Chapter -3

Different Fruit Crops Grown, their uses and importance
Different Fruit Crops Grown, Their uses and Importance

Rajouri is the home of both temperate as well as sub-tropical fruit crops. The temperate fruits popularly known as hill fruits or cold fruits are grown at an elevation of 1200-2000 metres and above the hills. The temperate fruits have a low to medium requirement of temperature and can resist an intense winter cold too. They shed their leaves with the approach of winter and remain in dormant condition throughout the winter months. Severe winter temperature is essential to enable these fruits trees to start normal growth in the spring. When grown in conditions of mild winter, the trees start growth late in spring and thus interfering with their normal flowering and fruits setting.

The fruits of Rajouri can be divided into two broad categories on the basis of climatic conditions under which they grow and produce well. In the first category may be grouped the apple, the pear, the European plum and the walnut, which do best under severe winter conditions usually experienced at an elevation above 1,500 metres in some hilly areas. Depending upon this aspect, they can also be successfully grown up to the elevation of 2,300 metre or even higher. In the second category may be grouped the peach, the Japanese plum, the apricot, the almond, grapes, ber and mango, which thrive in comparatively warmer situations at an elevation of 1,050 to 1,520 metres.

The fruits like apple, pear, plum and other fruit trees can be grown on different soil types, but the ideal soil is fairly deep, well drained, medium loam. Descent varieties of apple are more exacting in their soil requirement and should, therefore, be planted under the most suitable conditions of soil and drainage. Pears grow better on well drained, heavy soil, and are less tolerant of dry conditions than apple. The requirement of plum is about the same as that of the pears. Even poor soil with gravels would give reasonably good result if plenty of well rotted farmyard manure or compost is incorporated in the sub-soil before planting.
The area and the site selected for the cultivation of temperate fruits must be free from frost. Cold air which is heavier than warm air, collect in the low lying ground in the valleys where there is no outlet for it. Such frost pockets should be avoided. Some varieties are more resistant to the frost damage, and if proper selection is made much of the damage due to frost can be avoided.

Some species and varieties of the temperate fruits are indigenous to the State of Jammu and Kashmir, but the cultivated varieties grown in the region have largely been imported from abroad from time to time and from one region to the other. In 1936, the government of then Patiala invited Prof. R.W. Hodgson of the University of California for advice on fruits development in the region. As the result of their recommendations, ten orchards were established at different elevations in the hilly areas of Jammu and Kashmir to study the adaptability of various temperate fruits. These trails yield the most valuable information.

In Rajouri the area under temperate fruits is by no mean increasing at present, but the quality of fruit produced is superb and compares very favorable with that attain in other areas. The present production can meet only a small fraction of demand and consequently the prices remain very high. In view of this, there is ample scope for increased production and area under these fruits in the region.

3.1 Important varieties of the fruits grown.

3.1.1 Apple

The apple (*Malus pumila*) is a native of south western Asia and has been cultivated in the temperate regions of the world from time immemorial. It is the premier table fruit of the world. The crab apple (*Pyrus baccata*) grows wild in the Himalayan hills including Kashmir, its adjoining areas in Jammu division like Rajouri and poonch and is successfully cultivated in the northern plains. A dessert apple variety called Ambri is
said to be indigenous to the state of Jammu and Kashmir, and is most popular and widely grown apple variety in the region. The rest of the varieties grown in the country were imported from abroad at once times or the other.

The cultivated apple (*Malus domestica*) has originated in the temperate region of western Asia between black sea and Caspian Sea. Since the pre historic time it has existed in Europe, both in the cultivated and wild forms. Apple cultivation by Greeks and Romans seems to have been started from a few centuries BC. It is not known when the apple was introduced in the cooler parts of India but evidences show its presence in Agra in 1632. A dessert apple variety called Ambri which is indigenous to the Rajouri and in other areas of Jammu and Kashmir is the most popular and widely grown apple variety in that area. All other varieties were introduced by the European settlers firstly, missionaries and later on by elite growers, nurserymen and research introduction centres from time to time.

The apple is by far the most important of the different temperate fruits grown in Rajouri. The large scale introduction of apple varieties was made in 1887 by Mr. Alexander Coutts. The famous delicious variety of Kashmir apple was introduced by Samuel stokes a residence of Philadelphia, USA, in 1918.

The average temperature should be 21°C to 24°C during the growing season of the crop. Most of the varieties of apple require about 1500 hours below 7°C to break the rest. The areas and the location where frequent frost and hailstorms are common should be avoided for the cultivation of apple. Generally a cool climate with low winter temperature and little rainfall in summer are considered most suitable for the cultivation of apples. The soil for the cultivation of apple should be loamy and rich in organic matters without water logging. The soil suitable for apple cultivation should be slightly acidic to neutral reaction with 5.5 to 6.5 pH. It is always advisable to consider soil profile and soil texture before establishing and apple
Important varieties of apple grown in Rajouri and other parts of Jammu and Kashmir state are.

(i) **Apple Ambri (Ambri Kashmiri):** Ambri is the most popular indigenous apple in Rajouri. The size of the fruit is from medium to large, oblong, elliptical and tapering with yellowish green, tough, shining, smooth and 3/4\(^{th}\) stripped with red colour skin. The flesh is white, tender, crisp, juicy, aromatic and a good cropper and regular bearing variety. Picked at the end of September and available up to April. It is a sweet fruit ripening in October and keeping its condition for a long time and finding favours for its fragrance, sweetness and handsomeness.

(ii) **Maharaji (White Dotted Red):** It is a large size apple having bright red color on green base with conspicuous dots. Fruit of this variety is medium to large, roundish, and flattened with smooth, glossy skin covered with reddish strips and bluish white bloom. Dots white, many conspicuous, flesh yellowish white, crisp, tender, juicy, sub-acid. It is also cooking and dessert variety sweetens in storage and is an excellent keeper. The fruits mature in the late October to starting November.

