006-07 | 583.04 | 496.00 | 749.00 | 112.61 | 357.15 | 421.00 | 7662.88 |
| 2007-08 | 471.04 | 496.00 | 755.50 | 115.40 | 357.95 | 421.00 | 7561.54 |
| 2008-09 | 472.32 | 496.67 | 601.00 | 116.43 | 358.15 | 420.00 | 7406.47 |
| 2009-10 | 456.63 | 496.67 | 553.00 | 116.43 | 359.47 | 409.20 | 7385.88 |
| 2010-11 | 451.40 | 487.00 | 535.30 | 117.02 | 359.55 | 404.93 | 7374.00 |
| 2011-12 | 416.70 | 487.00 | 520.45 | 115.94 | 358.11 | 401.63 | 7334.05 |
| 2012-13 | 406.50 | 487.00 | 530.85 | 105.52 | 358.03 | 397.84 | 7282.96 |
| 2013-14 | 412.58 | 467.00 | 540.86 | 96.26 | 360.33 | 387.03 | 7221.43 |
| 2014-15 | 400.09 | 441.00 | 514.76 | 86.30 | 359.29 | 389.53 | 7106.14 |
| 2015-16 | 394.00 | 441.00 | 516.86 | 77.01 | 350.80 | 377.00 | 6976.69 |
| Avg. Area | 446.43 | 479.53 | 581.76 | 105.89 | 357.88 | 402.92 | 7331.20 |
| CGR | -3.44 | -1.35 | -3.98 | -3.98 | -0.07 | -1.23 | -0.88 |

Source: Directorate of Horticulture, H.P. Shimla.

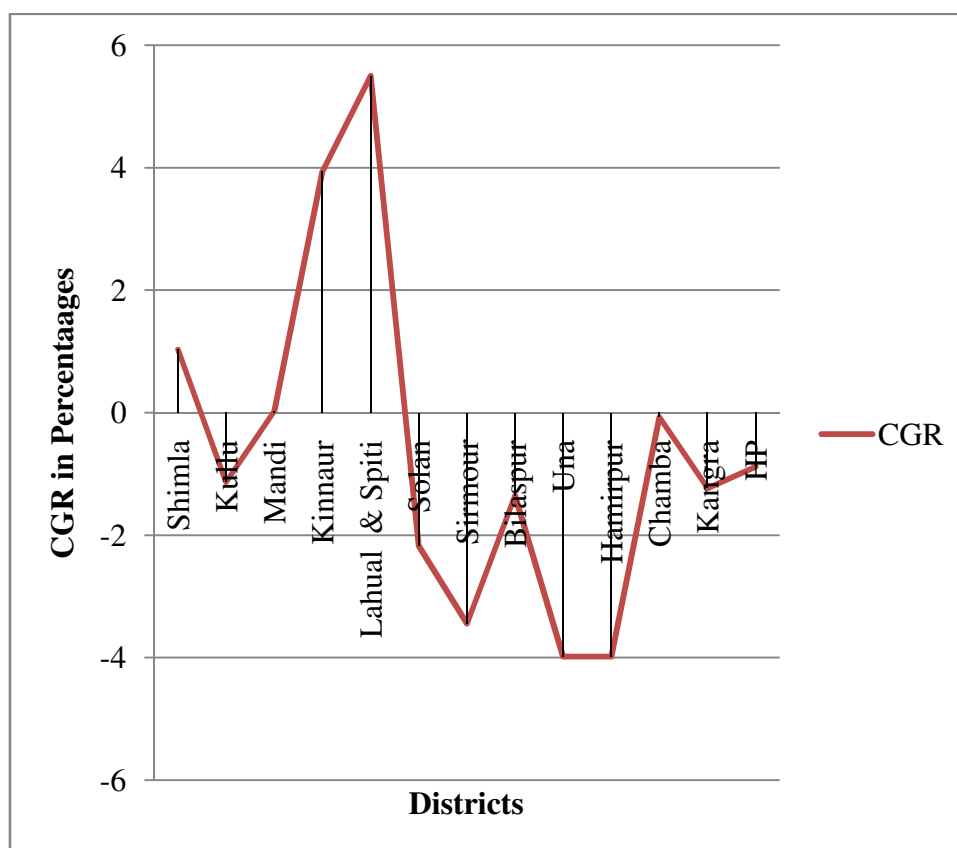


Figure-2.4: Compound growth rate in area under pear fruit in Himachal Pradesh

The average production of pear fruit during the years 2006-07 to 2015-16 is presented in Table 2.5. The average production of this fruit, during the years 2006-07 to 2015-16, has

been worked to be 23094.76 M.T. District-wise analysis of data shows, the average production of this fruit during the above mention years, is observed to be highest in Kullu district i.e. 12182.6 M.T., and which is followed by Shimla (5205.30 M.T.), Kangra (1564.38 M.T.), Solan (1128.13 M.T.), Mandi (1082.60 M.T.), Una (734.10 M.T.), Sirmour (531.96 M.T.), Chamba (212.33 M.T.), Hamirpur (210.81 M.T.), Bilaspur (208.94 M.T.), Kinnaur (30.16 M.T.) and Lahual & Spiti (3.45 M.T.) districts of the state, respectively.

Table- 2.5: Production of pear fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-----------|---------|----------|---------|---------|----------------|---------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 2632.00 | 3961.00 | 967.00 | 42.00 | 2.00 | 732.00 |
| 2007-08 | 2709.00 | 21261.00 | 1282.00 | 37.00 | 4.50 | 731.00 |
| 2008-09 | 2710.00 | 6863.00 | 885.00 | 38.00 | 3.00 | 802.75 |
| 2009-10 | 8202.00 | 4480.00 | 1015.00 | 84.00 | 2.00 | 740.00 |
| 2010-11 | 8903.00 | 17140.00 | 1151.00 | 26.00 | 4.00 | 1123.00 |
| 2011-12 | 2486.00 | 3465.00 | 1259.00 | 9.80 | 4.00 | 1290.00 |
| 2012-13 | 5913.00 | 13612.00 | 1075.00 | 11.80 | 4.50 | 1248.55 |
| 2013-14 | 7149.00 | 21841.00 | 1075.00 | 17.00 | 3.00 | 1393.00 |
| 2014-15 | 5050.00 | 10033.00 | 908.00 | 11.00 | 4.00 | 1495.00 |
| 2015-16 | 6299.00 | 19170.00 | 1209.00 | 25.00 | 3.50 | 1726.00 |
| Avg. Pro. | 5205.30 | 12182.60 | 1082.60 | 30.16 | 3.45 | 1128.13 |
| CGR | 9.39 | 10.49 | 0.50 | -13.56 | 4.11 | 10.98 |

Continued.....

Table- 2.5: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|---------|----------|--------|---------|----------|
| 2006-07 | 350.00 | 306.00 | 932.00 | 320.00 | 152.00 | 1643.00 | 12039.00 |
| 2007-08 | 427.00 | 266.00 | 1050.00 | 276.00 | 188.00 | 1343.00 | 29574.50 |
| 2008-09 | 552.92 | 335.00 | 1230.00 | 217.59 | 176.00 | 1636.84 | 15450.10 |
| 2009-10 | 271.65 | 514.00 | 143.00 | 123.00 | 84.00 | 1721.50 | 17380.15 |
| 2010-11 | 549.00 | 88.00 | 820.00 | 129.00 | 214.00 | 1928.00 | 32075.00 |
| 2011-12 | 387.00 | 107.00 | 557.00 | 192.00 | 242.30 | 1746.00 | 11745.10 |
| 2012-13 | 602.00 | 125.20 | 560.00 | 231.50 | 246.80 | 1580.50 | 25210.85 |
| 2013-14 | 819.00 | 135.20 | 759.00 | 227.00 | 266.20 | 1530.00 | 35214.40 |
| 2014-15 | 402.00 | 85.00 | 570.00 | 217.00 | 285.00 | 1160.00 | 20220.00 |
| 2015-16 | 959.00 | 128.00 | 720.00 | 175.00 | 269.00 | 1355.00 | 32038.50 |
| Avg. Pro. | 531.96 | 208.94 | 734.10 | 210.81 | 212.33 | 1564.38 | 23094.76 |
| CGR | 7.97 | -13.75 | -3.16 | -2.75 | 8.51 | -2.07 | 6.49 |

Source: Directorate of Horticulture, H.P. Shimla.

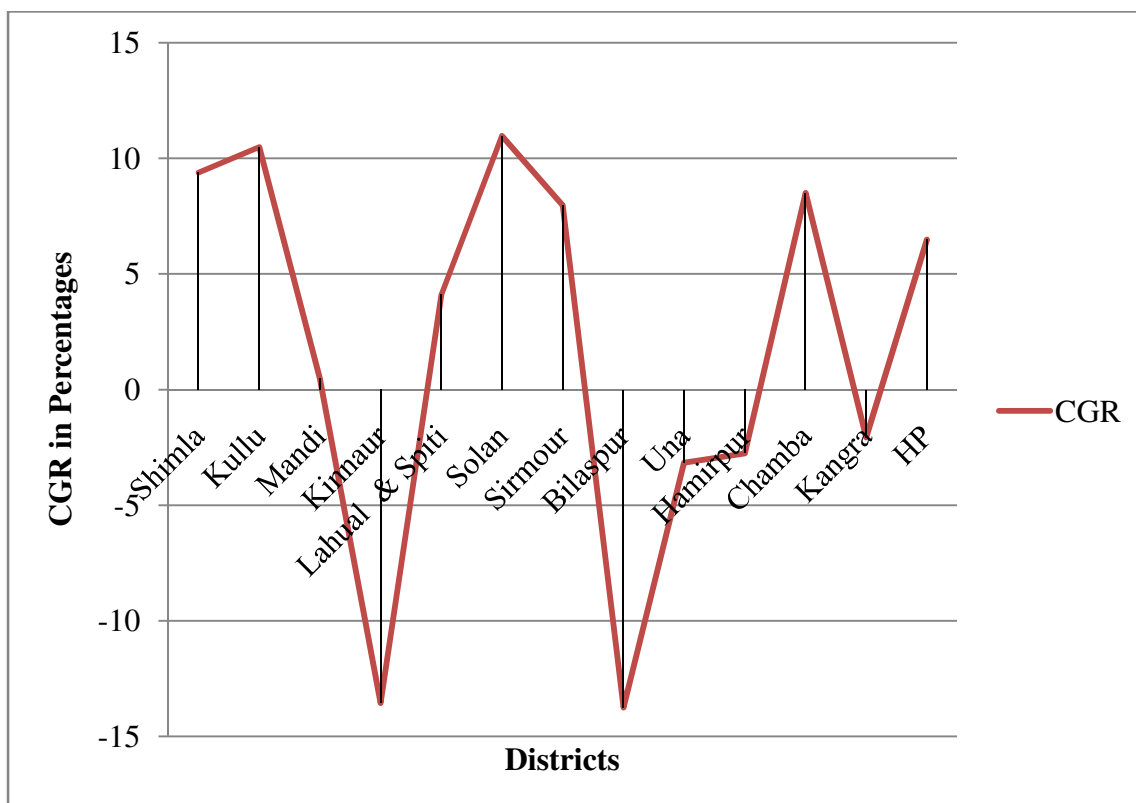


Figure-2.5: Compound growth rate in production of pear fruit in Himachal Pradesh

Further, during the years 2006-07 to 2015-16, the production of pear fruit is increasing at a compound growth rate of 7.44 per cent, per annum. By district-wise analysis of data, it is found that, compound rate of growth in production is observed to be highest in Solan district i.e. 10.83 per cent, per annum and which is followed by Sirmour (11.79 per cent), Kullu (11.75 per cent), Chamba (8.54 per cent), Shimla (8.26 per cent), Hamirpur (1.27 per cent), Una (0.84 per cent) and Mandi (0.04 per cent) districts of the state. It is also observed from the table and figure that four districts namely; Kangra, Lahual & Spiti, Bilaspur and Kinnaur districts of the state had registered a negative compound growth rate in production of pear fruit during the years 2006-07 to 2015-16.

Table-2.6: Per hectare productivity of pear fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|----------------------|--------|-------|-------|---------|----------------|-------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 1.78 | 8.20 | 0.54 | 0.79 | 0.31 | 0.65 |
| 2007-08 | 1.80 | 44.02 | 0.71 | 0.61 | 0.61 | 0.68 |
| 2008-09 | 1.77 | 14.38 | 0.49 | 0.59 | 0.32 | 0.77 |
| 2009-10 | 5.18 | 9.07 | 0.56 | 1.28 | 0.21 | 0.72 |
| 2010-11 | 5.50 | 34.80 | 0.63 | 0.40 | 0.43 | 1.10 |
| 2011-12 | 1.52 | 6.83 | 0.69 | 0.15 | 0.43 | 1.29 |
| 2012-13 | 3.62 | 27.71 | 0.59 | 0.18 | 0.43 | 1.27 |
| 2013-14 | 4.42 | 44.65 | 0.59 | 0.22 | 0.29 | 1.46 |
| 2014-15 | 3.13 | 21.52 | 0.50 | 0.14 | 0.35 | 1.60 |
| 2015-16 | 3.88 | 48.28 | 0.67 | 0.31 | 0.31 | 1.91 |
| Average Productivity | 3.29 | 25.48 | 0.60 | 0.45 | 0.36 | 1.12 |
| CGR | 8.26 | 11.75 | 0.40 | -16.89 | -1.34 | 13.40 |

Continued.....

Table-2.6: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|----------------------|---------|----------|------|----------|--------|--------|------|
| 2006-07 | 0.60 | 0.62 | 1.24 | 2.84 | 0.43 | 3.90 | 1.57 |
| 2007-08 | 0.91 | 0.54 | 1.39 | 2.39 | 0.53 | 3.19 | 3.91 |
| 2008-09 | 1.17 | 0.67 | 2.05 | 1.87 | 0.49 | 3.90 | 2.09 |
| 2009-10 | 0.59 | 1.03 | 0.26 | 1.06 | 0.23 | 4.21 | 2.35 |
| 2010-11 | 1.22 | 0.18 | 1.53 | 1.10 | 0.60 | 4.76 | 4.35 |
| 2011-12 | 0.93 | 0.22 | 1.07 | 1.66 | 0.68 | 4.35 | 1.60 |
| 2012-13 | 1.48 | 0.26 | 1.05 | 2.19 | 0.69 | 3.97 | 3.46 |
| 2013-14 | 1.99 | 0.29 | 1.40 | 2.36 | 0.74 | 3.95 | 4.88 |
| 2014-15 | 1.00 | 0.19 | 1.11 | 2.51 | 0.79 | 2.98 | 2.85 |
| 2015-16 | 2.43 | 0.29 | 1.39 | 2.27 | 0.77 | 3.59 | 4.59 |
| Average Productivity | 1.19 | 0.44 | 1.26 | 1.99 | 0.59 | 3.88 | 3.15 |
| CGR | 11.79 | -12.62 | 0.84 | 1.27 | 8.54 | -0.86 | 7.44 |

Source: Directorate of Horticulture, H.P. Shimla.

The average productivity of pear fruit is presented in Table 2.6. This table shows that, during the years 2006-07 to 2015-16, the per hectare productivity of pear fruit in Himachal Pradesh has been worked out 3.15 M.T. Further, district-wise analysis of data, it is found that the per hectare productivity of pear fruit is observed to be highest in Kullu district i.e. 25.48 M.T. and which is followed by Kangra (3.88 M.T.), Shimla (3.29 M.T.), Hamirpur (1.99 M.T.), Una (1.26 M.T.), Sirmour (1.19 M.T.), Solan (1.12 M.T.), Mandi (0.60 M.T.), Chamba (0.59 M.T.), Kinnaur (0.45 M.T.), Bilaspur (0.44 M.T.) and Lahual & Spiti (0.36 M.T.) districts of the state. During the years 2006-07 to 2015-16, per hectare productivity of pear fruit in Himachal Pradesh is observed to increase at a compound growth rate of 4.63 per cent, per annum.



Figure-2.6: Compound growth rate in per hectare productivity of pear fruit in Himachal Pradesh

The highest growth rate in productivity of pear fruit, during the above mention period, is observed in Solan district i.e. 14.64 per cent, per annum and which is followed by Sirmour (13.40 per cent), Kullu (11.75 per cent), Chamba (8.54 per cent), Shimla (8.26 per cent), Hamirpur (0.84 per cent), Una (0.84 per cent) and Mandi (0.40 per cent) districts of the state. It is also found that four districts had shown a negative growth rate in pear fruit productivity, during the years 2006-07 to 2015-16, viz; Kangra, Lahual & Spiti, Bilaspur, and kinnaur districts of the state.

2.2 Area, production and productivity of stone fruits in Himachal Pradesh

This section deals with area, production and productivity of three major stone fruits i.e. peach, plum and apricot fruits in Himachal Pradesh.

2.2.1 Area, production and productivity of peach fruit

The area, production and productivity of peach fruit, is presented in Tables 2.7, 2.8 and 2.9. Table 2.7 shows that, during the years 2006-07 to 2015-16, the average area of peach has been worked out 5135.19 hectares. The average area is found to be highest in Sirmour district i.e. 2966.16 hectares, which is followed by Mandi (762.57), Shimla (318.52 hectares), Solan (230.77 hectares), Kangra (209.63 hectares), Chamba (192.35 hectares), Bilaspur (118.78 hectares) Hamirpur (103.43 hectares), Kinnaur (72.70 hectares) and Kullu (46.32 hectares) districts of the state, respectively.

By analyzing the data, it is observed that the area under peach during the years 2006-07 to 2015-16 has been decreased at a compound growth rate of -1.62 per cent, per annum. While, analyzing the district-wise growth rates, it is found that the Kullu district has the highest compound growth rate in area under this fruit i.e. 5.98 per cent, per annum, which is followed by Kinnaur (1.58 per cent), Shimla (1.01 per cent), Mandi (0.54 per cent), and Sirmour (0.26 per cent), Una (0.26 per cent) districts of the state. It reveals that the area of peach fruit has been increased during the years 2006-07 to 2015-16.

Table- 2.7: Area under peach fruit in Himachal Pradesh

(Area in Hectares)

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
|-----------|--------|-------|--------|---------|----------------|--------|
| 2006-07 | 304.08 | 35.00 | 745.17 | 67.00 | 0.00 | 270.34 |
| 2007-08 | 301.63 | 41.00 | 754.17 | 68.00 | 0.00 | 278.86 |
| 2008-09 | 310.64 | 35.10 | 757.00 | 73.00 | 0.00 | 278.47 |
| 2009-10 | 324.30 | 39.00 | 761.47 | 73.00 | 0.00 | 273.46 |
| 2010-11 | 331.16 | 39.06 | 765.15 | 73.00 | 0.00 | 263.40 |
| 2011-12 | 331.58 | 62.79 | 769.18 | 73.00 | 0.00 | 255.33 |
| 2012-13 | 324.59 | 59.12 | 777.18 | 73.00 | 0.00 | 248.50 |
| 2013-14 | 317.63 | 58.32 | 766.40 | 77.07 | 0.00 | 234.50 |
| 2014-15 | 329.07 | 56.24 | 776.00 | 77.61 | 0.00 | 222.80 |
| 2015-16 | 331.00 | 49.84 | 783.00 | 78.00 | 0.00 | 212.80 |
| Avg. Area | 320.57 | 47.55 | 765.47 | 73.27 | 0.00 | 253.85 |
| CGR | 0.91 | 6.03 | 0.47 | 1.57 | - | -2.93 |

Continued...

Table- 2.7: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|-------|----------|--------|--------|---------|
| 2006-07 | 2954.10 | 125.36 | 95.19 | 108.00 | 216.45 | 215.00 | 5135.69 |
| 2007-08 | 2964.56 | 125.36 | 97.82 | 108.83 | 217.05 | 216.83 | 5174.11 |
| 2008-09 | 2976.29 | 125.54 | 92.91 | 109.65 | 197.34 | 214.26 | 5170.20 |
| 2009-10 | 2992.01 | 126.08 | 92.63 | 109.65 | 186.45 | 213.06 | 5191.11 |
| 2010-11 | 2990.00 | 118.48 | 90.60 | 110.64 | 184.39 | 211.07 | 5176.95 |
| 2011-12 | 2975.81 | 118.48 | 88.83 | 108.14 | 182.23 | 209.23 | 5174.60 |
| 2012-13 | 2970.79 | 118.48 | 86.07 | 101.08 | 183.01 | 208.42 | 5150.24 |
| 2013-14 | 2988.26 | 111.44 | 87.89 | 94.87 | 184.16 | 203.29 | 5123.83 |
| 2014-15 | 2986.40 | 106.03 | 81.52 | 93.27 | 179.38 | 204.77 | 5113.09 |
| 2015-16 | 2980.40 | 107.00 | 78.82 | 86.61 | 170.92 | 198.00 | 5076.39 |
| Avg. Area | 2977.86 | 118.23 | 89.23 | 103.07 | 190.14 | 209.39 | 5148.62 |
| CGR | 0.08 | -2.03 | -2.09 | -2.43 | -2.32 | -0.89 | -0.16 |

Source: Directorate of Horticulture, H.P. Shimla.

Further Solan district is observed to have lowest compound growth rate, i.e. -2.50 per cent, which is followed by Chamba (-2.29 per cent), Hamirpur (-2.01 per cent), Bilaspur (-1.76 per

cent) and Kangra (-0.73 per cent) districts of the state. It reveals that the area under peach fruit in these districts has been decreased, during the years 2006-07 to 2015-16 (Table 2.7).

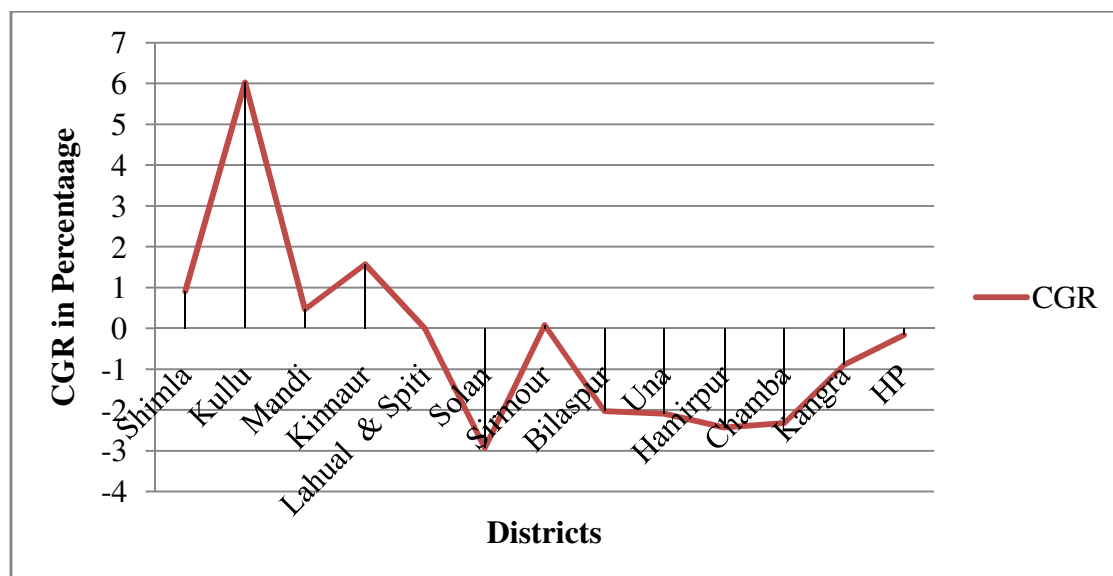


Figure-2.7: Compound growth rate in area under peach fruit in Himachal Pradesh

Production of peach fruit in Himachal Pradesh during the study year i.e. 2006-07 to 2015-16, is presented in Table 2.8. During the study years the average production of peach fruit has been worked out to be 7698.29 M.T. and which is observed to be highest in Sirmour district i.e. 6036.65 M.T. and same is followed by Kangra, Mandi, Shimla, Solan, Kullu, Chamba, Hamirpur, Una, Bilaspur, and Kinnaur districts of the State. Further, the production of this fruit has been decreased at a compound growth rate of -3.66 per cent, per annum, during the reference study years.

Table- 2.8: Production of peach fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-----------------|--------|--------|--------|---------|----------------|--------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 147.00 | 6.00 | 240.00 | 2.00 | 0.00 | 126.00 |
| 2007-08 | 163.00 | 11.00 | 428.00 | 1.00 | 0.00 | 110.00 |
| 2009-10 | 178.00 | 4.00 | 304.00 | 2.00 | 0.00 | 98.90 |
| 2010-11 | 131.00 | 77.00 | 423.00 | 6.00 | 0.00 | 95.40 |
| 2011-12 | 288.00 | 140.00 | 560.00 | 1.00 | 0.00 | 117.00 |
| 2012-13 | 150.00 | 70.00 | 531.00 | 0.90 | 0.00 | 167.00 |
| 2013-14 | 118.00 | 118.00 | 500.00 | 2.35 | 0.00 | 154.49 |
| 2014-15 | 227.47 | 95.00 | 500.00 | 0.95 | 0.00 | 166.00 |
| 2015-16 | 128.00 | 381.00 | 404.00 | 1.00 | 0.00 | 193.00 |
| 2014-15 | 161.00 | 356.00 | 433.00 | 2.00 | 0.00 | 163.00 |
| Avg. Production | 169.15 | 125.80 | 432.30 | 1.92 | 0.00 | 139.08 |
| CGR | -0.37 | 60.42 | 4.87 | -3.94 | - | 6.66 |

Continued...

