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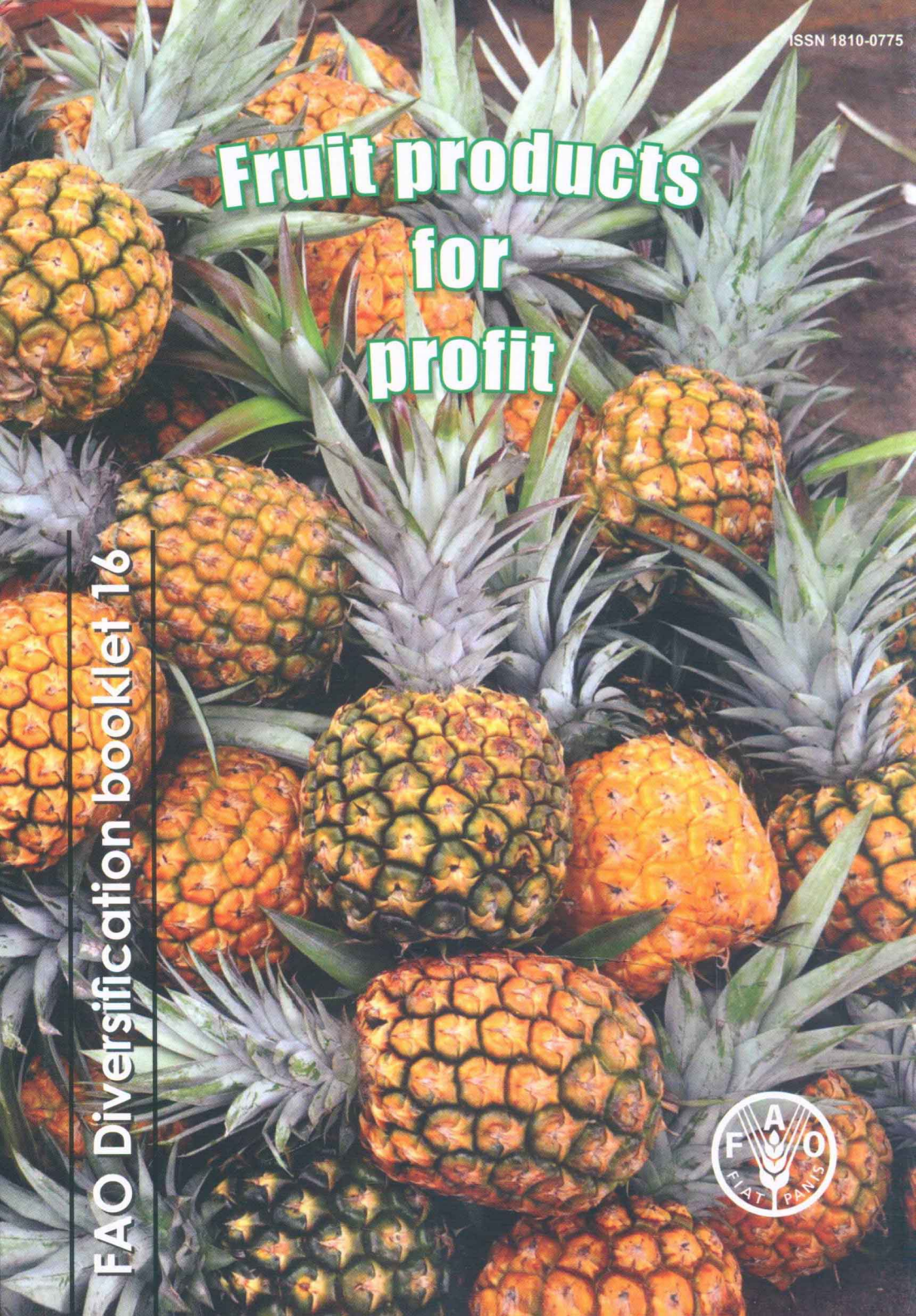
Fruit products for profit



FAO Diversification booklet 16

Diversification booklet number 16

Fruit products for profit

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Preface

The purpose of the FAO Diversification booklets is to raise awareness and provide decision support information about opportunities at farm and local community level to increase the incomes of small-scale farmers.

