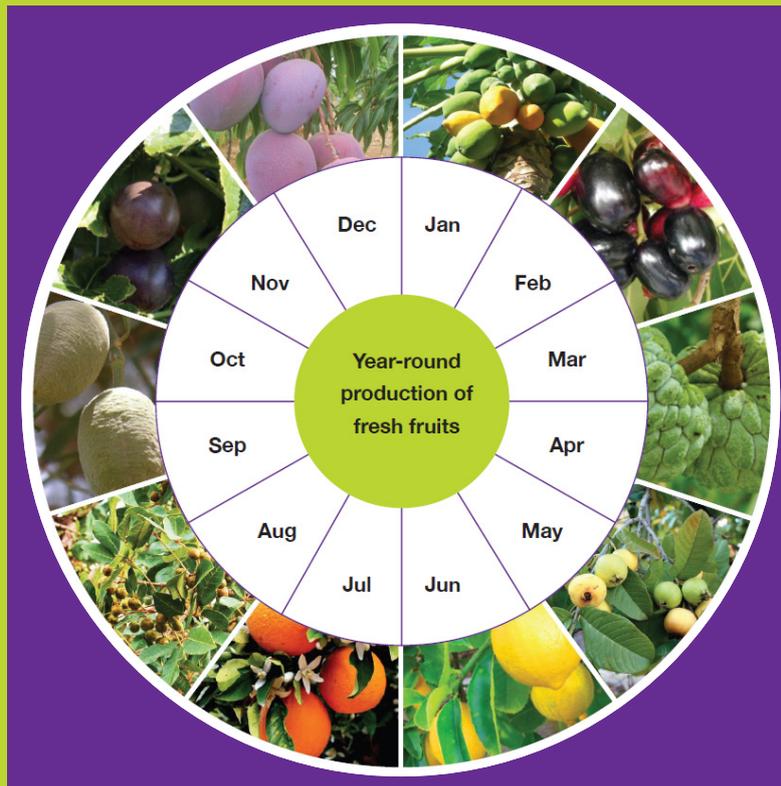


Fruit tree portfolios for filling household food and nutrition gaps: a case study from Eastern Kenya

ICRAF's site-specific innovation for diversifying fruit production and consumption



Food trees produce a variety of healthy, nutrient-dense foods including fruits, leafy vegetables, nuts, seeds and edible oils. They increase the nutritional quality of local diets, not only due to their micronutrients (mineral and vitamins), but also macronutrients (protein and carbohydrates) and phytochemicals (e.g. antioxidants). Specifically, fruit trees can be integrated into mixed crop farming systems to provide year-round harvest of a variety of healthy nutrient-dense foods.

In addition, trees are resilient with regard to climate variability and their products can close hunger and nutrition gaps that arise when staple crops fail or before they are ready for harvest. The cultivation of fruit trees on smallholders' farms provides a significant opportunity for farmers to diversify their crop production practices, besides potentially improving their diets, improving the

livelihoods and economic status of their households and benefiting from the ecological services that trees provide.

Quite often, in regions where rates of malnourishment remain comparatively high, such as sub-Saharan Africa and South Asia, the diets are dominated by starchy, energy-dense foods, with low consumption of nutrient-rich fruits and vegetables; this is particularly true for fruit consumption in East Africa, where annual per capita consumption is far below the World Health Organization (WHO) recommended 146kg of fruits and vegetables per year per capita (Table 1).

Many food systems here are characterized by a narrow diversity in the food produced on farms, which could result in low availability of nutrient-dense foods such as fruits and vegetables on farms and in markets, and consequently low dietary diversity of consumers.

Table 1. Average per capita annual fruit and vegetables consumption and stunting rates of children < 5 years in five countries in Eastern and Southern Africa

Country	Fruit consumption (kg/yr/person)	Vegetable consumption (kg/yr/person)	Stunting rate (%)
Ethiopia	1.3	25.4	40
Malawi	11.1	41.8	35
Tanzania	20.1	37.7	35
Kenya	25.8	88.3	26
Uganda	12.4	51.8	34

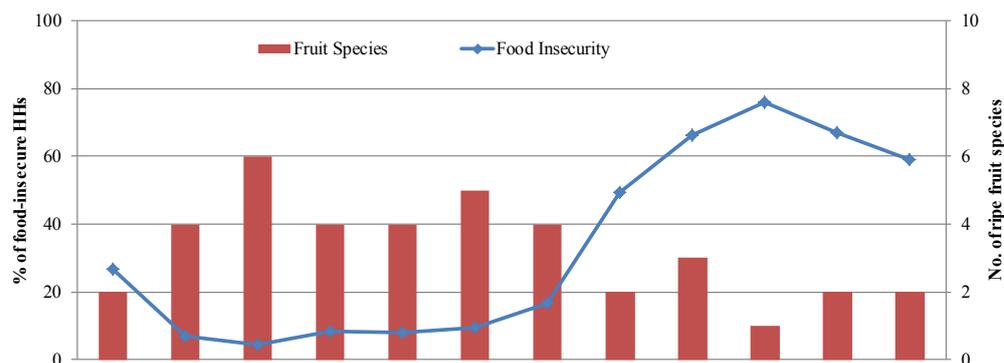
(Ruel et al. 2005; <http://apps.who.int/nutrition/landscape/report.aspx>).

