(C) TEMPERATE FRUITS

Apple. (*Pyrus malus* L.). Apple occupies nearly 12,141 hectares, mostly in temperate regions of Punjab, Uttar Pradesh, Himachal Pradesh and Kashmir and to a small extent in the Nilgiris.

VARIETIES. Apple varieties fall into two categories : diploids and triploids. Diploids have plenty of good pollen and are self-fruitful. Triploids are self-unfruitful and become productive only when pollinated by using suitable pollenizer varieties. Even self-fruitful varieties have to be interplanted to get commercial crops through cross-pollination. Varieties selected for interplanting should sufficiently overlap in their blossoming periods. Important varieties are listed below : *Himachal Pradesh*. 'Red Delicious', 'Golden Delicious', 'Worester Pearmain', 'Newton Wonder' (all diploids), 'Cox's Orange Pippen' (triploid), 'King of Pippens' (No. 13), 'Starking (Royal) Delicious' and 'Richard'. *Kashmir Valley*. 'Red Delicious' (diploid), 'Baldwin' (triploid), 'Ambri Kashmiri', 'White Dotted Red' and 'Blood Red'.
Simla Hills. 'Beauty of Bath' (triploid), 'Red Delicious', 'Jonathon', 'Rome Beauty' (all diploids), 'Early Shanburry', 'Red Astrachan', 'Red Sudeley', 'Stayman Winesap', 'Winter Banana' and 'Yellow Newton'. *Kumaon Hills*. 'James Grieve', 'Jonathon', 'Rome Beauty' (all diploids), 'Blenheim Orange Pippen', 'Delicious', 'Early Shanburry', 'Golden Pippen', 'King of Pippens', 'Rhymer' and 'Winter Banana'. *Kulu Valley*. 'Ben Davis', 'Red Delicious', 'Golden Delicious' (all diploids), 'Cox's Orange Tippen', 'Blenheim Orange', 'Baldwin' (all triploids), 'Red Astrachan', 'King of Pippens', 'Yellow Newton' and 'Granny Smith'. *Nilgiri*. 'Rome Beauty' (diploid) and 'Irish Peach'.

PROPAGATION AND PLANTING. Propagated mainly by shield-budding, bench-grafting and tongue-grafting on seedlings raised from seed. Use M. IX dwarfing stock and 7.5 to 9 metres if on seedling stock. Standardized clonal rootstocks of the Malling-Merton series are recommended where woolly aphis is serious.

Apricot. (*Prunus armeniaca* L.)

VARIETIES. The cultivated varieties of apricot are mainly exotic and they grow successfully at varying elevations. The following varieties are recommended : 'Shipley Early', 'Kaisha', 'New Castle', 'St. Ambroise', and 'Royal'. All these varieties are self-fruitful.

PROPAGATION AND PLANTING. Apricot is propagated by shield-budding on wild apricot stock, i.e. *zardalu*. Peach stock may also be used. Plant one-year-old grafts in autumn 6 to 7.5 metres apart.

PRUNING. Apricot grafts usually have numerous lateral branches unlike the straight whips of apple, pear and cherry. If the laterals developed in the nursery are not properly spaced, cut off the main stem while planting, about 50 to 75 cm above the ground level to promote the growth of new laterals. During the first summer, remove all unwanted laterals, leaving three to five well-placed branches to form the framework. Head-back the scaffold branches breast-high next winter to get secondary scaffold branches. Leave the upper branches longer than the lower ones, as the latter grow faster and crowd out the upper branches. By the end of the second growing season, the tree produces a large number of laterals on the scaffold branches and trunk, which should all be removed, except a few short growths (7 cm to 12 cm long) on the trunk and the main branches. Retain only five to seven secondary scaffolds. In subsequent years, thin only the branches which are either crossing or crowding one another. This practice admits light into the centre and encourages the growth of spurs.