Table- 2.8: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------------|---------|----------|-------|----------|--------|--------|----------|
| 2006-07 | 6855.00 | 13.00 | 17.00 | 119.00 | 70.00 | 578.00 | 8173.00 |
| 2007-08 | 7990.00 | 11.00 | 36.00 | 89.00 | 75.00 | 310.00 | 9224.00 |
| 2009-10 | 8578.80 | 18.00 | 40.00 | 62.45 | 97.20 | 552.93 | 9936.28 |
| 2010-11 | 3643.72 | 21.00 | 45.00 | 38.00 | 71.00 | 612.00 | 5163.12 |
| 2011-12 | 7594.00 | 11.00 | 60.00 | 44.00 | 94.00 | 618.00 | 9527.00 |
| 2012-13 | 3339.00 | 9.00 | 50.00 | 54.00 | 127.00 | 621.00 | 5118.90 |
| 2013-14 | 9554.00 | 7.75 | 51.00 | 94.55 | 130.00 | 546.70 | 11276.84 |
| 2014-15 | 4446.00 | 8.52 | 63.20 | 81.80 | 133.81 | 548.00 | 6270.75 |
| 2015-16 | 2292.00 | 7.00 | 70.00 | 104.00 | 174.00 | 494.00 | 4248.00 |
| 2014-15 | 6074.00 | 9.00 | 69.00 | 65.00 | 149.00 | 564.00 | 8045.00 |
| Avg. Production | 6036.65 | 11.53 | 50.12 | 75.18 | 112.10 | 544.46 | 7698.29 |
| CGR | -6.48 | -7.80 | 12.71 | -0.04 | 10.45 | 1.63 | -3.66 |

Source: Directorate of Horticulture, H.P. Shimla.

District-wise analysis of growth rate, it is found that, in Kullu district, the production of this fruit has been increased at highest compound growth rate of 60.42 per cent, and which is followed by Una, Chamba, Solan, Mandi and Kangra districts of the state. It is also observed that Hamirpur, Shimla, Kinnuar, Sirmour and Bilaspur districts of the State have negative compound growth rate, which reveals that the production of this fruit has been decreased in these districts (Table 2.8 and Figure 2.8).

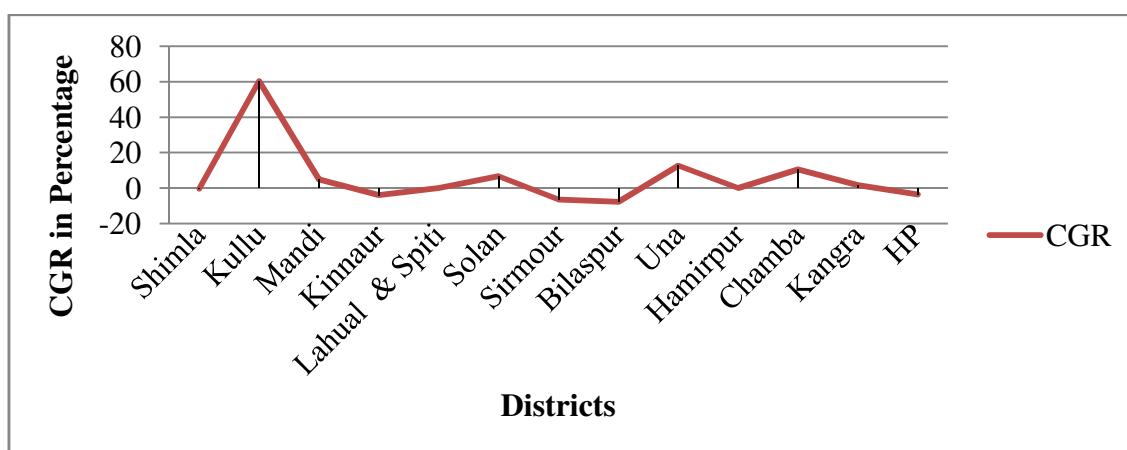


Figure- 2.8: Compound growth rate in production of peach fruit in Himachal Pradesh

The per hectare productivity of peach fruit during the years 2006-07 to 2015-16 is presented in Table 2.9. At state level, per hectare productivity of this fruit, during the above mention period, has been estimated to be 1.50 M.T. The highest productivity of peach fruit is observed to be in Kullu district i.e. 2.65 M.T. and which is followed by Kangra, Sirmour, Hamirpur, Chamba, Mandi and Una districts of the state, respectively.

Table-2.9: Per hectare productivity of peach fruit in Himachal Pradesh**(M.T.)**

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
|----------------------|--------|-------|-------|---------|----------------|-------|
| 2006-07 | 0.48 | 0.17 | 0.32 | 0.03 | 0.00 | 0.47 |
| 2007-08 | 0.54 | 0.27 | 0.57 | 0.01 | 0.00 | 0.39 |
| 2008-09 | 0.57 | 0.11 | 0.40 | 0.03 | 0.00 | 0.36 |
| 2009-10 | 0.40 | 1.97 | 0.56 | 0.08 | 0.00 | 0.35 |
| 2010-11 | 0.87 | 3.58 | 0.73 | 0.01 | 0.00 | 0.44 |
| 2011-12 | 0.45 | 1.11 | 0.69 | 0.01 | 0.00 | 0.65 |
| 2012-13 | 0.36 | 2.00 | 0.64 | 0.03 | 0.00 | 0.62 |
| 2013-14 | 0.72 | 1.63 | 0.65 | 0.01 | 0.00 | 0.71 |
| 2014-15 | 0.39 | 6.77 | 0.52 | 0.01 | 0.00 | 0.87 |
| 2015-16 | 0.49 | 7.14 | 0.55 | 0.03 | 0.00 | 0.77 |
| Average Productivity | 0.53 | 2.65 | 0.56 | 0.03 | 0.00 | 0.55 |
| CGR | -1.14 | 51.50 | 4.34 | -4.98 | - | 9.89 |

Continued.....

Table-2.9: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|----------------------|---------|----------|-------|----------|--------|--------|-------|
| 2006-07 | 2.32 | 0.10 | 0.18 | 1.10 | 0.32 | 2.69 | 1.59 |
| 2007-08 | 2.70 | 0.09 | 0.37 | 0.82 | 0.35 | 1.43 | 1.78 |
| 2008-09 | 2.88 | 0.14 | 0.43 | 0.57 | 0.49 | 2.58 | 1.92 |
| 2009-10 | 1.22 | 0.17 | 0.49 | 0.35 | 0.38 | 2.87 | 0.99 |
| 2010-11 | 2.54 | 0.09 | 0.66 | 0.40 | 0.51 | 2.93 | 1.84 |
| 2011-12 | 1.12 | 0.08 | 0.56 | 0.50 | 0.70 | 2.97 | 0.99 |
| 2012-13 | 3.22 | 0.07 | 0.59 | 0.94 | 0.71 | 2.62 | 2.19 |
| 2013-14 | 1.49 | 0.08 | 0.72 | 0.86 | 0.73 | 2.70 | 1.22 |
| 2014-15 | 0.77 | 0.07 | 0.86 | 1.12 | 0.97 | 2.41 | 0.83 |
| 2015-16 | 2.04 | 0.08 | 0.88 | 0.75 | 0.87 | 2.85 | 1.58 |
| Average Productivity | 2.03 | 0.10 | 0.56 | 0.73 | 0.59 | 2.60 | 1.50 |
| CGR | -6.53 | -5.51 | 15.07 | 2.44 | 13.11 | 2.54 | -3.51 |

Source: Directorate of Horticulture, H.P. Shimla.

District-wise growth rate of Productivity of peach fruit is calculated and presented in Table 2.9. The productivity of this fruit, at state level, during the years 2006-07 to 2015-16, was found to decrease at a growth rate of -3.51 per cent, per annum. Though, most of districts the productivity had shown positive increase but it was found to decline in four districts in the state namely; Shimla, Kinnaur, Bilaspur, and Sirmour. The highest annual growth rate in productivity of this fruit is observed to be in Kullu district i.e 51.50 per cent and which is followed by Una (15.07 per cent), Chamba (13.11 per cent), Solan (9.89 per cent), Mandi (4.34 per cent), Kangra (2.54), and Hamirpur (2.44 per cent) districts of the state.

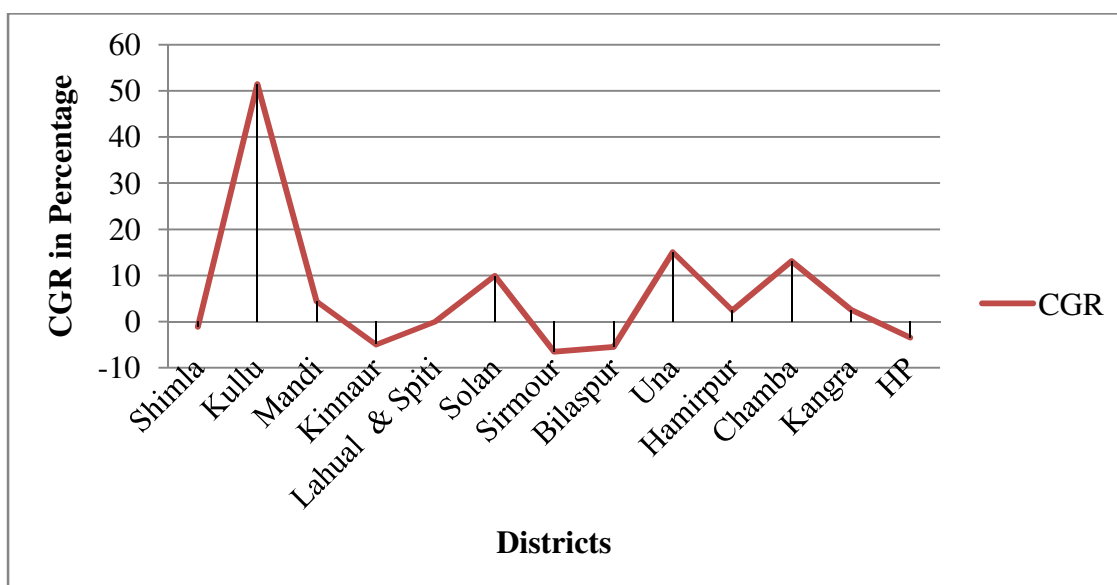


Figure-2.9: Compound growth rate in per hectare productivity of peach fruit in Himachal Pradesh

2.2.2 Area, production and productivity of plum fruit

The area, production, productivity of plum fruit during the years 2006-07 to 2015-16, is presented in Table 2.10, 2.11 and 2.12. The average area under this fruit, at State level, has been worked out 8499.61 hectares.

Table- 2.10: Area under plum fruit in Himachal Pradesh

(Area in Hectares)

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
|-----------|--------|---------|---------|---------|----------------|--------|
| 2006-07 | 600.10 | 2007.10 | 2683.80 | 8.08 | 7.80 | 629.20 |
| 2007-08 | 598.22 | 2051.10 | 2688.80 | 9.19 | 8.93 | 632.19 |
| 2008-09 | 602.04 | 2050.00 | 2697.00 | 9.19 | 9.25 | 635.67 |
| 2009-10 | 607.87 | 2078.65 | 2704.92 | 9.19 | 10.60 | 625.74 |
| 2010-11 | 615.77 | 2079.70 | 2712.14 | 10.04 | 11.00 | 634.90 |
| 2011-12 | 616.93 | 2122.76 | 2732.26 | 10.04 | 14.00 | 641.57 |
| 2012-13 | 616.65 | 2142.51 | 2735.26 | 10.04 | 15.00 | 631.70 |
| 2013-14 | 611.65 | 2124.59 | 2724.48 | 12.02 | 16.00 | 631.70 |
| 2014-15 | 613.57 | 2070.09 | 2759.00 | 13.13 | 18.00 | 630.70 |
| 2015-16 | 620.00 | 2073.99 | 2787.00 | 14.00 | 19.00 | 623.60 |
| Avg. Area | 610.28 | 2080.05 | 2722.47 | 10.49 | 12.96 | 631.70 |
| CGR | 0.36 | 0.39 | 0.37 | 5.64 | 10.81 | -0.05 |

Continued.....

Table- 2.10: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|-------|----------|--------|--------|---------|
| 2006-07 | 1349.05 | 88.94 | 81.22 | 146.00 | 380.97 | 413.65 | 8395.91 |
| 2007-08 | 1311.51 | 88.94 | 84.00 | 153.68 | 384.97 | 416.40 | 8427.93 |
| 2008-09 | 1300.95 | 90.23 | 80.60 | 157.55 | 376.00 | 411.43 | 8419.91 |
| 2009-10 | 1315.45 | 90.23 | 79.43 | 158.69 | 373.31 | 403.01 | 8457.09 |
| 2010-11 | 1317.32 | 82.74 | 76.80 | 161.72 | 370.11 | 404.26 | 8476.50 |
| 2011-12 | 1308.10 | 82.74 | 72.50 | 160.99 | 364.14 | 403.49 | 8529.52 |
| 2012-13 | 1309.16 | 81.28 | 72.75 | 159.17 | 366.48 | 404.94 | 8544.94 |
| 2013-14 | 1357.72 | 74.28 | 75.51 | 158.24 | 378.25 | 389.89 | 8554.33 |
| 2014-15 | 1401.93 | 67.28 | 72.58 | 173.74 | 368.09 | 392.60 | 8580.71 |
| 2015-16 | 1406.93 | 67.00 | 69.52 | 181.98 | 363.21 | 383.00 | 8609.23 |
| Avg. Area | 1337.81 | 81.37 | 76.49 | 161.18 | 372.55 | 402.27 | 8499.61 |
| CGR | 0.63 | -3.45 | -1.84 | 1.75 | -0.47 | -0.82 | 0.28 |

Source: Directorate of Horticulture, H.P. Shimla.

By examining the data it is found out that the average area under this fruit is highest in Mandi district i.e. 2722.47 hectares, which is followed by Kullu, Sirmour, Solan, Shimla, Kangra, Chamba, Hamirpur, Bilaspur, Una, Lahual & Spiti and Kinnaur districts of the state.

Further it is observed that area under this fruit has been increased at a growth rate of 0.28 per cent, per annum. While, district-wise analysis of growth, Lahual & Spiti district has been observed to have highest Compound growth rate i.e 10.81 per cent, per annum, and which is followed by Kinnaur, Hamirpur, Kullu, Sirmour, Shimla, Mandi and Solan districts of Himachal Pradesh. It is also observed that the Bilaspur, Una, Kangra and Chamba districts of the state have negative Compound growth rate, which reveals that area under this fruit has been decreased in these districts during the years 2006-07 to 2015-16.

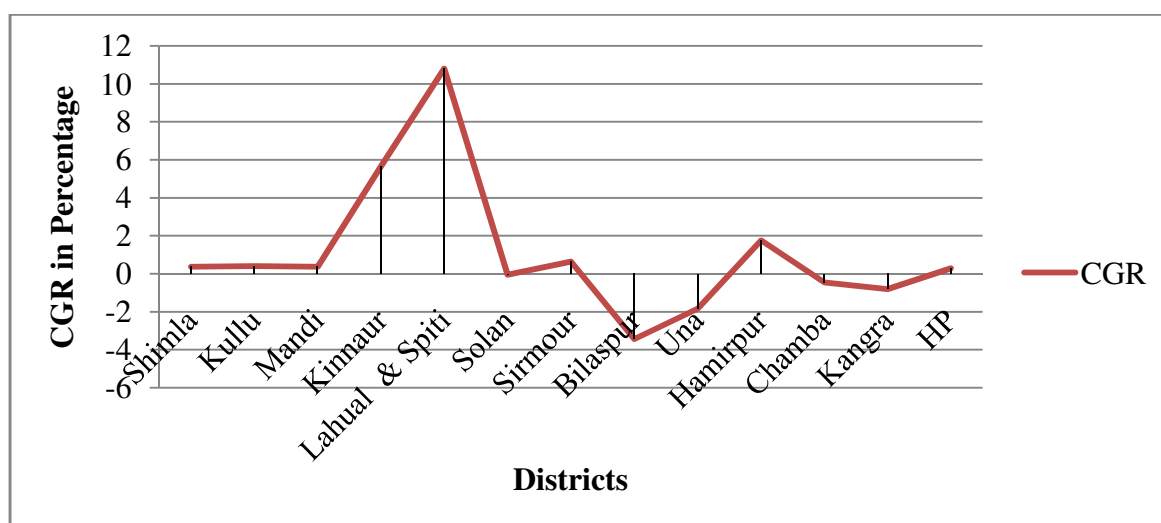


Figure- 2.10: Compound growth rate in area under plum fruit in Himachal Pradesh

The production of plum fruit in Himachal Pradesh is presented in Table 2.11. The average production of plum fruit in Himachal Pradesh, over the period 2006-07 to 2015-16 has been estimated to be 12295.10 M.T.

Table- 2.11: Production of plum fruit in Himachal Pradesh

(M.T.)

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
|-----------|--------|----------|---------|---------|----------------|---------|
| 2006-07 | 557.00 | 6770.00 | 612.00 | 2.00 | 3.00 | 898.00 |
| 2007-08 | 551.00 | 4831.00 | 1050.00 | 1.00 | 3.00 | 1152.00 |
| 2008-09 | 551.00 | 5154.00 | 430.00 | 2.19 | 3.00 | 1317.50 |
| 2009-10 | 423.00 | 6690.00 | 633.00 | 5.00 | 1.00 | 935.40 |
| 2010-11 | 736.00 | 8035.00 | 922.00 | 5.00 | 8.00 | 1381.00 |
| 2011-12 | 509.00 | 5631.00 | 791.00 | 3.52 | 9.00 | 830.00 |
| 2012-13 | 373.00 | 7463.00 | 588.00 | 2.30 | 10.00 | 1288.46 |
| 2013-14 | 897.42 | 11198.00 | 837.20 | 3.07 | 5.00 | 1279.00 |
| 2014-15 | 864.00 | 5518.00 | 654.00 | 2.00 | 5.00 | 1559.00 |
| 2015-16 | 602.00 | 13665.00 | 810.00 | 5.00 | 4.00 | 1439.00 |
| Avg. Pro. | 606.34 | 7495.50 | 732.72 | 3.11 | 5.10 | 1207.94 |
| CGR | 3.42 | 6.96 | 1.32 | 7.61 | 10.01 | 4.12 |

Continued.....

Table- 2.11: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|-------|----------|--------|---------|----------|
| 2006-07 | 315.00 | 13.00 | 21.00 | 99.00 | 150.00 | 1106.00 | 10546.00 |
| 2007-08 | 821.00 | 11.00 | 20.00 | 105.00 | 139.00 | 688.00 | 9372.00 |
| 2008-09 | 795.14 | 8.10 | 39.00 | 46.00 | 133.00 | 1112.60 | 9591.53 |
| 2009-10 | 455.96 | 19.00 | 36.00 | 47.00 | 89.00 | 1079.00 | 10413.36 |
| 2010-11 | 1315.00 | 9.00 | 50.00 | 49.00 | 161.00 | 1046.00 | 13717.00 |
| 2011-12 | 703.00 | 18.00 | 45.00 | 53.00 | 188.50 | 1078.00 | 9859.02 |
| 2012-13 | 1198.50 | 10.00 | 47.00 | 73.30 | 193.50 | 862.85 | 12109.91 |
| 2013-14 | 429.00 | 10.20 | 64.00 | 63.80 | 211.00 | 994.45 | 15992.14 |
| 2014-15 | 911.00 | 8.00 | 60.00 | 77.00 | 234.00 | 935.00 | 10827.00 |
| 2015-16 | 2921.00 | 9.00 | 59.00 | 55.00 | 226.00 | 728.00 | 20523.00 |
| Avg. Pro. | 986.46 | 11.53 | 44.10 | 66.81 | 172.50 | 962.99 | 12295.10 |
| CGR | 12.86 | -3.35 | 12.99 | -2.64 | 7.63 | -1.69 | 6.04 |

Source: Directorate of Horticulture, H.P. Shimla.

The highest average production of this fruit during the above mention period is observed in Mandi district and which is followed by Kullu, Sirmour, Solan, Shimla, Kangra, Chamba, Hamirpur, Bilaspur, Una, Lahual & Spiti and Kinnaur districts of the state.

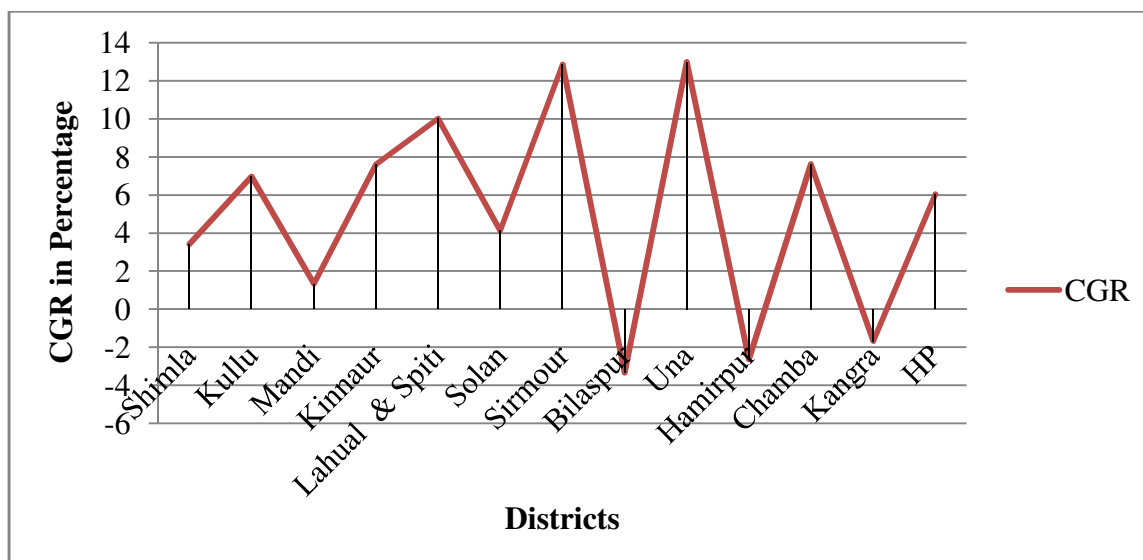


Figure- 2.11: Compound growth rate in production of plum fruit in Himachal Pradesh

Further, at the state level the growth rate in production this fruit is observed to be 6.04 per cent, per annum. The highest growth rate in production of this fruit is registered in Lahual & Spiti district i.e. 10.81 per cent, per annum and which is followed by Kinnaur (10.81 per cent), Hamirpur (1.75 per cent), Sirmour (0.63 per cent), Kullu (0.39 per cent), Mandi (0.37 per cent), Shimla (0.36 per cent), The production of this fruit is decline in five districts of the state, namely Solan, Chamba, Kangra, Una and Bilaspur.

Table-2.12: Per hectare productivity of plum fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-----------|--------|-------|-------|---------|----------------|-------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 0.93 | 3.37 | 0.23 | 0.25 | 0.38 | 1.43 |
| 2007-08 | 0.92 | 2.36 | 0.39 | 0.11 | 0.34 | 1.82 |
| 2008-09 | 0.92 | 2.51 | 0.16 | 0.24 | 0.32 | 2.07 |
| 2009-10 | 0.70 | 3.22 | 0.23 | 0.54 | 0.09 | 1.49 |
| 2010-11 | 1.20 | 3.86 | 0.34 | 0.50 | 0.73 | 2.18 |
| 2011-12 | 0.83 | 2.65 | 0.29 | 0.35 | 0.64 | 1.29 |
| 2012-13 | 0.60 | 3.48 | 0.21 | 0.23 | 0.67 | 2.04 |
| 2013-14 | 1.47 | 5.27 | 0.31 | 0.26 | 0.31 | 2.02 |
| 2014-15 | 1.41 | 2.67 | 0.24 | 0.15 | 0.28 | 2.47 |
| 2015-16 | 0.97 | 6.59 | 0.29 | 0.36 | 0.21 | 2.31 |
| Avg. Pro. | 0.99 | 3.60 | 0.27 | 0.30 | 0.39 | 1.91 |
| CGR | 3.00 | 6.55 | 0.95 | 1.80 | -0.58 | 4.18 |

Continued.....

Table-2.12: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|-------|----------|--------|--------|------|
| 2006-07 | 0.23 | 0.15 | 0.26 | 0.68 | 0.39 | 2.67 | 1.26 |
| 2007-08 | 0.63 | 0.12 | 0.24 | 0.68 | 0.36 | 1.65 | 1.11 |
| 2008-09 | 0.61 | 0.09 | 0.48 | 0.29 | 0.35 | 2.70 | 1.14 |
| 2009-10 | 0.35 | 0.21 | 0.45 | 0.30 | 0.24 | 2.68 | 1.23 |
| 2010-11 | 1.00 | 0.11 | 0.65 | 0.30 | 0.44 | 2.59 | 1.62 |
| 2011-12 | 0.54 | 0.22 | 0.62 | 0.33 | 0.52 | 2.67 | 1.16 |
| 2012-13 | 0.92 | 0.12 | 0.65 | 0.46 | 0.53 | 2.13 | 1.42 |
| 2013-14 | 0.32 | 0.14 | 0.85 | 0.40 | 0.56 | 2.55 | 1.87 |
| 2014-15 | 0.65 | 0.12 | 0.83 | 0.44 | 0.64 | 2.38 | 1.26 |
| 2015-16 | 2.08 | 0.13 | 0.85 | 0.30 | 0.62 | 1.90 | 2.38 |
| Avg. Pro. | 0.74 | 0.14 | 0.58 | 0.41 | 0.46 | 2.39 | 1.45 |
| CGR | 12.27 | -0.04 | 15.14 | -4.40 | 8.26 | -0.87 | 5.72 |

Source: Directorate of Horticulture, H.P. Shimla.