(iii) **Red Delicious:** It is one of the most widely grown apples and is a world renowned variety. The fruit is tapering in shape with characteristics five lobes at the apex. Skin is smooth, stripped and deep dark red in color. Flesh is fined grained, greenish white, sweet, very juicy and crisp with good aroma. Size is medium to large and become mature by the end of September and keeps till October. It is a good dessert, excellent variety, commands a premium in the market. It is a regular and good cropper.

(iv) **American Trel (Apriouge):** This variety has crisp, juicy greenish white and sweet flesh and is usually medium sized, as a result has become popular with consumer. It is of oblate shaped, deep and patchy red with smooth surface. It matures in the last week of September and is a good dessert variety.
(v) **Golden Delicious**: The variety of this apple is round in shape with smooth skin, golden color, and fine grained flesh; sweeten taste, very juicy and fully crisp. Mature in the end of October. This variety carries the highest food value.

(vi) **Baldwin**: It is an American variety, and is very successful in Kullu valley as compare to the Jammu and Kashmir. However, are grown in the state of Jammu and Kashmir. Fruits are of large size and deep bright red color. Flesh yellowish white, crisp, juicy, tender and mildly sub-acid. The quality of this variety is also very good, and are picked in October and keeps till March.

(vii) **Blood Red**: Fruit are of medium size, slightly flattened, oval, skin slightly ribbed and entirely covered with deep scarlet red colour and bluish bloom. Flesh pale yellow, crisp, tender, juicy aromatic, a distinct alternate bearer, picked in October.

Apple is a rich source of carbohydrates, protein, minerals like calcium, phosphorous, iron, sugar, potassium, thiamine and vitamin B6. Carbohydrate found in the apple consists of sugar, dextrins, starch, hemicellulose, cellulose and pectic substances. The apple fruits have been found to contain appreciable amount of sorbitol and various sugars. Sucrose, glucose and fructose content are also found. The major acids in apple are malic and citric acid.

Apple is of many medicinal values, it is believed to reduce the dental caries, helps to control obesity and supply extra energy for heavy exercise. It is chiefly used as table fruit. It is said that an apple a day keeps the Doctor away. The various products like jam, jelly, preserve, slices, saucer, apple butter, apple chips, apple rings, wine, juice, concentrated juice, cider and powder are prepared from apple.
3.1.2 Pear

A pear is one of the superior temperate fruits having good taste and flavour. It is next only to the apple amongst temperate fruits in production and varietals diversity. It is largely grown for consumption as a fresh fruit. Because of its wide range of soil and climatic adaptability, it is grown in both temperate and sub-tropical conditions. However the lack of attractive shape, colour and perishable nature and lack of processing industries in the state of Jammu and Kashmir are serious impediments in its cultivation on a large scale. The cultivation of pear has received a boost as a commercial crop and acreage under this fruit crop has been steadily increasing because of its high yield potential and good economic returns. Its need relatively less care as compare to apple due to its hardy nature which enable its to flourish well even on water logged soil where most other fruits trees fail to grow. It is also well known for its keeping quality and stands transportation to distant consuming centres. Pear is only fruit which offer good prospects as it is relatively free of any serious problems as compare to other citrus fruits. This is one of the main reasons that fruits growers today are switching on to the pears cultivation on a large scale.

Most of the species of the pear are native to the northern hemisphere of the old world. No species of pear is indigenous to either north or South America or Australia (*Pyrus pyrifolia Nakai*) is the most widely distributed of the oriental pears, extending over the entire china and some parts of Japan, where its culture dates back to 2500 to 3000 years. It may have been introduced in India from china during (120-170 A.D) its cultivation than spreads to other parts of the northern India.

The most important characteristic of pears is that it can tolerate a wide range of climatic condition. Most commercial cultivators require 900 to 1000 hours of chilling below 7°C to break rest. During dormancy it can tolerate even more cold temperature. Pear is essentially a temperate region fruit. However, it can be grown successfully in mid zone of Jammu division
also. Pears are grown successfully on a wide range of soils provided they have sufficient moisture. They are less tolerant to the drought and rather more tolerant to the impeded drainage as compare to apples. Some of the important species of pears grown for commercial cultivation in the study area are.

(i) **European pear** (*Pyrus communis* L.): The trees of this species grow in upright manner. Lenticels are present on the twigs. Barks are light brown to grey in colour. Shoots are light brown in colour. Leaves are small ovate, 5-10 cm long, margin serrated, base obtuse, leaves are dark green on above side while light green on under surface. It has persistent calyx, fleshy pedicels and pyriform shape in different form.

(ii) **Shiara** (*Pyrus serotina* Rehd): This species is the wild relative of the pear and is widely used as rootstock. Trees of this variety are 8-9 metre in height, spreading in nature. Leaves are ovate, 8-10 cm in length, medium in size, pointed at the tip, long spines, stout and pointed. Leaf margins finally serrated. It has deciduous calyx and fruits shape like apple.

(iii) **Chinese or Japanese or Sand pear** (*Pyrus pyrifolia*): The heights of the trees are 9-10 metre, having habit of spreading growth. Its bark is rough, splitted and light brown in colour with lenticels. Branches are with drooping habit with pubescence on young shoots. Leaves are mostly ovate, 10-15 cm in length with margin crenate, base round, apex narrowly acuminate. Leaves are dark green above and are light green below with pale green midrib. It has deciduous calyx, non fleshy pedicel and fruit shape like the apple fruit.

(iv) **Kainth** (*Pyrus pashia* Hamilton): The trees of this species are always grow upright, and are commonly used for rising of rootstock. Trees are 9-10 metre in height. Branches are thicker; leaves are elliptical, with serrated margin, acute apex, 5-7 cm long. Spine present, long and pointed. Fruits are sub-globose, brown and are one inch long.
(v) Hybrid Pear (*Pyrus communis* X *Pyrus pyrifolia*): Trees are spreading and medium in vigour. Leaves medium in size having 8-10 cm length, heart shaped, broader at the base and narrow toward the apex, upper surface glabrous, and undersurface light green. Fruits are small to medium in size and pyriform in shape with attractive greenish yellow color.

