

A. Survey of Fruit Cultivation in Kadayam.

By G. VENKATAKRISHNAN, B. Sc., Ag.,

Agricultural Demonstrator, Srivilliputtur.

Introduction. The importance of fruit as an integral part of our daily food has been of late increasingly recognised for their rich vitamin content and their therapeutic and prophylactic properties. The researches of Col. McCarrison and Dr. Akroyd, have proved the notoriously poor quality of the average South Indian diet and roused us from our apathy towards the dangers of malnutrition. These nutrition experts have recommended eating of more fruits as a panacea for all the prevailing deficiency diseases. The Government are alive to the demands of the situation and have started a campaign of "Grow more fruits". Attempts in this direction consist, not only in exploring the possibilities of fruit cultivation in the plains wherever facilities exist, but also in helping the fruit industry in places where it is in a nascent condition, or in a languishing state. The fruit growing area in and around Kadayam in the Tirunelveli District comes under the last category. With a view to suggest measures to resuscitate the industry to a profitable level, a preliminary survey of the tract was done in January 1939. This paper deals with the study of the present fruit growing conditions in this region and the possible lines of improvement.

Situation and nature of the tract. The Kadayam tract which lies to the North-west of Tirunelveli District is favourably situated in the orbit of the two monsoons. The annual rainfall is 38 inches on an average; 25 inches of which are received during the North-east monsoon; 8 inches during the South-west monsoon and the rest during the hot weather months. The climate is equable, the well water is free from injurious salts and is good for orchard irrigation. The soil is well drained. It is red gravelly in nature with sand sparsely mixed. The depth of the soil varies from 3 to 6 feet. Apart from nature's bounties, which are available in abundance for fruit cultivation, the tract enjoys easy access to the neighbouring urban markets through railways and excellent roads.

Fruit cultivation in the tract. Taking advantage of the favourable conditions a few enterprising landowners started lime cultivation in small areas 30 years ago. Their pioneering attempt met with signal success. Not only the area under limes has expanded to the extent of 200 acres at present, but the fruits of the tract have also captured the Trivandrum, Quilon and Cochin markets and hold almost a monopoly over them. The tract exports about 50,000 maunds of limes annually to the above markets. Lime is the only fruit of commercial importance in this area and is grown in holdings varying from 20 cents to 6 acres, spread over about 100 gardens. Next to acid-lime, light jacket orange is a most popular citrus variety occupying 30 acres in Katlamalai Estate lying in the environs of Kadayam. These find a sale in the local markets. The third important fruit crop is the

plantain. *Nottu Vazhai* and *Kothali* are two important varieties grown for local consumption in about 460 acres distributed over the whole area. The former variety occupies a larger area and is cheaper. The latter is better relished on account of its flavour and fetches a higher price of 2 to 4 annas per bunch. Mangoes are also cultivated in about 131 acres spread over small holdings varying from 20 cents to an acre. The popular varieties grown are *Neelam*, *Bangalora*, *Mulgova*, *Banganapalli* and *Dwarf Mulgova*. In addition, a good number of country varieties are being cultivated despite their poor quality and low yields. The total output of mangoes is on the whole poor for the area grown and inadequate for local consumption. Therefore large quantities of this commodity are being imported every year to satisfy the local demand. Of the other fruit varieties grown, mention may be made of the new introductions that bid fair to be successful are jack, Kamala oranges, sapotas, pineapple, pomegranates and grapes. These are grown in isolated patches in the midst of commercial fruit crops amounting on the whole to about 30 acres. Though these are foreign to the tract they come up vigorously and yield well. The possibilities of growing these varieties successfully on a commercial scale is evident from their excellent adaptability to the changed environments.

Methods of Cultivation. The chief commercial fruit crop of the tract being acid-lime, the methods of cultivation followed for this are briefly mentioned below. The plantations are started with seedlings preferably two years old. The spacings adopted vary to a great extent from 12 to 25 feet between plants. No inter crops are raised usually. Basin irrigation is commonly followed. The plants are watered up to the base of the stem. Such a method is construed to be unsuitable, if not injurious to growth and aeration of the roots. The frequency and depth of irrigation also vary from garden to garden, irrespective of the optimum water requirements of the crop.

