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RESEARCH ON TROPICAL FRUITS

(Background Paper)

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Introduction

This paper contains a review of the current state of research on tropical fruits at the international level. The fruits are grouped according to their food value and commercial importance on the local and international market; there is a major group which comprises banana, pineapple, mango, avocado and lime; another group of exotic fruits includes papaya, passion fruit and guava; a minor exotic group of fruits which has increasing commercial potential includes: lichee, durian, mangosteen, rambutan and anonas (soursop, sugar apple and atemoya); a fourth group refers to tropical nuts; cashew, macadamia, Brazil nut and peach nut, etc.

Research has been concentrated on the first group - which is well established in the international market but the research situation for the crops of the four groups is as follows:

1. Major fruits

1.1 Banana

Intensive research programmes are under way in Australia, Brazil, India, Israel, Jamaica, South Africa, and at the Institut Français de Recherches Fruitières Outre-Mer (IFAC) which conducts a worldwide programme. Private companies such as the United Fruit Company and the Standard Fruit Company have their own research programmes in Central America, Colombia, Ecuador and the Philippines but information on results is restricted. The most significant programme is conducted by IFAC because it deals with production aspects such as variety selection, plant nutrition, soil management, pest and disease control and post-harvest physiology, etc. The most active programme on banana breeding is under the auspices of the Banana Board of Jamaica, which aims at obtaining new varieties resistant to prevalent diseases such as the black leaf streak (Mycosphærella figiensis), nematodes and sigatoka (M. musicola). Unfortunately, this programme is facing a serious financial crisis and may have to close down in the near future. Some breeding is also carried out in Honduras by the United Fruit Company.

As regards production techniques, progress made in Brazil on banana production is relevant. This crop is facing a serious crisis because of increasing production costs as, in spite of intensive research carried out by IFAC and private companies, it seemed impossible to obtain yields above 80 tons/ha. Research conducted at the Instituto Agronomico at Campinas in Sao Paulo has shown that it is possible to obtain over 100 tons/ha at lower costs by renewing the plantations annually; in other words, the crop became annual, established at very high density, which helps to control weeds. Right after harvesting, the plants are chopped down and incorporated in the soil, thus considerably reducing the need for fertilizers. advantage is good nematode control because of fermentation of plant material in the soil.

1.2 Pineapple

The most relevant research programme on systematics, genetics, breeding, plant physiology, pest and disease control, fertilizing, planting density, processing, etc., has been carried out over the last fifty years by the Pineapple Research Institute (PRI) maintained by the Pineapple Growers' Association of Hawaii (PGA); this Institute is closing down this year because the PGA has decided to withdraw its financial support as a consequence of the economic difficulties which the Hawaiian pineapple industry is facing caused by high production costs and land value. Some pineapple breeding is being carried out by the University of Puerto Rico.

Research on problems which affect pineapple crops is carried out in Australia, Brazil, India, Malaysia, Mexico, Puerto Rico, South Africa, and by IFAC which has an active staff working in the Caribbean and Africa. Research on production, processing and post-harvest physiology is done by the Dole Company and Del Monte Corporation in the Philippines, Thailand and Kenya; the Standard Fruit Company is carrying out some research in Central America. Information obtained by these private companies is restricted.

1.3 Mango

The international market for this fruit, although not very active at the moment, is expected to expand for both fresh and processed products. The major producing regions are India and South-East Asia, tropical America, Australia, Africa and the Near East. Mango research has concentrated on variety selection, propagation, disease control, fertilizing and post-harvest physiology. Countries which have made a good contribution to improve mango production through research are Brazil, India, the United States (Florida and Hawaii), Israel, the Philippines and South Africa. IFAC is working on variety evaluation in Africa.

1.4 Avocado

Research on this fruit crop has dealt mostly with variety selection, rootstock and nutrition; intensive research has been carried out in California, Israel and South Africa for sub-tropical varieties, while research on tropical varieties is carried on mainly in Brazil, Florida and Puerto Rico. IFAC is promoting avocado production in some countries in Africa, always following variety trials. It is expected that recent developments in avocado processing, mainly on oil extraction and frozen paste, will bring about a great expansion of the avocado industry.

1.5 Lime

This is the most important tropical citrus fruit. Production is concentrated in tropical America, Asia, tropical Africa and the South Pacific. Essential oil and juice are the lime products most in demand on the international market. There is a potential for increasing the consumption of fresh Tahiti lime in Europe, Canada and Japan during the summer months when lemons are scarce. Limes are affected by virus diseases, mainly tristeza; twenty years ago this disease wiped out the lime industry in Ghana. Research in Brazil has shown that mild strains of tristeza virus afford protection against severe strains. Substantial research work on limes is carried out in Florida and Brazil.

