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Fruit Introduction, its Problems, and Place in National Wealth. *

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Introduction. In times gone by, India was known as the garden of the world. But today India is in poverty. Midas starving amidst the heaps of gold, does not afford a greater paradox. Why should there be periodic visits of famine and pestilence in a country where land is fertile, sunshine in plenty, winter injury negligible and the growing season long and favourable for good agriculture? In the utilization of our natural resources lies the real foundation of national prosperity.

Fruits and their place in Indian life. In this land, sages, philosophers and prophets seem to have lived on an exclusive diet of milk and fruit. Even in the present day there are thousands who live chiefly on fruits. On religious days many confine their diet to fruits. At weddings and temple worship fruit is indispensable. If anyone visits a friend, a relative or an officer it is a common custom to make an offering of fruit. Fruit is a cosmopolitan food. With fruit, a natural food, there is no distinction of caste or creed. The average meal in India is incomplete without pickles or chutneys, products of fruits and vegetables. A poor labourer is satisfied if some pickle is added to his meagre meal. Orange and lime juice have become indispensable in enteric and other ailments. In a hot country like ours fruit juices must be in greater demand than aerated waters. Coconut milk is already a popular beverage that is both refreshing and healthy. The fruit juices must be similarly popularised, so that their consumption may become a natural habit. We should have as our ultimate object and motto, a fruit a day for every man and woman of all ages and classes. Our fruits fresh, dried and canned, should easily find ready markets in European and other foreign markets.

Present Production and trade. As against all these immense possibilities for expansion of the fruit industry we are today actually faced with a position that is at once alarming from the national health point of view and ruinous from the view point of national economy.

The Departmental marketing surveys have shown that, we have now a total area of a little over 400,000 acres planted to fruits. Mangoes with 240,652 acres, bananas with 142,140 acres, oranges and limes with 21,000 acres form the main commercial fruits. Grapes (250 acres), pineapples (350 acres) and pears (500 acres) are the next in importance. Cashewnut

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is another important commercial product under fruits and nuts and is the only exportable commodity at present, accounting roughly for 8,000 tons of kernels per year. Fruits like guavas, custard apples and sapotas have not been surveyed. However, it has been estimated that the orchard value of all fruit crops at present in the Province is to the tune of Rs, 5,00,00,000. Of this apparently vast production, the exports to other provinces account for only a small quantity of mainly 564,000 mds. of mangoes, 2,50,000 mds. of bananas, 117,000 mds. of pineapples, 25,000 mds. of limes and very small quantities of pears and grapes of the aggregate value of about Rs. 2,171,000 per year. On the other hand, we actually import fruits of the value of Rs 162,000—grapes worth Rs. 1,27,000 oranges worth Rs. 492,000 pineapples of the value of Rs. 12,000 and limes of the value of Rs. 5,000 per year, making a total of Rs. 798,000 leaving a favourable net export balance of only Rs. 1,373,00 per annum of fresh fruits. Cashewnut exports also account to a total export value of about Rs. 10 lakhs per year. But this is not all the story. This country is a large importer of canned fruits and fruit products and is likely to depend more and more on foreign supplies in future, if no steps are taken to prevent such a state of affairs. At present India imports annually about Rs. 11,00,000 worth of canned and bottled fruits, of which this presidency alone takes about Rs. 2,00,000 per year. Imports of jams and jellies to India are of the annual value of about Rs. 7,00,000 of which Madras accounts for about Rs. 1,00,000. During 1937—38 imports of confectionery were of the value of Rs. 18,79, 891; pickles, chutneys, sauces and condiments Rs. 6,21,675, and vinegar Rs. 20,931. Besids these there are still, the fruit juices and beverages, fruit essences and artificial or synthetic fruit drinks, for which no reliable figures are available.