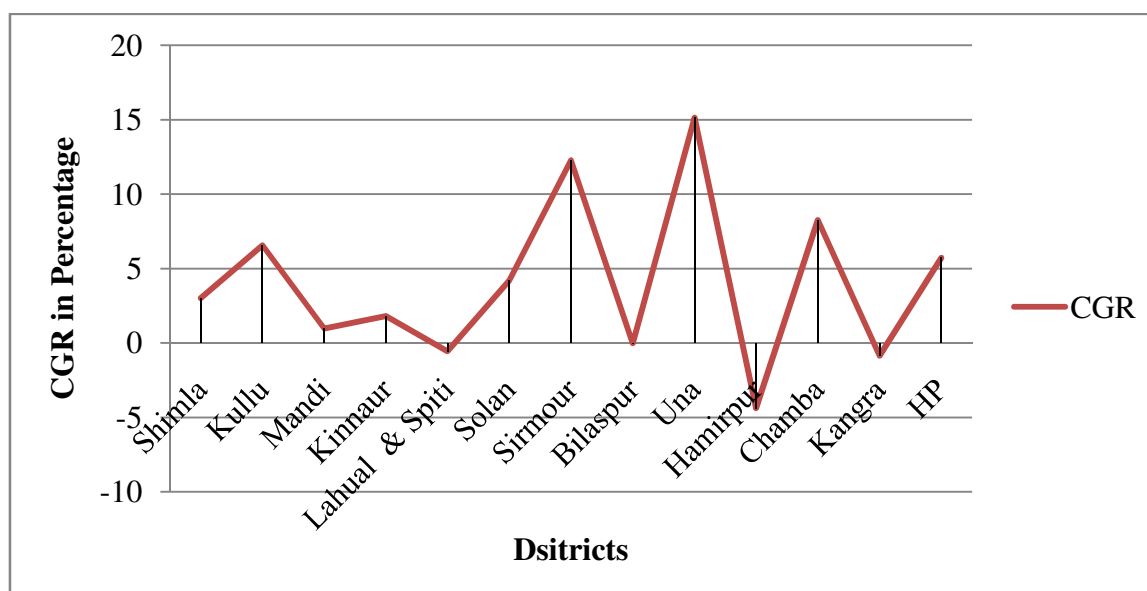


Figure-2.12: Compound growth rate in per hectare productivity of plum fruit in Himachal Pradesh

The productivity of plum fruit, at state level, during the years 2006-07 to 2015-16, was found to increase at a growth rate of 5.72 per cent, annually. Though, most of districts the productivity had shown positive increase but it was found to decline in four districts in the state namely; Bilaspur, Lahual & Spiti, Kangra, and Hamirpur. The highest annual growth rate in productivity of this fruit is observed in Una district i.e 15.14 per cent and same is followed by Sirmour (12.27 per cent), Chamba (8.26 per cent), Kullu (6.55 per cent), Solan (4.18 per cent), Shimla (3.00 per cent), Kinnaur (1.80 per cent) and Hamirpur (0.95 per cent) districts of the state.

2.2.3 Area, production and productivity of apricot fruit

The area, production and productivity of apricot fruit during the years 2006-07 to 2015-16 has been analyzed and presented in Tables 2.13, 2.14 and 2.15. The average area of apricot fruit has been worked out 3402.18 hectares. By examining the data it is found out that the average area of apricot fruit during the above mention years, is highest in Solan district i.e. 1002.93 hectares and which is followed by Shimla, Sirmour, Chamba, Mandi, Kullu, Kinnaur, Kangra, Lahual & Spiti, Hamirpur, Bilaspur and Una districts of the state, respectively. Further, at State level, during the years 2006-07 to 2015-16, the area under this fruit has been registered a compound growth rate of 0.65 per cent, per annum. District-wise analysis of growth rate it is observed that the Lahual & Spiti district has the highest compound growth rate i.e 5.36 per cent, per annum and which is followed by Sirmour, Kangra, Mandi, Solan, Shimla and Kullu districts of the state. Further, three districts namely Chamba, Hamirpur and Kinnaur have been observed to decline in area under this fruit during the above mention study period.

Table- 2.13: Area under apricot fruit in Himachal Pradesh

| Years | (Area in Hectares) | | | | | |
|-----------|--------------------|--------|--------|---------|----------------|---------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 669.16 | 227.00 | 222.01 | 246.00 | 16.50 | 907.00 |
| 2007-08 | 678.74 | 236.00 | 229.01 | 247.85 | 17.50 | 925.99 |
| 2008-09 | 690.03 | 233.66 | 240.00 | 317.88 | 18.60 | 962.41 |
| 2009-10 | 701.04 | 238.37 | 244.27 | 317.88 | 19.20 | 983.47 |
| 2010-11 | 706.76 | 239.71 | 247.36 | 318.78 | 19.50 | 1016.47 |
| 2011-12 | 708.91 | 271.25 | 251.45 | 318.78 | 23.50 | 1032.73 |
| 2012-13 | 705.29 | 262.20 | 252.45 | 318.78 | 24.50 | 1042.20 |
| 2013-14 | 697.46 | 258.10 | 253.00 | 77.07 | 24.10 | 1046.30 |
| 2014-15 | 701.48 | 246.00 | 265.00 | 77.61 | 25.10 | 1055.30 |
| 2015-16 | 707.00 | 217.00 | 278.00 | 78.00 | 25.40 | 1057.40 |
| Avg. Area | 696.59 | 242.93 | 248.26 | 231.86 | 21.39 | 1002.93 |
| CGR | 0.49 | 0.48 | 2.10 | -14.34 | 5.36 | 1.78 |

Continued.....

Table- 2.13: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|------|----------|--------|--------|---------|
| 2006-07 | 469.67 | 0.00 | 0.00 | 0.64 | 383.10 | 36.00 | 3177.08 |
| 2007-08 | 467.44 | 0.00 | 0.00 | 0.64 | 389.10 | 37.27 | 3229.54 |
| 2008-09 | 512.52 | 0.62 | 0.00 | 0.64 | 371.90 | 41.12 | 3389.38 |
| 2009-10 | 526.57 | 0.62 | 0.00 | 0.64 | 368.78 | 43.04 | 3443.88 |
| 2010-11 | 529.60 | 0.62 | 0.00 | 0.64 | 363.24 | 46.64 | 3489.32 |
| 2011-12 | 540.70 | 0.62 | 0.00 | 0.64 | 358.72 | 47.54 | 3554.84 |
| 2012-13 | 555.05 | 0.50 | 0.00 | 0.24 | 369.36 | 49.04 | 3579.61 |
| 2013-14 | 569.93 | 0.50 | 0.00 | 0.25 | 380.21 | 45.19 | 3352.11 |
| 2014-15 | 606.85 | 0.50 | 0.00 | 0.25 | 377.76 | 45.69 | 3401.54 |
| 2015-16 | 613.95 | 0.95 | 1.25 | 0.43 | 381.07 | 44.00 | 3404.45 |
| Avg. Area | 539.23 | 0.49 | 0.13 | 0.50 | 374.32 | 43.55 | 3402.18 |
| CGR | 3.4 | - | - | -10.23 | -0.09 | 2.52 | 0.65 |

Source: Directorate of Horticulture, H.P. Shimla.



Figure- 2.13: Compound growth rate in area under apricot fruit in Himachal Pradesh

During the years 2006-07 to 2015-16, the production of apricot fruit in Himachal Pradesh is presented in Table 2.14. The average production of this fruit at Himachal Pradesh level has been worked out 3359.98 M.T. The average production of this fruit has been worked highest in Solan and lowest in Bilaspur district of the state, Further the production of this fruit during the above mention period has been increased by registering a compound growth rate of 5.51 per cent annually.

Table- 2.14: Production of apricot fruit in Himachal Pradesh**(M.T.)**

| Years | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
|-----------|--------|--------|--------|---------|----------------|---------|
| 2006-07 | 269.00 | 21.00 | 353.00 | 166.00 | 13.00 | 1446.00 |
| 2007-08 | 295.00 | 52.00 | 497.00 | 183.00 | 8.00 | 1677.00 |
| 2008-09 | 295.00 | 24.00 | 380.00 | 156.05 | 4.00 | 1661.62 |
| 2009-10 | 124.00 | 22.00 | 360.00 | 220.00 | 13.00 | 1040.50 |
| 2010-11 | 363.00 | 140.00 | 361.00 | 124.00 | 2.00 | 1572.00 |
| 2011-12 | 203.00 | 46.00 | 301.00 | 90.41 | 6.00 | 1146.00 |
| 2012-13 | 197.00 | 38.00 | 300.00 | 110.90 | 50.00 | 1711.82 |
| 2013-14 | 358.11 | 152.00 | 295.00 | 126.00 | 22.00 | 1679.00 |
| 2014-15 | 207.00 | 774.00 | 192.00 | 200.00 | 27.00 | 2211.00 |
| 2015-16 | 248.00 | 612.00 | 304.00 | 381.00 | 28.00 | 2007.00 |
| Avg. Pro. | 255.91 | 188.10 | 334.30 | 175.74 | 17.30 | 1615.19 |
| CGR | -0.87 | 42.99 | -5.88 | 2.86 | 19.28 | 3.78 |

Continued.....

Table- 2.14: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|------|----------|--------|--------|---------|
| 2006-07 | 325.00 | 0.00 | 0.00 | 0.00 | 132.00 | 43.00 | 2768.00 |
| 2007-08 | 460.00 | 0.00 | 0.00 | 0.00 | 120.00 | 22.00 | 3314.00 |
| 2008-09 | 477.74 | 0.00 | 0.00 | 0.00 | 185.00 | 40.00 | 3223.41 |
| 2009-10 | 278.31 | 0.00 | 0.00 | 0.00 | 99.00 | 44.00 | 2200.81 |
| 2010-11 | 548.00 | 0.00 | 0.00 | 0.00 | 190.00 | 41.00 | 3341.00 |
| 2011-12 | 388.00 | 0.00 | 0.00 | 0.00 | 224.50 | 44.00 | 2448.91 |
| 2012-13 | 542.50 | 0.00 | 0.00 | 0.00 | 232.00 | 80.25 | 3262.47 |
| 2013-14 | 268.00 | 0.00 | 0.00 | 0.00 | 220.12 | 45.00 | 3165.23 |
| 2014-15 | 802.00 | 0.00 | 0.00 | 0.00 | 246.00 | 45.00 | 4704.00 |
| 2015-16 | 1216.00 | 0.00 | 0.00 | 0.00 | 301.00 | 75.00 | 5172.00 |
| Avg. Pro. | 530.56 | 0.00 | 0.00 | 0.00 | 194.96 | 47.93 | 3359.98 |
| CGR | 9.21 | - | - | - | 10.21 | 7.86 | 5.51 |

Source: Directorate of Horticulture, H.P. Shimla.

The highest growth rate in production of this fruit has been observed in Lahual & Spiti district i.e. 5.36 per cent, annually and which is followed by Sirmour, Kangra, Mandi, Solan, Shimla, and Kullu districts of the state. The four districts namely Chamba, Hamirpur and Kinnaur district of the state observed to be having a negative growth rate in production of this fruit during the reference study years.

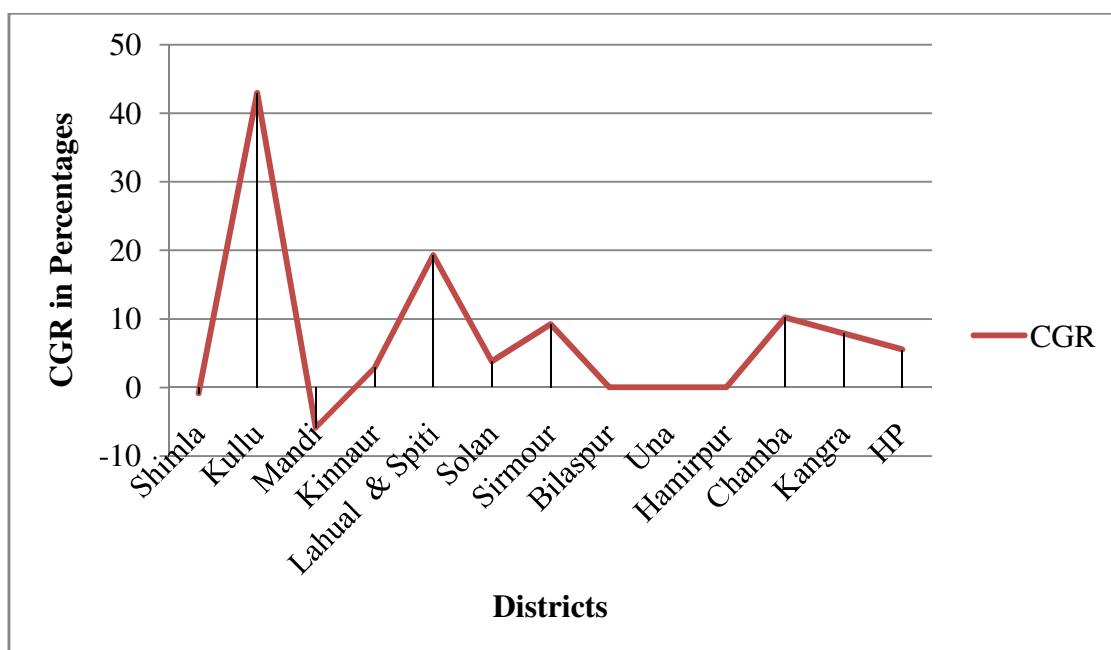


Figure- 2.14: Compound growth rate in production of apricot fruit in Himachal Pradesh

The per hectare productivity of apricot in Himachal Pradesh during the years 2006-07 to 2015-16 has been analyzed and presented in Table 2.15. The average productivity during above mention period is worked to be 0.99 M.T. District-wise analyses of data shows that, it was highest in Solan district and lowest in Shimla district of the state. Further during the above mention study period, the per hectare productivity of this fruit has been observed to increase at a compound growth rate of 4.80 per cent annually.

Table-2.15: Per hectare productivity of apricot fruit in Himachal Pradesh

| Years | (M.T.) | | | | | |
|-----------|--------|-------|-------|---------|----------------|-------|
| | Shimla | Kullu | Mandi | Kinnaur | Lahual & Spiti | Solan |
| 2006-07 | 0.40 | 0.09 | 1.59 | 0.67 | 0.79 | 1.59 |
| 2007-08 | 0.43 | 0.22 | 2.17 | 0.74 | 0.46 | 1.81 |
| 2008-09 | 0.43 | 0.10 | 1.58 | 0.49 | 0.22 | 1.73 |
| 2009-10 | 0.18 | 0.09 | 1.47 | 0.69 | 0.68 | 1.06 |
| 2010-11 | 0.51 | 0.58 | 1.46 | 0.39 | 0.10 | 1.55 |
| 2011-12 | 0.29 | 0.17 | 1.20 | 0.28 | 0.26 | 1.11 |
| 2012-13 | 0.28 | 0.14 | 1.19 | 0.35 | 2.04 | 1.64 |
| 2013-14 | 0.51 | 0.59 | 1.17 | 1.63 | 0.91 | 1.60 |
| 2014-15 | 0.30 | 3.15 | 0.72 | 2.58 | 1.08 | 2.10 |
| 2015-16 | 0.35 | 2.82 | 1.09 | 4.88 | 1.10 | 1.90 |
| Avg. Pro. | 0.37 | 0.77 | 1.35 | 0.76 | 0.81 | 1.61 |
| CGR | -1.27 | 42.64 | -7.83 | 20.13 | 13.09 | 1.98 |

Continued.....

Table-2.15: Continued.....

| Years | Sirmour | Bilaspur | Una | Hamirpur | Chamba | Kangra | HP |
|-----------|---------|----------|------|----------|--------|--------|------|
| 2006-07 | 0.69 | 0.00 | 0.00 | 0.00 | 0.34 | 1.19 | 0.87 |
| 2007-08 | 0.98 | 0.00 | 0.00 | 0.00 | 0.31 | 0.59 | 1.03 |
| 2008-09 | 0.93 | 0.00 | 0.00 | 0.00 | 0.50 | 0.97 | 0.95 |
| 2009-10 | 0.53 | 0.00 | 0.00 | 0.00 | 0.27 | 1.02 | 0.64 |
| 2010-11 | 1.03 | 0.00 | 0.00 | 0.00 | 0.52 | 0.88 | 0.96 |
| 2011-12 | 0.72 | 0.00 | 0.00 | 0.00 | 0.63 | 0.93 | 0.69 |
| 2012-13 | 0.98 | 0.00 | 0.00 | 0.00 | 0.63 | 1.64 | 0.91 |
| 2013-14 | 0.47 | 0.00 | 0.00 | 0.00 | 0.58 | 1.00 | 0.94 |
| 2014-15 | 1.32 | 0.00 | 0.00 | 0.00 | 0.65 | 0.98 | 1.38 |
| 2015-16 | 1.98 | 0.00 | 0.00 | 0.00 | 0.79 | 1.70 | 1.52 |
| Avg. Pro. | 0.98 | 0.00 | 0.00 | 0.00 | 0.52 | 1.10 | 0.99 |
| CGR | 6.02 | - | - | - | 10.35 | 5.22 | 4.80 |

Source: Directorate of Horticulture, H.P. Shimla.

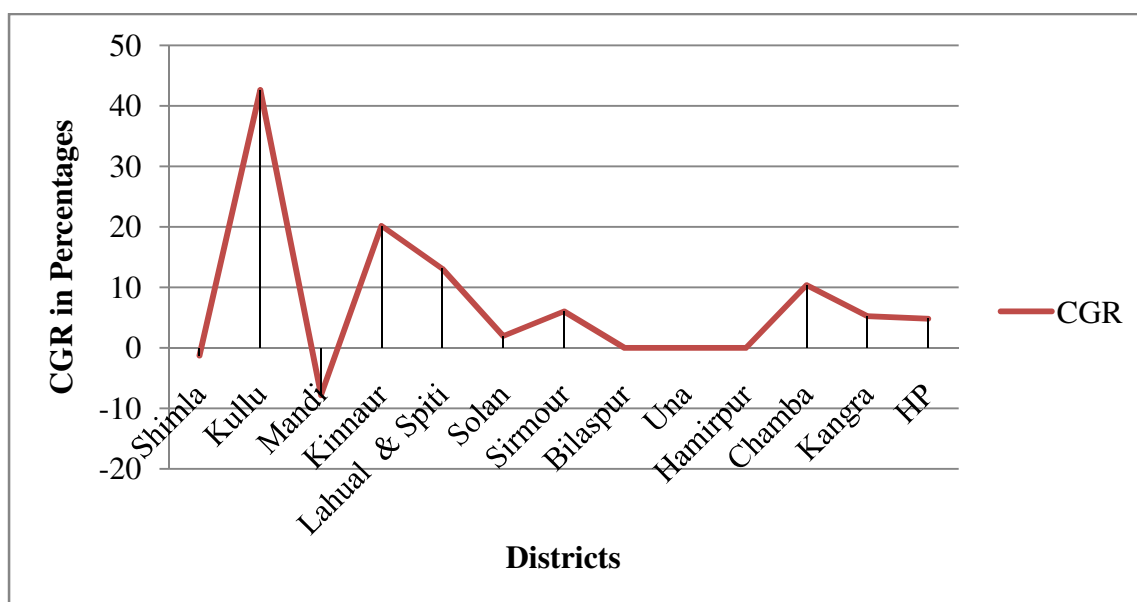


Figure-2.15: Compound growth rate in per hectare productivity of apricot fruit in Himachal Pradesh

District-wise analyses of the data it is found that the Kullu district has been registered a highest growth rate in productivity of apricot fruit, i.e. 42.64 per cent annually, during the reference study period and which is followed by Kinnaur (20.13 per cent), Lahual & Spiti (13.09 per cent), Chamba (10.35 per cent), Sirmour (6.02 per cent), Kangra (5.22 per cent), Solan (1.98 per cent), and Solan (1.98 per cent) districts of the state. The districts who have shown negative compound growth rate in productivity of apricot fruit during the years 2006-07 to 20105-16, are Shimla (-1.27 per cent) and Mandi (7.83 per cent).

Chapter-III

SOCIO-ECONOMIC PROFILE OF SAMPLED HOUSEHOLDS

The study of socio-economic status helps in identifying the adaptive capacity of the individuals or communities based on the characteristics like family size, education status, work-force, economic factors like occupation pattern, land use pattern, and investment behavior. In the present chapter an attempt has been made to highlights the above parameters in details.

3.1 Family size

The study of family size is important from labour availability point of view. The average family size is given in Table 3.1. As expounded in the table, the average family size among the pome fruit growers at overall level is 5.04 persons and which varies between 4.87 persons to 5.83 persons on different size of holdings i.e. marginal, small and medium.

Table 3.1 Sex-wise classification of population

| Sr. No. | Particulars | Pome Fruits Growers | | | Stone Fruits Growers | | |
|---------|-------------------|---------------------|---------------|---------------|----------------------|---------------|---------------|
| | | Male | Female | Total | Male | Female | Total |
| 1. | Marginal Holdings | 79 (2.47) | 77 (2.41) | 156 (4.87) | 80 (2.35) | 75 (2.21) | 155 (4.56) |
| 2. | Small Holdings | 34 (2.83) | 27 (2.25) | 61 (5.08) | 48 (4.36) | 36 (3.27) | 84 (7.63) |
| 3. | Medium Holdings | 20 (3.33) | 15 (2.50) | 35 (5.83) | 23 (4.60) | 22 (4.40) | 45 (9.00) |
| 4. | All | 133 (2.66) | 119 (2.38) | 252 (5.04) | 151 (3.02) | 133 (2.66) | 284 (5.68) |

Note: Figures in the parenthesis denote average family size.

Whereas among the stone fruit growers the average family size is 5.68 persons and it ranges between 4.56 persons to 9 persons on different size of holdings group. The results reveal that the average family size is comparatively high among the stone fruit growers than of pome fruit growers. It is also observed that average family size shows an increasing tendency with an increase in size class of holdings, both in pome and stone fruit grower households.

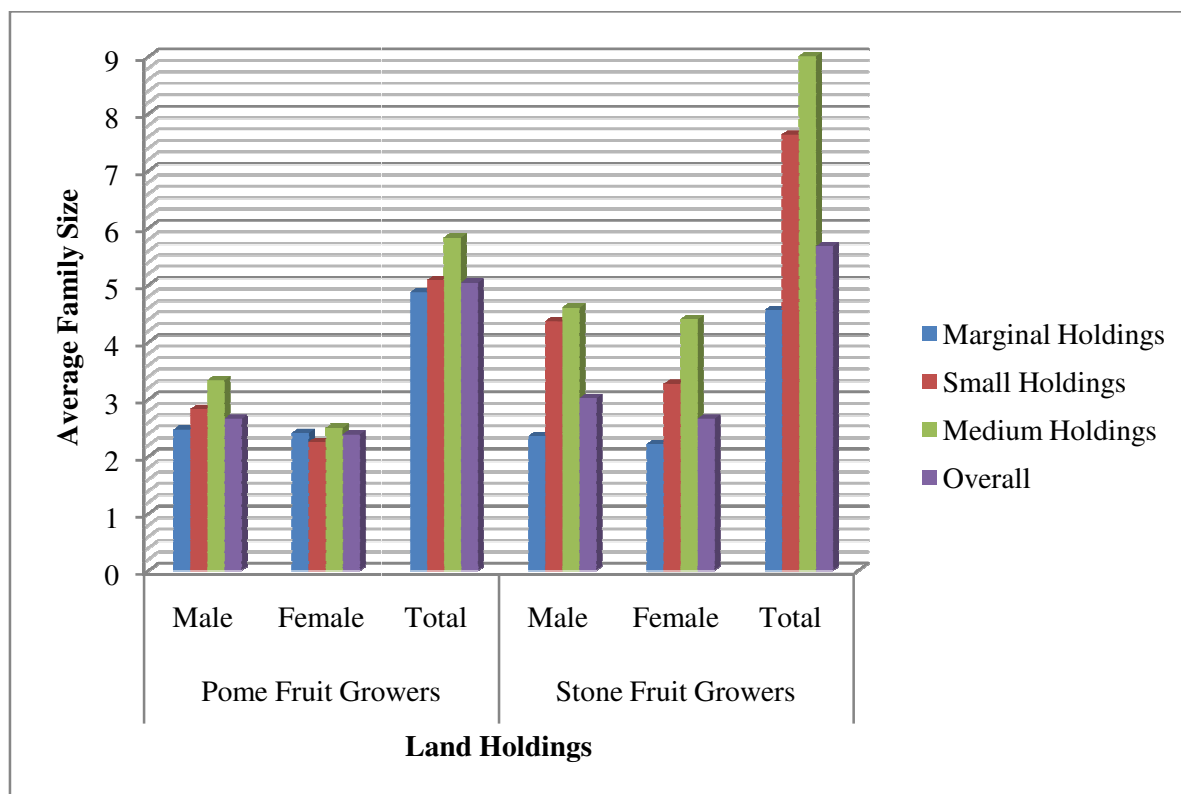


Figure-3.1: Average family size

3.2 Age-composition

Socio-economic transformation and adoption of innovations are greatly influenced by the age factors, particularly which of the decision maker, keeping in view this, the distribution of population among the sampled households has been analyzed and presented in Table 3.2. The perusal of the table shows that, at overall level, the maximum population among the pome fruit growers falls under the age group of 18-60 years and same is followed by the age group of 5-15 years, greater than 60, 15-18 years and age group of less than 5 years, respectively. Whereas among the stone fruit growers 63.03 per cent population falls under the age group of 18-60 years, 20.77 per cent under the 5-15 years, 7.39 per cent under the age group of greater than sixty, 5.99 per cent under the age group of 0-5 years, and rest of population falls under the age group of 15-18 years i.e. 2.82 per cent.

