

An Assessment of Apple Cultivation in Kalpa, Kinnaur District, Himachal Pradesh

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I. Introduction

Apple (*Maluspumila*) is commercially the most important temperate fruit and is the fourth produced in the world after banana, orange and grape. About 70 million tons of apples were grown worldwide in 2013, and China produced almost half of this total. The United States is the second-leading producer with more than 6% of world production. Turkey is the third largest producer, followed by Italy, India and Poland.

The area under apple cultivation in India increased by 24% from 1.95 lakh hectares. In 1991-92 to 2.42 lakh hectares. In 2001-02, although production increased by less than 1% (i.e. from 11 to 12 lakh tones). It is mostly grown in the states of Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh and Nagaland. Apple belt of the Himachal is the most important crop, accounting for about 90% of the total horticultural production.

Study area

Himachal Pradesh is one of the ideal locations for apple cultivation, covering the districts of Shimla, Siramour, Kullu, Mandi, Chamba and Kinnaur considering the vast production of apple orchards. The much-awaited delicious variety of apples from Himachal Pradesh's Kalpa (Kinnaur district) where horticulture is considered as a major livelihood source, most of all the households are involved in horticulture activity. The major horticulture produce in this area is apple. Kalpa is a small village at a height of 2960m in Kinnaur district of Himachal Pradesh. This place is at a distance of 230 km from Shimla and at 13 Km from Reckong-Peo; the district headquarter of Kinnaur district.

Agro-Climatic condition

Apple grows at an altitude of 2,900 m. above m.s.l. in the Himalayan range which experience 1,000-1,500 hours of chilling (the no. of hours during which temperature remains at or below 7⁰ C during the winter season). In Kalpa the temperature during the growing season is around 20-23⁰ C.

For optimum growth, apple trees need 100-125 cm of annual rainfall. In Kalpa excessive rains and fog near the fruit maturity period results in poor fruit quality with improper colour development and fungal spots on its surface. Areas exposed to high velocity of winds are not desirable for apple cultivation.

In Kalpa, hilly loamy soils, rich in organic matter with pH 5.5 to 6.5 and having proper drainage and aeration are suitable for apple cultivation.

Land Grounding : For establishment of new apple orchard, proper layout of the proposed area is very essential.

Planting Substance

The budding and tongue grafting methods are commonly used for propagation of apple. The planting material should be purchased only from the registered nurseries and proper care should be taken during transportation of the same.

Sapling Spacing

In Kalpa, the average number of plants in an area of one hectares, can range between 200 to 1250. Four different categories of planting density are followed viz. low (less than 250 plants/ha.), moderate (250-500 plants/ha.), high (500-1250 plants/ha.) and ultra high density (more than 1250 plants /ha.).

Planting Process

Square or hexagonal system of planting is followed in the garden or valleys whereas contour method is usually followed on the slopes of mountain of Kalpa. Plantation of pollinator species in between the main species is essential for proper fruit setting. For establishment of an orchard having Royal Delicious variety, plantation of Red Delicious and Golden Delicious as pollinators is recommended by the Horticulture Department.

Irrigation

The water requirement of apple is 114 cm. per annum which can be scheduled in 15-20 irrigations. In summer, irrigation is provided at an interval of 7-10 days while in winter it is given at an interval of 3-4 weeks. At least 8 irrigations are to be provided during critical period (April-August) of Kalpa. It is said that a small plant needs 5-6 buckets of water, whereas a mature tree needs at least 12-15 buckets of water.

Fertilizer

In Kalpa, both biotic and chemical fertilizer is used. N, P and K which is applied in an orchard of optimal fertility are 70:35:70 g. /year (age of the tree). After 10 years of age, the dose is stabilized at 700:350:700 g. of N, P and K /year. The standard fertilizer dose of N, P and K in an “off” year (when the crop load is low) is 500 g., 250g, and 400 g. respectively. In some trees deficiency of zinc, boron, manganese and calcium may be observed which is corrected with the application of appropriate chemicals.

Harvesting and Yield

The orchard start bearing from eighth year and the economic life of an apple tree exceeds 30 years. From eighth to seventeenth year, productivity goes on increasing and thereafter remains constant up to 30 years. The level of productivity varies due to soil erosion, irrigation, use of fertilizer and snowfall. Somehow it is shown in Kalpa that production stage extends up to even forty years depending upon agro-climatic condition and proper gardening. Apple being a climatic fruit, the maturity period does not coincide with ripening. The fruits are usually harvested before they are fully ripe.

Table 1: Growing and Harvesting Period of Apple in Kalpa

Types of apple	Season		
	Sowing	Growing	Harvesting
Royal Delicious	March-May	May-August	August-September
Macintosh	March-May	May-July	July-October
Green Delicious	February-May	May-August	August-October

Source: Field Survey

Types of Apple

There are mainly three types of apple are grown in Kalpa, which are

1. Royal Delicious
2. Macintosh
3. Green Delicious

Table 2: Types and spatial features of apple

Types of apple	Spatial Feature
1. Royal Delicious	Discovered in 1875, the red royal delicious apple varieties grew on Jesse Hiatt's farm in Peru, Iowa. Having considered it as a nuisance, hiatt decided to chop down sapling, but the growth was enormous. Finally he decided to let it grow. It is dark red in colure and very tasteful.
2. Macintosh	The apple was discovered by farmer John Macintosh, having its roots in the early 19th century, with numerous offspring, the fruit has become a highly influential apple variety. The soft flesh is good for eating the fruit raw. Its creamy flesh is also good for making apple sauce or apple butter. With a refreshing acidity, flavor of the apple is simple and aromatic. It is light red with yellowish spot in colour.
3. Green Delicious	As a commercial variety and as breeding stock, Green delicious apple is one of the most important apple varieties. It is tested sweet & sour & almost oval in shape.