Opportunities neglected. With the immense diversity of soil and climatic conditions, this country assuredly offers very vast possibilities for the production of the choicest varieties of almost every fruit known to the world. India is recognised to be the original home of a number of fruits which are now grown extensively in other parts of the world. In fact, the fruit industry in this country has assumed such an anamolous position that, it has now become a necessity to re-introduce from abroad the selected varieties of these very fruits which once were our country's pride. The famous Washington Navel of the New world, Australia, and Africa were according to some authorities originally introduced from the Eastern part of India. The famous lemon industry which has now become the chief source of citrus beverage is recognised to have its original home at the foot of the Himalayas. But to-day we take pride in having a few stray imported trees of these fruits in some of our gardens as mere local curiosities. What a commentary on our inertia! Even in the case of mangoes of which we hold almost a monopoly of production, we look to a Wilson Popene of the United States for the essential technical information on its culture. While the United States of America has undertaken systematic hybridisation on this

fruit, we in this province have just commenced planning a few preliminary experiments on this crop only during the past five years.

As one of the most important of the rural industries and as one of the main sources of our national health and wealth, fruit deserves much greater attention than has been given to it in past. Fruit research has been almost badly neglected for so long a time by the state, that we are just where we were about a century ago. It was formerly considered that tea, coffee and such other non-fruit plantation industries merited our attention more than fruit culture whose development was essential both for national economy and national health. While South Africa and Australia built up a flourishing export trade in fruits, which became a main source of wealth to the British settlers of those countries, the fruit industry in India was left in a static condition. Even the few enthusiasts who wished to work in the line were discouraged and accorded no facilities. The histroy of the gigantic expansion of fruit growing industries in Palestine and Brazil during a short space of two or three decades and of the canning industry in Hawai to the present state of being the leading industry of the islands are all matters of recent history which clearly demonstrate to us the enormous scope of extension possible in this country if due encouragement and guidance are given.

Fruit Introduction: Some notable results therefrom. Among a large number of methods open for improving the fruit industry I shall confine myself to-day to only one aspect, namely fruit introductions. The epoch making developments that have resulted in other parts of the world by fruit introductions serve to emphasize the value of such work in the present stage of our development. The romantic history of the introduction of Washington Navel orange in California in 1870 by one William Saunders, Superintendent of the Gardens in Washington, which has resulted in the growth of the Californian Citrus Industry to the present day annual farm value of 135 million dollars, is an outstanding instance in point. It has been aptly said that the introduction of the original batch of two trees of this variety into California proved as important in Californian history as the discovery of gold. Nay, this discovery was far more important than that of the precious metal, for this fruit has not only come to be recognized as the second most important exportable produce of California, but has also given continuous work to millions of people; but what is still more important, it is an all-important source of valuable vitamins of dietetic value which has improved the health and happiness of the peoples both of United States and a number of foreign nations.

An enquiry into the origin of the cultivated fruits discloses the fact that there were three distinct centres from which the migration has taken place in more than one direction. These were distributed in the three continents, two in the old world, Asia and Europe, and one in the New.

Old World.:—1. Southerneastern Asia—including China, India and Malay Archipelago. The fruits indigenous to those regions are as follows.

Sweet orange, mandarin, common jujube, apricot, peach, Kaki, litchi, citron, bitter orange, Indian jujube, mango, jak, dwarf-date, banana, coconut, lemon, lime and grapefruit. 2. Temperate Europe and Asia—caucasian region. Raspberry, Strawberry, almond, pear, pomegranate, gooseberry, olive, fig, pistachio, walnut, date, plum and apple.

New World. Tropical America. Pineapple, anonaceous fruits, cashew-nut, guava, pumpkin, sapodilla, avocado, tomato and cactus.

It is very significant and suggestive to correlate these regions with the centres of ancient civilization. The constant mingling of races and the consequent intercourse with other countries broke these centres, and as a result most of the fruits have become quite cosmopolitan. Take for instance the sweet orange, which is indigenous to Cochin China. It is sold in every country store in the United States and is cultivated at its best, in largest acreage in California, which is at the other end of the world.

Fruit Introduction in India and abroad. The introduction of fruits is popularly considered to be the job of a novice. This belief is based on an utter ignorance of the importance of this work. Fruit introduction as carried out in this country by amateurs has led to an enormous waste of national energy and wealth although it must be admitted that it has also conferred a few benefits.