Each booklet focuses on a farm or non-farm enterprise that can be integrated into small farms to increase incomes and enhance livelihoods. The enterprises profiled in the FAO Diversification booklets selected are suitable for smallholder farmers in terms of resource requirements, additional costs, exposure to risk and complexity. The products or services generated by the enterprises are suitable for meeting demand on a growing, or already strong, local market and are not dependent on an export market. However in this particular booklet, export markets are also considered. This is because international trade in fruits can affect local markets and export markets can provide opportunities for some types of fruits grown by smallholders.

The main target audience for these booklets are people and organizations that provide advisory, business and technical support services to resource-poor small-scale farmers and local communities in low- and middle-income countries. It is hoped that enough information is given to help these support service providers to consider new income-generating opportunities and how these might enable small-scale farmers to take action. What are the potential benefits? What are farmer requirements and constraints? What are critical 'success factors'?

The FAO Diversification booklets are also targeted to policy-makers and programme managers in government and non-governmental organizations. What actions might policy-makers take to create enabling environments for small-scale farmers to diversify into new income-generating activities?

The FAO Diversification booklets are not intended to be technical 'how to do it' guidelines. Readers will need to seek more information or technical support, so as to provide farmer advisory and support activities relating to the

introduction of new income-generating activities. To assist in this respect, each booklet identifies additional sources of information, technical support and website addresses.

A CD has been prepared with a full series of FAO Diversification booklets and relevant FAO technical guides, together with complementary guides on market research, financing, business planning, etc. Copies of the CD are available on request from FAO. FAO Diversification booklets can also be downloaded from the FAO Internet site.

If you find this booklet of value, we would like to hear from you. Tell your colleagues and friends about it. FAO would welcome suggestions about possible changes for enhancing our next edition or regarding relevant topics for other booklets. By sharing your views and ideas with us we can provide better services to you.

Acknowledgements

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Acknowledgements for the series
Gratitude is owed to Doyle Baker, Senior Technical Officer, Rural Infrastructure and Agro-Industries Division (AGS), FAO, for his vision, encouragement and constant support in the development of the FAO Diversification booklet series. Martin Hilmi managed the development, production and post-production of the series and provided technical support and inputs. Michael Breece undertook the design and layout of the booklets and desktop publishing.

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Introduction

Tropical and sub-tropical fruit can make a significant direct contribution to the subsistence of small-scale farmers by providing locally generated nutritious food that is often available when other agricultural crops have not yet been harvested. Fruit are a versatile product that, depending on need, can be consumed within the household or sold. Marketing fresh and processed fruit products generates income which can act as an economic buffer and seasonal safety net for poor farm households. Diversification into fruit production can generate employment and enable small-scale farmers to embark on a range of production, processing and marketing activities to complement existing income-generating activities. Often small-scale and home-based, these fruit-based micro-enterprises may provide a particularly important opportunity for women to earn an income and increase their status in the farm family as well as in the local community.

FIGURE 1 Tending fruit trees that have been intercropped with maize
(Photo: FAO/18317/ P. Cenini)

Fruit trees are typically multi-purpose in that many provide not only fruit but also medicinal products and livestock fodder, as well as fuel wood and timber at the end of their productive lives. In addition to economic benefits, fruit trees provide a number of environmental services. Many of the species discussed in this booklet have traditionally been grown in mixed cropping systems where they enhance biodiversity and strengthen resilience against the effects of adverse weather conditions, poor soils and pests. In regions where climate variability is commonplace and adverse impacts of climate change are expected, fruit trees may play an important role in buffering against production risks and providing a continuous supply of environmental services.

While most production and primary processing is likely to occur in rural areas, fruit trees can also be incorporated in urban gardens and streets, where they can contribute to household food and income security as well as providing shade and other environmental services.

CASE STUDY 1 **Increased acai production: feeding the urban poor and promoting forest conservation**

Since the 1950s, the city of Belem, Brazil, on the Amazon estuary has experienced a population increase from 300 000 residents to 2 million, attracting migrants from rural districts with strong family links to the countryside and a preference for rural foods. Acai fruit have been a low-cost staple food source in the region since pre-Columbian times and the palm is extensively cultivated and managed along rivers in forested areas, home gardens and a variety of tree farming systems. While fruit are harvested mainly from cultivated acai, the edible palm-heart is collected mainly from the wild. Consumption of the juice of acai berry in Belem increased from 90 000 litres per day in the late 1980s to 400 000 litres per day in the late 1990s. It is estimated that the volume of juice consumed per person per day is twice that of milk. The tree provides a staple for the growing population of urban poor as well as a fashionable food. As a result of increased demand, farmers have switched from annual crop production to forest based production systems centred on acai. Over the same period there has been a net increase in afforestation in this region of the Amazon, as a direct result of the increase in acai production, in contrast to other regions of the Amazon where deforestation continues.