Production

After last year's lean season, apple cultivators in Kalpa are hoping for a good crop this year because of favourable weather. Regular snow and rain in apple orchards have sufficiently increased the moisture content in the soil that helped the plant get nutrients in the pre-flowering season. In 2010-11, 8980 quintal apple was produced in the Kalpa.

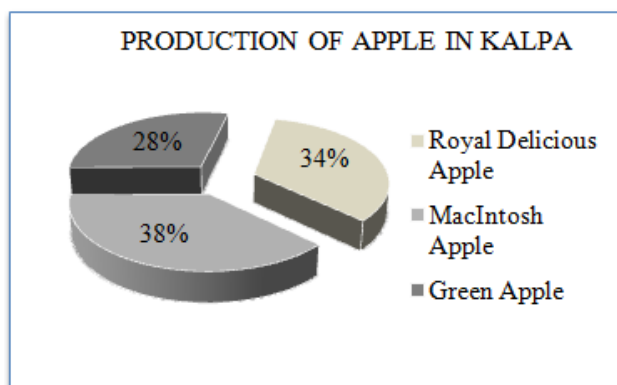
Table 3: Yearly Production of apple in Kalpa

Year	Production in quintal
1995-96	6,260
2000-01	8,250
2005-06	10,419
2010-11	8,980
2015-16 (Expected)	10,351

Source: Horticulture Dept. Recokng Peo, Himachal Pradesh

Year wise it is found that the apple production is gradually increasing in Kalpa. Sometimes the decline in the production is happened due to a snowless winter and dry monsoon. The field surveys estimate that there would be a good yield this year that would definitely overcome last year's production and expected figures of this year production could exceed 10,351 quintal. This year production of MacIntosh apple (37.83%) is much higher than other types of apple.

"A box of superior apple variety from Kinnaur is sold at a rate about Rs.2,200 and Rs.2,400 (\$35-\$39) in the Delhi market, which is 25-30 percent higher than any other apples coming from other districts", said Jai Chand ,a trader at Narkanda apple market, some 65 km from Shimla.



Source: Field Survey

Storage : Apples have a long storage life compared to other fruits and can be stored for a period of about 4-8 months after harvesting. The fruits can be kept in cold storage at a temperature of about 1.1⁰ to 0⁰ C and 85-90% relative humidity.

Packing: Apples are usually packed in wooden boxes having the capacity to accommodate of about 10 or 20 kg. Corrugated fibre board cartons are also used for packing in Kalpa. According to size of apple, cartons contain different amount of apples. Cartons contain 6 rows in small size of apples, it contain of about 4-5 row in case of big size of apples.

Marketing

Marketing of the produce is mainly controlled by intermediaries like wholesalers and commission agents. During years of good production, the wholesale prices in producing areas slip down to un-remunerative levels. Mainly garden owner of Kalpa give lease to intermediate farmers for some years. Apple produced in Himachal Pradesh is exported to Delhi, Kolkata, Mumbai and Gujarat at a large number and also apple produced in Kalpa is exported to foreign countries like Sri Lanka, Bangladesh, Canada, Myanmar etc.

Table 4: Major consumer of apple produced in Kalpa

Major Consumer	Percentage of Flow
Gujarat	5
Punjab	5
Delhi	40
Kolkata	30
Maharashtra	10
Others	10

Source: Field Survey

Diseases

In Kalpa, The main diseases reported are collar rot (Phytophthoracactorum), apple scab (Venturiainaequalis), cankers, die-back diseases etc. Plants resistance to the diseases should be used for cultivation. The infected plant parts need to be destroyed. Application of copper, oxychloride, mancozeb and other fungicides have been found to be effective in controlling the diseases.

Table 5: A brief SWOT analysis

Area of Interventions	Strengths	Weaknesses	Opportunities	Threats
Apple orchard	1. Existence of Regional Horticulture research Sub-station at Sharbo. 2. Good Apple production 3. Good Dry Fruits production.	1. Lack of storage facilities	1. Availability of surplus Land for further intensification of horticulture activity. 2. Interest of the villagers to expand horticulture activities	1. Climate Change 2. Various diseases

Source: Field Survey

Workers engaged in apple cultivation

In Kalpa, almost 78% of the local people have their own apple garden. Generally most of garden is situated beside their house. So, as a result all family members are involved in apple cultivation. Only small family kept some agricultural labourers coming from Shimla. It is said by primary survey that in Kalpa, youth to middle aged people are mainly involved in such cultivation.

Table 6: Workers engaged in apple cultivation

Sex	Percentage of population involve in apple cultivation			
	< 15 age	16-30 age	31-45 age	>45 age
Male	20	40	30	10
Female	30	30	20	20

Source: Field Survey

Every year garden owners sell a huge amount of apple. Apple cultivation is the main source of income of local people. Government of India declared this area as tax free area, which has also helped to enrich their economic condition. Himachal's Rs 2,500-crore apple industry, which accounts for more than 6% of the state's GDP and supports more than half of its rural population across six districts, is facing stiff challenge from better quality imports that are often competitively priced.

II. Conclusion

Apple cultivation has found to be the most important horticultural farming in this area. It has got great future prospects in terms of export. It does influence in the socio-economic life of the inhabitants of Kalpa. The growing importance of the Apple Industry is bringing about a revolutionary change in the state. Himachal Pradesh is now one of those states of the country which is quickly transforming itself from the most backward state to an advanced one.

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