The famous blood red orange of the Punjab introduced by a medical man, the Batavian orange of the Circars and the Mozambique oranges of Bombay and of Central Provinces possibly imported by the Dutch and the Portuguese settlers are instances of private enterprise, which have developed into large scale 'commerical industries in a short space of time. In a lesser way we have the grape growing industry near Kodaikanal Road and the Manilla orange in the Courtallam area, both of which go further to emphasize the value of foreign fruit introductions, but at what cost ?. Innumerable plants have been obtained from elsewhere and planted by growers in every part of India, only to prove a source of utter disappointment to the growers after some years. Let me give an illustration. Everyone of us knows that Jahangir is one of our choicest mango varieties. This variety, however, is known to be a very shy-bearer, so much so, that it has no place in a commercial garden. Despite this fact some nurserymen advertise it and offer it at fanciful prices. The unwary grower, in the belief that the variety would truly be an acquisition may plant a large area, which ultimately is found to lead to an economic loss. Similarly, the famous Washington Navel orange has been introduced in large numbers in all parts of India at considerable expense, but has not yet proved superior to our local oranges either in yield or quality. Yet nursery men are still selling to the public hundreds of plants of this variety. There are still more instances of persons introducing into the tropical plains of the Presidency such plants of the temperate regions like apples, peaches and plums. All such activities may bespeak of the grower's enthusiasm but hardly do credit to his horticultural intelligence or experience.

In contrast to this, let us compare the methods adopted in a country like U. S. A. There the first step in plant introduction is the exploration. It is the trained explorer who first goes out in search of the fruits; fruits that are new or those that are of value for breeding work. He studies the natural habitats and the peculiar growth and fruiting habits of every fruit tree he comes across. Being fully conversant with the conditions of his native home, he is able to pick out those of possible value and send them over to the Plant Introduction Office.

The galaxy of such world famous fruit explorers sent out by the United States Federal Department of Agriculture like David Fair-child, Wilson Popence, P. H. Dorset, W. T. Swingle, and Frank Mayer have truly contributed inestimable wealth and happiness to the States and have inspired the research workers and fruit growers all over the world. Even the private nurserymen of America have contributed no mean share in the enrichment of the fruit wealth of their country. Which of the prominent citrus growers in the world do not remember with silent gratitude the name of Charles Volz, a Californian nurseryman who was responsible for the introduction of sour orange and demonstrating its value as a rootstock for sweet oranges ? The value of this discovery alone is evidenced from the fact that, about 75 per cent of citrus trees grown in the world are to-day worked on the sour orange rootstock. Even so, the gigantic expansion of the fruit industry in the New World owes not a little to the fruit introductions and varietal trials carried out by two Florida nursery men, George Ludley and E. Reasoner.

The Plant introduction Bureau in America is a special organisation which identifies the plants introduced, tests them under controlled conditions at select centres, studies their peculiarities and requirements and finally selects those which are promising for large-scale tests. It is only after the large scale tests are completed, that plants are distributed to the public for commercial planting.

In the initial stages, however, the private nurserymen of India have also undoubtedly contributed much for the enrichment of the fruit wealth of this country. But it must be remembered however, that our fruit nurserymen are of a stamp quite different from the class one usually comes across in foreign countries. Poverty and lack of state help and scientific training have prevented the Indian grower and nurseryman from playing his legitimate part in the development of the Indian fruit industry. It is true that even in more advanced countries of the west, the nurserymen usually play only a secondary part in plant introduction, but in this country the state has necessarily to bear the full burden. In reality however, it has been the other way round, till very recently. We owe most of the little improvements in the fruit industry of this presidency to private enterprise, and not to the state. The origin of several thousands of acres under mangoes, primarily under such varieties as *Chinnaswarnarekha* of the Circars, *Mundappa* of the West Coast, *Jahangir*, *Imamposand*, *Allampur*, *Baneshan* and a number of *rasams* of the Andhra Desha and the *Vadlapudi* orange of the same tract

are all traceable to certain individuals who had the love and foresight of the pioneer. These and various other unrecorded instances prove the value of such work in the nation's progress. The glory of the work of these various benefactors to the human health and prosperity remain unrecognized in contrast to the reverence paid to such discoverers in other parts of the world.

Limiting factors in fruit culture. Of the four important limiting factors—moisture, soil, light and temperature, the fruit grower can modify the first two by irrigation and use of fertilizers but he cannot change light and temperature. It is universally admitted that temperature is the most important factor in determining the flora and the vegetating zones of different places, particularly in the distribution of food crop sections of the world. Temperature has a direct bearing upon fruit growing. Gardener, Bradford and Hooker thus summarise the influences of temperature.

