

Some Promising Fruit Products of South India.*

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Owing to the spontaneous and unregulated fruit industry of this part of India, our commercial orchards produce an admixture of good, bad and indifferent quality fruits in varying proportions. In almost every season the problem of disposal of the inferior quality or cull fruits is one of major importance to the fruit growers. The stability and expansion of a profitable fruit farming industry is intimately connected with the profitable utilisation of a large part, if not all, of those fruits that have no value in our fresh fruit markets. It is true that preparation of home-made jams, dried mangoes and some kinds of pickles and chutneys are popular in several parts of the country, but these outlets cannot be expected to touch even the fringe of the problem of the utilisation of fruits.

Even in the matter of our superior quality fruits the development of a large-sized fruit-products industry is essential to off-set the uncertainties of price fluctuation in fresh fruit markets. The frequent occurrence of gluts and uneconomic price levels can only be relieved by either the extension or the improvement of market facilities, or by the conversion of a bulk of our fresh fruit produce into suitable by-products. The fruit products industry has contributed a very large share in the development of the fruit-growing industries in many parts of the world, and should, make a special appeal to fruit growers in this country also.

Marketing improvements can only be effective in the case of fruits of marketable value that are produced in abundance in a fairly compact area within easy access of transportation centres. In this country where orchards have sprung up at all odd corners, often in localities from where transport is difficult or very expensive and where production itself is extremely unstandardised, the extent of possible improvement through better marketing is but limited. The development of 'fruit products industry' is therefore of great importance in this country, if adequate returns for all the fruits produced are to reach the pockets of growers. Madras ranks very high among the fruit producing Provinces and States in India. We claim an area of about 250,000 acres under mangoes, about 150,000 under bananas, over 20,000 acres under citrus and a very large undetermined area under a host of cheaply and abundantly produced fruits like, custard apple, wild fig, etc. In the conversion of these fruits into fruit products lies obviously a profitable avenue for the future prosperity of our fruit-growing industry.

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During the past six years some preliminary work on the conversion of a number of commercially grown fruits into a variety of products has been in progress at the Fruit Research Station, Kodur. It is naturally to be expected that with a work that is of such a complex and prolonged nature, much results of practical value cannot accrue from these preliminary trials. Nevertheless some of the products manufactured on the station have been certified by a large number of independent observers to be of high quality and full of promise. The following is an account of the work carried out on some of the products which may be of interest to those who may venture to develop a profitable opening for at least a part of their fruit produce.

Lime products. Limes form one of the most extensively grown fruits in this province and are exported in considerable quantities to North Indian markets. The high transportation costs and the heavy seasonal productions often result in only unremunerative returns to lime growers, as a result of which the necessity for the development of lime products is clearly indicated. Work on the preparation of lime cordials and squashes, lime-peel powder and pickles has given encouraging results at Kodur. The cost of preparation of good quality lime beverage of about 12 oz. (without container) works to only Rs. 0—2—3, as against the sale price of similar imported products at Rs. 1—12—0 per 24 oz. (including container). These figures amply indicate the scope for the extended manufacture of these products. The most suitable method for preparation of lime beverages consists of bottling the juice with 65° Brix, with 200 parts of sulphur dioxide per million parts by weight, in sterilised containers after five minutes of exhaustion.

Vadlapudi orange. Vadlapudi orange is a fruit of some commercial importance particularly in Guntur and Kistna districts. Owing to its reputed dietetic value, it has enjoyed a fairly good market in the Circars for some years past. But the production has now reached to such a proportion that the problem of marketing these fruits profitably in other parts of the Presidency or the country is found to be acute, as taste for this fruit is not easily developed except in some parts of Circars. A palatable squash with 60° Brix preserved in 150 parts of sulphur dioxide per million by weight, and exhausted in the same way as for lime beverages, has been prepared at a cost of Re. 0—2—9 per 12 oz. The preparation of essential oils from the peels of these orange has also been attempted with some success, while Messrs. The India Fruits, Ltd. have manufactured some excellent marmalades from these fruits.

Chinee orange. Squashes and cordials from inferior quality *chinee* oranges have been prepared by adopting the same methods as referred to above and with the addition of some amount of lime juice in order to bring the acidity in the final product to about 2% in terms of citric acid. Preserved orange beverages are, however, notorious for rapid deterioration in quality under storage conditions, for preventing which de-aeration has been reported to be essential. The latter method remains yet to be tried.

Lemon Beverages. In point of flavour, lemon beverages are decidedly superior to those of limes. Although lemons are not cultivated on a commercial scale in this Presidency, the high productive nature of a number of varieties so far tried at Kodur together with the precocious habit and ability to produce fruits almost throughout the year, appear to mark out these lemons as full of promise. Trials on the preparation of squashes and cordials with fruits of several varieties of lemons, adopting the same methods as those described under limes, have also given very encouraging results.

Pineapple. The West Coast provides some of the ideal conditions for cultivation of pineapple at a cost which can bear comparison with any other part of the world. Simhachalam and some parts of the Circars and also Lower Pulney are other areas where this fruit is found to thrive very well. Excellent products of canned pineapple, pineapple jam, pineapple squashes and pineapple candy have been prepared by employing the wellknown methods. But the cost of manufacture of these products at Kodur, several hundreds of miles away from production centres, becomes too high so that the manufacture of these does not seem to be a profitable proposition. There seems to be some scope for the establishment of a pineapple cannery in West Coast provided the cannery can command an assured and regular supply of suitable varieties. This is one of the crops in which the extension of the area and the development of canning factories are closely inter-dependent and are bound to be mutually benefitted. Of all the varieties so far tried the Kew has been found to be the most suitable for canning.

