THE CULTIVATION OF FRUITS IN CEYLON WITH CULTURAL DETAILS—X

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GROUP E

SOME FURTHER FRUITS FOR UP-COUNTRY (4,000 FEET AND OVER)

(4) THE CAPE GOOSEBERRY (*Physalis peruviana*).—The botanical name for the genus infers a bladder and has reference to the enlarged bladder-like calyx which encloses the fruit. It belongs to the same family as the potato and the tomato and as a fruit for both dessert and cooking purposes has much to recommend it. Where largely grown it is in ready demand for jams and preserves.

In habit it resembles a climber more than a shrub and is grown best if support is afforded the plant in the way of a fence or trellis. It is indigenous to Peru and Chili but is commonly cultivated in sub-tropical and warm temperate countries and in the hill districts of Ceylon and India.

It is not however very well known in Ceylon and deserves a much wider cultivation. It is adaptable to a wide range at elevations of three thousand feet and above and is suited to most soils though it prefers a well drained sandy soil of fair humus content.

The Cape Gooseberry is, in warm temperate countries, treated as an annual but in the sub-tropics and hills of the tropics is best treated as a perennial. The plant is straggly in habit and rarely attains more than 3 feet in height, but when well grown gives very heavy crops. The fruits range in size from $\frac{3}{4}$ to 1 inch in diameter, roundish in form, the flavour is sweet and pleasant but slightly acid, and when ripe is yellow in colour.

Seedlings are mostly true to type and the best seed should be selected and sown in a prepared bed or in boxes, and preferably under cover. Germination is fairly rapid and seedlings from beds can be put out in permanent sites on attaining a height of 3 inches or so. Where sown in boxes or pans transplanting into beds in the small stage at 3 inches apart is advised, and later the seedlings can be transferred to their permanent quarters. In each case plantings should be made at 3 feet apart and some form of support afforded them.

The fruits fall when ripe and if collected and stored under dry conditions can be kept in excellent condition over a considerable period but the enlarged calyx which surrounds the fruit should be retained. This should prove of considerable advantage in handling and transport of this fruit if the plant be cultivated on any large scale.

The allied species (*Physalis pubescens*) known as the Ground Cherry and also as the Strawberry Tomato and the Musk Tomato produces excellent fruit, but it has a great drawback in that it rarely grows erect and is very prostrate in habit more resembling a ground cover plant. It is more difficult to cultivate and demands a fairly large area over which to roam, and the Cape Gooseberry is therefore, because of its more erect habit, the better species with which to persevere.

(5) THE MOUNTAIN PAPAW (*Carica candamarconsis*).—A near relative of the low-country papaw and both as a fruit and ornamental plant is a useful acquisition, its introduction dating back to 1880. It is a native of the highlands of Central America where it thrives at an elevation of six to ten thousand feet, and in Ceylon has now become semi-naturalised at the higher elevations, grows freely, and produces an abundance of fruit.

It does not appear to thrive or fruit below 4,000 feet and is a fruit for the high elevations only of Ceylon. Its possibilities, by hybridising with the low-country papaw, have not to date been ascertained but such, if successful, should extend the area of its cultivation and such hybrids should improve upon the quality of the present up-country papaw.

The tree resembles in growth and fruit its low-country relative, attaining a height of 8 to 10 feet. The fruit is much smaller than the papaw, usually 3 to 4 inches in length, being much the same shape as the true papaw and the flesh yellow in colour. The fruit is somewhat sweetish and slightly acid and though such can be eaten raw with the assistance of a little sugar. It is much better appreciated when stewed. It makes good jams and jellies also and is, like the true papaw, also considered to be particularly good for dyspeptics.

The tree has no particular soil requirements, being very hardy and adaptable and thrives best in good loamy or well worked garden soil in which a proportion of cattle manure, leaf-mould or such humus is incorporated. A certain amount of moisture is required by the plant and this, owing to the elevation to which it is limited in Ceylon is generally available.

