

*Alma mater* whose approbation we will all care for, expressed in the words "well done, my boys".

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### **The Cultivation of the Apple.\***

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The apple is one of the most important staple fruits of the world. The plant is grown in sub-tropical and temperate regions throughout Europe, United States, Australia and, to a less extent, in India. The plant could be grown here at elevations between 3,000 and 7,000 feet above sea level, with a rainfall of 30 to 50 inches.

The land selected for the garden should fulfil all the conditions necessary for any good cultivation with facilities for irrigation and drainage. It is certainly better if the site is situated near a town or any commercial place, so that marketing the fruits may be easy. Red loamy soil with a little lime in it overlying a bed of gravel or laterite would suit apple very well. It is well if the land has a slope, and the slope faces the morning sun. It should be protected from wind, lest the young plants suffer and the old plants drop their flowers.

In the way of preparing the soil there is nothing particularly to be done for cultivating apples. They require no shade trees. The land should be cleared of all the trees and their roots removed. If the area is small it may be dug up, or the land may be ploughed deep and taken out. In the first year a leguminous crop may be grown with advantage as this will keep down the weeds and besides this the nature of the crop will give us an idea of the fertility of the soil. While this preliminary crop stands, odd works, like trenching and fencing, may be got through.

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\* Being summary of paper read by Mr. H. C. Javarayya, L. Ag., at the last Agricultural Conference held in July 1914.

The plant is propagated in many ways - by seeds, by cuttings, by layerings and by suckers, the last being the commonest here. The suckers are taken out and potted or planted in beds in the rainy season. These will form the future stocks for grafting. In some gardens where no systematic planting is done the suckers are permanently planted in the garden itself where they are grafted. The stocks should be 2 to 3 ft. high and  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch in thickness. There are certain good varieties like the 'Northern Spy' which are disease-resistant. Such varieties should be selected. The selection of scion is also important. It should be taken from a tree having a good history. Grafting is done in the month of February and March when there is free circulation of sap in the plants. The process of grafting done in Bangalore is that of tongue grafting. It is important that the stock and the scion are of one size. They are both cut similarly with a clean slope, and over the slope of the cut they are split so as to form tongues. They are then put together face to face and the tongue of the scion pushed into the slit in the stock. The union is perfect. Budding is not done here. Imported plants are budded. Budded plants have two advantages over grafted ones. One is that the suckers in the former stock can be easily distinguished and the other is that in grafted plants there are chances of the scion separating from the stock either by bad handling or by the force of wind. Care should be taken in the selection of plants, as the quality of the fruit depends upon that of the tree. Plants that are precocious and show unusually quick growth should be avoided and plants that have stunted growth should also be refused. Plants having a steady and healthy growth should be selected. Again plants in which the union of the stock and the scion is not good, should be refused. The gardeners in Bangalore always use the local grafts. They are comparatively cheaper than those imported, their price being 8 as while that of the imported is 1-4-0 to 1-8-0. each. Of the latter class that do well there, some are Ribstin

peppin, Worcester permain, Peas-goods Nonsuch, Cox's orange-peppin and Rome beauty. Among these plants, there are two classes,—the Standard and the Dwarf. The standard plants grow tall and yield more, but take a longer time to fruit. The dwarf plant is short and begins to bear in 3 years. The distance at which the plants are planted apart varies according to the character of the plant and the nature of the soil, though the latter is not so important in intensive cultivation. In the Tiglar's gardens at Bangalore, the plants are put very close—from 5 to 10 feet apart—the reason being that the plants keep straight as they are not pruned and as such do not occupy much space. In Ootacamund they are planted 15 to 20 feet apart. The imported plants require to be put at least 15 feet from each other so that there may be room for air and light to enter in. The common systems of planting are the square or the quincunx or triangular ones. The latter way is adopted when the permanent plants are slow growing. The centre of the square is planted with a quick growing small tree which may be removed when the large trees attain their full size. The pits may be 3 ft. by 3 ft. by 3 ft. Where drainage is not very satisfactory pieces of bricks and small stones may be put at the bottom of the pits. While planting some of the surface soil should be put in a heap in the pit, so that the roots of the plant might comfortably place themselves. After the plant is placed, the surface soil should be thrown over the roots and well pressed. Then nearly the rest of the pit should be filled with the remaining soil and water poured in so that the soil may settle and then the pit may be completely filled. Some say that it is not good to mix any manure while planting but as the plants should not be disturbed for some time, I think some well rotted farmyard manure may be mixed with the soil along with some sand. The usual precautions must be taken when planting and there should be a hollow round the plant, slightly away from the stem, for water to stand. A small number of good waterings

followed by stirring is much better than a large number of poor sprinklings. The plants are planted at the commencement of rains when the rainfall is light, but in places where there is heavy rain, planting is done in the latter period of the rainy season. Apple belongs to the class of the deciduous plants, that is, it has a dormant or resting stage in winter when it does not need much water. During hot weather, the plants should be watered twice a week.

In the first two years crops of vegetables may be raised. This will help in making the soil mellow and checking the weeds and also pay us the cost of the expenditure for the year. The water and the manure used for these crops will be useful for the apples as well.