Source: Adapted from Padoch, C., Brondizio, E., Costa, S., Pinedo-Vasquez, M., Sears, R.R. & Siqueira, A. 2008. Urban forest and rural cities: multi-sited households, consumption patterns, and forest resources in Amazonia. Ecology and Society 13(2)

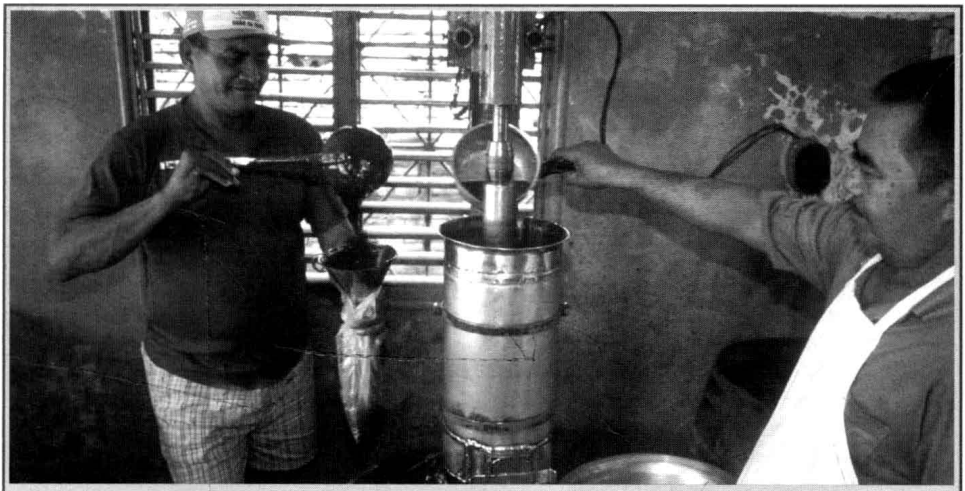

FIGURE 2 Juice being extracted from acai fruit (Euterpe Oleracea) that is very popular in Brazil.
(Photo: FAO/6047/ G. Bizzarri)

The fruit trees discussed in this booklet are cultivated in tropical and sub-tropical regions of the world and have the potential of being incorporated into smallholder farming systems to support livelihood diversification. Tropical and sub-tropical fruit trees are usually evergreen and perennial and are frost sensitive with little growth below 10°C. Tropical species are distinct from subtropical species in that they require humid conditions and are sensitive to temperatures below 20°C. They thrive in climates where average mean temperatures are higher than 10°C for the coldest month. Hundreds of tropical fruits are grown in these conditions, but only about 50 are well known.

The most widely cultivated and globally traded tropical and subtropical fruit trees are mango, various species of citrus, avocado, papaya and kiwi. However, this booklet focuses on species that are predominantly of importance in local and national markets, with some beginning to have a presence on global markets, including mangosteen (*Garcinia mangostana*), custard apple (*Annona reticulata*), jackfruit (*Artocarpus heterophyllus*), peach palm (*Bactris gasipaes*), acai palm (*Euterpe oleracea*), tree tomato (*Solanum betacea*, [also known as *tamarillo]*) and safou (*Dacryodes edulis)*. Although originating in one tropical region, many of these species are already being cultivated in other tropical and subtropical regions (see Box 1).

BOX 1 Fruit trees of importance for trade in local and national markets

Cultivation of the **mangosteen** tree has extended into Southern and Southeast Asia, northern Australia, the West Indies, tropical America and tropical Africa from its origin in the Malay Archipelago. It thrives in wet regions up to 600 m above sea level. In Asia, the fruit are generally traded as a fresh fruit or used to make and flavour desserts, jams, juices and wines. Its unique flavour, attractive fragrance and visual appeal have made mangosteen a very desirable exotic fruit in Europe and North America.