Propagation is by seed as with the true papaw and can either be sown at stake or in boxes under cover. Growth is fairly rapid and where sown other than at stake the seedlings should

be planted into permanent sites on attaining a height of 4 to 5 inches, the planting distances varying from six to eight feet apart.

(6) THE TREE TOMATO (*Cyphomandra betacea*) also known as the Gas-Takkali, S. is a rather succulent to semi-woody shrub of Peru and neighbouring countries where it forms a miniature tree of 6 to 8 feet height at elevations varying from 5,000 to 8,000 feet. It is a close ally of the ordinary tomato. It was first introduced to Ceylon about 1882 and has now become a well established plant in up-country districts as well as in parts of India.

There is a regular demand for the fruits in up-country markets and if this tree were more extensively cultivated there is little doubt but that a large demand would arise from the markets elsewhere in the Island, particularly as this fruit bears transportation so well.

The tree has large fleshy leaves and bears smooth skinned oblong to egg shaped fleshy and succulent fruits in clusters at the end of the bunches. The fruits are 2 or 3 inches in length and of two varieties, one a reddish yellow, and the other a deep purple in colour when ripe. Both varieties are much relished by many people when quite ripe and eaten raw, and as a stewed fruit has much to recommend it. They are also used to some extent in the making of jams and jellies.

In the up-country districts of Ceylon the tree often attains a height of 10 feet and though at present restricted to the higher elevations, there seems no reason why this fruit should not be profitably grown at an elevation as low as 2,000 feet provided a good soil and well drained position is afforded it.

The plant is very robust and easy to grow, yields fruit in its second year and continues to give good crops for a number of years, the fruiting season usually being during the dry north-east monsoon months.

It requires a good loamy soil and moderate rainfall. It is propagated by seed and a high germinating percentage is usually obtained. If sown in beds or boxes the seedlings should be potted into baskets or bamboos on attaining the second pair of leaves and can be planted into permanent sites, 10 ft. by 10 ft., at a very early age. At Peradeniya such seedlings attain this stage in 3 months from sowing but at higher elevations progress will be proportionately slower.

(7) Where fruit growing in up-country districts is undertaken the cultivator does, sooner or later, turn his thoughts to the fruit trees of the temperate zone, namely Apples, Pears, Plums, Apricots and Nectarines, but Ceylon—even with its seemingly temperate conditions up-country—is still within the

tropics and the wintering season, so essential for these fruits is lacking, strong monsoon winds and heavy rains being further drawbacks to the cultivation of such fruits and in the majority of cases little satisfaction is obtained.

The Peach and the Pear have possibilities and the Peach has already been dealt with. The Pear flourishes in the up-country districts in the form of a large but hard fruit fit for cooking purposes only, and not too well flavoured at that. The date of its introduction is in doubt but it is well established in up-country gardens and thrives with little attention. Its possibilities as a stock on which to graft better varieties have not yet been put to the test but there is little doubt that an improvement in pear cultivation would thereby result.

The European Pear (*Pyrus communis*) has an enormous number of varieties or horticultural forms of which many have evolved as hybrids or chance seedlings and are cultivated throughout Europe and North America where the pear is commonly grafted on the Quince, the wild pear or free stock. In Northern Asia the usual stock is the Quince, its own seedlings, and the wild Chinese Sand Pear. (*Prunus sinensis*), the latter being reputed to be particularly blight resistant, whilst the Quince is used chiefly for dwarfing effect. Hybrids between the European and the Chinese Sand Pear have been obtained in America and the well known "Keiffer" and "Le Conte" owe their origin to this cross. No progress in establishing good varieties in this country is likely to be made by the mere import of good varieties, for these are most difficult to establish on the root stock used by growers outside the Island. It is very necessary that a root stock suited to the conditions of the country such as the present common cooking pear should be used as the stock and the imported plant used for scion purposes.