Table-3.2: Age-wise classification of population

| Sr. No. | Particulars | Age-Group | | | | | Total |
|-----------|-----------------------------|--------------|---------------|--------------|----------------|--------------|--------------|
| | | 0-5 | 5-15 | 15-18 | 18-60 | 60 & above | |
| 1. | Pome Fruits Growers | | | | | | |
| | Marginal Holdings | 3 (1.92) | 38 (24.36) | 8 (5.13) | 95 (60.90) | 12 (7.69) | 156 (100) |
| | Small Holdings | 3 (8.20) | 10 (16.39) | 3 (4.92) | 39 (63.95) | 4 (6.56) | 61 (100) |
| | Medium Holdings | 2 (5.71) | 3 (8.57) | 2 (5.71) | 23 (65.71) | 5 (14.29) | 35 (100) |
| | Overall | 10 (3.97) | 51 (20.24) | 13 (5.16) | 157 (62.30) | 21 (8.33) | 252 (100) |
| 2. | Stone Fruits Growers | | | | | | |
| | Marginal Holdings | 11 (7.10) | 32 (20.65) | 3 (1.94) | 96 (61.94) | 13 (8.39) | 155 (100) |
| | Small Holdings | 4 (4.76) | 20 (23.81) | 2 (2.38) | 53 (63.10) | 5 (5.95) | 84 (100) |
| | Medium Holdings | 2 (4.44) | 7 (15.56) | 3 (6.67) | 30 (66.67) | 3 (6.67) | 45 (100) |
| | All | 17 (5.99) | 59 (20.77) | 8 (2.82) | 179 (63.03) | 21 (7.39) | 284 (100) |

Note: Figures in the parenthesis denote percentages to the row total.

3.3 Labour force

The labour force and dependency ratio among the sampled households is analyzed and presented in Table 3.3. The data in the table shows that, among the pome fruit growers, the labour force on marginal, small and medium size holdings has been worked out 66.02, 68.85, and 71.43 per cent respectively. By adjoining all the holdings together this percentage come out 67.46 per cent. Whereas, among the stone fruit growers the labour force has been worked out 63.87, 65.47 and 73.33 per cent on marginal, small and medium size of holdings, and by adjoining all the holdings together it came out 65.85 per cent. The results depicts that the labour force among the sample households shows an increasing tendency with an increase in the size class of holdings.

Table-3.3: Labour force among the sampled households

| Sr. No. | Particulars | Pome Fruits Growers | | | | Stone Fruits Growers | | | |
|---------|-------------|---------------------|---------------|---------------|----------------|----------------------|---------------|---------------|----------------|
| | | Marginal | Small | Medium | All | Marginal | Small | Medium | All |
| 1. | Workforce | 103 (66.02) | 42 (68.85) | 25 (71.43) | 170 (67.46) | 99 (63.87) | 55 (65.47) | 33 (73.33) | 187 (65.85) |
| 2. | Dependents | 53 (33.97) | 19 (31.15) | 10 (28.57) | 82 (32.54) | 56 (36.13) | 29 (34.52) | 12 (26.67) | 97 (34.15) |
| 3. | Total | 156 (100) | 61 (100) | 35 (100) | 252 (100) | 155 (100) | 84 (100) | 45 (100) | 284 (100) |

Note: Figures in the parenthesis denote percentages to the column total.

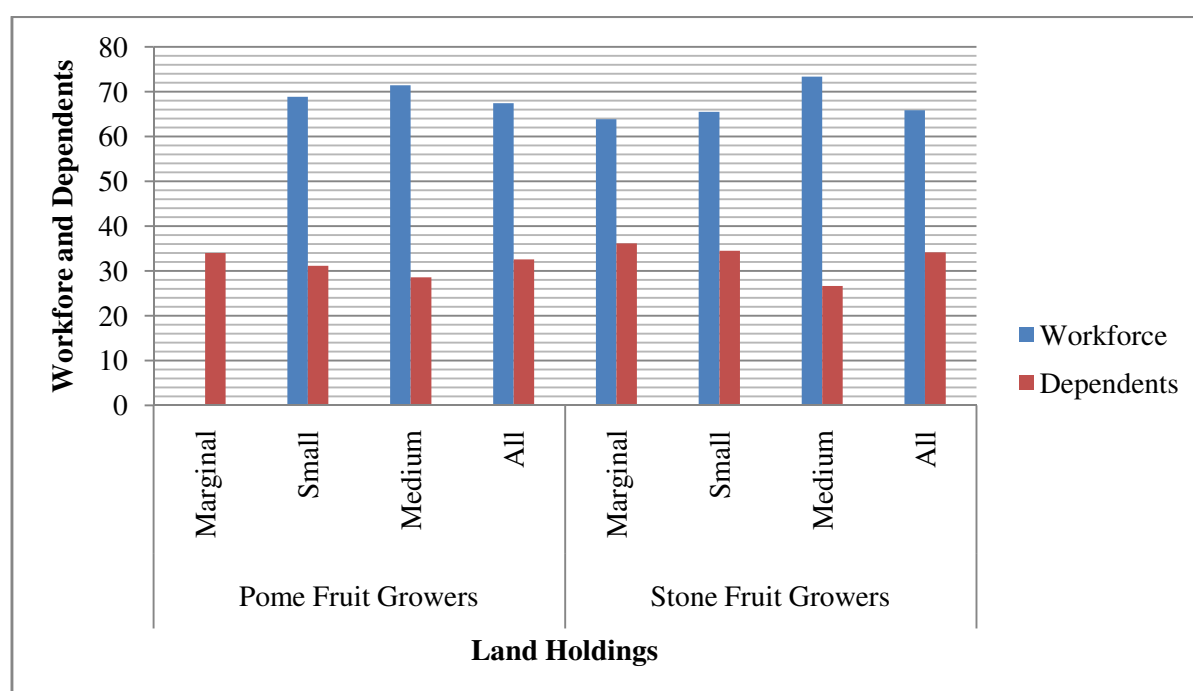


Figure-3.2: Workforce and dependents

Further, it is observed from the table that among the pome fruit growers the dependency ratio is highest on marginal holdings i.e. 33.97 per cent and same is followed by small and medium size of holdings group. At over all this percentage came out 32.54 per cent. Whereas among the stone fruit growers at overall level the dependency ratio has been worked out 34.15 per cent and which varies between 36.13 per cent to 26.67 per cent on marginal to medium size of holdings groups. It is also noticed from the data that the dependency ration among the pome and stone fruit growers shows a decreasing tendency with an increase in the size class of holdings.

3.4 Education status

The education is an important asset in the development process. This is true in horticulture farming as well. The educated persons are better placed to perceive and adopt new technology than illiterate. Therefore, the study of educational status of the family gains importance. Keeping in view this importance, the educational status of sampled households has been analyzed and presented Table 3.4. Among the pome fruit growers most prevalent standard of education is observed to be primary standard and same is followed by higher secondary, graduation, matric, middle and post graduation. Whereas, among the stone fruit growers the matric is observed most prevalent standard of education and same is followed by primary, higher, secondary, middle, graduation and post graduation.

Table-3.4: Education status among the sampled households

| Sr. No. | Particulars | Kids | Illiterate | 5 th | 8 th | 10 th | 10+2 | Graduate | PG | Total | Literacy Rate* |
|-----------|----------------------------|--------------|---------------|-----------------|-----------------|------------------|---------------|---------------|-------------|--------------|----------------|
| 1. | Pome Fruit Growers | | | | | | | | | | |
| | Marginal | 3 (1.92) | 19 (12.18) | 38 (24.35) | 25 (16.02) | 23 (14.74) | 28 (17.95) | 15 (9.61) | 5 (3.20) | 156 (100) | 87.58 |
| | Small | 8 (8.20) | 6 (9.84) | 12 (19.67) | 6 (9.84) | 8 (13.11) | 12 (19.67) | 12 (19.67) | 2 (3.28) | 61 (100) | 89.28 |
| | Medium | 2 (5.71) | 3 (18.57) | 4 (11.43) | 3 (8.57) | 4 (11.43) | 4 (11.43) | 14 (40.00) | 2 (5.71) | 35 (100) | 90.91 |
| | All | 10 (3.97) | 28 (11.11) | 54 (21.43) | 34 (13.49) | 35 (13.89) | 44 (17.46) | 41 (16.67) | 9 (3.57) | 252 (100) | 88.43 |
| 2. | Stone Fruit Growers | | | | | | | | | | |
| | Marginal | 11 (7.10) | 19 (12.26) | 17 (10.97) | 24 (15.48) | 31 (20.00) | 28 (18.06) | 21 (13.55) | 4 (2.58) | 155 (100) | 86.81 |
| | Small | 4 (4.76) | 7 (8.33) | 25 (29.76) | 10 (11.90) | 18 (21.43) | 11 (13.09) | 6 (7.14) | 3 (3.57) | 84 (100) | 91.25 |
| | Medium | 2 (4.44) | 2 (4.44) | 9 (20.00) | 5 (11.11) | 10 (22.22) | 11 (24.44) | 4 (8.88) | 2 (4.44) | 45 (100) | 95.35 |
| | All | 17 (5.98) | 28 (9.86) | 51 (17.96) | 39 (13.73) | 59 (20.77) | 50 (17.61) | 31 (10.91) | 9 (3.17) | 284 (100) | 89.51 |

Note: Figure in the parenthesis is the percentages to the row total.

*Literacy Rate worked out by excluding kids from total population

3.5 Literacy rate

Literacy rate among the pome fruit growers at over all level has been worked out 88.43 per cent and which ranges between 87.58 to 90.91 per cent on marginal to medium size of holdings group. Whereas, among stone fruit growers, literacy rate at over all level, has been observed to be 89.51 per cent and on marginal to medium size of holdings it ranges between 86.81 to 95.35 per cent, respectively. From the data in the table it is observed that literacy rate shows an increasing tendency with an increase in the size class of land holdings, both in case of pome and stone fruit.

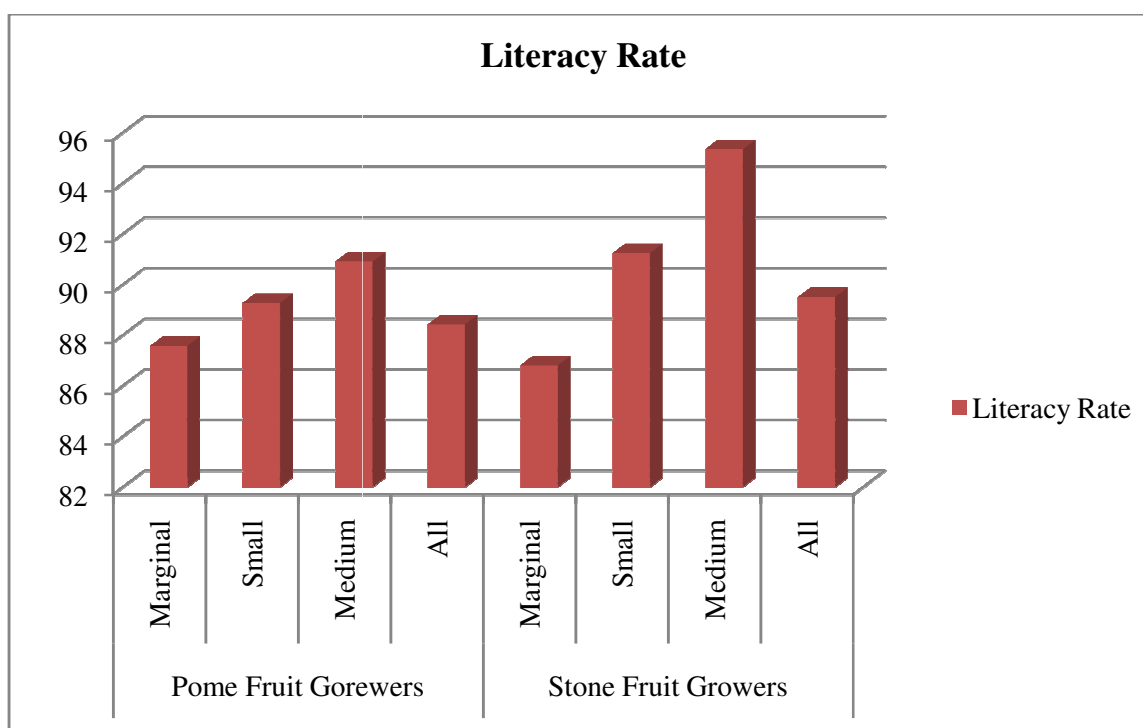


Figure-3.3: Literacy rate among the sampled households

3.6 Occupation pattern

The data in the Table revealed that among the pome fruit growers at overall level agriculture cum horticulture is the main occupation and same is followed by service, business and other occupation, respectively. Whereas, among the stone fruit growers same trend as pome fruit growers, have been observed. At overall level, agriculture cum horticulture is observed main occupation among stone fruit growers and same is followed by service, business and other occupations.

Table-3.5: Occupation distribution among the sampled households

| Sr. No. | Occupation | Pome Fruit Growers | | | | Stone Fruit Growers | | | |
|---------|------------------------------|--------------------|---------------|---------------|----------------|---------------------|---------------|---------------|----------------|
| | | Marginal | Small | Medium | All | Marginal | Small | Medium | All |
| 1. | Agriculture Cum Horticulture | 72 (69.90) | 31 (73.80) | 20 (80.00) | 121 (71.18) | 64 (64.64) | 38 (69.09) | 25 (75.75) | 127 (67.91) |
| 2. | Service | 15 (14.56) | 5 (11.90) | 2 (8.00) | 22 (12.94) | 21 (21.21) | 10 (18.18) | 5 (15.15) | 36 (19.25) |
| 3. | Business | 10 (9.71) | 4 (9.52) | 2 (8.00) | 16 (9.41) | 9 (9.09) | 5 (9.09) | 2 (6.06) | 16 (8.55) |
| 4. | Others | 6 (5.82) | 2 (4.76) | 1 (4.00) | 9 (5.29) | 5 (5.05) | 2 (3.64) | 1 (3.03) | 8 (4.28) |
| 5. | Labour Force | 103 (100) | 42 (100) | 25 (100) | 170 (100) | 99 (100) | 55 (100) | 33 (100) | 187 (100) |

Note: Figure in the parenthesis is the percentages to the column total.

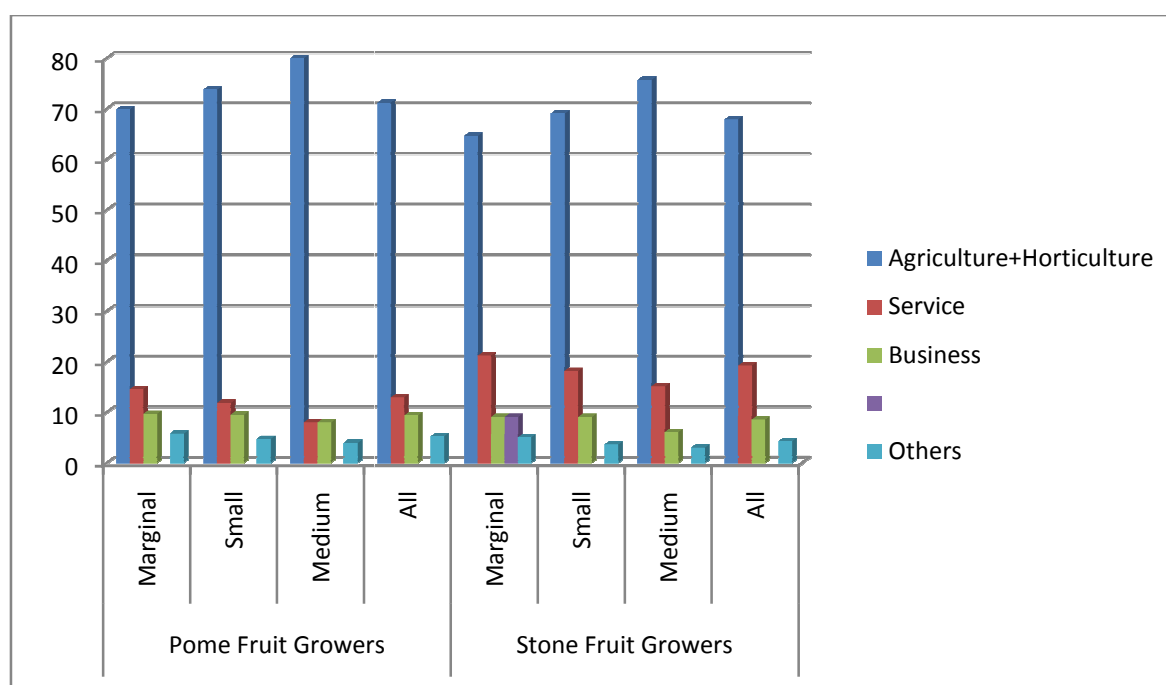


Figure-3.4: Occupation pattern among the sampled households

3.7 Land use pattern

The land use pattern among the sampled households is presented in Table 3.6. Among the pome fruit growers, at overall level, average cultivated land has been worked out 1.28 hectares and which varies between 0.58 to 5.21 hectares on marginal to medium size of holdings group. Further, at overall level, uncultivated land has been worked out only 0.16 hectare and which ranges between 0.04 to 0.83 hectares on different size of holdings group viz; marginal, small and medium.

Table 3.6: Land use pattern among the sampled households

(Area in Hectares)

| Sr. No. | Particulars | Pome Fruits Growers | | | | Stone Fruits Growers | | | |
|---------|------------------------------------|---------------------|-------|--------|------|----------------------|-------|--------|------|
| | | Marginal | Small | Medium | All | Marginal | Small | Medium | All |
| 1. | Cultivated Land | | | | | | | | |
| a. | Field Crops | 0.04 | 0.09 | 0.21 | 0.07 | 0.15 | 0.39 | 0.56 | 0.24 |
| b. | Fruit Crops | 0.54 | 1.29 | 5.21 | 1.21 | 0.34 | 0.78 | 2.37 | 0.64 |
| c. | Sub-total | 0.58 | 1.38 | 5.21 | 1.28 | 0.49 | 1.17 | 2.93 | 0.88 |
| 2. | Uncultivated Land | | | | | | | | |
| a. | Barren Land | 0.02 | 0.03 | 0.45 | 0.07 | 0.01 | 0.04 | 0.29 | 0.04 |
| b. | Permanent Pasture and Grazing Land | 0.01 | 0.03 | 0.05 | 0.02 | 0.01 | 0.02 | 0.40 | 0.05 |
| d. | Grass Land | 0.01 | 0.07 | 0.33 | 0.07 | 0.01 | 0.05 | 0.32 | 0.05 |
| e. | Sub-total | 0.04 | 0.13 | 0.83 | 0.16 | 0.03 | 0.11 | 1.01 | 0.14 |
| 3. | Grand total | 0.62 | 1.51 | 6.04 | 1.44 | 0.52 | 1.28 | 3.94 | 1.02 |

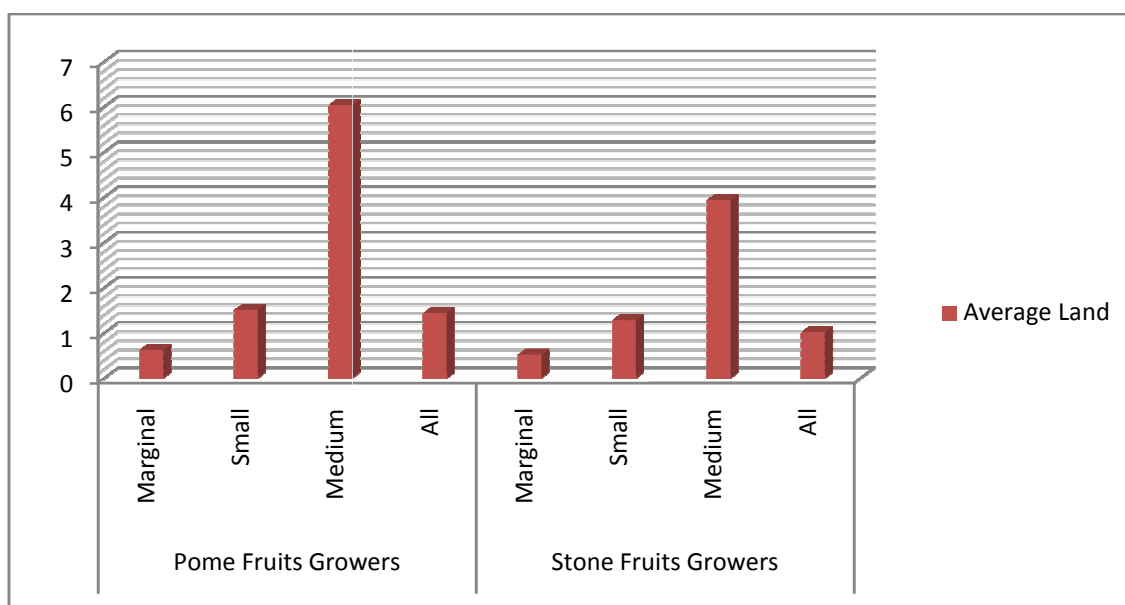


Figure-3.5: Average size of holdings

Among the stone fruit growers average cultivated land at overall level has been worked out 0.88 hectare and which varies 0.49 hectare to 2.93 hectares, between marginal to medium size of holdings group. Further, uncultivated land is worked to be 0.14 hectare and which varies 0.03 hectare to 1.01 hectares between marginal to medium size of holdings group.

Average size of holdings at overall level among the pome fruit growers has been estimated to be 1.44 hectares, which ranges between 0.62 to 6.04 hectares on marginal to medium size of holdings group. Whereas among the stone fruit growers this value came out 1.02 hectares at overall level, and same ranges between 0.52 hectare to 3.94 hectares on marginal to medium size of holdings group. It is also observed that operated area and average size of holdings is comparatively high among the pome fruit growers than of stone fruit growers.

3.8 Farm implements

Different type of implements owned by sampled households is presented in Table 3.7.

Table-3.7: Implements among the sampled households

(Value in Rs.)

| Sr. No. | Particulars | Pome Fruits Growers | | | |
|-----------|--------------------|---------------------|----------|----------|----------|
| | | Marginal | Small | Medium | All |
| 1. | Majors | | | | |
| | Sprayers | 2031.25 | 23916.67 | 25500.00 | 10100.00 |
| | Plough | 0.00 | 0.00 | 0.00 | 0.00 |
| | Yoke | 0.00 | 0.00 | 0.00 | 0.00 |
| | Planker | 0.00 | 0.00 | 0.00 | 0.00 |
| 2. | Minor | | | | |
| | Kudali | 231.56 | 381.67 | 508.33 | 300.80 |
| | Kassi | 177.50 | 250.00 | 395.00 | 221.00 |
| | Spade | 317.13 | 357.50 | 708.33 | 373.76 |
| | Khilna | 226.25 | 372.50 | 661.67 | 313.60 |
| | Sholvel | 117.19 | 133.33 | 88.33 | 117.60 |
| | Axe | 435.00 | 425.00 | 736.67 | 468.80 |
| | Darrat | 270.31 | 210.83 | 400.00 | 271.60 |
| | Sickle | 471.88 | 508.33 | 708.33 | 509.00 |
| | Jhabal | 414.06 | 478.33 | 1333.33 | 539.80 |
| | Gainti | 349.38 | 368.33 | 550.00 | 378.00 |
| | Saw | 243.13 | 412.08 | 725.00 | 341.50 |
| | Pruning Scissors | 1059.38 | 1400.00 | 1450.00 | 1188.00 |
| | Grafting Knives | 450.00 | 575.00 | 725.00 | 513.00 |
| | Kilta | 1165.63 | 1550.00 | 3650.00 | 1556.00 |
| 3. | Others* | | | | |
| | Baskets | 1253.13 | 1100.00 | 3166.67 | 1446.00 |
| | Drums | 3371.88 | 3958.33 | 4366.67 | 3632.00 |
| | Buckets | 1276.56 | 1135.00 | 2165.00 | 1349.20 |
| | Ladders | 1087.50 | 1450.00 | 2383.33 | 1330.00 |
| 4. | Grand Total | 14948.69 | 23916.67 | 50221.67 | 24949.66 |

Continued.....

Table-3.7: Continued.....

| Sr. No. | Particulars | Stone Fruits Growers | | | |
|-----------|--------------------|----------------------|----------|----------|----------|
| | | Marginal | Small | Medium | All |
| 1. | Majors | | | | |
| | Sprayers | 7588.24 | 14545.45 | 20000.00 | 10360.00 |
| | Plough | 461.76 | 1090.91 | 1900.00 | 744.00 |
| | Yoke | 244.12 | 581.82 | 1120.00 | 406.00 |
| | Planker | 185.29 | 450.00 | 800.00 | 305.00 |
| 2. | Minor | | | | |
| | Kudali | 173.53 | 509.09 | 730.00 | 303.00 |
| | Kassi | 85.29 | 197.27 | 360.00 | 137.40 |
| | Spade | 227.94 | 294.55 | 408.00 | 260.60 |
| | Khilna | 151.47 | 257.27 | 284.00 | 188.00 |
| | Sholvel | 39.71 | 90.00 | 1740.00 | 220.80 |
| | Axe | 308.82 | 500.00 | 396.00 | 359.60 |
| | Darrat | 130.88 | 358.18 | 334.00 | 201.20 |
| | Sickle | 211.76 | 606.36 | 730.00 | 350.40 |
| | Jhabal | 300.00 | 390.91 | 280.00 | 318.00 |
| | Gainti | 160.29 | 293.64 | 198.00 | 193.40 |
| | Saw | 170.59 | 265.45 | 172.00 | 191.60 |
| | Pruning Scissors | 165.59 | 809.09 | 1200.00 | 410.60 |
| | Grafting Knives | 208.82 | 400.00 | 700.00 | 300.00 |
| | Kilta | 405.88 | 2500.00 | 2800.00 | 1106.00 |
| 3. | Others* | | | | |
| | Baskets | 435.29 | 1500.00 | 920.00 | 718.00 |
| | Drums | 1000.00 | 2336.36 | 2560.00 | 1450.00 |
| | Buckets | 800.00 | 1277.27 | 570.00 | 882.00 |
| | Ladders | 350.00 | 954.55 | 1440.00 | 592.00 |
| 4. | Grand Total | 13805.29 | 30208.18 | 39642.00 | 19997.60 |

Among the pome fruit growers the average value of implements has been worked out to be Rs. 14948.69, Rs. 23916.67, and Rs. 50221.67 on marginal, small and medium size of holdings. Among at the overall level the average value of implements came out Rs. 24949.66. Whereas among the stone fruits growers the average value of implements at overall level has been worked out to be Rs. 19997.60 and which varies between Rs. 13805.29 to Rs. 39642.00 on marginal to medium size of holdings. It is observed that the pome fruits growers have more implements as compared to stone fruits growers.