The pruning of old trees should aim at producing new spurs to replace those broken during picking. The kind and the amount of pruning depend upon the bearing habit of the variety. Light to moderate thinning of branches and the shortening of new wood back to the laterals is the usual practice. If new growth is less than 40 to 80 cm each year, resort to severe pruning.

MANURING. Follow instructions given for manuring peach.

THINNING OF FRUITS. Thin the fruits 4 to 8 cm apart, leaving not more than two to three fruits on each spur.

HARVESTING. The fruit should be picked when it is still hard, but has attained the proper colour. For drying, the fruit is harvested by hand-picking when it is fully ripe.

Cherry. Cherries (*Prunus avium* L.) are of two types : sweet used for desert, and sour used for cooking, grown mainly in the Simla Hills, the Kulu Valley and Kashmir at elevations above 1,500 metres.

VARIETIES. Selected varieties of proven merit are : 'Early Rivers', 'Governor Wood', 'Bigarreau de Schreken', 'Elton','Bedford Prolific', 'White Bigarreau', 'Monstrueuse de Mezel', 'Bigarreau Napoleaon', 'Emperor Frencis' and 'Late Black Bigarreau'. It is desirable to choose varieties that will ripen in succession in order to obtain the crops over a longer period.

A large number of varieties are self-unfruitful and do not set fruits with their own pollen. As they are also cross-incompatible, only the compatible varieties, whose period of flowering overlaps to effect cross-pollination, should be interplanted to get commercial crops.

PROPAGATION AND PLANTING. The plants are propagated by whip or tongue grafting on seedlings of wild cherry stock, called *paja*. Grafts are ready for transplanting in two years. Sometimes, the rootstock plants are planted in permanent positions in the orchard and grafted *in situ*.

As cherry-trees are generally affected by frost, the site selected for planting should be such that the sun reaches the trees gradually. The distance between the trees varies from 9 to 12 metres, depending upon the variety. The trees should be properly staked after planting.

PRUNING. Cherry-trees grow into shape without much pruning. Crowded branches should be thinned out and dead-wood removed in the dormant season. The pruned cuts should be painted with tar.

MANURING. Cherry orchards are best put under grass which is grazed by sheep. In addition to sheep manure, phosphate manures are applied to obtain a good growth of clovers. A dressing of fertilizers to supply 75 to 100 kg of N, 55 to 90 kg of P_2O_5 and 110 to 165 kg of K_2O per hectare may be recommended.

Peach. The area under peach (*Prunus persica* (L.) Stokes) is very small and is mainly located in the Himalayas at various elevations.

VARIETIES. Some of the promising varieties are 'Early Beatrice', 'Alexander', 'Early Rivers', 'Duke of York', 'Peregrime', 'Noblesse', 'Late Devonian', 'Elberta', 'J.H. Hale', and 'Triumph'. Except 'J.H. Hale', all other varieties are self-fruitful and set good crops without cross-pollination.

PROPAGATION AND PLANTING. Propagation is done by budding on seedling peach. One-year-old grafts are planted 6 to 8 metres apart in early spring. Immediately after planting, the trees are white-washed to protect the bark from the sun.

PRUNING. At the time of planting, the stem is cut to about 0.6 metre from the ground and three to four branches are allowed to develop, distributed round the main stem. All other shoots that grow during the first summer are removed. During the first dormant season, two well-spaced secondary branches on each main branch are selected and the main branch is cut close t the secondary branches. During the second summer, water-sprouts, if any are removed. At the time of second pruning in winter, secondary branches are not cut, except to regulate the shape of the tree. In pruning, cut always to the outside buds to encourage a spreading shape.

In the case of bearing trees, annual pruning is necessary to maintain the centre open. Two- to three-year-old branches may be cut back to the outward-pointing side branches to encourage a spreading growth. Shorten and thin outside branches to stimulate the growth of new fruiting wood every year. A satisfactory annual growth should be 45 to 50 cm long.