Pear is very delicious and juicy fruit and is a rich source of protein and mineral. Ripe fruits contain 10.0 to 13.0 per cent total soluble solids and 0.20-0.32 per cent acidity. Brix acid ratio in *Paternakh* is 36:1, in leconte 47:1 and in *Baggugosha* is 60:1. The protein content in pear is 0.6 per cent. It is used in the preparation of several delicious products as pear preserve, jam, chutney, juice and canned pear. Its preserve has attractive amber colour with flavour.

3.1.3 Peach

Peach has a good position among the stone fruits in Rajouri. All the common varieties of peach belong to the species *Prunus persica*. The growing of peach in undivided India was mainly done in the earst-while North-West Frontier Province. Even today the bulk of the supplies of this fruit are from that place. In the plains of north India, cultivation of peach has attained a significant position during the last few years and still there is scope for putting more area under the fruit. The cultivar Flordasun was recommended for commercial cultivation in the plains of Kashmir, Rajouri and its adjoining Jammu region along with the plains of Punjab as this was found to be more promising. The fruits of this variety ripen very early and fetches good price when there is no other fresh fruits in the market.

The peach is grown as a commercial and home fruit in most of the temperate countries of the world. According to early writers it might be the native of Persia. However the cultivated form of peach came to Indian temperate region from china. Peach ranks second only after the apple in terms of their commercial importance. Early spring planting for peach is
better than planting in autumn. The plants should be whitewashed to protect them from sunburn. Light, deep and well drained soil is suitable for the cultivation of peach.

The peach is delicious juicy highly palatable fruit. It is the rich source of vitamin A, iron and protein. The total soluble solid in different varieties range from 10.0 to 12.0 percent and acidity 0.4 to 0.6 per cent. Brix° acid in flordasun peach is 28:1.

The fruit is generally consumed fresh but delicious squash can also be prepared. The fruits of some varieties can be canned with good success. The cultivar Shan-e-Punjab and florda red has been found suitable for canning. The important varieties of peach grown in Rajouri are:

(i) *Prunus persica* Batsch: It is much like the almond in botanical characters. It is the common peach having low headed tree with glabrous twigs. Leaves are 10-23 cm long and are broadly lanceolate, finally sharp serrate when young, otherwise, coarsely-serrate. They are shining above and are lighter beneath. The petiole are usually gland bearing, flower solitary, pink in appearance, the sepals more or less pubescent on outside, fruits are soft, stones are deep pitted and very hard.

(ii) *Prunus davidiana*: The tree is slender willow shaped, leaves are smaller and narrower than the common varieties of peach and are tapering near the base into very long acuminate point, very sharp serrate, light green. Flowering occurs very early and are one inch or slightly more in diameter, light pink, solitary, the sepals glabrous. Fruits are nearly globular. The suture prominent, pubescent, yellowish or grayish, stone small and nearly spherical and free from the whitish dry flesh.

(iii) *Prunus mira*, Wilson: The trees are small with bushy slender branches. Leaves are narrow, long and pointed. Fruits roundish and or oval, pubescent, flesh white and freestone. Stone are usually small and smooth. The tree has late blooming habit.
3.1.4 Plum

The cultivated varieties of plum in India in general and in Jammu and Kashmir in particular are drawn from two sources, the European varieties (*Prunus domestica*) and Japanese varieties (*Prunus salicina*). The plum is temperate in nature and is a strong growing small tree. The low chilling early varieties of plum come into the market when the other fruits are scarce and thus had little competition in the market at that time. The establishment of plum orchard is easier than certain other fruit trees because of its relatively hardness. In orchard such as pear, mango and litchi which come into bearing rather late plum may be planted as filler tree.

The plum is probably native of China. Some of its varieties were taken to Japan about 1500 A.D. after that they are known with the name of Japanese plum. Some of the varieties of salicina cultivars were later introduced to Europe from America. The cultivation of plum in India was started by European settlers in 1870 in Kashmir, Kulu, Shimla and Kumaon hills. The cultivation of plum needed less of winter chilling i.e. about 700 to 1000 hours below 7.2° C. most of the varieties are resistant to winter cold and thus can be grown in the extreme northern regions. The bloom period of plum tend to delay on the northern slopes thus helping them to escape spring frost injuries. The plum grows and produces well in the low and mid hill region ranging between 650-1650 metres above the sea level. Cool winter and warm summer are suitable for the successful cultivation of plum. The Japanese plum can even do well on the inferior soil having shallow water table and high pH. However, well drained medium to deep soils are much suitable for good growth and longer life of plant.

(i) *Santa rosa*: The fruit of this variety are purple crimson in colour. Trees grow upright; flesh is amber with red colour near the skin. It is self fruitful and prolific bearer cultivar. The fruits are picked in July and are very juicy characteristic flavour.
(ii) **Beauty**: The fruit is medium sized, deep red in colour, clingstone, delicious and early prolific and a regular bearer, picked in July.

(iii) **Bright Red Burbank**: This is a Japanese variety with almost globular fruit, halves equal, apex roundish, and skin dark red. Flesh becomes very sweet and is of agreeable flavour. Very prolific and a regular bearer, picked in July-August.

(iv) **Early Transparent Gage**: fruits rather small and roundish, delicious, regular and fairly prolific. Ripen from the middle of July onward.

(v) **Grand Duke**: fruits are very large sized, oval, halves unequal, apex flattened. Skin dark purple in colour, flesh greenish yellow, prolific, good for cooking and jam, ripen at the end of August.