Manuring. Regular manuring of the plants is done from the time they start bearing. The manures are applied in two doses. The first dose which consists of 5 to 10 baskets of cattle manure per plant is applied in June—July about the close of the fruiting period. The second dose is given in December—January in the form of green leaf manure at one head-load per plant. Kolingi, Avarai, and Vagai are the chief green leaf manures. The use of artificials as manure is rather rare though it seems to have a promising future. One Mr. K. K. Lakshiminarayana Iyer of Kadayam tried bone meal at 10 lb per plant in conjunction with 75 lb of green leaf manure and obtained 5 per cent more yield per plant over the control.

Fruiting Period. The trees begin to bear from the third year of the planting. But from the 8th to 25th year peak productions are usually obtained ; each tree gives about 4000 fruits per year.

Diseases. The common diseases prevalent in these orchards especially on limes, are canker, gummosis and die-back. But no serious attempt

has so far been made to apply suitable remedial measures to control their spread.

Marketing. Nearly 85 per cent of the limes produced are exported by rail to Trivandrum, Quilon, Kottarakara, Tuticorin, Punalur, Tiruchendur, Nagarcoil, Marthandam and even to the far off towns like Virudhunagar, Trichinopoly and Madura. The rest of the produce, which is transported to the neighbouring shandies and towns by carts and buses finds easy sale there. Marketing is done by contractors and local merchants who take the produce on lease from these gardens. In this connection it should be mentioned that a Co-operative Society started in this centre for marketing of fruits has not been functioning satisfactorily owing to the unhealthy competition set up by the middlemen and merchants among the fruit growers. The following table gives the quantities of lime fruits exported during the several months of the year 1938.

Monthly movements of limes from Kadayam.

<i>Months.</i>	<i>Quantity in Maunds of 82½ lb.</i>
January	6350
February	1900
March	3000
April	2750
May	5080
June	4070
July	4300
August	2900
September	1800
October	2650
November	4150
December	6000

Financial returns. As in many other agricultural commodities the depression has of late affected the lime industry. The fall in the market price is nearly 50 per cent which can be judged from the fact that the present rental value per acre is only Rs. 500/- as against Rs. 1000/- in the last decade. Apart from the agricultural depression other contributory causes for the low ebb of the industry is the lack of organisation between the growers for efficient marketing; nor have they made any serious attempt to adopt improved and systematic methods of cultivation to compensate the diminished returns, through increased production and reduction in the cost of cultivation. One more reason which is of recent origin is the serious competition of lime fruits from Ayyampalayam and Kannivadi tracts of Madura District in the Trivandrum and Quilon markets. In the above tract limes are raised under rainfed conditions on the hill slopes in and around Kannivadi. The fruits from the above regions are therefore available at much cheaper prices. Further in the Travancore markets the demand for limes is low during the rainy months which coincides with a heavy production in the Kadayam tract and elsewhere. The scope for alternative markets during periods of heavy production has not been explored and glut prevails everywhere.

Suggested methods of improvements. *Selection.* From the survey of the fruit cultivation in this region it is evident that the present state of the industry needs improvement over a wide range, from the selection and cultivation methods to that of marketing of the produce. The first and foremost attempt should be to replace the existing varieties which are uneconomic and of an unknown or doubtful pedigree by those of outstanding merit. A number of exotic varieties of repute must be introduced for trials in this tract and the most suitable and consecutively high yielding types should be propagated. Increased production through improved varieties could to a great extent make up for the fall in the income of the fruit grower.

Varietal cropping. It is not sound economics to stake all the investment upon one variety such as the acid-lime when fair prices are not assured for many months in the year. It is desirable to grow in addition a number of other varieties of fruits such as Cheeni oranges from Kodur, pomeloes, sapotas, jak, pomegranates, grapes etc. which can provide the grower with continuous and regular income all through the year. In other words the first grower should allocate the area under various fruits suitably to get an economic and continuous income all the year round instead of sticking on to lime growing alone.

Off-season bearing types. Some of the valuable forms of off-season types can be grown with success in addition to early, middle and late season varieties for getting a continuous supply of fruits over a long period with profit. In one garden belonging to Mr. A. V. Subramania Mudaliar at Alwarkurice a few off-season bearing varieties are being grown and they are found to fetch a good income.

Selection in the nursery state. In selecting acclimatized and reputed varieties for the plantations rigorous elimination of the plants which are poor in growth and susceptible to the diseases must be made. This will ensure starting of the orchard with vigorous and consecutively heavy yielding types.