Fruit-buds are borne laterally upon one-year-old wood and on short spur-like twigs. Ordinarily, they develop two fruit-buds and a leaf-bud at one node. The fruit-buds are usually located from the middle of the shoot upwards. In cutting away branches, the position of the fruit-buds should be taken into consideration.

CULTURE. A peach orchard should be regularly cultivated. Ploughing, which should not be deeper than 10 cm, is generally done in winter. A suitable cover or green-manure crop may be sown in the rainy season after the fruits are picked and ploughed-under during winter. A dose of fertilizers to supply 55 to 65 kg of N, 55 to 65 kg of P and 110 to 135 kg of K per hectare may be applied to the bearing trees in spring. Immediately after the natural fruit-drop in May and June, the fruits should be thinned out so as to have them 10 to 15 cm apart.

HARVESTING AND MARKETING. Peaches are picked when they are still hard, as they can ripen well during storage or in transit.

Pear. Pear(*Pyrus communis* L.) is grown mainly in the hills at elevations ranging from 1,500 to 2,500 metres. Its cultivation is rather restricted, mainly because the fruit does not store well.

VARIETIES. The following varieties are recommended : 'William Bon Christien' (Bartlett), 'Clapp'soil Favourits', 'Thimpsons', 'Doyenne du Comice', 'Easter Beurre', 'Winter Nalis', 'Conference', 'Dr, Jules Guyot', 'Marie Louise d'Uccle', *Baggugosha* (Citron des carmes) and Emile d'Heyst. *Baggugosha* can also be grown in the submontane tracts, but there its quality is poor. *Nashpati* is another variety that is grown successfully in the plains.

POLLINATION. Most of the pear varieties are self-unfruitful and the planting of pollenizer varieties is advocated. *Nashpati* is a self-fruitful variety.

PROPAGATION AND PLANTING. Pear is propagated by shield-budding which is done in June-July. The stocks are raised either from the seeds of a commercial variety or from those of wild pear, *shegal* (*Pyrus pashia)*. To produce dwarf trees, quince 'C' stock is employed. Some varieties are not compatible with quince. They are propagated by double-working, using as intermediate a pear variety which can successfully be grown on the quince stock.

One-year-old grafts are planted in autumn. Those propagated on the quince stock are planted one to one-and-a-half metres apart, if they are trained as cordons. Those trained as pyramids are planted 3.5 to 4.5 m apart.

PRUNING AND TRAINING. Pears on the pear stock make vigorous growth and develop into large trees. They remain dwarf on the quince stock when they are trained into different forms. For the pyramid form, cut the graft while planting at about three-fourths of a metre above the ground. Next winter, prune the leader to about 25 cm and the laterals to about 20 cm to the outward-pointing buds. In the second summer, all the branch leaders and laterals should be pruned to five or six leaves from the clusters, allowing the central leader to grow unchecked. In the third winter, the central leader is cut back to about one-third its length, but the branch leaders and laterals are not pruned. In the third summer, the branch leaders and the laterals, except the central leader, are again cut back to five or six leaves as in the previous summer. In the fourth winter, the central leader is again cut back to one-third its length. By following this procedure, a pear-tree on the quince stock would start flowering in fourth year. The bearing pear-trees are pruned as in the case of apples.

FRUIT-THINNING. As a rule, less thinning is required in the case of pears than in the case of apples. One fruit per cluster in the case of prolific varieties and one to two fruits per cluster in others may be retained after thinning.

MANURING. The method of manuring and the time of its application are the same as for apples. The amount of nitrogen to be applied should, however, be a little more than in the case of apples.

HARVESTING AND MARKETING. 'Bartlett' is picked when still green and hard. The early varieties are packed without storing, whereas the late varieties require storing to develop full flavour. The fruit should be size-graded before storing.