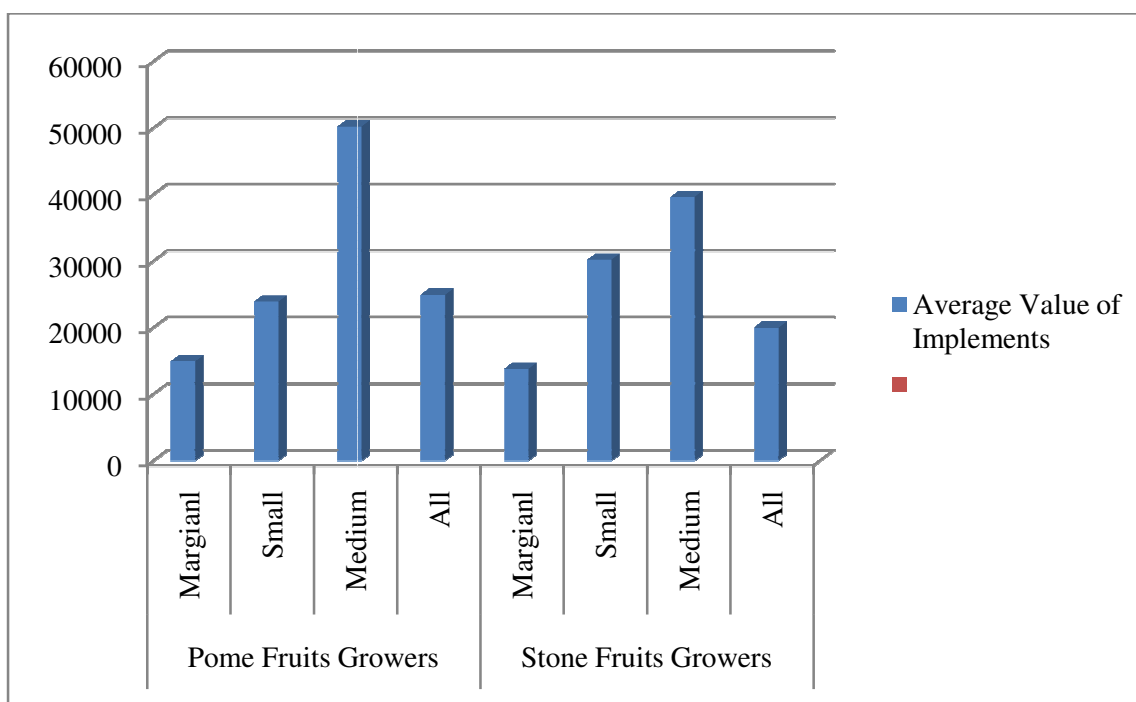


Figure-3.6: Average value of implements

3.9 Livestock resource

Average value of livestock among the pome fruits growers is worked out to be Rs. 20218.75, Rs. 84166.67 and Rs. 124166.67 on marginal, small and medium size of holdings, respectively. At overall level this value came out Rs. 36040. Whereas among the stone fruits growers at overall level average value of livestock is worked out to be Rs. 58790, and this value varies from Rs. 42558.82 to Rs. 124400 between marginal to medium size of holdings group. It is observed that the average value of livestock among the stone fruits growers is worked to be higher than of pome fruit growers (Table 3.8).

Table-3.8 Average value of livestock

| Sr. No | Particulars | Pome Fruits Growers | | | | Stone Fruits Growers | | | |
|--------|-------------|---------------------|----------|-----------|----------|----------------------|----------|-----------|----------|
| | | Marginal | Small | Medium | All | Marginal | Small | Medium | All |
| 1. | Cow | 11937.50 | 17583.33 | 68666.67 | 20100.00 | 15823.53 | 26363.64 | 40200.00 | 20580.00 |
| 2. | Young stock | 1718.75 | 3666.67 | 8666.67 | 3020.00 | 1235.29 | 7136.36 | 5000.00 | 2910.00 |
| 3. | Buffalo | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 3. | Bullock | 0.00 | 0.00 | 0.00 | 0.00 | 9264.71 | 16909.09 | 18200.00 | 11840.00 |
| 4. | Sheep | 2500.00 | 5416.67 | 15833.33 | 4800.00 | 2558.82 | 7181.82 | 15200.00 | 4840.00 |
| 5. | Goat | 4062.50 | 7500.00 | 31000.00 | 8120.00 | 13676.47 | 22363.64 | 45800.00 | 18800.00 |
| 6. | Total | 20218.75 | 34166.67 | 124166.67 | 36040.00 | 42558.82 | 79954.55 | 124400.00 | 58970.00 |

(Value in Rs.)

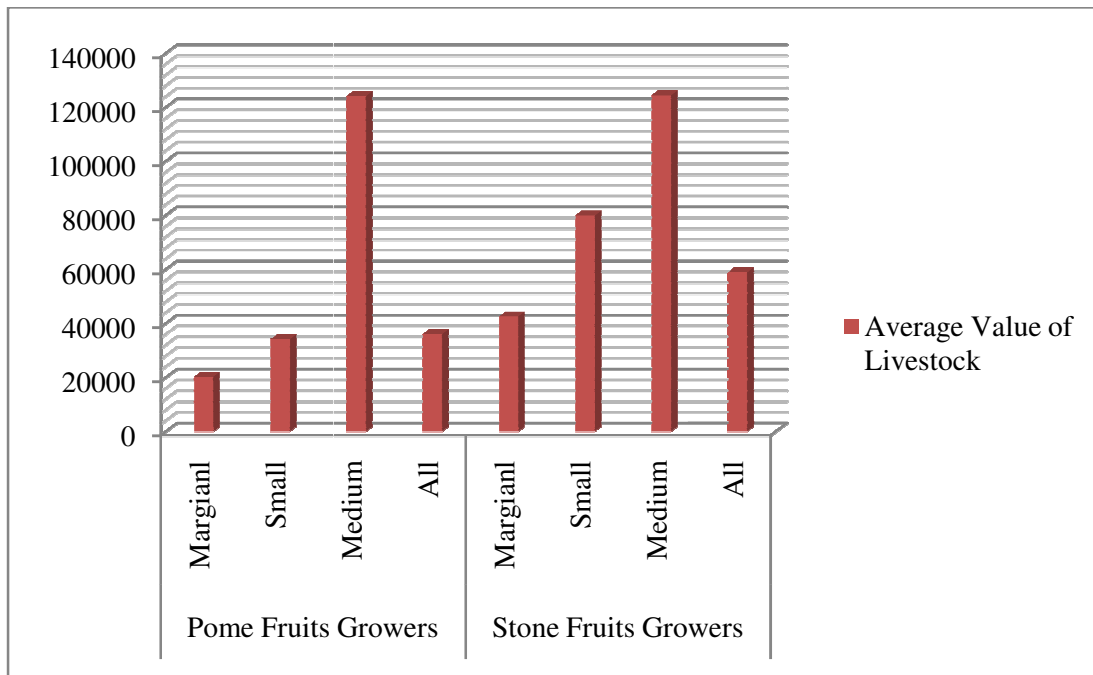


Figure-3.7: Average value of livestock

Chapter-IV

PRODUCTIVITY OF POME AND STONE FRUITS AMONG THE SAMPLED HOUSEHOLDS

In this chapter an attempt has been made to analyze the area, production and productivity of pome and stone fruits on the basis of variety and age. Under pome fruits two fruits namely apple and pear and under stone fruits three fruits namely plum, peach and apricot have been studied.

4.1 Variety-wise area under pome and stone fruits

This section deals with variety-wise area under pome and stone fruits.

4.1.1 Variety-wise area under pome fruits

Variety-wise area under pome fruits among the sampled households is presented in Table 4.1. Among the apple fruit, at overall level the area under royal variety is observed to be highest i.e. 0.68 hectare, which is followed by red golden, Richard, golden and red varieties of apple fruit. The same trend in area under these varieties of this fruit has also been observed on small and medium size of holdings group. Whereas, among the pear fruit the highest area under Tumba variety i.e. 0.06 hectare which is followed by babukosha, half red, burgmat and lambi dandi varieties of pear fruit. Same type of trends in area under varieties of this fruit has also been observed on small and medium size of holdings group (Table and Figure 4.1).

Table-4.1: Average area under pome fruits

(Area in Hectare per household)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|---------|-------------|----------|-------|--------|------|
| 1. | Apple | | | | |
| a. | Royal | 0.32 | 0.75 | 2.43 | 0.68 |
| b. | Golden | 0.04 | 0.10 | 0.19 | 0.07 |
| c. | Red-Golden | 0.07 | 0.17 | 0.81 | 0.18 |
| d. | Richard | 0.04 | 0.04 | 0.55 | 0.09 |
| e. | Red | 0.04 | 0.03 | 0.53 | 0.08 |
| 2. | Pear | | | | |
| a. | Babukosha | 0.01 | 0.06 | 0.23 | 0.05 |
| b. | Tumba | 0.02 | 0.05 | 0.27 | 0.06 |
| c. | Half Red | 0.01 | 0.03 | 0.16 | 0.03 |
| d. | Lambi Dandi | 0.02 | 0.03 | 0.01 | 0.01 |
| e. | Burgmat | 0.01 | 0.03 | 0.03 | 0.02 |
| 3. | Total | 0.58 | 1.29 | 5.21 | 1.28 |

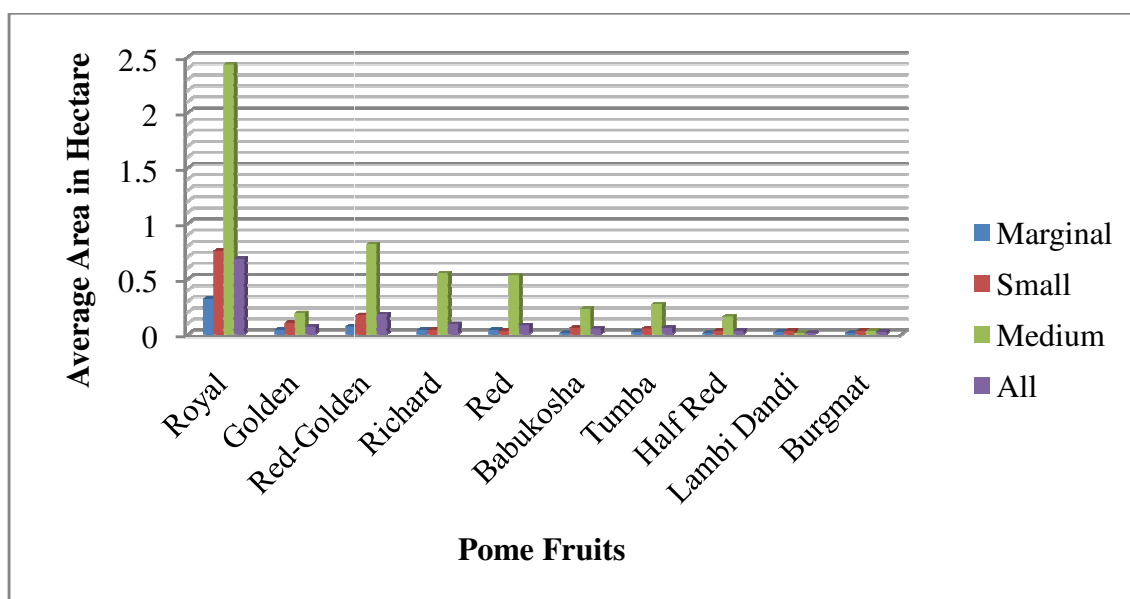


Figure-4.1: Variety-wise area under pome fruits

4.1.2 Variety-wise area under stone fruits

The variety wise area under stone fruit has been presented in Table 4.2. The data in the table revealed that at overall level, meripoza variety of plum has highest area i.e. 0.12 hectare and which is followed by beauty and santroza variety, respectively. Same type of trends under these varieties has also been observed on small and medium size of holdings.

Table-4.2: Average area under stone fruits

(Area in hectare per household)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|----------------|----------|-------|--------|------|
| 1. | Plum | | | | |
| a. | Santroza | 0.03 | 0.07 | 0.14 | 0.05 |
| b. | Meripoza | 0.09 | 0.13 | 0.32 | 0.12 |
| c. | Beauty | 0.05 | 0.10 | 0.30 | 0.09 |
| 2. | Peach | | | | |
| a. | July Elberta | 0.10 | 0.30 | 0.60 | 0.19 |
| b. | Alton | 0.03 | 0.13 | 0.45 | 0.09 |
| 3. | Apricot | | | | |
| a. | Shakarpara | 0.03 | 0.04 | 0.40 | 0.07 |
| b. | Safeda | 0.01 | 0.01 | 0.16 | 0.03 |
| 4. | Total | 0.34 | 0.78 | 2.37 | 0.64 |

The area under July elberta variety of peach is worked 0.10, 0.30 and 0.60 hectare on marginal, small and medium size of holdings, respectively. Among the all the holdings together this value came out 0.19 hectare. Whereas among the alton variety of plum, on an average, at overall level, the average area worked out to be 0.09 hectare and which ranges between 0.03 to 0.45 hectare on marginal to medium size of holdings. It is also observed from the data that the July elberta variety of plum has highest area than of alton variety. Same type of trends also observed on different size of holdings group.

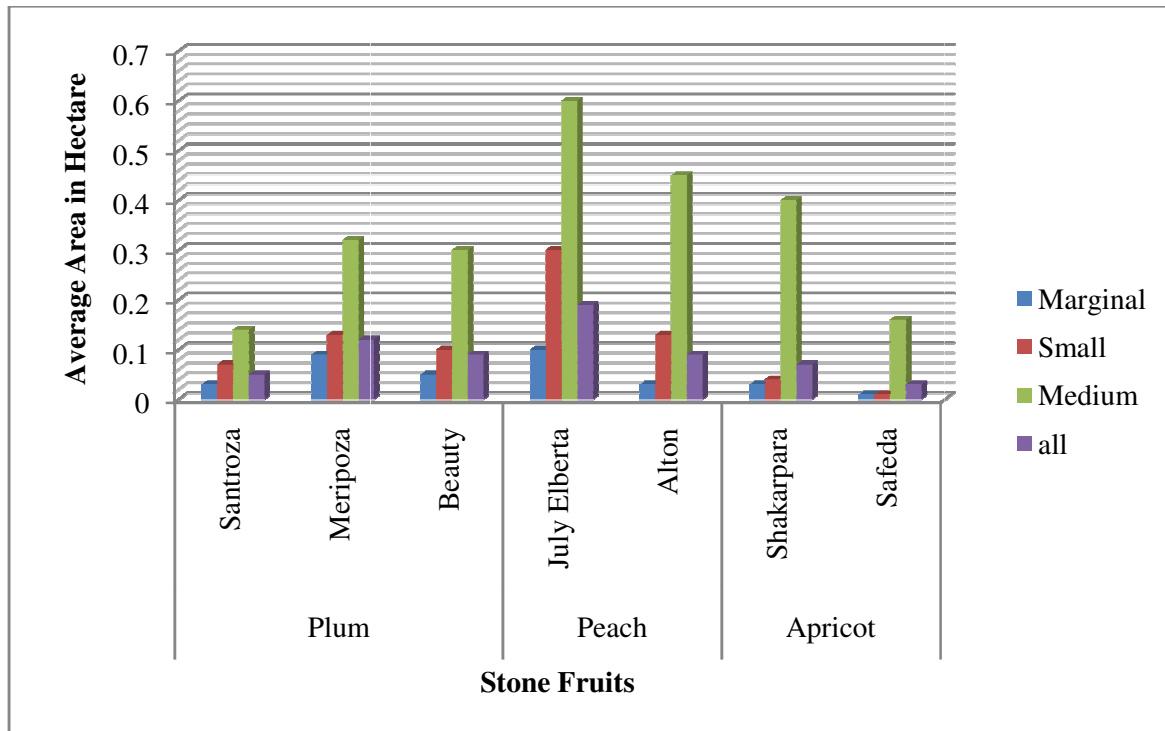


Figure-4.2: Variety-wise area under stone fruits

Among the apricot fruit, shakarpara variety has highest area i.e. 0.07 hectare and which varies from 0.03 hectare to 0.40 hectare on marginal to medium size of holdings group. The average area under safeda variety of this fruit has been worked out 0.01, 0.01 and 0.16 hectare on marginal, small, and medium size of holdings group. By adjoining all the holdings together this value came out 0.03 hectare.

4.2 Variety-wise classification of plants of pome and stone fruits

In this section variety wise classification of pome and stone fruits plants among the sampled households has been analyzed.

4.2.1 Variety-wise classification of plants of pome fruits

Variety-wise number of plants (non-bearing and bearing) of apple fruit is presented in Table 4.3. The data in the table depicts that at overall level, per household average number of plants has been worked out 426 no's, out of which 52.11, 9.86, 17.84 9.86 and 10.53 per cent were of royal, golden, red golden, Richard, and red variety of apple. On marginal to medium size of holdings group it ranges between 172 plants to 1819 plants. Further, it observed that plants under royal variety shows an increasing tendency with an increase in the size class of holdings.

Table-4.3: Variety-wise classification of apple plants

| | | (No/HH) | | | | | | |
|---------|-------------|---------|----------------|----------------|----------------|----------------|----------------|---------------|
| Sr. No. | Particulars | Royal | Golden | Red Golden | Richard | Red | Total | |
| 1. | Marginal | N | 13 (52.00) | 5 (20.00) | 4 (16.00) | 1 (4.00) | 2 (8.00) | 25 (100) |
| | | B | 100 (68.03) | 10 (6.80) | 22 (14.97) | 10 (6.80) | 5 (3.40) | 147 (100) |
| | | T | 113 (65.70) | 15 (8.72) | 26 (15.12) | 11 (6.40) | 7 (4.07) | 172 (100) |
| 2. | Small | N | 5 (33.33) | 4 (26.67) | 2 (13.33) | 3 (20.00) | 1 (6.67) | 15 (100) |
| | | B | 253 (64.50) | 37 (9.61) | 51 (13.25) | 27 (7.01) | 17 (4.42) | 385 (100) |
| | | T | 258 (64.50) | 41 (10.25) | 53 (13.25) | 30 (7.50) | 18 (4.50) | 400 (100) |
| 3. | Medium | N | 183 (69.58) | 20 (7.60) | 15 (5.70) | 25 (9.51) | 20 (7.60) | 263 (100) |
| | | B | 551 (35.41) | 162 (10.41) | 375 (24.10) | 200 (12.58) | 268 (17.22) | 1556 (100) |
| | | T | 734 (40.35) | 182 (10.01) | 390 (21.44) | 225 (12.37) | 288 (15.83) | 1819 (100) |
| 4. | All | N | 31 (60.78) | 7 (13.73) | 5 (9.80) | 4 (7.84) | 4 (7.84) | 51 (100) |
| | | B | 191 (50.93) | 35 (9.33) | 71 (18.93) | 38 (10.13) | 40 (10.67) | 375 (100) |
| | | T | 222 (52.11) | 42 (9.86) | 76 (17.84) | 42 (9.86) | 44 (10.33) | 426 (100) |

Further in the study areas farmers were growing only five varieties of pear viz; babukosha, tumba, half red, lambi dandi and burgmat. The average plants of pear fruit, among the growers are presented in Table 4.4. Table shows that overall level on an average there are 97 plants of this fruit on per farm and which ranges between 34 plants to 284 plants on marginal to medium size of holdings group. On marginal holdings farmers are giving

more preference to tumba, and half red variety than of babukosha, lambi dandi and burgmat. On Small holdings the farmers are giving preference to babukosha variety than of tumba, burgmat, lambi dandi and half red. Whereas, medium size of holdings, the farmers are giving more preference to half red variety of pear than of lambi dandi, burgmat, babukosha and tumba.

Table-4.4: Variety-wise classification of pear plants

| | | (No/HH) | | | | | |
|-----------------|---|---------------|---------------|---------------|---------------|---------------|--------------|
| Particulars | | Babukosha | Tumba | Half Red | Lambi Dandi | Burgmat | Total |
| Marginal | N | 3 (33.33) | 2 (22.22) | 2 (22.22) | 1 (11.11) | 1 (11.11) | 9 (100) |
| | B | 3 (12.00) | 6 (24.00) | 6 (24.00) | 5 (20.00) | 5 (20.00) | 25 (100) |
| | T | 6 (17.65) | 8 (223.53) | 8 (23.53) | 6 (17.65) | 6 (17.65) | 34 (100) |
| Small | N | 1 (14.29) | 1 (14.29) | 1 (14.29) | 2 (28.57) | 2 (28.57) | 7 (100) |
| | B | 54 (32.53) | 45 (27.11) | 8 (4.82) | 23 (13.86) | 36 (21.69) | 166 (100) |
| | T | 55 (31.79) | 46 (26.59) | 9 (5.20) | 25 (14.45) | 38 (21.97) | 173 (100) |
| Medium | N | 5 (12.50) | 4 (10.00) | 14 (35.00) | 12 (30.00) | 5 (12.50) | 40 (100) |
| | B | 39 (17.41) | 35 (15.63) | 85 (37.95) | 45 (20.09) | 40 (17.86) | 244 (100) |
| | T | 44 (15.49) | 39 (13.73) | 99 (34.86) | 57 (20.07) | 45 (15.85) | 284 (100) |
| All | N | 3 (23.08) | 2 (15.38) | 3 (23.08) | 3 (23.08) | 2 (15.38) | 13 (100) |
| | B | 19 (22.62) | 18 (21.43) | 16 (19.05) | 14 (16.67) | 17 (20.24) | 84 (100) |
| | T | 22 (22.68) | 20 (20.62) | 19 (19.59) | 17 (17.53) | 19 (19.59) | 97 (100) |

4.2.2 Variety-wise classification of plants of stone fruits

In the study areas, farmers were growing three varieties of plum fruit viz; Santroa, meripoza and beauty. At overall level, the total number of plants is worked out 121 no's and out of which 44.63 per cent were of meripoza, 33.06 per cent of beauty and 22.31 per cent of santroza variety of plum. Average plants of this fruit on marginal, small and medium size of holdings are worked out 90, 143 and 277 no's, respectively (Table 4.5).

From the data analysis, it is observed that in the study areas farmers are giving more preference to meripoza variety of plum fruit than of other varieties viz; beauty and santroza etc. Further, it is also observed that with an increase in the size of holdings the average number of plum plants shows an increasing tendency.

Table-4.5: Variety-wise classification of plum plants

| Particulars | | (No/HH) | | | |
|-------------|---|---------------|---------------|----------------|--------------|
| | | Santroza | Meripoza | Beauty | Total |
| Marginal | N | 2 (22.22) | 5 (55.55) | 2 (22.22) | 9 (100) |
| | B | 14 (17.28) | 44 (54.32) | 23 (28.39) | 81 (100) |
| | T | 16 (17.78) | 49 (54.44) | 25 (27.78) | 90 (100) |
| Small | N | 5 (38.46) | 4 (30.77) | 4 (30.77) | 13 (100) |
| | B | 37 (28.46) | 54 (41.54) | 39 (30.00) | 130 (100) |
| | T | 42 (29.37) | 58 (40.56) | 43 (30.07) | 143 (100) |
| Medium | N | 10 (29.41) | 14 (41.18) | 10 (29.41) | 34 (100) |
| | B | 49 (20.16) | 68 (27.98) | 126 (51.85) | 243 (100) |
| | T | 59 (21.30) | 82 (29.60) | 136 (49.10) | 277 (100) |
| All | N | 4 (30.77) | 6 (46.15) | 3 (23.08) | 13 (100) |
| | B | 23 (21.30) | 48 (44.44) | 37 (34.26) | 108 (100) |
| | T | 27 (22.31) | 54 (44.63) | 40 (33.06) | 121 (100) |

In study areas stone fruit growers are growing July elberta and alton variety of peach. On the marginal, small, and medium size of holdings, per household average peach plants are worked to be 87, 165, and 197 no's respectively. Whereas, among all the holdings together average peach plants came out 115 no's and out of which 66.96 per cent plants were of July elberta and 33.04 per cent were of alton variety. From the data analysis it is observed that in

study areas farmers are giving more preference to July elberta variety of peach than of alton (Table 4.6).

Table-4.6: Variety-wise classification of peach plants

(No/HH)

| Particulars | | July Elberta | Alton | Total |
|-------------|---|----------------|---------------|--------------|
| Marginal | N | 6 (66.67) | 3 (33.33) | 9 (100) |
| | B | 60 (76.92) | 18 (23.08) | 78 (100) |
| | T | 66 (75.86) | 21 (24.14) | 87 (100) |
| Small | N | 10 (71.43) | 4 (28.57) | 14 (100) |
| | B | 92 (60.93) | 59 (39.07) | 151 (100) |
| | T | 102 (61.82) | 63 (38.18) | 165 (100) |
| Medium | N | 18 (56.25) | 14 (43.75) | 32 (100) |
| | B | 81 (49.09) | 84 (50.91) | 165 (100) |
| | T | 99 (50.25) | 98 (49.75) | 197 (100) |
| All | N | 8 (66.67) | 4 (33.33) | 12 (100) |
| | B | 69 (66.99) | 34 (33.01) | 103 (100) |
| | T | 77 (66.96) | 38 (33.04) | 115 (100) |

Further in the study areas farmers are growing two type of variety of apricot viz; shakarpara and safeda. At overall level, average plants of apricot is worked out to be 26 no's and out of which 76.92 per cent were of shakarpara and rest of safeda type variety of apricot. On marginal, small and medium size of holdings average plants of this fruit is worked out 19, 24 and 84 no's. It is observed that in the study area farmers are giving more preference to shakarpara than of safeda variety of apricot (Table 4.7).