(vi) **Alu Bokhara**: The tree is upright, tall and vigorous and is self unfruitful. However, a good pollinizer for this variety is fruitful, fruits large having yellow skin tinted with red colour, pulp is juicy and sweet. Besides being palatable and delicious, it has high nutritive values. It is one of the richest sources of vitamin B1 (Thiamine). Plums are also rich in vitamin A and riboflavin. It is the good source of sugar, protein, carbohydrates and minerals like calcium, phosphorus and iron.

The plum is known for its cooling effect and is considered best to overcome the effect of Jaundice. Their leaves are also used as mouth freshners. Various kinds of juice, jam, jellies and chutney are also prepared from the plums. Certain varieties are consumed dried to make prunes.

3.1.5 **Almond**

The almond (*Prunus amygdalus Batsch*) is one of the oldest tree nut crops in the world. It is a favorite nut fruit in India and is grown in the Jammu and Kashmir. In Hindi it is also called *Badam*. It is the concentrated source of energy due to its high oil content. As the production of almond is very much limited, almond cultivation has been in progress to some extent
in the hilly areas of Jammu and Kashmir and Himachal Pradesh. It is the native of Mediterranean region and is under cultivation there from time immemorial especially in the warmer part of the world bordering the Mediterranean Sea. It was probably carried to Greece, North Africa, Europe, Australia and America.

It is mainly cultivated between latitude 36° and 45° N, although under certain mild climatic conditions. Cultivation may extend further north. The major almond growing areas in India are the valley of Kashmir and its surrounding area of Baramula and Anantnag. However, it also grows in Rajouri and Poonch but with low percentage.

Almond can be grown in the both temperate and sub-tropical area successfully with low rainfall. Precipitation at the time of flowering and fruit maturity is injurious. The area located between 30° to 40° north and south are considered successful. Elevation of prominent almond growing areas ranges from about 700 to 2500 metre above sea level. The altitude for almond growing areas in Rajouri ranges between (1500-1800) metres above sea level. It can be grown successfully on lower elevation too as almond known for low chilling requirement. The areas in the study area where almond grow have an altitude of 1650 metre above sea level. The places get the annual rainfall of nearly 400 mm which is fairly distributed through out the year.

For crop maturity almond requires a fairly large number of heat units and may not do well at places where summers are cool and foggy. At a place known as Dalwal in Jhelum district of Pakistan almonds are grown successfully under sub-tropical and sub montane conditions. The chilling requirements of almond for growth and fruiting are rather low i.e an exposure to low temperature of 250-500 hours below 7.2°C during winter is only needed. Light loam soils are considered suitable for almond, while heavy soils are not suitable. Deep alluvial soil is much important for the development of almond. Almonds are not very fastidious in their soil
requirement, however good drainage is essential. In those areas where soil is poorly drained, even well grown almond trees collapses suddenly due to saturation of soil for three to four days.

A lot of emphasis was laid on the cultivation of almond in Jammu and Kashmir in the past. All the old plantations are of seedling type. The plantation of budded plants of known cultivars of good quality, thin shelled and mostly medium shelled is now being encouraged. A considerable number of varieties of almond are also procured from Australia, Greece, Italy, Spain and USA. Three types of almond grown are (i) Sweet hard shelled, (ii) Bitter hard shelled and (iii) Paper shelled or Romali, besides two main types of almond mainly foreign and kabuli are commonly found. Important commercial varieties of almond have been introduced in the region are imported from U.S.A.

The almond is highly nourishing and has great medicinal values. It is the rich source of protein, fat, mineral and vitamin B1. The kernel of almond is very high source of energy and results in 655 calories per 100g fresh weight. Kernel of almond contain rich amount of copper which is considered good for human brain. Very valuable oil called roghan badam is extracted from almond and is consider a highly valuable medicinal value, also used pharmaceutical and cosmetic preparation; it can also be used for consumption for increasing thinking power.

3.1.6 Apricot

The apricot (Prunus armeniaca L.) is one of the important stone fruit of Rajouri. It is drought resistant, salt tolerant, hardy plant less susceptible to pests and diseases and insects. Apricot is considered to be originated in north east china, and procured to India very late. The area suitable for its cultivation is taken as temperate zone lying between 33° and 70°E longitude and 53° and 30°N latitude. Wild apricot (zardalu) appears to be indigenous to India.
Apricot is very much susceptible to frost due to early flowering. Flowerings are suffers from frost during the period of early February or March. Temperature limit for flowering lies near about 27-32°F and for fruit setting is 30-32°F. The minimum temperature for the fruit ripening varied from 15-19°C. An altitude of 1200-1500 metres above sea level is successful for the growth of apricot. An uninterrupted warm spring and long cool winter are favorable for apricot fruitining. The flower buds drop if the temperature remains hot for long period during the dormancy. An annual rainfall of about 100 cm is sufficient for obtaining good crops. The trees of apricot are hardy to grow in most of the soils which is well drained and deep. The soil should be about 3-4 metre deep. If the drainage is good high lime content of the soil help to the growth.

The varieties such as New Castle, Gilgiti sweet, Shipley early and kaisha are grown along the mid hill areas, while Moorpark, Turkey, Royal, St.Ambroise and Charmagz in mid as well as high hills. In some areas with high altitude Nari, Kaisha, Charmagz, Halman and Rakcha Karpu are predominant.

It is a delicious, attractive and highly nutritious fruit. It is the rich source of vitamin A and contain much more carbohydrate, protein, mineral, phosphorous and niacin then majority of other fruits. It also contains calcium, iron, thiamin, riboflavin, ascorbic acid, vitamin B1 and vitamin B12. The pulp of the fresh apricot contains pectic substances as calcium pectate.

3.1.7 Walnut

The walnut (*Juglans regia L.*) is popularly known by the name of *akhrot* in India. In India Jammu and Kashmir is the principal walnut growing state. It is a native of the north western Himalayas and is found growing in all parts of the Himalayan regions including Kashmir Himalayas between the elevations of 1,219 to 2,134 metres above sea level. Walnut
believed to have originated in Iran and its surrounding areas. It was brought to Europe by the army of Alexander. The walnut move from Italy to Spain, France, Portugal, Germany and USSR and went to China from Tibet and then to India. In India walnut confined to the state of Jammu and Kashmir and is also spreading to Himachal Pradesh and Uttrakhand. Jammu and Kashmir has large areas under the walnut cultivation.