Persimmon. Persimmon (*Diospyros kaki* L.f.) is grown in the Kulu Valley at elevations ranging from 900 to 1,500 kilometres. The promising varieties are 'Fuy', 'Hachiya' and 'Hyakume'. Several good varieties, such as 'Dai Dai', 'Maru' and 'Tenanshi', are also being grown successfully at the Pomological Station, Conoor in the Nilgiris in southern India. The tree is propagated by grafting (whip and tongue method) on seedlings of *Diospyros lotus* and *D. virginiana*. The grafts are planted in winter, 6.5 to 7.5 m apart.

The trees are headed back one or two metres above the ground at the planting time. Four to five shoots are allowed to grow round the stem to avoid narrow crotches and to develop a well-balanced head. There is no further pruning after this. Dead, broken and interfering branches are removed every year.

The fruit is picked when it has attained a yellowish or reddish colour, characteristic of the variety, when still hard. It is clipped from the tree, keeping intact the calyx and a short piece of the stem. It is wrapped up in tissue-paper and packed in a two-layer box for transport. With astringent varieties, the fruit has to be cured before it is fit for eating out of hand. The simplest method is to place the fruits in a closed chamber with other ripening fruits such as pears and tomatoes.

Plum. Plum (*Prunus domestica* (L.) Stokes) is grown mainly in the Himalayas where the following varieties have been successfully grown : 'Grand Duke', 'Early Transparent Gage', 'Victoria', 'Santa Rosa', 'Wickson', 'Beauty' and 'Kelsey'. In the south, in the Nigiris and Kodaikanal in the Tamil Nadu stae, several choice varieties of the Japenese plum (*P. salicina*) are grown. The more important of these are 'Rubio', 'Alu Bokhara', 'Gaviota', 'Shiro', 'Combination' and 'Hale'. All varieties except 'Beauty', 'Santa Rosa', 'Gaviota', 'Rubio', 'Alu Bokhara' and 'Hale' which are self-fruitful, requires cross-pollination from other varieties. Plums are usually propagated by shield-budding on wild apricot or common peach stock. Planting, spacing, cultivation and fertilization are the same as for peach.

PRUNING. Cut back the top to about 60 cm at planting time. Select three to five scaffold branches situated spirally round the stem, equidistant from one another, and remove the unwanted ones. At the time of first winter pruning, the main branches are headed back. All growth, except the main and secondary branches, is removed during the year. At the second winter pruning, crossing and other undesirable branches are removed. In the case of varieties having a tendency for upward growth, heading should be done to outward-pointing buds to make them more spreading. Subsequent pruning is carried out every year on similar lines. The pruning should be light as far as possible. The bearing trees are pruned to secure a balance between vegetative growth and fruiting.

THINNING. Thinning should be carried out after the natural fruti-drop in April and May but before the hardening of the pits.

HARVESTING AND MARKETING. For transporting, the fruits are picked a few days in advance of full maturity. The change of colour for each variety determines its stage of maturity. The fruits are required to be harvested in three or four pickings.

Strawberry. The cultivated varieties of strawberry (*Fragaria spp.* grown in India are all imported. The following are recommended : 'Laxton's Latest', 'Royal Sovereign', 'Early Cambridge', 'Huxley Giant', 'Penomenol' and 'Robinson'.

PROPAGATION AND PLANTING. Maiden palnts (runners) that have not borne any crop are used for planting. The planting-distance is half a metre between plants and three-fourths to one metre between rows. Runners with a good root-system are used to set a new palntation. Transplanting is done in March-April in the hills and in January-February in the plains.

CULTURE. Prepare the land by ploughing deep, followed by harrowing. Add bulky organic manures. Keep down weeds by light hoeing and runners, as and when they form. Manuring is done in winter. When plants blossom in spring, bed the plantation with straw to keep fruits off the soil. After fruiting, remove the straw and weeds, and cut off all runners. Continue hoeing. Rotate strawberry with vegetables every three years.

IRRIGATION. Apply irrigation at five-day intervals during summer.