Apple requires manuring every year. For the growth of the plant and the development of fruits a large quantity of the plant food is removed from the soil. It is said that five bushels of fruits take away eleven pounds of nitrogen, one pound of phosphoric acid and sixteen pounds of potash; besides this the plant itself requires a quantity of all those. This gives us an idea of the requirements of the plant. In Bangalore 15 to 20 tons of farm yard manure are applied per acre. They also use night soil with great effect; artificial manures can also be advantageously used. Nitrogen helps the plant to grow robust. Its effect is particularly seen on the leaf. Where there is plenty of Nitrogen, we see good foliage with dark green colour. Nitrogen also makes the fruits heavy and juicy. Excess of Nitrogen produces rank growth which will be followed by 'die-back' disease. Phosphoric acid has influence on the whole of the plant and, it is said, on the growth of flowers specially. Potash influences the general health of the tree and its productiveness. Its particular effect is on the character, colour, sweetness and flavour of the fruit. The manures that are commonly used are sulphate of ammonia, superphosphate, bone meal and sulphate of potash. We have tried the mixture of sulphate of ammonia, superphosphate and sulphate of potash in an average soil in the proportion of 2 : 3 : 4. The manures

are finely mixed with an equal quantity of very fine red soil and 4 to 8 pounds are applied to each plant according to its age and size.

The next important operation is the pruning of the plants. All that the local gardeners do is to simply strip off all the leaves except a few at the top. This they do twice a year, in February and September, to induce flower buds. It is leaf-pruning that they do and they do not believe in the pruning of branches. But branch pruning is advantageous and, if carefully done will, at the end of 2 years, give a well balanced shapely tree with ten or twelve branches and with fruits' spurs from the little branches which are pinched back. Out of the shoots that come from the buds below, three or four are kept at even directions. Any shoot from the stock will have to go. If any of the shoots grow unusually long it should be pinched and kept back. The next year these main branches are again pruned to a foot length and the third year again they are pruned regularly as before. Subsequent pruning comprises in removing dead wood and branches that rub and cross each other. Usually, for a bush plant the vase shape is a convenient one. The branches will be low and the stem will not be exposed to the sun. evaporation on the ground will be less on account of shade, and it will be easy for picking, spraying and general handling of the plant. With the weight of the fruits the branches get open to allow light and air and on the whole the plant will be stable.

Another point to be borne in mind while pruning is that the branches should be cut to an outer bud generally, and to a side bud in particular cases, where gaps have to be filled. If, on the other hand, it is cut to an inner bud the shoot gets to grow towards the centre of the plant which should not be allowed. The trunk should be kept clean to 2 or 3 feet in the case of bush plants. A word about pruning fruits. When we want a smaller number of large fruits, instead of a larger number of small fruits, then as many only as we want are allowed to go on, the rest being taken out. Till the 3rd year the plant should not be allowed to fruit as that will exhaust the

life of the plant. The trees flower about the month of March and September. The practice is to take two crops, but it is considered that in that case plants get weaker. While talking about pruning, I might say how the fruit bud looks different from a leaf-bud. Leaf buds are long and pointed. They produce either leaves or branches; whereas fruit buds are short and round. The scaly leaves that cover them are slightly broader. Leaf buds may be forced into fruit buds by artificial disturbance.

In some cases where the plant grows too much into wood and leaf without growing fruit buds, slight root pruning is advisable. This is done by merely digging a trench round and away from the stem of the tree and cutting a few roots. I might say that a secateur or pruning shear is very useful for pruning and one that has a well curved upper blade which ensures a "drawing" cut is to be preferred to one that produces a "crushing" cut as in the case of the common scissors.

As I said before, in the first and second year, a crop of vegetables may be raised but later on some leguminous crops may be grown. This will keep the land cool and free from weeds and will also improve the soil. The rest of the plant during the period of dormancy in winter should not be disturbed by any cultivation.

Now about the produce. Fruits may be kept afresh for about a fortnight. A good system of packing is to put them in cases which have partitions that will hold just a fruit. The fruits should be covered with thin tissue paper and the boxes should be ventilated.

Apples are often attacked by diseases and fall a prey to enemies. Entomological and Mycological details I will omit as most of us are not interested. We have stem borers, bugs, leaf eating caterpillars, bark eating hoppers, aphids and red spiders. Stem borers should be pricked with a thin wire and some neem oil poured into the hole. For sucking insects kerosine emulsion or resin wash are effective remedies. These insecticides have become so popular that I need not describe the methods of preparation. Hoppers that are found on the

stems and branches on small trees could be cut into two with a sharp knife. For leaf eating caterpillars hand-picking should be done before they spread. Besides insect pests we have fungus pests also, apple blight and black spot. Our treatment of Bordeaux mixture is too well known to require description. If the plant is bad beyond remedy, it should be cut, removed and burnt. Discretion must be used in applying insecticides on the fruits as they are poisonous. As fruits ripen, the spray fluid should be diluted. No spraying should be done in the final stage of the fruits.

While concluding, I might say that the question whether the improved system or the local system of cultivation is profitable, cannot be answered at once. While deciding this question, one of the chief points for consideration is the nature of the demand for the fruits at the market. We see that the number of men who use these fruits is increasing. We should know whether they care for quantity of an indifferent sort or for quality *i.e.* the size, colour, and flavour of the fruits. Poor people here do not buy apples; it is only the rich class who generally care for the fruit. In these circumstances improved system of cultivation is certain to pay in the course of a few years, though not at the start of the plantation.

Mr. Javarayya also gave details of cultivation charges and a balance sheet showing that, at the end of 20 years, a profit of Rs. 700/- per acre may be obtained in favourable cases.

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### Notes.

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We offer our hearty congratulations to Mr. A. Seturama Aiyar, Dip. Agri., of Needamangalam on the title of Rao Sahib conferred on him on the occasion of H. M. the King Emperor's birthday. Passing out of the Saidapet Agricultural College nearly 20 years ago, with a good Diploma, Rao Sahib Seturama Aiyar chose to be a gentleman farmer and settled at Needamangalam. He took prominent part in all kinds of public life in the district during these years, but he was more prominently known for his enthusiastic honorary work in the