Table-4.7: Variety-wise classification of apricot plants

| | | (No/HH) | | |
|-------------|---|---------------|---------------|-------------|
| Particulars | | Shakarpara | Safeda | Total |
| Marginal | N | 2 (66.67) | 1 (33.33) | 3 (100) |
| | B | 13 (81.25) | 3 (18.75) | 16 (100) |
| | T | 15 (78.95) | 4 (21.05) | 19 (100) |
| Small | N | 3 (60.00) | 2 (40.00) | 5 (100) |
| | B | 16 (84.21) | 3 (15.79) | 19 (100) |
| | T | 19 (79.17) | 5 (20.83) | 24 (100) |
| Medium | N | 12 (60.00) | 8 (40.00) | 20 (100) |
| | B | 52 (81.25) | 12 (18.75) | 64 (100) |
| | T | 64 (76.19) | 20 (23.81) | 84 (100) |
| All | N | 3 (60.00) | 2 (40.00) | 5 (100) |
| | B | 17 (80.95) | 4 (19.05) | 21 (100) |
| | T | 20 (76.92) | 6 (23.08) | 26 (100) |

4.3 Age-wise distribution of plants of pome and stone fruits

This section deals with age-wise distribution of pome and stone fruits plants among the sampled households.

4.3.1 Age-wise distribution of plants of pome fruits

Age wise distribution of plants of pome and stone fruits is presented in Table 4.8. Among the apple fruit growers at overall level maximum plants fall under the age group of 20 years and above (46.70 per cent) which is followed by the age group of 15-20 years, 1-5 years and 6-15 years, respectively. Further on marginal, small and medium size of holdings same trend is also observed.

Table-4.8: Age-wise distribution of plants of pome fruits

| | | | | | (No/HH) |
|-----------|--------------|---------------|----------------|----------------|----------------|
| Sr. No. | Particulars | Marginal | Small | Medium | All |
| 1. | Apple | | | | |
| a. | 1-5 | 25 (14.53) | 15 (3.75) | 263 (14.46) | 51 (12.03) |
| b. | 6-15 | 11 (6.40) | 32 (8.00) | 224 (12.31) | 42 (9.91) |
| c. | 15-20 | 46 (26.74) | 120 (30.00) | 629 (34.58) | 134 (31.60) |
| d. | 20 & above | 90 (52.33) | 233 (58.25) | 703 (38.65) | 198 (46.70) |
| e. | Total | 172 (100) | 400 (100) | 1819 (100) | 424 (100) |
| 2. | Pear | | | | |
| a. | 1-5 | 9 (26.47) | 7 (4.05) | 40 (14.08) | 12 (12.37) |
| b. | 6-15 | 5 (14.71) | 33 (19.08) | 61 (21.48) | 18 (18.56) |
| c. | 15-20 | 8 (25.53) | 58 (33.53) | 83 (29.23) | 29 (29.90) |
| d. | 20 & above | 12 (35.29) | 75 (43.35) | 100 (35.21) | 48 (49.48) |
| e. | Total | 34 (100) | 173 (100) | 284 (100) | 97 (100) |

Further, among the pear fruit growers at overall level maximum plants falls under the age group of 20 & above years i.e. 49.48 per cent. On marginal, small and medium size of holdings same trend is also observed.

4.3.2 Age-wise distribution of plants of stone fruits

Among the stone fruit growers at overall level maximum plants fall under the age group of 20 years and above viz; 54.17 per cent, 42.61 per cent, 40.74 per cent for plum, peach and apricot fruit. The same trend is also observed on marginal, small, and medium size of holdings group. From the above analysis it is also observed that majority of orchards are of old-age, which may also be a reason of low productivity (Table 4.9).

Table-4.9: Age-wise distribution of plants of stone fruits

| | | | | | (No/HH) |
|-----------|----------------|---------------|---------------|----------------|---------------|
| Sr. No. | Particulars | Marginal | Small | Medium | All |
| 1. | Plum | | | | |
| a. | 1-5 | 9 (10.00) | 13 (9.09) | 34 (12.27) | 12 (10.00) |
| b. | 6-15 | 11 (12.22) | 25 (17.48) | 43 (15.52) | 17 (14.17) |
| c. | 15-20 | 15 (16.67) | 30 (20.98) | 90 (32.49) | 26 (21.67) |
| d. | 20 & above | 55 (61.11) | 75 (52.45) | 110 (39.71) | 65 (54.17) |
| e. | Total | 90 (100) | 143 (100) | 277 (100) | 120 (100) |
| 2. | Peach | | | | |
| a. | 1-5 | 9 (10.34) | 14 (8.48) | 32 (16.24) | 12 (10.26) |
| b. | 6-15 | 20 (18.39) | 25 (15.15) | 42 (21.32) | 23 (20.00) |
| c. | 15-20 | 22 (9.09) | 46 (27.88) | 55 (27.92) | 31 (29.96) |
| d. | 20 & above | 36 (25.29) | 80 (48.48) | 68 (34.52) | 49 (42.61) |
| e. | Total | 87 (100) | 165 (100) | 197 (100) | 115 (100) |
| 3. | Apricot | | | | |
| a. | 1-5 | 3 (15.79) | 5 (20.83) | 20 (23.81) | 5 (18.52) |
| b. | 6-15 | 4 (21.05) | 4 (16.67) | 14 (16.67) | 5 (18.52) |
| c. | 15-20 | 4 (21.05) | 5 (20.83) | 20 (23.81) | 6 22.22) |
| d. | 20 & above | 8 (42.11) | 10 (41.67) | 30 (35.71) | 11 (40.74) |
| e. | Total | 19 (100) | 24 (100) | 84 (100) | 27 (100) |

4.4 Variety-wise distribution of production of pome and stone fruits

In this section the variety wise distribution of pome and stone fruits among the sampled households has been analyzed.

4.4.1 Variety-wise distribution of production of pome fruits

The data in the Table 4.10 reveals that at overall level, on an average total production of apple has been worked out 1659 boxes out which maximum production is of royal variety i.e. 65.04 per cent of the total production followed by others varieties of apple. On marginal to

medium size of holdings, it ranges between 532 boxes to 8371 boxes. It also observed that royal variety is more productive than of others varieties.

Table-4.10: Variety-wise production of pome fruits

(Boxes/HH)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|--------------|----------|-------|--------|------|
| 1. | Apple | | | | |
| a. | Royal | 400 | 1125 | 4608 | 1079 |
| b. | Golden | 22 | 50 | 600 | 98 |
| c. | Red Golden | 68 | 65 | 375 | 179 |
| d. | Richard | 25 | 40 | 1000 | 146 |
| e. | Red | 17 | 27 | 1163 | 157 |
| f. | Total | 532 | 1307 | 8371 | 1659 |
| 2. | Pear | | | | |
| a. | Babukosha | 16 | 220 | 390 | 110 |
| b. | Tumba | 18 | 200 | 180 | 81 |
| c. | Half Red | 12 | 30 | 340 | 56 |
| d. | Lambi Dandi | 10 | 100 | 190 | 53 |
| e. | Burgmat | 14 | 160 | 181 | 69 |
| f. | Total | 70 | 710 | 1281 | 369 |

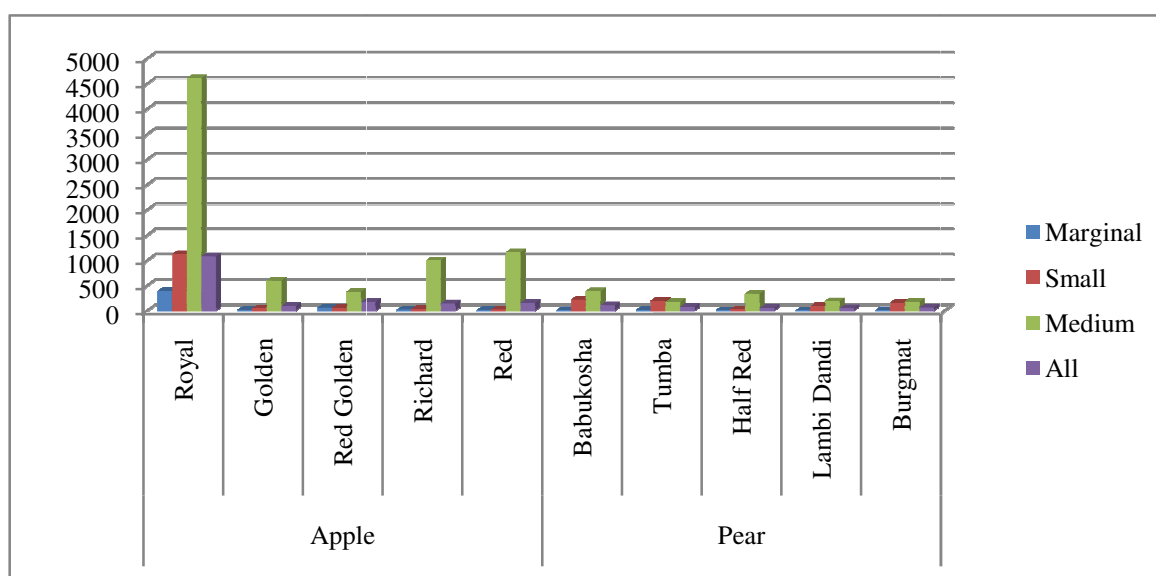


Figure-4.3: Variety-wise production of pome fruits

Further on an average total production of pear has been worked out 70, 710 and 1281 boxes on marginal, small and medium farms and whereas, among all the farms together this came out 369 boxes. From the data it is clear that babukosha variety of pear is more productive than of other varieties viz; tumba, halfred, lami dandi and burgmat.

4.4.2 Variety-wise distribution of production of stone fruits

The variety wise production of stone fruits is presented in Table 4.11. At overall level the average production of plum fruit is worked to be 222 boxes. The meripoza variety of plum has highest production i.e. 101 boxes and same is followed by santroza (70 boxes) and beauty (51 boxes). Whereas, among the marginal, small and medium farms, the average production of this fruit, has been worked out 168, 240 and 560 boxes. Further meripoza variety has been observed to have highest production on these farms.

Table-4.11: Variety-wise production of stone fruits

| (Boxes/HH) | | | | | |
|------------|----------------|------------|-------------|-------------|------------|
| Sr. No. | Particulars | Marginal | Small | Medium | All |
| 1. | Plum | | | | |
| a. | Santroza | 42 | 100 | 196 | 70 |
| b. | Meripoza | 90 | 90 | 204 | 101 |
| c. | Beauty | 36 | 50 | 160 | 51 |
| d. | Total | 168 | 240 | 560 | 222 |
| 2. | Peach | | | | |
| a. | July Elberta | 420 | 644 | 648 | 492 |
| b. | Alton | 108 | 390 | 588 | 218 |
| c. | Total | 528 | 1034 | 1236 | 710 |
| 3. | Apricot | | | | |
| a. | Shakarpara | 40 | 68 | 260 | 68 |
| b. | Safeda | 10 | 15 | 48 | 15 |
| e. | Total | 50 | 83 | 308 | 83 |

The average production of peach fruit among the sampled households has been worked out 710 boxes at overall level and this varies between 168 boxes to 560 boxes on marginal to medium size of holdings. Further at overall level July elberta variety of peach is observed to be having highest production i.e. 492 boxes and followed by alton variety. On marginal, small and medium size of holdings same trends, has also been observed.

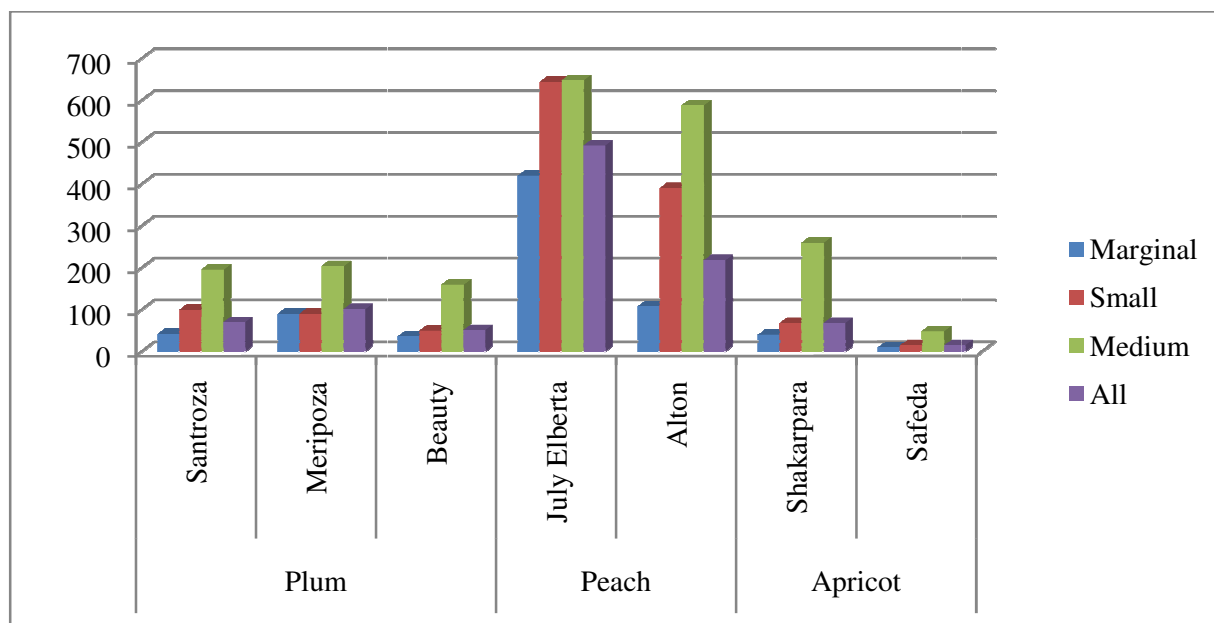


Figure-4.4: Variety-wise production of stone fruits

Further, at overall level, per household average production of apricot has been estimated 83 boxes, out of which 83 per cent production is contributed by shakarpara and rest of safeda variety. On marginal, small and medium size of holdings the average production of this fruit has been worked out 50, 83, 308 boxes. Out of which maximum production is contributed by shakarpara and rest of safeda variety of apricot.

4.5 Age-wise distribution of production of pome and stone fruits

This section deals with age-wise distribution of production of pome and stone fruits in the study areas among the sampled households.

4.5.1 Age-wise distribution of production of pome fruits

Among the pome fruit growers average production of apple fruit is worked out 1659 boxes at overall level out of which 59.19, 30.31, and 10.43 per cent production falls under the age group of 15-20 years, 20 & above and 6-15 years respectively. The average production of pear fruit is worked out to be 114 boxes, which varies between 70 boxes to 244 boxes on different size of holdings. It is observed that maximum production falls under the age group of 5-20 years. Further the production under the age group of 6-15 and 15-20 years shows an increasing tendency and the production under the age group of 20 & above years, shows a decreasing tendency with an increase in the size class of holdings (Table 4.12).

Table-4.12: Age-wise distribution of production of pome fruits

| (Boxes/HH) | | | | | |
|------------|--------------|----------------|----------------|-----------------|----------------|
| Sr. No. | Particulars | Marginal | Small | Medium | All |
| 1. | Apple | | | | |
| | 6-15 years | 33 (6.20) | 128 (9.79) | 1008 (12.04) | 173 (10.43) |
| | 15-20 years | 284 (53.38) | 780 (59.68) | 5106 (60.99) | 982 (59.19) |
| | 20 & Above | 215 (40.41) | 399 (30.53) | 2257 (26.96) | 504 (30.31) |
| | Total | 532 (100) | 1307 (100) | 8371 (100) | 1659 (100) |
| 2. | Pear | | | | |
| | 6-15 years | 10 (14.29) | 33 (19.88) | 83 (34.02) | 24 (21.05) |
| | 15-20 years | 36 (51.43) | 75 (45.18) | 117 (47.95) | 42 (36.84) |
| | 20 & Above | 24 (34.29) | 58 (34.94) | 44 (18.03) | 35 (30.70) |
| | Total | 70 (100) | 166 (100) | 244 (100) | 114 (100) |

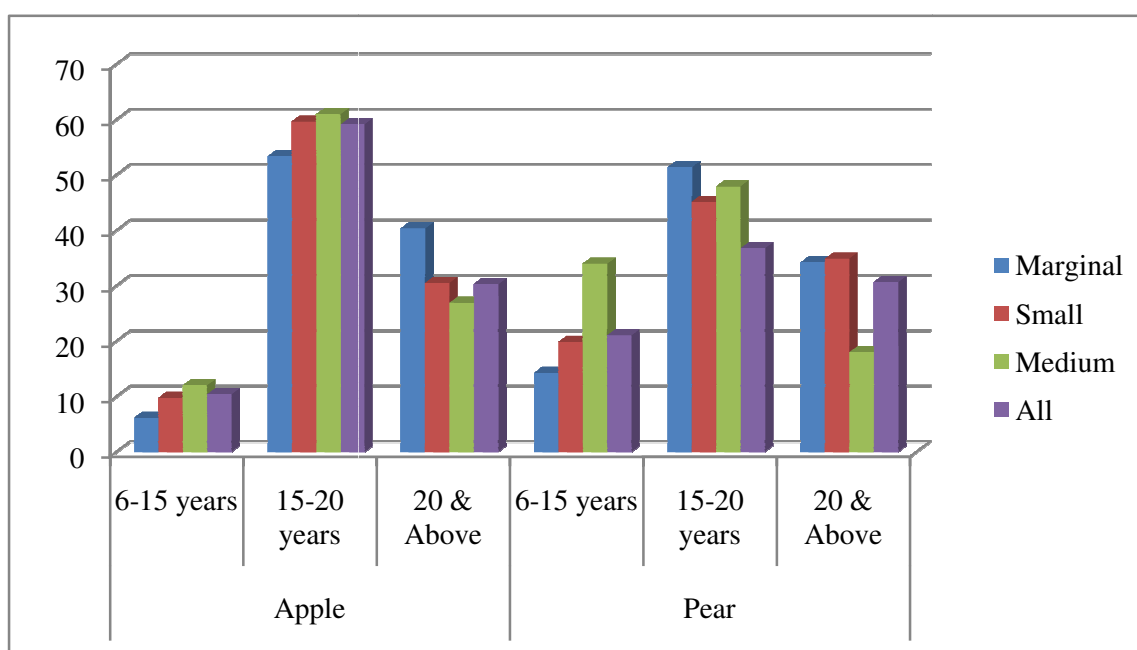


Figure-4.5: Age-wise distribution of production of pome fruits

4.5.2 Age-wise distribution of production of stone fruits

Age wise production of stone fruits among the sampled households has been analyzed and presented in Table 4.13. The average production of plum fruit on marginal, small and medium farms is worked out to be 168 boxes, 240 boxes and 560 boxes, respectively.

Table-4.13: Age-wise distribution of production of stone fruits

(Boxes/HH)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|----------------|----------------|----------------|----------------|----------------|
| 1. | Plum | | | | |
| | 6-15 years | 35 (20.83) | 55 (22.92) | 190 (33.93) | 55 (32.74) |
| | 15-20 years | 78 (46.43) | 115 (47.92) | 270 (48.21) | 105 (62.50) |
| | 20 & Above | 55 (32.74) | 70 (29.17) | 100 (17.86) | 63 (37.50) |
| | Total | 168 (100) | 240 (100) | 560 (100) | 223 (100) |
| 2. | Peach | | | | |
| | 6-15 years | 138 (26.14) | 300 (29.01) | 400 (32.36) | 200 (28.17) |
| | 15-20 years | 200 (37.88) | 419 (40.52) | 510 (26.38) | 279 (39.30) |
| | 20 & Above | 190 (35.98) | 315 (30.46) | 326 (26.38) | 231 (32.54) |
| | Total | 528 (100) | 1034 (100) | 1236 (100) | 710 (100) |
| 3. | Apricot | | | | |
| | 6-15 years | 16 (32.00) | 36 (43.37) | 13 (42.53) | 32 (38.55) |
| | 15-20 years | 22 (44.50) | 40 (48.19) | 155 (50.32) | 39 (46.99) |
| | 20 & Above | 12 (24.00) | 7 (8.43) | 22 (7.14) | 12 (14.46) |
| | Total | 50 (100) | 83 (100) | 308 (100) | 83 (100) |

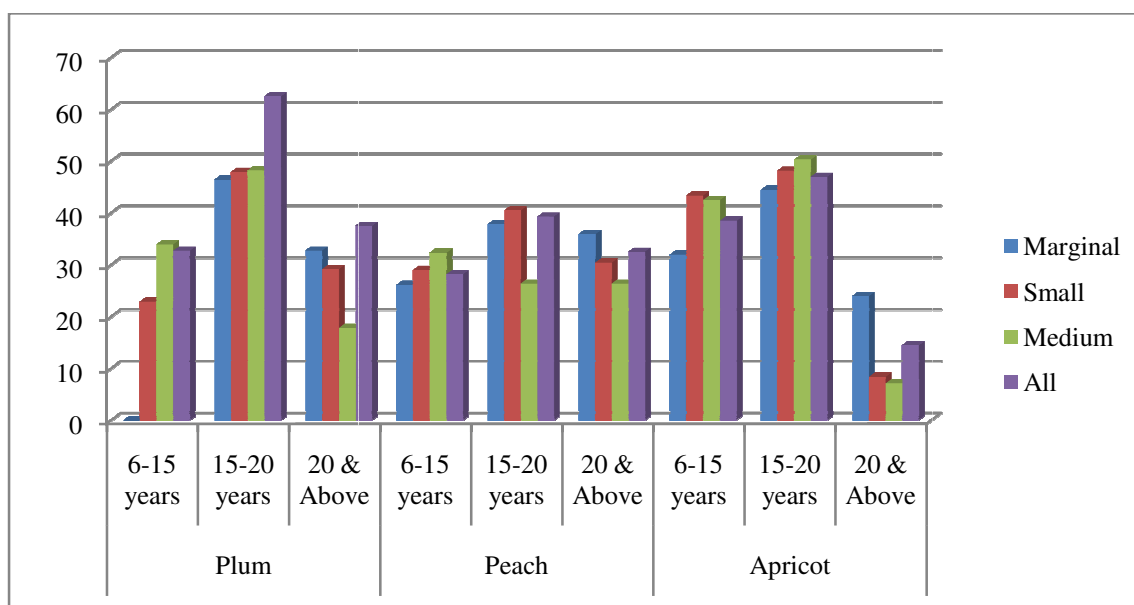


Figure-4.6: Age-wise distribution of production of stone fruits

At overall level, the average production is worked out 223 boxes. From the analysis of data it is observed that maximum production falls under the age group of 15-20 years and which shows an increasing tendency with an increase in the size class of holdings i.e. marginal to medium farms. Further, the production under the age group of 20 & above years shows declining trends with an increase in the size class of holdings.

At overall level, the average production of peach and apricot fruit has been estimated to be 710 and 83 boxes. On marginal, small and medium size of holdings the average production of peach varies between 528 boxes to 1236 boxes and for apricot it is 50 to 308 boxes.

4.5.3 Percentage change in production of pome and stone fruits

The percentage change in production of pome and stone fruits has been worked out and presented in Table 4.14. Among the pome fruits growers at overall level the average production of apple fruits during the year 2016-17 was 1930 boxes and which decreased to 1659 boxes in 2018-19 with a percentage change of -14.04 per cent. The production of pear fruit during the year 2016-17 was 510 boxes and which decreased to 369 boxes during the year 2018-19 with a percentage change of -27.65. Whereas among the stone fruit growers the average production of plum during the year 2016-17 was 320 boxes and which decreased to 222 boxes during the year 2018-19 with a percentage change of -30.63 per cent. The production of peach during the 2016-17 was 830 boxes and which decreased to 710 boxes with a percentage change of -14.46 per cent. Whereas the production of apricot fruit during the year 2018-19 is worked out 83 boxes and which was 125 boxes during the year 2016-17. The production of this fruit decreased with a percentage change of -33.60 per cent.

Table-4.14: Percentage change in production of pome and stone fruits

| (Boxes/HH) | | | | | |
|------------|---------------------|---------|---------|---------|-------------------|
| Sr. No. | Particulars | 2016-17 | 2017-18 | 2018-19 | Percentage Change |
| 1. | Pome Fruits | | | | |
| | Apple | 1930 | 1850 | 1659 | -14.04 |
| | Pear | 510 | 425 | 369 | -27.65 |
| 2. | Stone Fruits | | | | |
| | Plum | 320 | 270 | 222 | -30.63 |
| | Peach | 830 | 790 | 710 | -14.46 |
| | Apricot | 125 | 111 | 83 | -33.60 |

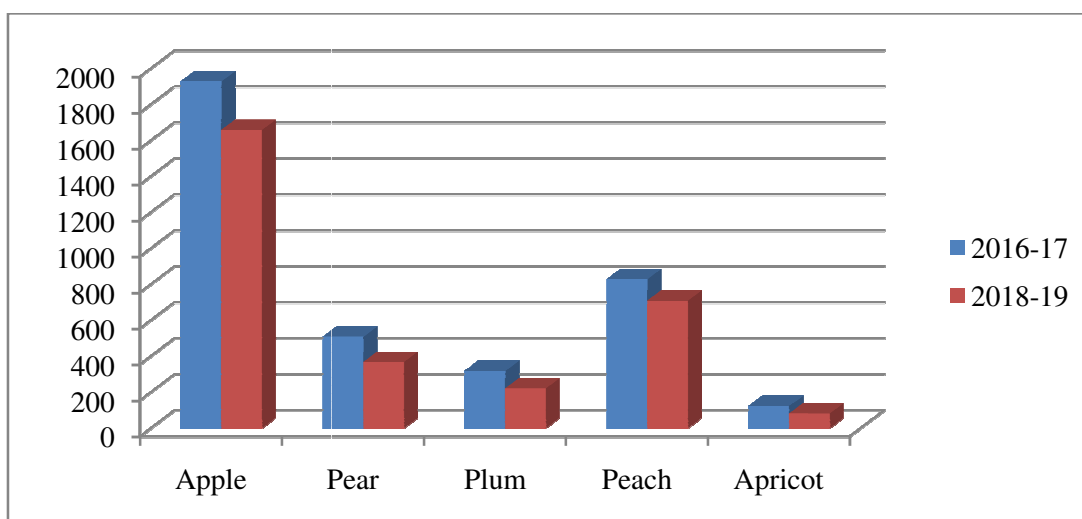


Figure-4.7: Percentage change in production of pome and stone fruits

4.6 Variety-wise productivity of pome and stone fruits

In this section the productivity of pome and stone fruits according to age and variety has been discussed and analyzed.