The walnut requires a climate which is free from frost in spring and from extreme heat in summer. A temperature of even 2 to 3 degrees below freezing point (0°C) results in the killing of a large percentage of young walnut flowers if they are just starting to bloom. If the summers are very hot, the nuts get sunburned, and such nuts usually become “blanks”, particularly if the temperature goes to about 37.8°C in the shade and humidity is low. The nut is mostly grown in the mid-hill areas of Kashmir, Jammu, Rajouri and Kangra in the Himachal Pradesh and Uttar Pradesh. They grow well in areas with rainfall of about 76 cm or more. If other conditions are favorable, the deficiency in rainfall can be made up by artificial irrigation.

The soil most suitable for walnuts is a well-drained deep silt loam containing an abundance of organic matter. It should not have a fluctuating water level, hardpan, sandy sub-soil and alkali. A soil 2 to 3 metres deep gives the best results, because walnut roots penetrate up to a depth of about 3 metres. The trees growing on a shallow soil with less moisture content are liable to suffer more from sunburn than trees growing on a deep silt soil. Since the trees attain a huge size and require wide spacing, the farmer’s don’t like to put their cultivated area under walnuts. They are mostly grown on unreclaimed area and poor types of soil at odd places, on terrace walls area near the dwellings. Still they grow fairly well and yield variable quantities of nuts over a long period. It is only the marginal or sub-marginal types of soils that are likely to be devoted to this nut, the better class of land
being reserved for farm crops or more paying fruits like pomes and stone fruits.

Almost all the trees in this country being of seedling origin, no standard named varieties exist. In Jammu and Kashmir a regular survey of walnut trees was undertaken along with other fruits from 1945-1953 when some 900 samples of walnut were collected which were divided into 75 groups according to the shape and external characters of the nut. Stray trees producing excellent qualities of nut are also grown there. These trees produce paper shelled walnut of white colour and big size. The kernel separates easily and is of white colour and of excellent taste and flavour. The walnut cultivation can be greatly improved if all such trees are marked and the very best out of them propagated vegetatively. A systematic study and propagation of these varieties is the prime need of the walnut industry in these areas.

The walnut of Rajouri is the rich source of energy containing protein, fat and mineral. It contain good amount of vitamin of B group and is the richest in vitamin B6 among all the other nuts. Both immature fruits and the green hulls of walnut are very rich source of ascorbic acid. Immature fruits of walnut can be use for preparing various products like pickles, chutneys, marmalades, juice and syrups. Walnut oil is used for edible purpose, artist’s oil colour, warnishes and soap making. The oil cakes being rich in protein are fed to the cattles. The fruit has excellent flavour and is mainly consumed as a dry fruit. Its usefulness in cooking is highly acclaimed, because it adds desirable aroma, flavour, crispness, tenderness to dishes. They are also given in the form of gift at auspicious occasions. The nuts are processed by blanching, slicing, chopping, grinding into paste and butter and combining with other foods. Kernels are also taken as snacks between regular meals. The shell flour is extensively used as an ingredient in plastic fillers, battery cases, moulding resin forms, industrial tile and in insecticide spreader.
3.1.8 Cherry

Cherry is one of the important temperate fruit which occupies a unique position among the temperate fruits of India. It is one of the important fruit of Jammu and Kashmir. The cultivated cherries have been broadly divided into two main groups of sweet cherries (*Prunus avium* L.) and sour cherries (*Prunus cerasus* L.). In Rajouri and all over the Kashmir valley the cultivation of sweet cherries has been done on the commercial basis.

It is considered to be the native of turkey and south east European region and as far as east as northern India and china. The sweet cherry probably originated between the black sea and Caspian Sea and its dispersion to Europe by migratory birds. Different type of sour cherry exists in Eastern Europe and western Soviet Union. The sweet cherry needs comparatively warm temperature as that of sour cherry, because sour cherry can tolerate more cold then the sweet cherry. The sweet cherry suffered more bud damage at -25-30°C in the nursery stage then the sour cherry. In the orchards the sweet cherry suffers more from frost. Sour cherry requires 15°C mean temperature during the growing period and don’t thrive well in the warm climate. The sweet cherry is badly damaged at both severe cold and warm climate. They are well adapted at an elevation above 1500 metres. The preferable site for the cherry plantation is the hill slope where the cold air may drain down. The trees grown on the southern aspect on low elevation may suffer from drought in the month of may-June. Heavy rains at the time of flowering and towards ripening period cause heavy damage. The soil with high fertility is suitable for cherry cultivation. It gives better performance on well drained warm, deep, free working and sandy loam soil. The soil should able to hold sufficient water for 15-20 days during the period of high water requirement. Cherries are not able to tolerate wet feet; therefore soil with water logging should be avoided.
Numerous varieties of sweet cherry have been tried out in the hilly areas of India, particularly Jammu and Kashmir. Some of these are:

(i) Bedford prolific: it has black skin, flesh of good taste and flavored, early flowering cultivars and ripen in mid of May.

(ii) Cherry Mishri: it is large sized with red in colour with firm skin and sweet and juicy flesh.

(iii) Cherry Awal Number: it is of medium size, light red colour and quite fleshy. The flesh is juicy and sweet with acidic tinge. It comes into the market in the month of May.

(iv) Cherry Double: This variety is large sized and attractive with creamy-red colour, the flesh is firm and juicy but slightly acidic. It is a good keeper used for excellent canning and dessert purpose.