A small hand-made pineapple extractor for the removal of eyes expeditiously and with least wastage of edible matter and juice has been devised at Kodur and is now being sold by the Metal Industries, Shoranur. A small dehydrating chamber which can be heated with a special home-made oven and in which control of heat can be effected has also been devised and this renders the dehydration of fruits and preparation of candy very simple.

Mango. Although mango forms the leading commercially produced fruit of this Province no encouraging result in the canning of this fruit has so far been achieved. Several of our varieties are believed to be deficient in acidity, and therefore are difficult to be processed by the ordinary methods. The presence of turpenes tend to give an oil-flavour to the product and therefore devices have to be evolved to eliminate these in the final pack. Trials on canning of several of our wellknown commercial varieties like *neelum* and *bangalora* have proved a failure from the point of view of quality, although the products remained in sound condition inside the cans for even two years. *Manoranjan* and *baneshan* have shown to can slightly better, but even these cannot be said to be up to the mark. Messrs. India Fruits Ltd. have however succeeded in obtaining some good packs with *chinnasuvarekha* and some *rasam* varieties, particularly with *kothapallekobbari*. With dehydration, however, good success has been

obtained with several varieties and mango "leather" of good palatability and attractive appearance have been prepared. There is also a good prospect for the manufacture of several types of pickles and chutneys both on a cottage industry and factory scale.

Banana flour. By dehydration in the specially improvised chamber referred to previously, it has been possible to prepare flour from several varieties of bananas, of which some have appealed greatly to a number of independent observers. Mixed with milk and sugar the flour of *virupakshi* has been considered by several to provide an excellent food, possibly of very high dietetic value also. The flour of banana may also lend itself for the manufacture of a variety of foodstuffs like biscuits, bread and some special types of breakfast and invalid foods.

Papaya. To many, a fresh ripe papaya is distasteful, but in the papaya conserve even the most fastidious taste will find a product at once cheap and of high palatability. Candied papaya is also a product with considerable appeal to children and adults, and which can be manufactured cheaply with no elaborate equipments. The manufacture of crude papain has also been attempted with success.

Jack fruit and custard apple. Manufacture of industrial products from these two fruits which are found almost in wild state in some parts of the Presidency is bound to be of great economic importance. Candied jack, jack syrup and custard apple jam, butter and chutney are some of the products attempted with a good deal of success.

Candied citron peel and kumquats. Of all the fruit products, candying is believed to offer the simplest process for any one to follow. Candied peel of citrons and the whole fruit of kumquat involve very simple methods of preparations consisting of the washing of the fruit, pricking, a gradual impregnation of sugar and final dehydration. Industrially, more complicated processes such as colouring, glazing and improvement of the flavour artificially may have to be employed. But as a cottage industry manufacture of these products from raw fruits which now goes almost entirely to waste merits earnest consideration.

Wild fig powder. Dehydrated sound fruits of *Ficus glomerata* Foxl. which is a tree found to thrive under the most neglected conditions, when ground, give a powder of great relish for eating with milk and sugar added to taste. The raw material costs almost nothing except for collection, but as a final product whether as a base for porridge or for the preparation of a variety of home-made sweets, the fig products deserve to be considered as of no mean dietetic or table value.

The brief account that is presented herewith of the work carried out at Kodur should, it is hoped, convince one of the immense potentialities for the development of our fruit canning and products industry. Up to the end of the last financial year, the total amount spent on manufacture of fruit products amounted to Rs. 2,026—8—10, while the receipts from the sale of

products and the value of stock on hand amounted to Rs. 1,421—14—4. The difference of Rs. 594—10—6 represents the total expenditure purely on research. This small amount expended on work on such a large variety of products over a period of over four years and with such encouraging results can never be said to have been disproportionate to the output or quality of work carried out. Much greater facilities and funds for the conduct and prosecution of research on this field of economic importance is considered most necessary, if the interests of fruit industry in all its bearings is to be properly safe-guarded, and its expansion and development adequately regulated and stimulated.

Preliminary Studies on the Cardamom Thrips (*Taeniothrips Cardamomi* Ramk), and its Control.

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Introduction. The problem of cardamom thrips and their control is one of very recent investigation. Practically nothing was known of them till 1934, when they were first discovered by the junior author to be the sole agent concerned in causing unsightly scabs on the cardamom capsules. Ramakrishna Ayyar (1935) has described the thrips; Ramakrishna Ayyar and Kylasam (1935) have given a short account of the nature and the extent of damage caused by them. Since then the thrips situation has steadily worsened. The cardamom industry for which South India holds a monopoly has been steadily deteriorating as a result thereof. In view of the importance of the cardamom industry which is computed to give a turn over of nearly Rs. 10,000,000 per annum from a total production of 8,000,000 pounds of capsules, it was felt that the problem of thrips control required immediate attention. Experiments were started by the Entomologist in collaboration with Mr. K. M. Thomas, Government Mycologist, in 1939 at the Korangumudi Estate, Valparai (Anamalais Hills), where damage by thrips was reported to be very severe. The object of the experiment was to find out if it was possible to secure significant diminution of scab injury of the capsules by a reduction of thrips population with the aid of toxic sprays and dusts at a time when the thrips population was high.

Host and its Environment. The host plant is a herbaceous perennial and is cultivated under the shade of primary forests at elevations of 2,500 ft to 4,000 ft. Blossoming would appear to be governed by the extent of rains received in February—March; if for any reason the rains hold off at this critical period flowering is held back and a very poor crop finally results. In favourable seasons the blossoming would start by April and reach the peak by the end of May. The flush would wane thereafter but the plants will continue to produce scattered flowers till the end of December. Molegode (1938) and Subbiah (1940) have given detailed accounts of the