4.6.1 Variety-wise productivity of pome fruits

Variety-wise per plant productivity of pome fruits is worked out and is presented in Table 4.15. At overall level, per plant productivity of apple is highest among the royal variety i.e. 5.65 boxes, and which is followed by red, Richard, golden and red golden variety of the apple. Among the pear fruit, babukosha variety is observed more productive with 5.65 boxes per plant, which is followed by other varieties viz; tumba, burgmat, lambi dandi and half red. Further same trend is also observed on small and medium holdings except marginal holdings.

Table-4.15: Variety-wise productivity of pome fruits

(Per pant productivity in boxes)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|--------------|----------|-------|--------|------|
| 1. | Apple | | | | |
| | Royal | 4.00 | 4.45 | 8.36 | 5.65 |
| | Golden | 2.20 | 1.35 | 3.70 | 2.80 |
| | Red Golden | 3.09 | 1.27 | 2.67 | 2.52 |
| | Richard | 2.50 | 1.48 | 5.00 | 3.84 |
| | Red | 3.40 | 1.59 | 4.34 | 3.93 |
| 2. | Pear | | | | |
| | Babukosha | 5.35 | 4.07 | 10.00 | 5.79 |
| | Tumba | 3.00 | 4.44 | 5.14 | 4.50 |
| | Half Red | 2.00 | 3.75 | 4.00 | 3.50 |
| | Lambi Dandi | 2.00 | 4.35 | 4.22 | 3.79 |
| | Burgmat | 2.80 | 4.44 | 4.53 | 4.06 |

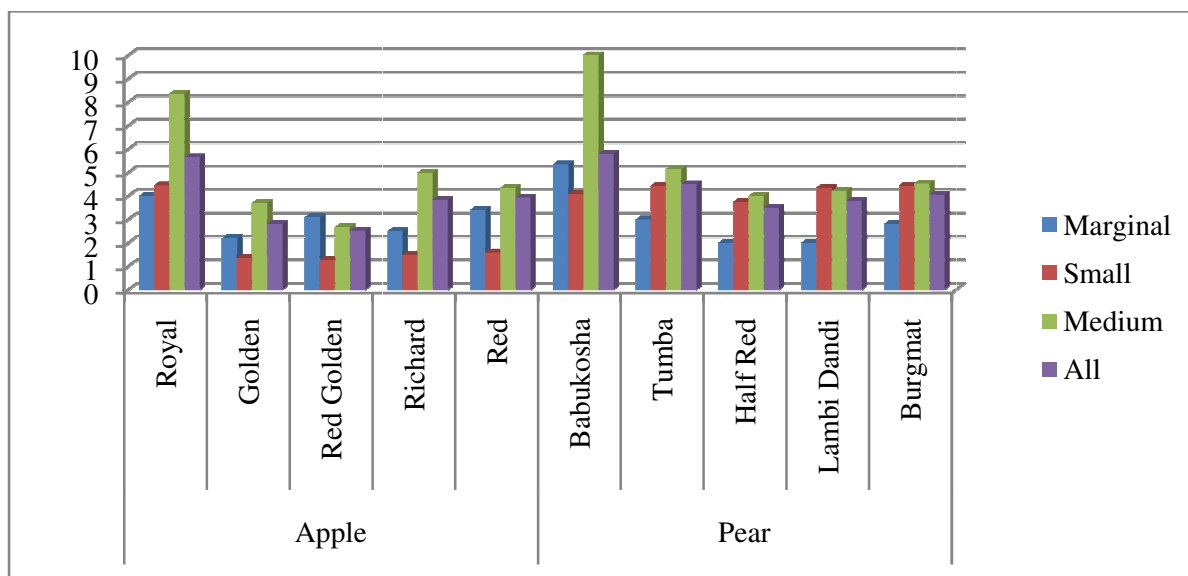


Figure-4.8: Variety-wise productivity of pome fruits

4.6.2 Variety-wise productivity of stone fruits

Among the plum fruit growers, per plant productivity of santroza variety is worked highest (3.04 boxes) than of meripoza and beauty varieties at overall level. The same trend is also observed on marginal, small and medium holdings respectively. Whereas, among the peach fruit the July elberta is observed more productive than of alton. The per plant productivity of July elberta is worked out 7.13 boxes per plant at overall level and which varies between 7 boxes to 8 boxes, on marginal to medium size of holdings (Table 4.16).

Table-4.16: Variety-wise productivity of stone fruits

(Per plant productivity in boxes)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|----------------|----------|-------|--------|------|
| 1. | Plum | | | | |
| | Santroza | 3.00 | 2.70 | 4.00 | 3.04 |
| | Meripoza | 2.05 | 1.67 | 3.00 | 2.10 |
| | Beauty | 1.57 | 1.28 | 1.27 | 1.38 |
| 2. | Peach | | | | |
| | July Elberta | 7.00 | 7.00 | 8.00 | 7.13 |
| | Alton | 6.00 | 6.61 | 7.00 | 6.41 |
| 3. | Apricot | | | | |
| | Shakarpara | 3.08 | 4.25 | 5.00 | 4.00 |
| | Safeda | 3.33 | 5.00 | 4.00 | 3.75 |

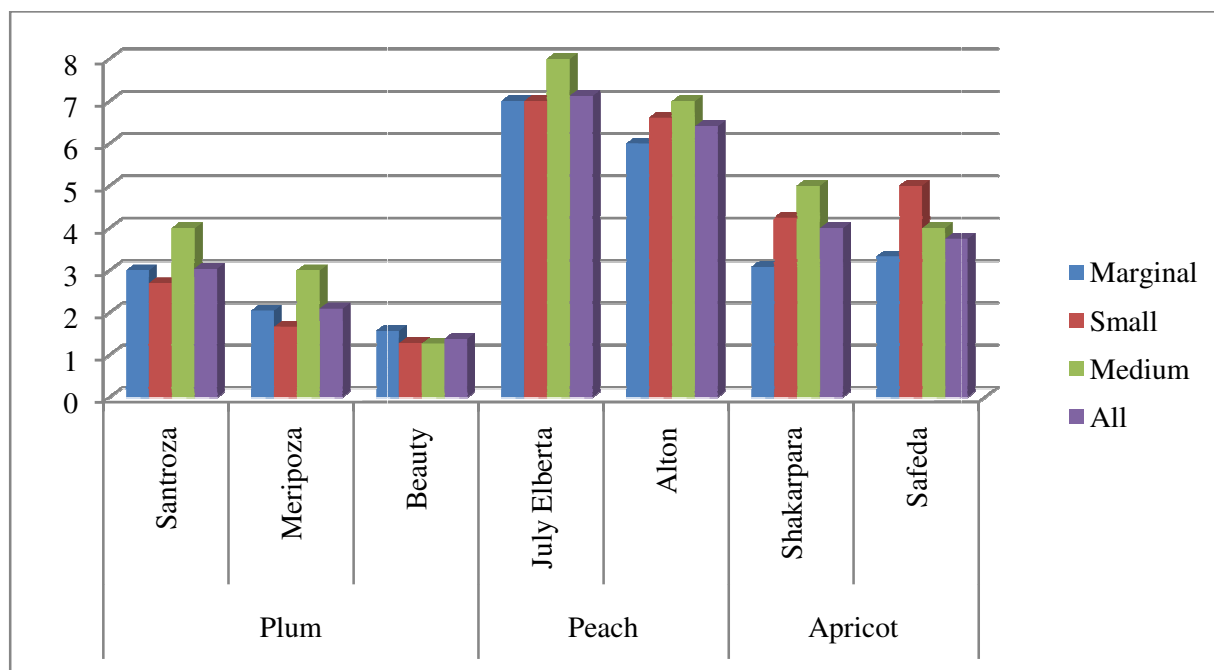


Figure-4.9: Variety-wise productivity of stone fruits

Further, among apricot fruit per plant productivity of shakarpara variety is worked to be highest i.e. 4 boxes, per plant and which ranges between 3.08 boxes to 5.00 boxes on different size of holdings.

4.7 Age-wise productivity of pome and stone fruits

In this section age wise productivity of pome and stone fruit has been discussed and analyzed.

4.7.1 Age-wise productivity of pome fruits

Per plant age wise productivity of apple fruit is presented in Table 4.17. At overall level, it is found that the age group of 15-20 years is more productive (7.33 boxes per plant), than of 6-15 years and 20 & above years. Further same trend is also observed on marginal, small and medium size of holdings.

Among the pear fruit growers, under the age group of 6-15 years, per plant boxes is worked out 2.00, 1.00 and 1.36 on marginal, small and medium size of holdings, whereas by adjoining all the holdings together this value came out 1.33 boxes, per plant. Under the age group of 15-20 years the per plant average productivity is worked to be 1.45 boxes and which ranges between 4.25 boxes to 1.41 boxes, per plant on marginal to medium size of holdings. Further, under the age group of 20 and above 20 years the average productivity of pear fruit

ranges between 2.00 boxes to 0.44 boxes per plant, on marginal and medium size of holdings, and which come 0.73 boxes, per plant at overall level.

Table-4.17: Age-wise productivity of pome fruits

(Per plant productivity in boxes)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|--------------|----------|-------|--------|------|
| 1. | Apple | | | | |
| | 6-15 years | 3.00 | 4.00 | 4.50 | 4.12 |
| | 15-20 years | 6.17 | 6.50 | 8.12 | 7.33 |
| | 20 & Above | 2.39 | 1.71 | 3.21 | 2.55 |
| 2. | Pear | | | | |
| | 6-15 years | 2.00 | 1.00 | 1.36 | 1.33 |
| | 15-20 years | 4.50 | 1.29 | 1.41 | 1.45 |
| | 20 & Above | 2.00 | 0.77 | 0.44 | 0.73 |

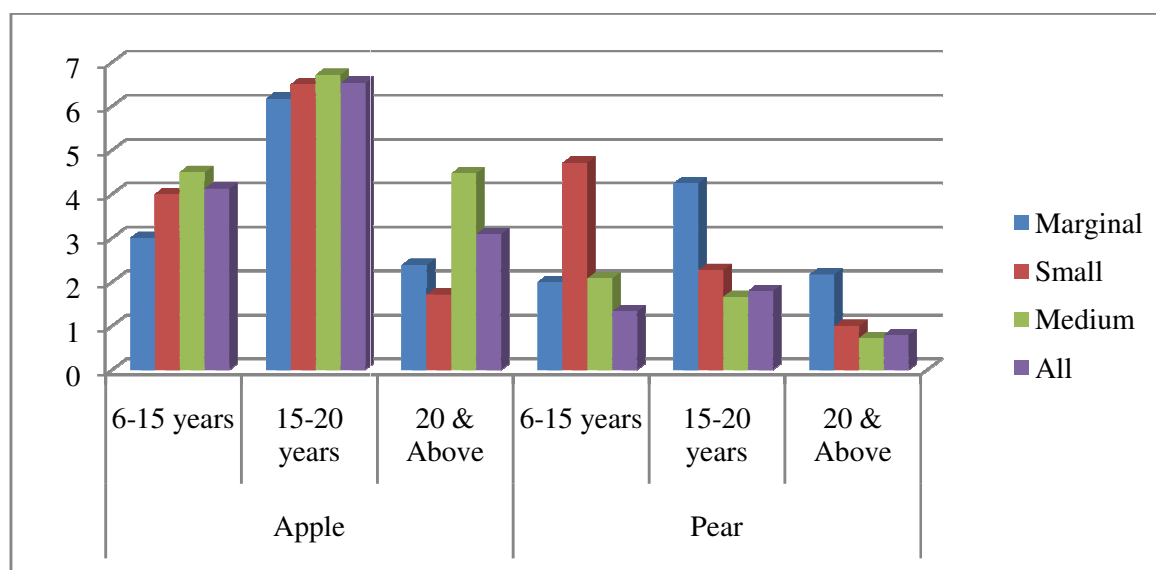


Figure-4.10: Age-wise productivity of pome fruits

4.7.2 Age-wise productivity of stone fruits

Among the stone fruit growers per plant productivity of plum fruit is worked out 3.18, 2.20 and 4.42 boxes on marginal, small and medium size of holdings. At over all level, it came out 3.24 boxes. Under the age group of 15-20 years, per plant productivity of plum fruit varies between 5.20 boxes to 3.00 boxes on marginal to medium size of holdings and by adjoining all the holdings together this value came out 4.4 boxes. Further under the age group

of 20 & above 20 years, per plant productivity is observed to be 0.97 box, at overall level and which ranges between 1 to 0.91 boxes on marginal to medium size of holdings (Table 4.18).

Table-4.18: Age-wise productivity of stone fruits

(Per plant productivity in boxes)

| Sr. No. | Particulars | Marginal | Small | Medium | All |
|-----------|----------------|----------|-------|--------|------|
| 1. | Plum | | | | |
| | 6-15 years | 3.18 | 2.20 | 4.42 | 3.24 |
| | 15-20 years | 5.20 | 3.83 | 3.00 | 4.04 |
| | 20 & Above | 1.00 | 0.93 | 0.91 | 0.97 |
| 2. | Peach | | | | |
| | 6-15 years | 6.90 | 12.00 | 9.52 | 8.70 |
| | 15-20 years | 9.09 | 9.11 | 9.27 | 9.00 |
| | 20 & Above | 5.28 | 3.94 | 4.79 | 4.71 |
| 3. | Apricot | | | | |
| | 6-15 years | 4.00 | 9.00 | 9.36 | 6.40 |
| | 15-20 years | 5.50 | 8.00 | 7.75 | 6.50 |
| | 20 & Above | 1.50 | 0.70 | 0.73 | 1.09 |

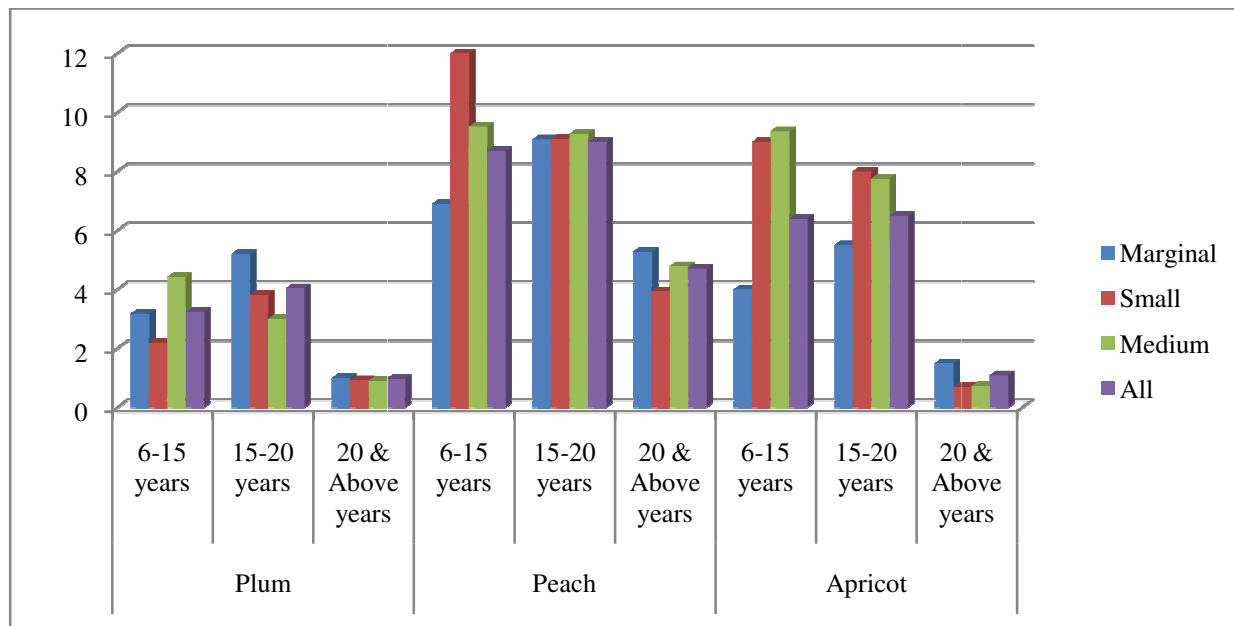


Figure-4.11: Age-wise productivity of stone fruits

It is also observed that average productivity under this age group is less, as compared to others age group viz; 6-15, and 15-20 years. Under the age group of 15-20 years the per plant average productivity of peach at overall level has been worked out 9.00 boxes, which is

highest and followed by others age group viz; 6-15 and 15-20 years. On marginal, small and medium size of holdings the highest productivity of this fruit is worked out to be 6.90, 12.00 and 9.52 boxes per plant and which is followed by the age group of 15-20 and 20 & above years.

The per plant average productivity of apricot has been worked out to be 4, 9, and 9.36 boxes on marginal, small and medium size of farms, which shows an increasing tendency. At overall level this value came out 6.40 boxes. Further, at overall level, under the age group of 15-20 years per plant average productivity is 7.80 boxes and which varies between 5.50 boxes to 7.75 boxes on marginal to medium size of holdings. Under the age group of 20 & above years the per plant average productivity is worked out 1.50, 0.70, and 0.73 boxes on marginal, small and medium size of holdings, whereas at overall level this value came out 1.09 box per plant.

4.7.3 Percentage change in productivity of pome and stone fruits

The percentage change in the productivity of pome and stone fruits has been worked out and presented in Table 4.19. It is observed that the per hectare productivity of apple during the year 2016-17 was 1754 boxes and which decreased to 1508 boxes during the year 2018-19 with a percentage change of -14 per cent.

Table-4.19: Percentage change in productivity of pome and stone fruits

| (Per hectare productivity in boxes) | | | | |
|--|---------------------|----------------|----------------|--------------------------|
| Sr. No. | Particulars | 2016-17 | 2018-19 | Percentage Change |
| 1. | Pome Fruits | | | |
| | Apple | 1754 | 1508 | -14 |
| | Pear | 3000 | 2170 | -28 |
| 2. | Stone Fruits | | | |
| | Plum | 1231 | 854 | -31 |
| | Peach | 2964 | 2336 | -14 |
| | Apricot | 1250 | 830 | -33 |

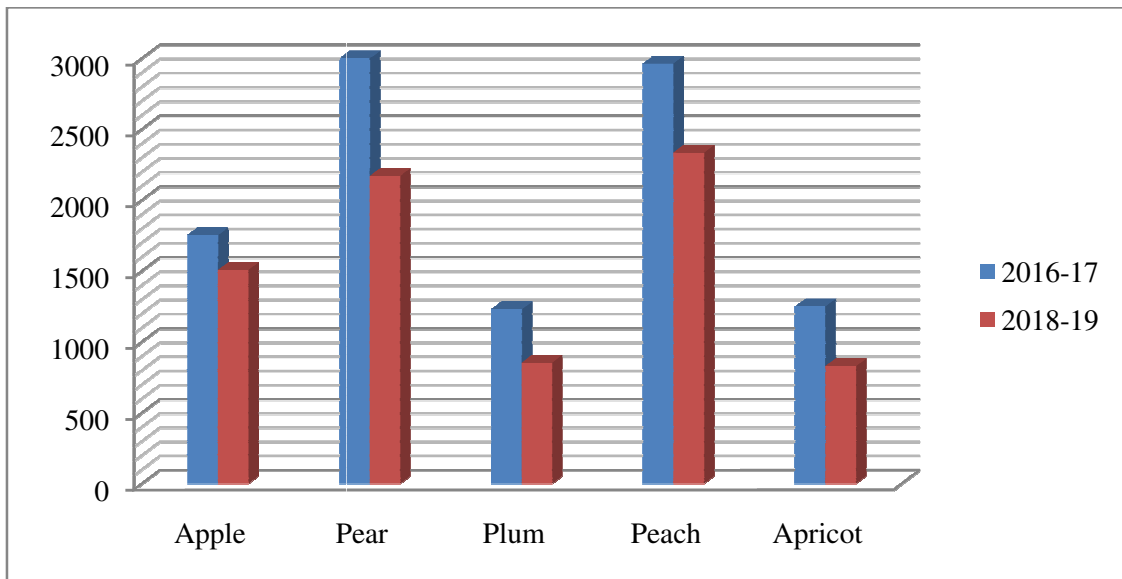


Figure-4.12: Percentage change in productivity of pome and stone fruits

Further per hectare productivity of pear fruit is observed to decrease. In the year 2016-17 it was 3000 boxes and same is decreased to 2170 boxes with a percentage change of -28 per cent. Whereas among the stone fruit growers the per hectare productivity of plum was 1231 boxes during the year 2016-17 and same is decreased to 854 boxes with the percentage change of -31 per cent. The average productivity of peach was 2964 boxes during the year 2016-17 and it decreased to 2536 boxes during the 2018-19, with a percentage change of -14 per cent. The per hectare productivity of apricot fruit was 1250 boxes during the year 2016-17 and same is decreased to 830 boxes during the 2018-19, with a percentage change of -33 per cent.

Chapter-V

CAUSES OF LOW PRODUCTIVITY OF POME AND STONE FRUITS

Low productivity of pome and stone fruits in the recent years has become a serious concern of the growers in all the growing areas. The productivity of pome and stone fruits has been fluctuating year to year. The factors which influence yields are climate, variety, pollinizer, pollinator, soil, and cultural management practices. Most of factors influencing productivity are manageable to a large extent but the climatic factors are beyond the control. In this chapter an attempt has been made to analyze the causes and consequences of low productivity of pome and stone fruits in the study areas.

5.1 Causes of low productivity of pome and stone fruits

In this section the causes of low productivity of pome and stone fruits has been discussed and analyzed in detail in Table 5.1.

5.1.1 Climatic factors

In the study area at overall level, 68 per cent households considered climatic factor as one of the causes of low productivity of pome fruits. Among the marginal to medium farms, this percentage ranges between 53.33 to 83.33 per cent. Whereas on stone fruits farms at overall level 80 per cent households reported climatic factors as one of the causes of low productivity of stone fruits. Further on marginal, small and medium size of holdings, 79.41, 81.82 and 80 per cent households considered this as one of the causes of low productivity of stone fruits. The households further reported that at the time of flowering and fruit setting low temperature adversely affects production of these fruits. Fluctuating temperature during this period particularly rains accompanied by low temperature inhibits the cross pollination due to restricted bees activity and washing off pollen and poor pollen tube growth.

5.1.2 Varietal factors

Among the pome fruit growers at overall level near about 40 per cent households reported there is problem of improved variety of pome fruit and considered it as a cause and reason of low production and productivity of these fruits.

Table-5.1: Factors of low productivity of pome and stone fruits

| Sr. No. | Causes/ Factors | Pome Fruits Growers | | | | Stone Fruits Growers | | | |
|---------|---------------------------------------|---------------------|-------|--------|-------|----------------------|-------|--------|-------|
| | | Marginal | Small | Medium | All | Marginal | Small | Medium | All |
| 1. | Climatic Factors | 53.33 | 85.71 | 83.33 | 67.86 | 79.41 | 81.82 | 80.00 | 80.00 |
| 2. | Varietal Factors | 26.67 | 42.86 | 66.67 | 39.29 | 41.18 | 45.45 | 60.00 | 44.00 |
| 3. | Lack of Pollinizers | 13.33 | 42.86 | 50.00 | 25.00 | 38.24 | 27.27 | 20.00 | 34.00 |
| 4. | Lack of Pollinators | 33.33 | 85.71 | 33.33 | 46.43 | 29.41 | 36.36 | 40.00 | 32.00 |
| 5. | Inadequate Nutrition | 40.00 | 71.43 | 33.33 | 46.43 | 58.82 | 54.55 | 80.00 | 60.00 |
| 6. | Poor Soil Condition | 73.33 | 57.14 | 50.00 | 50.00 | 35.29 | 45.45 | 40.00 | 38.00 |
| 7. | Poor Canopy Management | 40.00 | 71.43 | 50.00 | 50.00 | 32.35 | 27.27 | 40.00 | 38.00 |
| 8. | Senile Orchards | 40.00 | 71.43 | 50.00 | 50.00 | 61.76 | 54.55 | 60.00 | 60.00 |
| 9. | Pathology Factors | 40.00 | 57.14 | 50.00 | 46.43 | 47.06 | 36.36 | 40.00 | 44.00 |
| 10. | Entomological Factors | 66.67 | 85.71 | 33.33 | 64.29 | 50.00 | 45.45 | 60.00 | 50.00 |
| 11. | Inadequate Irrigation Facilities | 93.33 | 71.43 | 50.00 | 78.57 | 52.94 | 63.64 | 80.00 | 58.00 |
| 12. | Problem of Extension Services | 80.00 | 57.14 | 50.00 | 67.86 | 47.06 | 45.45 | 60.00 | 48.00 |
| 13. | Problem of Fertilizer Outlet | 73.33 | 71.43 | 66.67 | 71.43 | 35.29 | 27.27 | 60.00 | 36.00 |
| 14. | Problem of Plant protection Materials | 80.00 | 85.71 | 66.67 | 78.57 | 50.00 | 36.36 | 40.00 | 46.00 |

Further they reported that in Himachal Pradesh there is predominance of traditional varieties and these varieties have strong tendency of alternate bearing, which is also one of the reasons for low production and productivity. Whereas, among the stone fruit growers, near about 44 per cent households reported this type of problem, at overall level. On marginal and medium size of holdings this percentage fluctuates between 41.18 to 60 per cent.