Cherries are rich in protein, sugar, carotene and folic acid. Its fruits are also rich in potassium, calcium, iron, magnesium, zinc and vitamin C. The sweet cherry is mainly used for table purpose and also in canned fruit cocktail, bakery, confectionary, ice cream, juice making, fruit salads and distilling liquor. The sour cherry is mainly used for processing purpose. The wine produced from sour cherry is very popular.

3.1.9 Mango

The mango is cultivated only in the few patches of Jammu division where the sub tropical climatic conditions prevail. The mango cultivation of Jammu and Kashmir is not too much because of its cold climate and unsuitability of the soil. The mango cultivation in Jammu scattered in few patches and some of the best varieties such as Dasehri, Chousa, Langrah are also grown there. However in temperate its production becomes low.
3.1.10 Ber

The cultivation of ber is confined only to the few patches of the area where tropical to subtropical climatic conditions prevails. It is one of the important fruit crop. Most of the varieties of ber grown in Jammu and Kashmir wild and plants are small bushy type.

3.1.11 Grapes and pomegranate

In the older days Jammu and Kashmir was celebrated for its grapes; but now only few patches are cultivated. It is difficult to find good dessert grape in the area. As far as pomegranate and its varieties are concerned, only few varieties are present. However it has been observed that there is a regular increase in the percentage of area and production of sub-tropical fruits in some parts of Rajouri and in other parts of the state.

3.1.12 Other Wild Varieties of Fruits

There are hundreds of other varieties of fruits which are wild in nature and are very useful for the people of the areas located near the forested areas. It is said that these varieties of wild fruits have the medicinal value much important then the general fruits. Most of the people living in the hilly and forested area depend on the wild fruits for nutrition. The transhumans which are migratory in nature used these wild varieties of fruits in their diet. They also keep them preserved for winter as these fruits are the rich source of protein, vitamins and minerals as compare to other food grain crops.

3.2 Fruits Related Industries and Their Importance

3.2.1 Preservation Industries

Fruit preservation industries in the modern times have become an important part of the development programme, in the area where fruit culture is practiced. In the state of Jammu and Kashmir, fruit cultivation
constitutes an integral part of the over-all economy of the state and as such preservation is considered to be very essential for the simple reason that all the fruits particularly defective, deformed and very small size fruits which otherwise cannot be marketed because of their very low price, cannot be consumed.

One of the regular and disturbing problems being experienced by the growers in the state is that many fruits ripe during the period from September to the end of October resulting in market gult. The small growers as a result of this situation suffer a lot because of low prices caused by the abundant supplies of fresh fruits mainly apple to the market. As soon as the season ends, supply is restricted with the result that the prices raise steeply. The solution of the problem lies in the fact that fresh fruits when ready should be sent to distant markets in the country. This will save large quantities of fruits from spoilage and thus the prices in the local market will not go down to such an extent that the grower may be looser.

Thus all the fruits cannot be marketed at one time, it is therefore, essential that surplus quantities of fruits should be kept in cold storage. The latter facility cannot be availed of by large number of small growers who cannot afford to pay charges for the cold storage facilities. Under these circumstances the middlemen appear on the scene and purchase the bulk of fresh fruit at the prevalent market rate which is definitely low and put the possible quantities into the cold storage. When the season is off, these middlemen sell the fruit at exorbitant rates to the whole sellers. Such situations deprive the fruit growers to make good profits.

To solve these problems there is an immense need of solution. Therefore the solution of the problem is two folds. Firstly, the government should provide maximum cold storage facilities at cheaper rates to the small growers and secondly, there should be more factories for the preservation of surplus fruits including second grade and deformed ones which usually fetch low prices in the market. The low quality inclusive of deformed and
small size fruits account for about twenty to thirty per cent of the annual production in the valley of Kashmir. In the absence of proper existing facilities for preservation of fruits the above noted quantity goes waste, causing huge loss to the growers as well as to the state. The importance of preservation of fruits products in the modern times needs little emphasis. It not only helps to raise the economic standard of the growers but it also provides nutrition to a large section of the population. It is also useful, from the point of view that it provides some essential minerals to the human body. Fresh fruits if consumed in daily diet help in maintaining good health.

It is evident that preservation is more in the private sector than in the public sector with the exception of two items i.e. beverages and vinegar, which occupy satisfactory position in the public sector. It is also obvious that in the private sector the list of preserved fruit products, beverages including vinegar, apple juice and canned fruits occupy the first, second and third positions respectively, while production of dehydrated item is the lowest amongst preserved articles. The probable reason for this may be that this type of dehydrated product is not much popular outside the state and hence it is meant mainly for the local consumption where it cannot fetch good prices.

Preservation is not satisfactory in the public sector for the probable reason that most of the preservation units are confined to main city and only a few which happen to be outside this city and are not located in the areas where fruit is available with minimum cost on cartage.

Indigenous methods of preserving fruits in Jammu and Kashmir have been practiced from time immemorial. The Kashmiris, are well-versed in the old art of preservation and some of them are still using old techniques because of lack of resources as well as technical know how.

One of the important step taken by the government of Jammu and Kashmir is the establishment of community canning centre, with a view to
encourage housewives to come to this centre and avail themselves of the facilities without payment of any fee and can get their own fruits canned under the expert supervision of the staff employed at the centre. This facility will go a long way in encouraging the rural population to utilize the low grade deformed and small size fruits profitably. Preservation of different categories is done in many ways. Some of them are as under.

**Apple Juice:** Apple juice is rich in essential nutritive elements and as such it is becoming increasingly popular. In case of processed products, vitamin-C content of the juices remains practically unaffected during processing. This amount of production was very low in the past few years as compared to the market demand for soft drink in the state as well as in the country, but now the production improved a lot in many form of appy and others in the market. It is therefore, necessary to enhance the rate of production so that the total requirement of the state as well as of the country could be met. Apple juice concentrate is generally made from such fruits, which are of low quality including deformed and defective ones. In case production is stepped up, it is likely that quality apples may also be used for the production of apple juice.