Custard apple is thought to have originated in the Antilles but has been naturalised in tropical America and is cultivated in South and Southeastern Asia and Australia. Its fruit are eaten fresh and are used to flavour milk shakes, custards or ice creams. It may also be used as rootstock for other *Annona* species which include *A. cherimolia* (cherimoya), *A. muricata* (soursop) and *A. squamosa* (sugar apple).

Jackfruit is indigenous to the tropical forests of India, Bangladesh and Malaysia and has been widely introduced to other South and Southeast Asian countries including southern China. It is also cultivated in tropical Africa and tropical and warm subtropical America and Australia. The large fruit are sold fresh or as a dried ingredient to flavour foods in the food processing industry. In Asia the immature fruit are cooked as vegetables while mature fruit can also be fermented and distilled to make liqueurs. The seeds are sold as snacks or ground to make a flour that can be used as an alternative to modified cereal starch. The timber is considered of high value in construction and furniture making enterprises.

Peach palm is indigenous to the humid tropics of South America, extending into the dry tropics (Mexico, some Caribbean islands and other continents) and grows best at low to middle altitudes with high rainfall. The fruit of the peach palm is traded locally in the humid tropics of South America as a fruit for cooking, a source of flour and oil and fermented to produce alcohol.

The large **acai palm** is indigenous to the Amazon river, is widely distributed in northern South America, and considered abundant in eastern Amazonian estuaries, flood plains, swamps and upland regions. It is economically important in the Brazilian state of Pará. In the Amazon region, the acai palm berry is sold fresh and as a dried powder to flavour food and drinks. Both peach palm and acai palm are also cultivated for their palm-heart, which is considered a delicacy and exported all over the world.

Tree tomato is cultivated in tropical highlands, the sub-tropics and mild temperate areas. It is indigenous to the Andes Mountains of Chile and Peru and is grown commercially in California and New Zealand. The fruit are sold fresh, but can also be processed into jams, jellies and chutneys and boiled or pureed to add flavour to drinks and for use in the food processing industry.

BOX 1 **Fruit trees of importance for trade in local and national markets** *(Cont.)*

Safou is native to humid tropical zones of Africa, but its wide temperature, rainfall, day length and soil range make it suitable for cultivation in sub-tropical and temperate zones. Safou has been introduced to Malaysia as an exotic and prefers shady, non-flooded areas. In the humid tropics of Africa, safou fruit are cooked as a vegetable and both the fruit and seeds are a source of edible oil.

Purpose of the booklet

The focus of this booklet is on fruit trees for small-scale farmers grown in home gardens and small-scale orchards, rather than on species such as oil palm that are predominantly cultivated in industrial-scale plantations. The booklet is intended to raise awareness and provide information to people