Cultural practices. The cultural practices followed are crude and unsystematised. The same methods are followed irrespective of the habits of the varieties. The spacings given to the fruit trees are either too close or too far with no uniformity for particular varieties. Standardised methods of spacing necessary for each variety should be followed to produce the maximum yields. In this tract it would be suitable and economical to have 20 feet spacing for acid-limes and pomegranates, 30 feet for oranges and up to 40 feet for mangoes. In addition planting of trees in lines by adopting the square system or quincunx method would be more advantageous.

Manuring. The system of manuring followed is not specialised with reference to the requirements of each variety. A judicious system of manuring suitable for each crop with profitable use of artificials wherever possible should be inculcated.

Irrigation. The method of irrigation practised is neither economical nor quite beneficial to the plants. Ring irrigation should be practised by virtue of which shallow basins round the plants must be widened leaving a bund round the basal portion of the stem, so that irrigation water may not reach the trunk. The present method of shallow irrigations at frequent intervals can be replaced by copious irrigations at longer intervals.

Application of remedial measures for the common diseases. The trees should be periodically examined for any pests and diseases. As a preventive measure against the spread of any disease the affected or dead portions must be pruned off. In orange and lime gardens it is essential to remove periodically water shoots and dead branches. Whenever any disease appears, standard remedial measures should be immediately adopted to check their spread. Of the diseases on lime in this tract 'canker' is a serious one. It is characterised by yellow mottled patches and brown corky spots on the leaves, tender stems and fruits. In severe cases it gives a scabby appearance to the fruit and makes it less attractive for the market. The juice content of the fruit is also reduced. Pruning and spraying with Bordeaux mixture has been found to be an effective remedy against the disease.

'Gummosis' is another serious disease which affects the stem. A liquid oozes out from the affected portion and the bark cracks. The bearing capacity of the plant is reduced, ultimately the plant may die if neglected. Application of Bordeaux paste to the affected portions is recommended. (Bordeaux paste is prepared by mixing one part of copper sulphate with three parts of lime in water to a thick consistency.)

Die-back. This is a disease which is common in orchards where drainage is lacking and the soil deficient in lime. The shoot portion starts drying up from the tip downwards. In such cases the disease can be checked by promptly pruning off the affected part up to the healthy portion of the stem or branch and applying Bordeaux paste to the cut surface.

Encouragement of fruit canning and bye-product industry. As an adjunct to fruit cultivation it would be profitable to start canning of fruits and manufacture of by-products. During periods of heavy production which create a glut in the market it would be better to utilise the surplus produce for preparing preserved products of fruits instead of resorting to under-selling the produce. Manufacture of lime beverages, squashes and cordials which find an easy sale during summer months should be encouraged. Preparations of citric-acid, essential oils, and fruit candies as bye products will be another enterprise in this direction. The canning of fruits like mango, jak, orange, pine-apple and the preparation of products like banana, figs, flour and crisps are not warranted under present conditions but can be taken up as and when the fruit industry of the tract develops.

Marketing. Facilities for quick and easy marketing occupy the key position of the fruit industry. The marketing system should be efficient

aiming at quick disposal of the produce at favourable rates. It is due to lack of organisation in this centre that the fruit grower is not able to get a square deal for his produce.

A system of grading of the fruits must be adopted so that the market value of the fruits may be enhanced. A well organised Sale Society on a co-operative basis must be started which will not only reduce the cost of export but also ensure fair prices for the grower all the year round. Such a procedure will effectively replace middlemen, who hold a grip over the marketing organisation at present.

Another important recommendation is the extension of the fruit growing area on account of the commercial possibility. The area to the north of Kadayam up to Tenkasi and up to Tirunelveli in the south has plenty of natural resources for fruit gardening. These regions can be exploited with profit. Large scale production will not only improve the opulence of the fruit grower but also lead to the cheapness of the commodity and ultimately to greater consumption by even the poorest class of people.

A further step in the campaign would be to encourage fruit growing by ryots with small holdings, so that every cottage can boast of a fruit orchard of its own to satisfy its requirements. The success of such schemes will have far-reaching results in the long run.

Acknowledgment. I am indebted to Sri K. C. Naick, M. Sc. (Bristol) for his valuable guidance in the conduct of the survey.