The raw material for apple juice concentrate is obtained from orchards, which are located in the distant villages. Faking of small size and deformed fruits is done in the orchards and then sent to the units for the manufacture of juice. This involves sufficient expenditure on cartege. It is therefore, desirable that small units of juice concentrate should be established at tehsil headquarters or block levels, which are located in the apple producing areas. This will help to solve the problem in many ways. Firstly, expenditure on cartege will be minimized, Secondly defective deformed fruits which otherwise rot in the orchards may be profitably utilized. Thirdly it will solve the problem of unemployed labour, skilled cad unskilled both to a certain extent by employing them in the manufacturing
units. Fourthly it will increase the income of the small fruit growers as well as of the state as a whole.

**Canned Products**: To keep the fruits free from the microbial spoilage over long period of storage, the processed fruits which have been sterilized by heating are sealed in suitable containers. Jars and bottles of clear finit glass are used widely by the preservation industry. In addition to the tin and glass containers several other things have also been introduced recently. These are made of materials like plywood, plastic and aluminium. The tin container however, continues to be the most important item in this field. Besides for domestic consumption, people from main centres avail the facilities, provided by the government Community Canning Centre, where on nominal charges different items can be prepared.

It is therefore necessary for location of new Canning centres, at places where raw material is available in abundance and from where finished articles could easily be exported. Thus from this point of view tehsil or block headquarters will be ideal locations provided that they have requisite facilities for this purpose.

**Jam and Jelly**: Jam is a mixture of fruit and sugar and is cooked to a thick consistency which is neither syrup nor stiff but firm enough to hold the evenly distributed fruit tissues in position. A good jam has bright colour and true fruit flavour. While Jelly is prepared by cooking fruit extract and sugar to a stage at which it is set to a proper consistency. A good jelly has a strong flavour of the original fruit is clear, transparent and well-set.

These items are prepared even by the local villagers for their domestic purpose. Thus the items of this type prepared in the factories and other processing units are not in the great demand in the state and are prepared for exporting to the other states. It has been observed that their demands are increasing day by day. In order to meet the demand for all the people in the state and outside, it is desirable that production should be
stepped up so that the growers may get more profit from their production. It is therefore necessary that the district headquarters should have at least one such centre where maximum production of these items at low cost should be ensured. These new industrial installations may envisage more consumption of the raw material as well as generation of employment in these industries. With the help of these proposed industrial units the private as well as the public sectors both have to setup more factories for the production of containers either of glass or plastic. This will again absorb more labour in such factories.

**Beverage and Vinegar:** Since the earliest times fermented beverages have been known to mankind. Vinegar is perhaps the oldest known fermented product and grape wine being the most important one. Wines are often named after the fruit from which they are made. In the state of Jammu and Kashmir, vinegars are prepared mainly from apples and pear and accordingly they are named. It is obtained from sugar substances and contains a minimum of four per cent acetic acid in its composition besides varying amounts of acids and salts of the fruit from which it is made.

Fruits vinegars are usually prepared from low grade fruits having at least fifteen per cent fermentable sugars in the final Juice. In about six months time, the sugary substance turns into vinegar which is further allowed for a few months to remove harsh flavour and develop agreeable aroma. In Jammu and Kashmir beverages and vinegar are prepared in the public sector and its production is highest in comparison to other products. It is sold through Jammu and Kashmir excise department with its sale centre almost in every town of the state. At present its production is not keeping pace with the demand.

It is thus necessary that the production of this item should remain in the public sector because in private sector there is much possibility that major portion of the production may be disposed of in the black market. There is however, large scope for its development in the public sector at
each district headquarters so that production could be increased to a large scale.

**Sauce and Pickle:** Vinegar is one of the important preserving agents in these products. In case of sauce it is considered necessary to add certain chemical preservatives. Sauces are usually packed in narrow-mouthed bottles and generally preserved by pasteurization. In case of pickles, oil, spices and salt are added for flavour and preservation. These items are meant mainly for consumption outside state of Jammu and Kashmir because for domestic consumption such items are prepared almost in every house of the state with better taste. Hence the factory items do not find much market in the valley.

It is generally observed that home made pickle is far better in taste and lasts longer than the factory made pickles. This observation is supported by the incidence that tourists from outside the state demand generally home prepared pickles. They are cheaper and better in taste. In view of this fact, it is desirable that the rural population should be engaged through subsidy granted by the government to manufacture more and more pickles. In case the production is on a large scale, the net profit that may accrue to the rural population may be appreciable and more people may be engaged in the industry. This will help to solve the financial problems of many small growers and will be able to consume large quantities of second grade fruits which cannot fetch better prices in the market.

**Dehydrated Products:** The modern method of dehydration under controlled temperature and humidity conditions is assuming increasing importance in many parts of the country. Fruits can be dried either in the sun or by artificial heat in chambers called dehydrators. Dehydration of fruits needs no emphasis because drying is one of the most economical means of preserving fruits. It reduces the moisture content to such an extent that no micro-organism can grow in it and those already present either die or remain dormant for want of nourishment.
Fruits meant for drying are cut into slices. Drying in the sun is widely practiced for domestic consumption as well as for sale in many parts of the state besides dehydration, and in the preservation Industries for commercial purposes. In case where the commodity is meant for sale, treatment with sulphur fumes for maintaining their colour and avoiding spoilage by microbial activity is suggested. They are kept in trays and then placed in the sun with occasional turning of the fruit for many days. When the fruit is dried to the required extent then it is stored in the Gowdans and thereafter within few days, it is kept in boxes. This process is usually followed for equalizing the moisture content of the fruits.

In the state of Jammu and Kashmir, it has been observed that drying of apricot in the sun is widely practiced. The probable reason for this practice in the months of June and July is that the sun shines brightly and the drying of the fruits takes minimum time and gives better results.