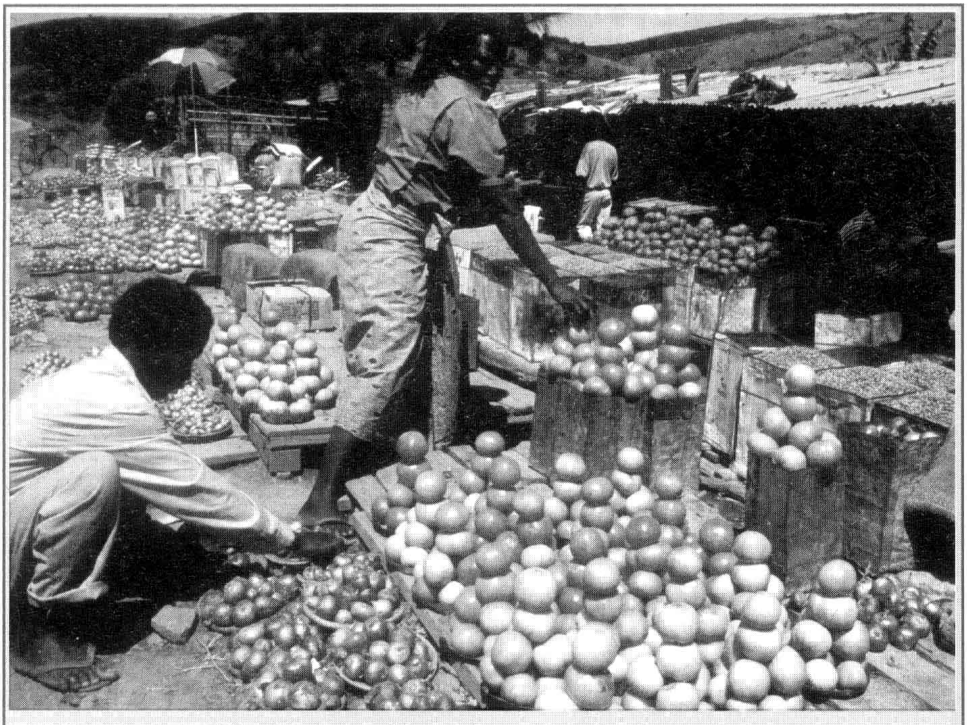

FIGURE 3 A rural fruit and vegetable market in Uganda
(Photo: FAO/19334/ R. Faidutti)

and organizations, public and private, who are working with local communities to promote sustainable livelihood diversification for small-scale farmers. The booklet outlines the potential benefits of a fruit enterprise deriving from increased incomes, but also considers improved diets and food security for the farm family. It outlines the basic requirements for cultivating fruit trees, marketing fruit and also processing fruit as well as drawing attention to some of the challenges. Even though harvesting of wild fruit trees is not considered in this booklet, processing, packaging and marketing of fruit produce is similar for both cultivated and wild harvested fruit.

Fruit and sustainable livelihoods

Fruit trees can contribute to household nutrition, food security and income and may be a particularly useful source of livelihood diversification for women and other vulnerable groups. They are a valuable component of sustainable agricultural systems.

Fruit for health

Tropical and sub-tropical fruits have a high and diverse vitamin and mineral content that can form an essential part of a nutritionally balanced diet. As fruit tend to have a substantial amount of potassium, phosphorous, calcium and frequently, iron and

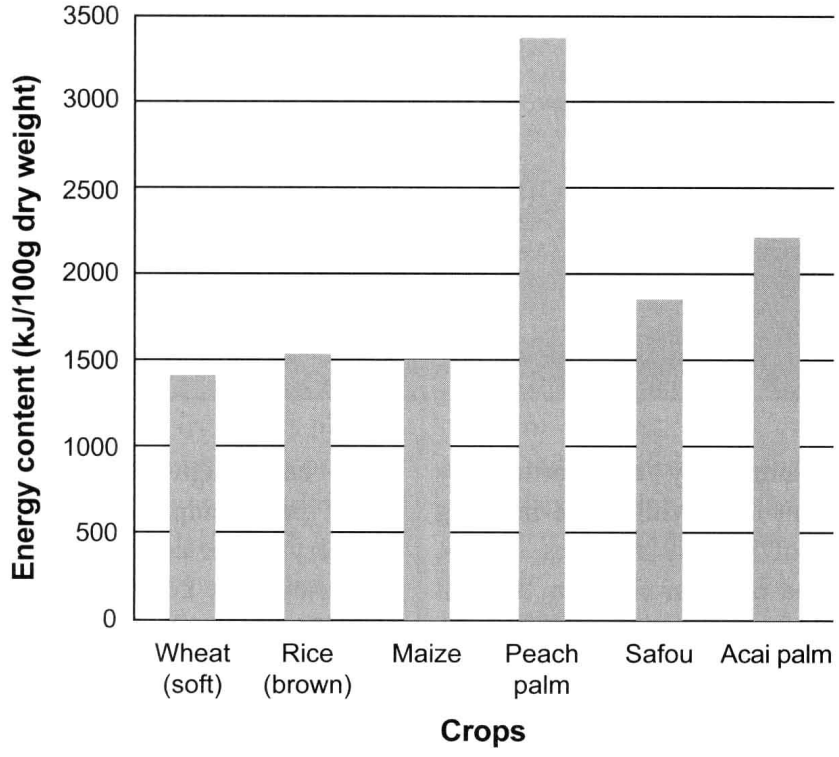

FIGURE 4 A comparison of energy content of some cereal crops and edible fruit pulp of peach palm, safou and acai palm

CASE STUDY 2 **Cuban home gardens provide food security, income and environmental stability**

After the collapse of the former Soviet Union in 1989, the economic situation in Cuba deteriorated dramatically with low wages and minimal food rations from the State. As families found it increasingly difficult to feed themselves, individually owned home gardens flourished. They now provide a rich diversity of trees, shrubs and herbs that are intensively managed in harmony with annual and perennial agricultural crops and small livestock, resulting in increased socio-economic and environmental stability.