Fruit tree portfolio development

The World Agroforestry Centre through the European Commission/The International Fund for Agricultural Development (EC/IFAD) funded Fruiting Africa project have developed the 'fruit tree portfolio' approach for identifying ecologically, socio-cultural and nutritionally suitable fruit tree species for year-round fruit production on farms. This is aimed at enhancing the diversity of fruits on farms and in food systems for increased consumption and better diets, while addressing seasonal fruit availability.

Fruit tree portfolios are location-specific combinations of indigenous and exotic fruit tree species that can provide year-round harvest of vitamin-rich fruits and, at the same time, fill 'hunger gaps' and specific 'nutrient gaps'.

Central to the development of a fruit tree portfolio is the identification of the specific seasons and months of the year where households in a given area may experience higher levels of food insecurity. The objective of the fruit tree portfolio is to ensure that at least one fruit tree species is available for harvest in each month of the year. In this approach, if there are gaps identified, it is necessary to 'close' these gaps by identifying ecologically-suitable fruit tree species which could be cultivated for fruit harvest during the specified time. In addition, it is necessary to identify fruit tree combinations that are nutrient-dense (pro-vitamin A, vitamin C) and can be cultivated on farms to provide not only for consecutive harvest year round, but to fill specific and identified, food and nutrition gaps (Figure 1).



English name	Species name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Vit A	Vit C
Pawpaw	<i>Carica papaya</i>	■	■	■	■	■	■	■			■			+++	++
Mango	<i>Mangifera indica</i>	■	■	■	■	■	■	■						+++	+
Waterberry	<i>Syzygium spp.</i>				■	■	■	■	■	■				(+)	+
Custard apple	<i>Annona reticulata</i>			■	■	■	■	■	■	■				++	+++
Guava	<i>Psidium guajava</i>			■	■	■	■	■	■	■				++	+++
Lemon	<i>Citrus limon</i>				■	■	■	■	■	■					+
Orange	<i>Citrus sinensis</i>				■	■	■	■	■	■					+
Chocolate berry	<i>Vitex doniana</i>													+++	
Avocado	<i>Persea americana</i>														
Passion	<i>Passiflora edulis</i>							■	■	■	■	■		+++	
Desert date	<i>Balanites aegyptiaca</i>								■	■	■		■		(+)
Available vitamin A and C-rich fruit species		2	2	5	4	6	5	4	2	2	1	2	2		

Figure 1. The fruit tree portfolio for Machakos County, comprises of a selection of 10 fruit tree species ecologically suited to the area which can be promoted to meet year round harvest needs and contribute towards supplying pro-vitamin A and vitamin C in people’s diet. Ratings of beta carotene (vitamin A) and vitamin C contents are given as +++ = very high; + = intermediate; and (+) = moderate. Harvest periods of vitamin A and C-rich fruits are indicated by the green-shaded boxes. Avocado does not contain as high content of vitamin A

and C as other fruits in the portfolio; it is included for its 6-month harvest availability and contains other important nutrients, particularly fat content (a 146g portion can provide 21% of Recommended Daily Amount, and dietary fibre).

The portfolio approach can be developed to include suitable and complementary vegetables, as well as annual and staple crops to provide for a ‘whole diet’ approach.

Fruit tree portfolios established in Machakos, Eastern Kenya: a novel site-specific intervention of the Fruit Africa project

Between March and December 2015, a total of 13 fruit tree portfolio sites were established in farmers’ fields and community nurseries to serve as demonstration sites in Machakos County. One demonstration plot was established at the Machakos Rural Resource Centre (RRC) for the purpose of training farmers and other interested actors in Machakos County (Figure 2).

Machakos RRC serves as a centre to train and transfer knowledge to farmers and others on agroforestry, tree

planting and management, nursery establishment, and as a source of quality tree planting material. Twelve fruit tree portfolio plots were established on champion/innovative farmers’ fields to ensure wider reach to the surrounding communities. The fruit tree portfolio plots provide farmers with access to action demonstration sites, for information and technology exchange and for replication on other farms.



The flagship fruit tree portfolio demonstration plot at the ICRAF-ATC Rural Resource Centre, Machakos, Eastern Kenya



The fruit tree portfolio demonstration plot has integrated agriculture and nutrition communication material available for farmers. Photo © World Agroforestry Centre/Danyell Odhiambo

Agnes Gachiuri (right) an ICRAF staff holds an indigenous fruit tree -Machakos ASK Show 2015. Photo © World Agroforestry Centre/Danyell Odhiambo



A display of quality tree planting materials at the ICRAF-ATC Rural Resource Centre, Machakos, Eastern Kenya

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