The importance of dehydrated fruit products lies in the fact that it can be used by the poor people in place of cereals. In the remote villages it has been observed that during the winter season some rural communities make its use as an integral part of their diet and these people are healthier than those who take cereals throughout the year. Through dry food products the poor rural communities get more vitamins and some other minerals which they take unconsciously and become free from many deficiency diseases. In view of the benefits which the common men can derive, it is proposed that such centres should be increased in the near future, preferably at tehsil headquarters.

Further people of the rural areas should be given more training by experts about the modern methods of drying fruits in the sun so that the dried products may remain free and safe from bacterial attack and also without any loss being caused to the nutritive value of the fruits. Preservation of fruits is rightly called the safety valve of fruit industry as it takes care of the surplus and low grade fruits, which would otherwise fetch
very low price in the market. Development of fruit culture can become economical and profitable only if the preservation industries can consume more and more of the lower qualities of fruits.

It has been observed that the existing preservation centres cannot cope with the situation as far as the low grade fruit is concerned. In case, the overall production of fresh fruit increases, the problem of preservation with the existing number of centres will become more and more acute with the result that large quantities of second grade fruits will be spoiled, this will result in heavy losses to the growers as well as to the state exchequer.

3.2.2 Other Industries

3.2.2.1 Saw Mill Industry

With an appreciable expansion in the area under fruit crops and increase in the production of fruits in the state Jammu and Kashmir, requirement of wooden boxes has considerably increased. According to a modest estimate, more than six million boxes annually needed for packing the fruits. Additional requirement of wooden boxes has led to establishment of more saw mills at a number of places.

The chief source of timber used for preparation of boxes is poplars and willow which are grown on wastelands and also along roadsides. Very often it has been seen that these sources do not suffice the requirement and therefore some wood is to be obtained from the forest area. Saw mill industries provide job opportunities to a large number of populations. As a result of increase in the fruit crop production particularly apple, there is an urgent need to device some economical substitute for wood because the process of cutting trees regularly may create many problems. This process will adversely affect the tourist industry. Secondly it will also disturb the ecological balance of the nature, which may create un-desirable results. Thirdly the flexible stem and leaves of the trees which provide chief source of fodder for the animals during winter season will not be available. Hence
there will be acute shortage of fodder during the winter season. In the month of September and October, the flexible stems are cut, dried and stored for purposes of fodder for the winter season. In the light of the observation made earlier it is evident that as a result of removal of large number of tree for various purposes there is every likelihood that the animal population may decrease, causing shortage of dairy products.

3.2.2.2 Wood Carving Industry

Jammu and Kashmir is famous for its wood carving industry. The wood, which is used for this purpose is derived from walnut which is a fruit tree. The average cost of a walnut tree is very high and hence all the decoration pieces which are prepared from this wood are also very costly. Till recently, walnut trees were felled indiscriminately which affected adversely fruit production and resulted in the reduction of the number of fruit trees. Considering the loss caused by the cutting of walnut trees, the state government by legislation has banned the felling of such trees indiscriminately. However under the existing provision, license is given to those who want to use the wood for carving purposes. They are not allowed to cut the trees which are productive under any circumstance, only such trees can be removed which have become almost unproductive or dry or disease infected.

3.2.2.3 Transport Industry

Transport industry playing an important role in the movement and disposal of fruits, its product and walnut wood. Large numbers of trucks during and off season are kept engaged in the transport of fresh fruits, fruit products and fruits kept in the cold storages. Besides, thousands of vehicles are engaged within the state for transporting the products to the different markets. Another industry has also been developed which is closely related to orchards. This is known as ‘honey industry’. Orchards provide ideal places for their brooding and development and the product are exported to
different parts of the country on commercial scale. This provides a good source of income to the individual as well as to the state government on the whole.

3.3 Nutritional Value of Fruits

In the human diet importance of fruit has been universally recognized. Fortunately fruit is not like a medicine, which has to be forced down to the unwilling patients but rather its attractive appearance and delicious flavour compels persons of all age groups to take it readily and voluntarily. The daily use of fresh fruits, citrus fruits and leafy green vegetables and their products is generally considered as one of the major factors in the improvement of health and lengthening of the average life.

Fruits are the chief source of vitamins, which are very essential for the maintenance of proper health and resistance against various diseases. Besides, there are also certain mineral salts, the deficiency of which can lead to disturbance of metabolism resulting in ill-health. Similarly the protein and cellulose stimulate the intestinal activity and safeguards the human body from various disorders. It is a well known fact that man cannot lead a healthy life on cereals alone. Nutrition experts suggest a consumption of more than 65 grams of fruit per head per day in addition to cereals, vegetables, pulses, milk, meat etc. In view of these facts, it can be said that the use of fruit in our daily diet is of great importance.

3.4 Medicinal Value of Fruit

Fruits are also considered to possess specific medicinal values, e.g., walnut, almond, pear and apricot, besides having substantial nutritive value are much more important from the medicinal point of view. Nut oil has been found beneficial for the treatment of skin disease of the leprous type. In a way walnut tree as a whole possesses considerable medicinal value. Its bark has been used as an anthelmintic, laxative as well as a detergent. The water extract of the leaves is specially prescribed for strumous sores.
because of their antibiotic action. The leaves exhibit a beneficial influence on ulcers, syphilis and skin eruptions.

A chemical namely Juglone, present in green walnut shells produces stains on skin. This chemical finds use in dermatological practice for the treatment of eczema, psoriasis, Impetigo and other skin diseases. Ringworm Infections are effectively treated by its local action.

It is also responsible for all the toxic effects exhibited by the walnut tree towards certain plants including tomato and potato. The secretion of walnut leaves washed down by rain to a tomato plant is reported to arrest its growth and causes curled leaves. The toxicity of Juglone is indicated by the fact that many plants will not grow in the vicinity of walnut trees. Walnut kernels have also been recommended, for the treatment of colic dysentery and heart burn.
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Different varieties of fruits at the time of ripening
Different varieties of fruits at the time of ripening
Different varieties of fruits at the time of flowering and ripening
Apple in garden and flowering of peach