As a means of improvement on the present cooking pear, imports of certain well known varieties known to thrive in localities where the winter is negligible are the first necessity, and "Keiffer's Hybrid", "Beurre Bosc", "Le Conte" and the "Bartlett" pear are varieties suited to a wide range of conditions, the "Beurre Bosc" and the "Bartlett" being essentially fruits for dessert purposes.

In up-country districts propagation of the present cooking pear is by rooted cuttings, but own seedlings can be recommended as a more satisfactory means of raising stock plants, and such should be available for budding or grafting from 2 years of age, the usual method employed elsewhere being by budding or grafting. Where budded in the nursery the plants should be large enough for transport to permanent sites at three years of age.

Growth of the tree is not rapid and is more often stunted, nor does the tree attain any great size, and 15 feet by 15 feet should be ample planting distances.

Little can be said at this stage with regard to pruning as the principles vary remarkably among the different varieties of pear in cultivation and experience must be the guide when it is ascertained to what extent the common cooking pear, used as a stock plant, meets the requirements.

CONCLUSION

Throughout these articles it will have been noted that propagation by vegetative means has been much emphasised and the properties of the root stock in the improvement of fruit culture in the Island is one of the most important items that has yet to be studied. The grafting and budding of fruits is comparatively new to Ceylon but is an ancient practice in many other countries though the full importance of this operation has not, even there, been realised until recent years.

In the present early stages of fruit propagation here, it is advisable to repeat once again the fundamental principles on which such grafting and budding is advocated and why it has such preference over the seedling. The latter, as regards the propagation of the more choice fruits cannot be relied upon, as some of the best fruits produce little or no seed. In others the flowers are pollinated by neighbouring trees of inferior quality, resulting in seeds and seedlings of mixed parentage, or in other words not true to type, and there are many other reasons also.

In practice, the result of grafting or budding is that a fruit tree is produced, built up of two of the same or closely related individuals—the root stock and the scion.

The chosen root stock is invariably of a type noted for its robust and strong root system and growth, its adaptability to various, or even to a particular soil, to rainfall, to temperature and to other factors. The scion is of course either a bud or woody portion of the selected variety of fruit which it is desired to propagate. The advantages of grafting or budding are that the characters of the scion are retained with some certainty, it is a means towards uniformity in an orchard, the tree is brought into bearing at an earlier age than the seedling and in certain required instances dicœcious trees can be intergrafted to assure more perfect pollination of the flowers.

A certain amount of data has already been acquired as to suitable rootstocks for the various fruits and is embodied in our articles, but much remains for future experiment.

Stock characters have been elucidated in many instances and the information put to very practical use. That the Sour Orange is a sound stock for most Citrus is well known, it being resistant to many root troubles, and latterly in the West Indies it has been the means of resuscitating the Lime industry which but a short time ago stood in danger of being completely wiped out owing to wither tip disease. In Ceylon the country Mandarin appears to be the best of all Citrus so far experimented with in its resistance to Citrus Canker. Soursop has proved to date at Peradeniya a very sound stock for the Cherimoya, the Alligator Apple for the Ilama and some other Anonas, the common local mango for the more choice mangoes, the local Avocado for West Indian and Mexican varieties of the fruit, the Goraka and Cochin Goraka for the Mangosteen, and so on.

All this however is mostly only one aspect of the subject—that these fruits can actually be budded or grafted one with the other. Full compatability of the stock, its effect upon the scion or the scion on the stock, to what extent one stock is better than another, and whether budding low or high on the stem of the stock affects the character of the scion, the causes of bud overgrowth and many other problems of the kind as bud variation and similar phenomena, have to be studied. With deciduous fruits the European horticulturist grafts his trees on the stem of the root stock on the assumption that the stem of the stock plays an important part, whilst the American horticulturist in the main grafts on the root of the seedling stock on the grounds that a greater amount of scion influence is thereby gained.

Tropical fruits unlike the fruits of temperate countries have received little attention as regards selection and improvement, but by vegetative propagation of the best varieties on the lines already stated, considerable progress in the desired direction is to be obtained, pending more complete knowledge of stock influences and how these may best be turned to account.