A study of three villages found that with an average size of just 25x35 m, home gardens nevertheless contained over 100 different plant species. Half of these were fruit trees, the most common being avocado (*Persea americana*), mango (*Mangifera indica*), coconut (*Cocos nucifera*), breadfruit (*Artocarpus communis*), guava (*Psidium guajava*), soursop (*Annona muricata*), sugar apple (*Annona squamosa*), orange (*Citrus sinensis*), papaya (*Carica papaya*), bananas and plantains.

Home garden owners in these villages ranged from medium sized farmers with 60 ha of land to pensioners and low-wage earners. For most, their home garden was a part-time activity dedicated primarily to producing food for home consumption and to feed animals. The food quantity and diversity provided by home gardens, particularly between 1989 and 1993, was essential to maintaining the wellbeing of Cubans when the daily supply of calories was very low and malnutrition was common. As Cuba's economic situation has improved, home gardens have continued to play a central role in providing a diverse source of food throughout the year, while complementing other income-generating activities in resource-poor households. An added benefit has been a reduction in environmental degradation as farmers have sourced food and fuel wood from their home gardens rather than cultivating crops on steep slopes or encroaching into forested areas.

Source: Adapted from Wezel, A. & Bender, S.2003.Plant species diversity of home gardens of Cuba and its significance for household food supply, Agroforestry Systems 57, pp. 39-49

magnesium, they are particularly important in providing the building blocks of healthy muscles, bones, teeth and brain in children, as well as aiding protein digestion, cellular metabolism and a fully functional nervous system.

Some fruit such as acai fruit are extremely high in dietary fibre, which aids digestion and reduces cholesterol in the blood. Certain fruits have high calorific values. Peach palm pulp, for example, is not very sweet and is equal to, or surpasses some cereals with respect to energy, fats and carbohydrates (see Figure 4). The dried pulp of safou and acai berry, similarly outperform cereal crops when energy and fat contents are compared. Some fruit are also a good source of protein, with peach palm fruit containing all

essential and non-essential amino acids.

Fruit can be incorporated into diets in many different ways. Ripe fruit are often sweet and eaten fresh on their own or in desserts. The flavour of some fruits like mangosteen and custard apple can be improved through chilling. Fruit can also be preserved in jams and pickles or dried and powdered for use in drinks or confectionary (see FAO Diversification booklet Nos. 4 and 5 *Value from village processing* and *Processing for prosperity*). In many species, such as jackfruit, immature green fruit can be cooked and used like vegetables. Seeds of some species can be fried and eaten as snacks (see FAO Diversification booklet No. 18 *Selling street and snack foods*) and may be a good source of oil. In addition to providing healthy side-dishes and desserts for the whole family, fruit trees planted near the house can be especially important for young children – who have particularly high energy and nutritional requirements – by providing easily accessible snacks.

Medicinal properties of fruit

There is a wealth of indigenous knowledge about the medicinal uses of different fruit trees. Thus all parts of the jackfruit tree, for example, are used as remedies for everything from skin diseases and asthma, to dysentery, intestinal worms, diabetes, ulcers, pain, wounds and abscesses. Tannin from the dried unripe fruit of custard apple is used against diarrhoea and dysentery while the bark prevents excessive bleeding and the root is used as a tonic to reduce fever (see FAO Diversification booklet No.17 *Health and wealth from Medicinal Aromatic Plants*). However, as much of this traditional knowledge has not yet been subjected to scientific research, expert medical advice should always be sought in case of illness.

Fruit and food security

Food security implies that individual households are able to meet their daily food needs from their own farm or have the means to obtain food from local off-farm sources. Fruit crops are a suitable addition to any small-scale farm and home and market garden (see FAO Diversification booklet No.2 *Livelihoods grow in gardens*) because they require little cash and labour input once they are established and, if planted in appropriate locations, do not need to interfere with staple crops. Planting a number of different fruit tree species can provide households