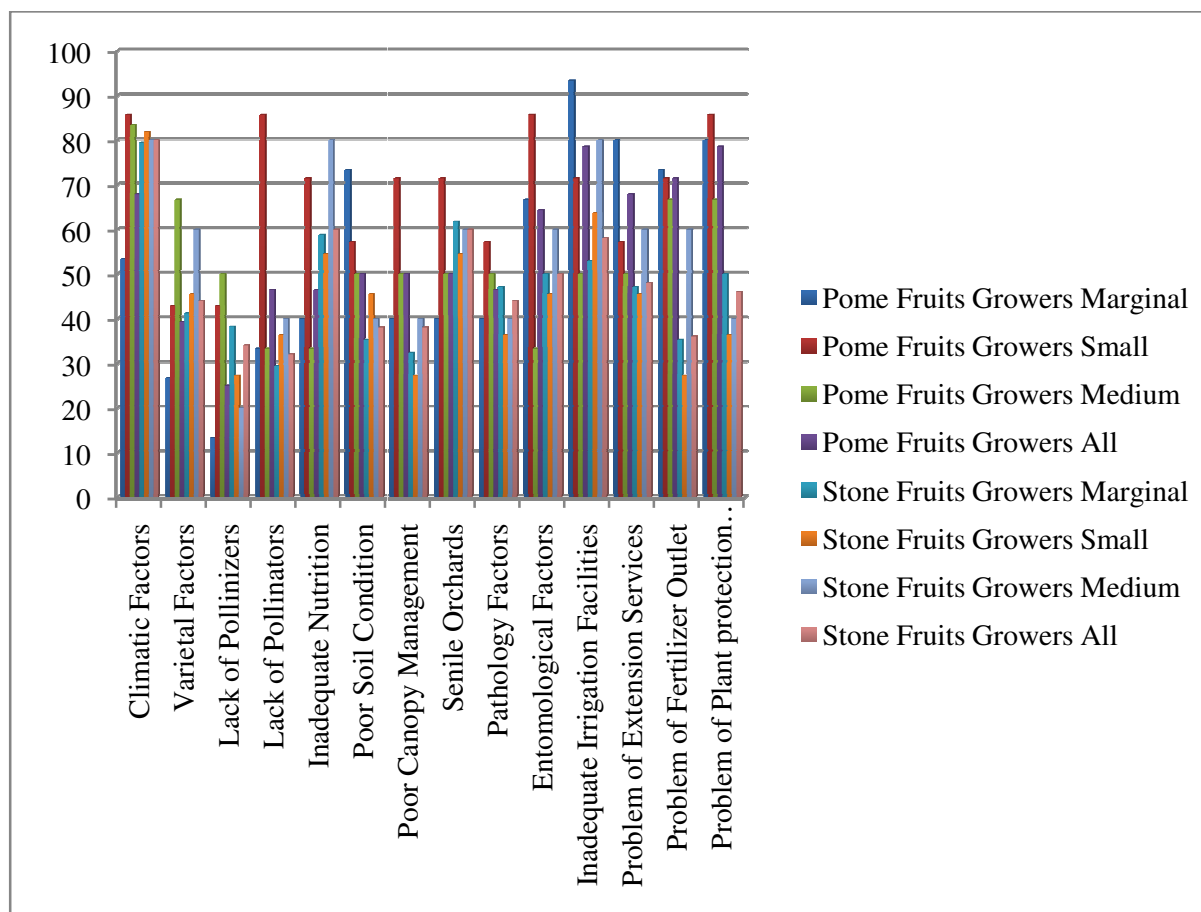


Figure-5.1: Factors of low productivity of pome and stone fruits

5.1.3 Inadequate polliniser

In the Himachal Pradesh there is problem of adequacy of pollinizer, at overall level 25 per cent households considered this problem as one of the causes of low productivity of pome fruits in the study areas. On marginal, small and medium size of holdings this percentage has been worked out 13.33, 42.86 and 50.00 per cent. Among the stone fruit growers near 34 per cent households at overall level considered inadequate polliniser as one of the reasons of low productivity. On marginal to medium size of holdings it ranges 38.24 to 20 per cent.

5.1.4. Lack of pollinators

At overall level 46 per cent households reported that there is dominance of traditional pollinators and which resulting in low productivity of pome fruits. Whereas on marginal, small and medium size of holdings 33.33, 85.71 and 33.33 per cent households reported such type of problem, respectively. Among the stone fruit growers, about 32 per cent households at overall level reported it as one of the causes of low productivity and same ranges between

29.41 to 40 per cent. Honey bees are the major agents besides other wild pollinators for effective pollination fruits. Households further reported that over the years the population of honey bees and other pollinators has declined due to unsystematic use of pesticides. Placement of honeybees in the orchards has also not picked up due to shortage of beehives.

5.1.5 Inadequate nutrition

Among the pome fruit growers 46.43 per cent households reported that there is problem of adequacy of nutrients and same resulting in low productivity of these fruits. On marginal, small and medium size of holdings 40, 71.43 and 33.33 per cent households considered this as one of the causes of low productivity of these fruit viz; apple and pear. Whereas among the stone fruit growers 60 per cent households at overall level reported such type of problem and which ranges between 58.82 to 80 per cent on marginal to medium size of farms. Households further reported that due to hilly terrain cultivation of fruits is mostly done on the slopes which creates serious problem of water and nutrient losses. It is also observed that sometimes there is dry spells during April-June and September-November and which make the nutrients unavailable to the plants even if applied adequately in the soil. Contrarily leakage of the nutrients during rainy season from July-August further affects the health of the fruit trees. It has also been noticed that the fertilizers are not applied according to the requirement of the fruit trees which also a one of cause of low productivity.

5.1.6 Poor soil condition

Among the pome fruit growers at overall level 50 per cent households reported that soil of their land in poor condition and which resulting the low productivity of these fruits. On the marginal, small and medium size of holdings 73.33, 57.14 and 50 per cent households reported such type of problem and considered it as one of the causes of low of productivity. Whereas among the stone fruit growers at overall level 38 per cent households considered poor soil condition as a cause of low productivity of stone fruits. On marginal, small and medium size of holdings 35.29, 45.45 and 40 per cent households considered this as one of the causes of low productivity. Further it is also observed the orchards which are planted on the slopes, run off losses render the soils nutritionally and structurally poor. In many orchards, soils which don't have adequate drainage facilities and temporary water logging during the rainy season destroy the feeder roots and temporarily

restrict the uptake of the nutrients. All these factors adversely affect the plant health and productivity of pome and stone fruit.

5.1.7 Poor canopy management

At overall level, 50 per cent households considered poor canopy management as one of the causes and reasons for low productivity of pome fruits. This ranges between 40 per cent on marginal to 50.00 per cent on medium farms. Whereas among the stone fruit growers, about 32, 27 and 40 per cent households of marginal, small and medium size of holdings, depict poor canopy management as one of the causes of low productivity of stone fruits. At overall level this percentage came out 38 per cent. Further it is also observed that the orchardist's dependency on hired pruners is increasing day by day. The fruit plants are not properly trained and pruned by these untrained pruners and developing poor canopy in orchards, and which resulting low production and productivity of fruits. At lower elevation, where the vegetative growth is excessively more due to warm conditions, hard pruning promotes more vegetative growth and reduces reproductive growth is considered a wrong orchard practice. In such conditions lesser heading back and more thinning out of shoots as per tree behavior is required to balance cropping and growth.

5.1.8 Senile orchards

Among the pome fruit growers, at overall level 50 per cent households, considered senile of orchard as a cause of low productivity of stone fruit and on marginal to medium size of holdings it ranges between 40 to 50 per cent. Further about 62, 55 and 60 per cent households of stone fruits is considered such type problem as one of the causes of low productivity of stone fruits. At overall level this percentage came out 60 per cent. It is also observed that senile orchards producing the problem of unfruitfulness more seriously than the young orchards. The old orchards have also been planted under traditional system. Such orchards do not produce adequate annual growth and usually have foliage of small size.

5.1.9 Pathological factors

Among the pome fruit growers 46.43 per cent households at overall considered pathological factors as one of the causes of low productivity of this fruits. On the marginal, small and medium size of holdings near about 40, 57 and 50 per cent households

considered this as a cause of low productivity. Among the pome orchards number of diseases has been observed which are affecting the pome orchards viz; scab, premature leaf fall, root rot, color rot, replant problem, powdery mildew, cankers and viruses. The most serious among these is scab. Further among the stone fruits the most important diseases are leaf curl, brown rot, powdery, rust, leaf spot, scab, canker and dieback, black not, wilt and root rot etc.

5.1.10 Entomological factors

The magnitude of pest in incidence varies from region to region and orchard to orchards. Aphid is most dominant affecting orchards to a large extent. Among the pome fruit growers on marginal, small and medium size of holdings 66.67, 85.71 and 33.33 per cent households considered entomological factors as one of the causes of low productivity of pome fruit. At overall level this percentage came out 64.29 per cent. Whereas among the stone fruit growers at overall level, 50 per cent households considered entomological factors as one of the causes of low productivity of stone fruit.

5.1.11 Inadequate irrigation facilities

Availability of irrigation facilities also influenced the productivity of fruits to a large scale. Among the pome fruit growers about 79 per cent households at overall level reported that there is problem of irrigation, which is one of the causes of low productivity, whereas among the marginal, small and medium size of holdings this percentage came out 93.33, 71.43 and 50.00 per cent. Further among the stone fruit growers at overall level 58 per cent households reported inadequate irrigation facilities and considering it as one of the causes of low productivity. And which ranges from 52.94 per cent on marginal to 80 per cent on medium size of holdings.

5.1.12 Problem of extension services

In the study areas farmers also considered inadequate extension service as one of the causes of low productivity. Among the pome fruit growers at overall level, near about 68 households reported this type of problem and considered it as one of the causes of low productivity. On marginal, small and medium size of holdings 80, 57.14 and 50 per cent households reported such type of problem. Whereas among the stone fruit growers only 48 per cent households reported problem in extension services and considered it as one of the

causes of low productivity. On marginal to medium size of holdings it ranges between 47 to 60 per cent.

5.1.13 Problem of fertilizer outlet

In the study areas farmer reported farness of fertilizer outlet. Due to farness of fertilizer outlet sometimes they did not purchase it timely, when there is a need of it in orchards. Among the pome fruit growers at overall level 71.43 per cent households reported problem of fertilizer related to farness, and considered it as one of the causes of low productivity. On marginal, small and medium size of holdings 73.33, 71.43 and 66.67 per cent households considered it as one of the causes of low productivity. Further among the stone fruit growers, at overall level 36 per cent households reported such type of problem and on marginal to medium size of holdings it varies between 35.29 to 60 per cent.

5.1.14 Problem of plant protection materials

In the study areas farmers reported problems of plant protection material such as its cost and availability. At overall level among the pome fruit growers about 79 per cent households reported the problem of plant protection material related to its higher cost and availability and considered it as one of the causes of low productivity. On the marginal, small and medium size of holdings 80, 86 and 67 per cent households reported such type of problems. Among the stone fruits growers at overall level 46 per cent households reported the problems of plant protection materials and considered it as one of the causes of low productivity.

Chapter-VI

SUMMARY, CONCLUSIONS AND SUGGESTIONS

The State has achieved a significant progress in the production of quality pome and stone fruits in the country but the productivity of these fruits are far below the desired level. Horticulture development in Himachal Pradesh is an economic necessity. The horticulture sector in the state has made remarkable contributions to farming economy. The crop productivity growth is an indication of use of farming knowledge, technology, infrastructural development, farm investment and development of suitable price policy. It implies more efficient distribution of scarce resources.

Objectives

The present study was planned to highlight the causes and consequences of low productivity of pome and stone fruits in Himachal Pradesh. More specifically, the important objectives of the study were as under;

1. To study the socio-economic background of the sampled farmers.
2. To examine the trends in area, production and productivity of the selected fruits in the State.
3. To find the productivity of the selected fruits of the sampled households.
4. To find out the factors influencing the productivity of these fruits.
5. Suggestions to increase the productivity of the fruits.

Methodology

A Multi-stage purposive-cum-random sampling technique has been used in the selection of districts, blocks, villages and fruit growers. At first stage, two districts having maximum area under fruits (stone and pome fruits) has been selected for the purpose of the study. At second stage, one development block from each of the selected district, on the basis of having largest area under pome and stone fruits has been chosen. Further, from these development blocks, cluster of 2 revenue villages from each selected block were chosen purposively based on area, production and productivity of stone and pome fruits. From these revenue villages a sample of 100 growers has been drawn randomly on the basis of land holdings respectively. In order to achieve the objectives a simple tabular analysis has been used to estimate/calculate averages, percentages and ratio etc. Further, the compound growth rates for

area, production and productivity were computed with the help of exponential growth function.

Main findings

Socio-economic background of the sampled farmers

1. The average family size among the pome fruit growers at overall level is 5.04 persons and whereas among the stone fruit growers it is 5.68 persons.
2. The labour force among the pome fruit growers has been worked out 67.76 per cent. Whereas, among the stone fruit growers it is 65.85 per cent.
3. Literacy rate among the pome fruit growers at over all level has been worked out 88.43 per cent whereas, among stone fruit growers, it has been observed to be 89.51 per cent.
4. Among the pome fruit growers and stone fruit growers agriculture cum horticulture is the main occupation.
5. Average size of holdings level among the pome fruit and stone fruits growers has been estimated to be 1.44 hectares and 1.02 hectares at overall level.
6. Among the pome fruit growers the average value of implements has been worked out to be Rs. 24949.66. Whereas among the stone fruits growers it was Rs. 19997.60.
7. Among the pome fruits grower's average value of livestock is worked out to be Rs. 36040. Whereas stone fruits growers possessed livestock's of Rs. 58790 at overall level.

Growth trends in area, production and productivity of the pome and stone fruits

Apple

1. The area under apple fruit during the years 2006-07 to 2015-16 in the state is increasing at compound growth rate of 2.12 per cent per annum. Further, Lahual & Spiti district has the highest compound growth rate i.e. 12.09 per cent, per annum and which is followed by Bilaspur (6.72 per cent), Shimla (3.04 per cent), Mandi (2.72 per cent), Kullu (1.80 per cent), Chamba (1.6 per cent) and Kinnaur (0.99 per cent) districts of the state.
2. The production of apple fruit at state level during the years 2006-07 to 2015-16, has been observed to increase at compound growth rate of 7.42 per cent, annually. District-wise analysis of compound growth rate, Sirmour district has been observed to have highest compound growth rate in production of this fruit i.e. 20.77 per cent, per

annum, and which is followed by Chamba (16.88 per cent), Shimla (8.04 per cent), Kullu (6.95 per cent), Kinnaur (5.34 per cent), Mandi (3.18 per cent) districts of the state. Further, three districts viz; Solan, Kangra and Lahual & Spiti have registered a negative compound growth rate in apple production during the years 2006-07 to 2015-16.

3. At State level per hectare productivity of apple fruit, during the years 2006-07 to 2015-16 has been observed to increasing at a growth rate of 5.23 per cent, per annum. Further in Sirmour district of the state this compound growth rate is observed to be highest, i.e. 24.83 per cent, per annum, and which is followed by Chamba, Kullu, Shimla, Kinnaur and Mandi districts of the state, respectively.

Pear

1. At the state level, the area under pear fruit, during the years 2006-07 to 2015-16, has been decreased, at the compound growth rate of -0.88 per cent, per annum. Though, three districts namely Lahual & Spiti, Kinnaur, Shimla, and Mandi district of the state observed to increase the under this fruit at the compound growth rate of 5.5, 3.94, 1.03 and 0.03 per cent, annually. But eight district viz; Chamab, Kullu, Kangra, Bilaspur, Solan, Sirmour, Una and Hamirpur districts of the state has shown decline in area under this fruit with a growth rates of -0.07, -1.13, -1.23, -1.35, -2.17, -3.44, -3.98 and 3.98 per cent, annually.
2. It is observed that in Himachal Pradesh, during the years 2006-07 to 2015-16, the production of pear fruit has been increased at a compound growth rate of 7.44 per cent, per annum. District-wise analysis of data, Solan district is observed to be have highest compound growth rate i.e. 10.83 per cent, per annum and which is followed by Sirmour (11.79 per cent), Kullu (11.75 per cent), Chamba (8.54 per cent), Shimla (8.26 per cent), Hamirpur (1.27 per cent), Una (0.84 per cent) and Mandi (0.04 per cent) districts of the state. Further four districts namely; Kangra, Lahual & Spiti, Bilaspur and Kinnaur districts of the state had registered negative compound growth rate in production of pear fruit during the years 2006-07 to 2015-16.
3. During the years 2006-07 to 2015-16, the productivity of pear fruit in Himachal Pradesh is observed to increase at a compound growth rate of 4.63 per cent, per annum. The highest growth rate in productivity during the above mention period is observed in Solan district i.e. 14.64 per cent, per annum and which is followed by Sirmour (13.40 per cent), Kullu (11.75 per cent), Chamba (8.54 per cent), Shimla

(8.26 per cent), Hamirpur (0.84 per cent), Una (0.84 per cent), Mandi (0.40 per cent) districts of the state. Further four districts had shown negative growth rate in productivity of pear fruit, during the years 2006-07 to 2015-16, viz; Kangra, Lahual & Spiti, Bilaspur, and Kinnaur districts of the state.

Peach

1. The area under peach during the years 2006-07 to 2015-16 is observed to decreasing at a compound growth rate of -1.62 per cent, per annum. While, analyzing the district-wise growth rates of area under this fruit, the Kullu district has been observed to have highest compound growth i.e. 5.98 per cent per annum, which is followed by Kinnaur (1.58 per cent), Shimla (1.01 per cent), Mandi (0.54 per cent), and Sirmour (0.26 percent), Una (0.26 per cent) districts of the state.
2. The production of peach fruit has been estimated to decrease at a growth rate of -3.66 per cent, per annum, during years 2006-07 to 2015-16. District-wise analysis of growth rates, it is found that, in Kullu district, the production of this fruit is increasing at highest growth i.e. 60.42 per cent, and which is followed by Una, Chamba, Solan, Mandi and Kangra districts of the state.
3. The productivity of peach fruit, at state level, during the years 2006-07 to 2015-16, has been found to decrease at a growth rate of -3.51 per cent, annually. The highest annual growth rate in productivity of this fruit is observed in Kullu district i.e 51.50 per cent. Though, most of districts have shown positive increase but it was found to decline in four districts in the state namely; Shimla, Kinnaur, Bilaspur, and Sirmour.

Plum

1. The area under plum fruit during the years 2006-07 to 2015-16 is observed to increase at a growth rate of 0.28 per cent, per annum. While, district wise analysis of growth, it is observed that, Lahual & Spiti district has highest Compound growth rate i.e 10.81 per cent, per annum, and same is followed by Kinnaur, Hamirpur, Kullu, Sirmour, Shimla, Mandi and Solan districts of Himachal Pradesh.
2. During the years 2006-07 to 2015-16 the highest compound growth rate of production is registered in Lahual & Spiti district i.e. 10.81 per cent, per annum and which is followed by Kinnaur (10.81 per cent), Hamirpur (1.75 per cent), Sirmour (0.63 per cent), Kullu (0.39 per cent), Mandi (0.37 per cent), Shimla (0.36 per cent). Further the

production of plum fruit is observed to decline in five districts of the state, namely Solan, Chamba, Kangra, Una and Bilaspur.

3. The productivity of plum fruit, at state level, during the years 2006-07 to 2015-16, was found to increase at a growth rate of 5.72 per cent, annually. Though, most of districts the productivity had shown positive increase but it was found to decline in four districts in the state namely; Bilaspur, Lahual & Spiti, Kangra, and Hamirpur. The highest annual growth rate in productivity of this fruit is observed in Una district i.e 15.14 per cent.

Apricot

1. At State level, the area under apricot fruit during the years 2006-07 to 2015-16, has been registered a compound growth rate of 0.65 per cent, per annum. District-wise analysis of growth rate it is observed that the Lahual & Spiti district has the highest compound growth rate i.e 5.36 per cent, per annum and which is followed by Sirmour, Kangra, Mandi, Solan, Shimla and Kullu districts of the state. Further, three districts namely Chamba, Hamirpur and Kinnaur have been observed to decline in area under this fruit during the above mention study period.
2. The production of this fruit during the years 2006-07 to 2015-16 has been observed to increase by registering a compound growth rate of 5.51 per cent annually. The highest growth rate in production has been observed in Lahual & Spiti district i.e. 5.36 per cent, annually and which is followed by Sirmour, Kangra, Mandi, Solan, Shimla, and Kullu districts of the state. Further Chamba, Hamirpur and Kinnaur districts of the state is observed to be having a negative growth rate in production.
3. During the years 2006-07 to 2015-16, Kullu district has been observed to have a highest compound growth rate in productivity of apricot fruit, i.e. 42.64 per cent, annually and which is followed by Kinnaur (20.13 per cent), Lahual & Spiti (13.09 per cent), Chamba (10.35 per cent), Sirmour (6.02 per cent), Kangra (5.22 per cent), Solan (1.98 per cent), and Solan (1.98 per cent) districts of the state.

Productivity of pome and stone fruits

Variety-wise analysis

1. At overall level, per plant productivity of apple fruit has been estimated to be highest among the royal variety i.e. 5.65 boxes, and which is followed by red, Richard, golden and red golden variety of the apple.

2. Among the pear fruit, babukosha variety is observed more productive with 5.65 boxes per plant, which is followed by other varieties viz; tumba, burgmat, lambi dandi and half red.
3. At overall level, among the plum fruit growers, per plant productivity of santroza variety has been worked to be highest (3.04 boxes) than of meripoza and beauty varieties.
4. Among the peach fruit the July elberta has been observed more productive than of alton variety. The per plant productivity of July elberta is worked out to be 7.13 boxes per plant.
5. Among apricot fruit per plant productivity of shakarapara variety has been observed to having maximum productivity i.e. 4 boxes, per plant and than of safeda.

Age-wise analysis

1. At overall level, Per plant productivity of apple fruit, it is found that age group of 15-20 years is more productive (6.53 boxes per plant), than of 6-15 years and 20 & above years.
2. Among the pear fruit growers, at overall level per plant average productivity under the age group of 6-15 years has been worked out 1.33 boxes. Under the age group of 15-20 years the average productivity is worked to be 1.45 boxes, per plant. Further, under the age group of twenty and greater than twenty years the average productivity of pear fruit has been estimated 0.73 boxes, per plant.
3. Among the stone fruit growers at overall level per plant productivity of plum fruit under the age group of 6-15 years, is worked out to be 3.24 boxes. Under the age group of 15-20 and 20 & above 20 years, per plant productivity of plum fruit has been worked out to be 4.4 boxes and 0.97 boxes.
4. The per plant average productivity of peach at overall level has been worked to be 9.00 boxes under the age group of 15-20 years, which is highest and same is followed by others age group viz; 6-15, 20 & above 20 years.
5. The per plant average productivity of apricot, under the age group of 6-15 years has been worked out to be 6.40 boxes. Further, at overall level, under the age group of 15-20 and 20 & 20 years per plant average productivity has been worked out to be 7.80 boxes 1.50 boxes.

Changes in productivity of pome and stone fruits

1. It has been observed that the per hectare productivity of apple during the year 2016-17 was 1754 boxes and which decreased to 1508 boxes during the year 2018-19 with a percentage change of -14 per cent.
2. Per hectare productivity of pear fruit has also been observed to decrease, in the year 2016-17 it was 3000 boxes and same is decreased to 2170 boxes during the year 2018-19 with a percentage change of -28 per cent.
3. Per hectare productivity of plum during the year 2016-17 has been estimated 1231 boxes and same is decreased to 854 boxes during the year 2018-19, with a percentage change of -31 per cent.
4. Per hectare average productivity of peach has been estimated 2964 boxes during the year 2016-17 and same is decreased to 2536 boxes during the year 2018-19, with a percentage change of -14 per cent.
5. Per hectare productivity of apricot fruit has been 1250 boxes during the year 2016-17 and same is decreased to 830 boxes during the year 2018-19, with a percentage change of -33 per cent.

Factors influencing the productivity of pome and stone fruits

Low productivity of pome and stone fruits in the recent years has become a serious concern of the growers in all the growing areas. The productivity these fruits has been fluctuating year to year. The factors which influencing the productivity are climatic, varietal, inadequate pollinizer, pollinator, inadequate nutrition, poor soil conditions, poor canopy management, senile orchards, pathological factors, entomological factors, inadequate irrigation facilities, extension services, fertilizer outlet and plant protection materials. Most of factors influencing productivity are manageable to a large extent but the climatic factors are beyond the control.

Suggestions

In the views of causes of low productivity of pome and stone fruits, the following suggestions are being made to enhance production and productivity;

- Govt. should ensure availability of rootstocks and good quality planting material through its large multiplication by using micro-propagation techniques and planting of suitable variety at suitable site.

- Govt. should ensure adequate availability of imported cultivars of pome and stone fruits and top working with it, instead of the low yielding inferior plantation of seedling origin.
- Pome and stone fruits shows decline in productivity potential and fruit quality. Majority of orchards are senile and have become unproductive and uneconomical. Scientists should Rejuvenation these orchards on priority bases to enhance productivity.
- Govt. should improving orchard efficiency through orchard management. Orchards should be educated on the importance of irrigation, nutrient management, expansion of areas of cultivation.
- Govt. must ensure evolvement of such varieties which are resistant to major pests and diseases by non-convention approach. So the productivity of pome and stone fruits can be enhanced to desired level.
- High density planting of fruits is impetuous due to technology intervention and small holdings. This system provides high productivity, precocity, high returns per unit area and efficient use of inputs. Govt. should ensure such type of planting to enhance productivity of pome and stone fruits.
- Efficient canopy management ensures higher productivity of quality fruits to due to proper light interception, photosynthesis and dry matter accumulation. Govt. must ensure efficient canopy management through proper training and pruning.
- Orchards needs good balanced climate. But the weather of hills becoming warm due to cutting of trees and increasing construction of concrete structures. Govt. should stop such activities.