2. Exotic fruits

2.1 Papaya

Major research on this fruit crop has been on variety improvement through breeding in Hawaii, South Africa, India and Australia; an intensive breeding programme which includes wild species is under way in Venezuela with the aim of obtaining varieties with resistance to virus diseases; the results obtained in Hawaii on post-harvest physiology research has considerably improved the shipping quality of papaya.

2.2 Passion fruit

The main producing countries are Australia, Brazil, Kenya, the United States (Hawaii) and some of the South Pacific Islands. Products preferred on the international market are juice (single strength and frozen concentrate) and nectar. Australia and the United States (Hawaii and Florida) are leading research on this fruit, the major fields being breeding for resistance to root diseases, plant nutrition, pest and disease control, pruning and pollination.

2.3 Guava

A well-known fruit in most tropical and sub-tropical regions, it is processed into marmalade, paste, juice, nectar and preserves, and is also dehydrated and frozen. These products are becoming appreciated in the most developed countries because of their fine flavour and high vitamin C content. Guava research is principally focused on variety improvement for processing and is mostly done in the United States (Florida and Hawaii), Brazil, South Africa and India. Propagation is also investigated.

2.4 Minor exotic fruits

These are fruits produced and consumed in great amounts in the tropics; some have been processed and introduced in Western Europe, Canada, Japan and the United States. Worth mentioning are the lichee, durian, longan, mangosteen, rambutan and anonas. Research work on these fruits has not been continuous; special attention has been given to variety improvement and propagation, mostly carried out in the Philippines, Malaysia, India, Indonesia and Thailand; some progress has been achieved in processing and storage.

2.5 Tropical nuts

The demand for these nuts in the international market is expected to expand in the next decade; of particular importance is the cashew nut grown in Brazil, India, Mozambique and Tanzania, which are major exporters; the macadamia nut is originally from Australia but it is grown intensively in Hawaii; the Brazilian nut is an extractive industry from the jungle of the Brazilian Amazon; the peach palm is grown in tropical America.

Research on cashew nut is carried out in Brazil, India and Mozambique; most important problems are variety improvement, fruit set, propagation and mechanical shelling. Regarding macadamia, considerable research work has been carried out at the University of Hawaii on selection of improved varieties, propagation, fertilizing and nut processing. The Brazil nut which could be grown well in southeast Asia and Africa - mainly because of its high nutritive value, faces

basic problems which have not been investigated, most important being variety improvement and propagation, as seedlings take over fifteen years to start bearing, trees grow very tall, making organized production uneconomical.

Special reference should be made to the peach palm, which produces nuts of high nutritive value as they constitute a valuable source of vitamin A; they are grown in Central America, Colombia and the Amazon Basin; the hearts are used as palmitos of good quality. Some research, mainly variety selection, is carried out in Costa Rica by the Inter-American Institute of Agricultural Sciences and in Brazil by the Institute of Agricultural Research of North (IPEAN) in Belem.

3. The role of FAO in promoting tropical fruits

Three divisions deal with tropical fruits in FAO, both through the Regular Programme and UNDP field projects. Production and protection aspects are dealt with by Plant Production and Protection Division (AGP); processing and marketing by Agricultural Services Division (AGS) and trade by Commodities and Trade Division (ESC) - the latter Division has been very active in the Inter-governmental Study Group on Citrus and the Inter-governmental Study Group on Bananas. In the field, FAO carries a great amount of work on feasibility studies which include tropical fruits as alternatives in agricultural diversification schemes in Latin America. At the moment, FAO has about 21 tropical horticulturists in the field working on tropical fruit: mainly on variety improvement (introduction and evaluation), demonstration on growing techniques and training. In Brazil, FAO is executing a large-scale project on Tropical Fruit Processing which is expected to have considerable impact on the tropical fruit industry in the northeast and includes a component on production improvement. In Asia, the Regional Office in Bangkok has conducted studies on the need to establish a Tropical Fruit Research and Training Centre for south Asia, and a FAO expert has assisted the Malaysian Agricultural Research and Development Institute (MARDI) in the organization of a research programme on tropical fruits.

4. FAO has organized international technical meetings on banana production and tropical fruit propagation; a symposium on the improvement of mango production will be held in Bangkok in 1975.

5. Additional research needed

FAO is also hoping to obtain UNDP support for the organization of a panel on tropical fruit research and development in the Far East. Before this panel meets, a consultant will survey and analyse the present situation of research and training on tropical fruits in the region. This survey will allow the consultant to indicate the most important crops and the main gaps, as well as to prepare the agenda for the panel. It is hoped that the results of this survey will be very relevant to the needs of the TAC. In relation to the need for additional research efforts, FAO's experience in the field indicates that many problems limit expansion programmes in tropical fruits. However, the most serious is the difficulty in obtaining reliable propagative material, particularly with major crops like banana, pineapple, mango, guava and papaya, and considerable research effort is needed in the preparation treatment, storage and transport of such material.

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