1. It delimits zones beyond which the growing of specific fruit becomes commercially hazardous because of lower winter temperature.

2. It delimits zones beyond which the growth of certain fruits becomes unprofitable because of high temperature.

3. Makes certain areas unprofitable for some fruits because of low summer temperature.

4. Turns good land to that of doubtful value for several fruits because of danger from spring frosts.

5. Within areas ordinarily safe for growing certain specific fruits an occasional deviation from normal may cause considerable damage.

6. Some insects and diseases are more or less dependent on proper temperature for their optimum development.

Heat is such an important factor that the fruit zones of the world which correspond to the life zones of meridian 34 are determined by the total units of temperature.

This is a broad and general division of fruit zones. Different varieties of the same fruit differ in their range of temperature. The same variety is not successful in the different tracts under the same climatic zones. That the same varieties of apple, grape, date, orange and peach grown in the similar crop zones are not uniform in their quality, is well known. The Washington navel orange is not successful in Florida, while the California grapefruit is inferior to that of Florida. Some of the non-astringent Japanese persimmons develop astringency in California though grown under apparently similar soil conditions as those found in Florida.

Moisture :— This plays an important role in fruit introduction. Moisture means rainfall, its time and the amount and also the relative humidity. Irrigation may make up for the insufficient rainfall but humidity and the time of rainfall limit the fruit production. The time of rain is closely related to successful fruit production. Rains during the blooming and fruiting period are detrimental to the pollination and ripening of fruit. The

possible effects are (1) bees will not work on a cloudy and rainy day, (2) stigmatic fluid becomes thin, (3) pollen may be washed away or anthers may burst, (4) the maturity of the fruit may be delayed and (5) splitting and souring may occur. Water has its own influence upon the yield, size, colour and composition of the fruit.

Light :— Light affects plants in intensity, quality and duration of exposure. It affects the flowering, fruiting and the quality of fruit. Fruit on the outside of the tree and fully exposed to light is inferior and often ruined, while the fruit screened by foliage is of the finest quality. Duration of light is very effective in the metabolic processes and carbohydrate formation. The longer the duration of light, the higher is the amount of plant food manufactured. The length of day is unique in its action on sexual reproduction. The blossoming and fruiting of a species may depend on whether the length of day in a new region is favourable or unfavourable.

Wind. This has injurious effects upon the tree and the fruit. The stems and branches bend away from the normal direction of growth and finally break. High winds during the fruiting season destroy the whole crop by stripping the fruit from the tree. Wind interferes with the pollination as the insects are not active in a strong wind. Wind location should be observed in locating the orchard site. Wind prevents the germination of pollen grain.

Soils. Fortunately most of the fruits are not exact in the soil requirements. Fertilizers and manures may correct the soil defects. Hard pans and too acid or alkaline soils should be avoided. Elevation, texture of soil, presence of forest trees as wind breaks, all enter into local climate of the orchard site.

Plant Diseases. In introducing a new plant, one should take extreme precaution in preventing the entrance of any pest or disease with it.

What the Government is doing. The importance of research work on fruits came into prominence in this country as a result of the post-war depression in agricultural prices. The Royal Commission on Agriculture has clearly emphasised the importance of fruit development. This recommendation has since achieved greater importance as a result of the work of nutrition experts. All these factors were responsible for the new orientation in the policy of the Imperial Council of Agricultural Research who have now sanctioned a number of fruit research schemes in different parts of India. With the starting of one of these schemes at Kodur in Cuddapah district the work of fruit introductions and variety trials naturally loomed large in the activities of this station. At present the station possesses valuable collection of over 100 reputed varieties of mangoes from all over India, Burma, Ceylon and Phillipines, and a still more vast collection of all the reputed varieties of citrus and those of lesser importance that are indigenous to this country. In fact, the collection has already attracted the attention of workers abroad, who have sought the help of the station to

introduce some of these varieties in their respective countries. While this collection will be a valuable source of selecting the varieties according to regional needs and according to the local fancies and prejudices of the growers and the consumers, it will also prove to be a valuable material for pursuing the hybridization work in future. It is regrettable that sufficient funds and facilities have not been provided for augmenting this collection and for starting similar variety collection centres in other representative tracts of this province. I am convinced that such stations are urgently required to be opened at Kodaikanal, for the hill fruits, in the agency tracts of the Circars for fruits suited to the humid regions and also perhaps in the Tamil districts for increasing the fruit wealth in that part of the province. Certain fruits of temperate regions have been introduced on the Nilgiris at different times but perhaps not entirely in a systematic manner. The work that has been done on the Nilgiris is not likely to be of practical value to the Kodaikanals. The most important tracts have been suggested but it is possible to multiply the fruit stations by selecting other tracts also, such as the Shevaroys, Lower Palani hills, Curtalam area and the Wynaad tract of the west coast.

Fruits that can be introduced. It needs no emphasis to be told that this Presidency has multiplicity of conditions which favour the profitable cultivation of many fruits. The dry and hot weather conditions prevailing in the Ceded Districts afford a vast scope for the introduction of choice varieties of dates, a crop which has contributed so much wealth to countries like Iraq, Egypt, some portions of South Africa and United States of America, possessing similar environmental conditions. The rain-fed tracts of the Circars agency, lower Palni Hills and Wynaad of the West Coast already grow excellent varieties of loose jacket oranges, and I see immense scope for developing these industries by the importations of better varieties. Even in the uncultivated forest areas, possibilities exist for the development of cultivaton of vast number of profitable varieties of fruits like zizyphus, custard apple, jak and perhaps some choice types of mangosteens also. There are yet other types of fruits like persimmons, litchees, rambhutan, durrian, avocadoes etc. which can find a number of congenial places in the presidency. The last mentioned fruit, has a protein content, which is about 2 per cent higher than that in other fruits. Temperature does not seem to limit the development of the avocado industry in S. India. The avocado is a boon to vegetarians. It takes the place of meat. Add an avocado to each meal of an average labourer and it would certainly change his constitution. It is an excellent diet in wasting diseases such as tuberculosis, and a blessing to victims of diabetes, diseases very common in India.

Fruit introduction is only one aspect of the complicated problem in the improvement of fruit industry in this province. Nevertheless, it is an important aspect, particularly so in the initial stages of fruit researh in a country like India. Selection of trees of outstanding merits, controlled hybridization and investigations into the improvements of propagations and

orchard practices as well as effective control of fruit diseases and pests are other important problems that cry for solution. Above all, we have yet to commence intensive investigations into the fruit canning and fruit by-products manufacture. This has specially become very important at the present age when frequent gluts and low prices have given a set back to the fruit growing industry. Unless means are devised for diverting the surplus produce into a profitable outlet as the fruit canning factory, one can never guarantee reasonable returns to the growers nor can one hope to meet the increasing demands for canned and preserved fruits in this country. I immediate action is not taken in this matter not only the fruit industry stands to suffer but eventually a stage will be reached when it will become impossible to oust the foreign products from our internal markets.

Transport of fruit is another serious problem that requires immediate attention. In this case it is very necessary that detailed investigation should be undertaken in the cold or gas storage of fruits so as to determine the maximum period of storage life and the optimum storage temperatures during transport for each and every commercial variety of fruit. At least one cold storage plant at Madras and another at an important growing centre like Kodur appear to me to be urgently required for tackling this problem. It must, however be pointed out that the improvement of transport of fresh fruit is limited by the prevailing rules and regulations of the railway companies over whom we have no control.

An Appeal and an Assurance. In conclusion let me explain to you what the present Government of this province stands for and how it is striving to materially improve the lot of the rural classes. As a nation dwells in the village, the rural problems occupy the first and best of our attention. Debt Relief Act, Prohibition, Land Laws (Tenacy Reforms), Cloth Bill; and National Planning or Industrial Revival are the order of the day. As students of Agriculture we must look ahead with a broad vision and find ways and means to improve our national wealth. Improving the present crops, introduction of new crops and getting better prices for the peasant's produce are some of the ways in this direction. In this work the Government expects every one of you to extend to it your hearty co-operation. As Confucius has said "The well being of a people is like a tree; agriculture is its root; manufacture and commerce are its branches. Break these away and the tree dies". The present Government cares for the tree, for its every limb and parts thereof. The fruit industry which is one of the important limbs can depend upon the government to have its interest well-protected and well nursed by every means in its power.