

Neglected & Underutilized Species

ECHO Asia Impact Center

OVERVIEW

- What are NUS?
- Why are they neglected and underutilized?
- Why should they be restored?
- What can we do?
- NUS examples

Neglected & Underutilized Species (NUS)

- **Definition** of underutilized crops – “Species with underexploited potential for contributing to food security, nutrition, health, income generation, and environmental services” (FAO-2007)
- Also known as: neglected, minor, lost, promising, alternative, and traditional (Hart, 2007)
- Not only food for people, but also uses of animal forage, soil remediation, biomass for soil fertilizer and other uses, like construction, fences or windbreaks



Species & Varieties can be neglected and underutilized



Neglected and Underutilized Species include things like

- Chaya, Katuk, Moringa, in some places

Some species are not neglected, but diverse varieties of that species are

- Bananas:
1,000 varieties. Cavendish variety accounts for 50% of bananas grown in the world (FAO)



Reasons crops become neglected or underutilized

- Changing farming practices
- Changing market demands
- Cultural erosion
- Result of modernization,
migration, urbanization or
land degradation



Why might a crop be NUS?

- Limited range of growth (e.g. particular growth requirements)
- Limited recognition
- Products not as able to be transported or processed as wheat, corn, or rice for distribution
- Edible portions inconvenient to access (e.g. edible hearts of rattan shoots are cloaked in thorny stems)



Why else might a crop be NUS?

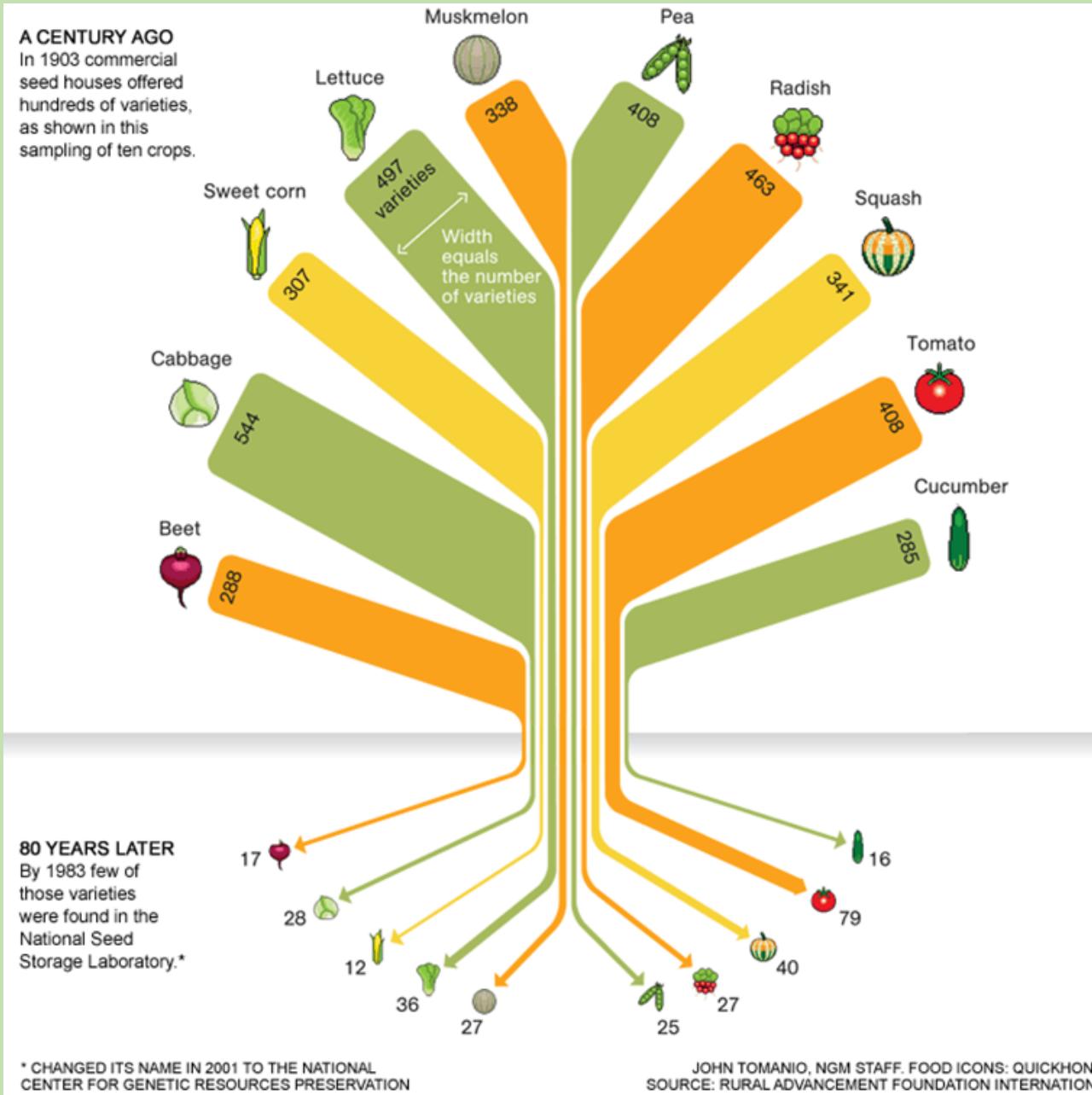
- Nutritional issues and toxins require special processing
 - High oxalates (taro leaves and stems)
 - Cyanide compounds (Chaya, cassava leaves and tubers)
- Not widely considered as palatable (bitter, astringent)



Diminishing Plant Species Biodiversity

- During their history, human beings have used over 40,000 plant species for food, fiber, forage, fuel, industrial, cultural, and medicinal purposes
- Approximately 7,000 species have been cultivated for food
- Approximately 170 plant species are currently grown on a commercially significant scale
- We depend highly on just 30 of these for daily calories and nutrients
- **Corn, rice, & wheat** make up about **50%** of the world's calories

Diminishing Plant Species Biodiversity



Comparison of seed varieties sold by commercial U.S. seed houses in 1903 with those in the U.S. National Seed Storage Laboratory in 1983.

The survey found that about 93 percent of the varieties had gone extinct.

Food Ark



“A crisis is looming. To feed our growing population, we'll need to double food production. Yet crop yields aren't increasing fast enough, and climate change and new diseases threaten and limit varieties we've come to depend on for food. Luckily, we still have the seeds and breeds to ensure our future food supply—but we must take steps to save them.”

-Food Ark, National Geographic, 2011

Why should NUS
be restored?

Benefits of NUS

- Addresses **food security**
- Creates **resilience**
- Preserves **culture** and tradition
- Encourages **biodiversity**



What can be done?

Seed Saving and Seed Banking





Value of Informal Seed Systems

Farmer self-saved seed, farmer to farmer exchange, and community seed banks

- Encourages crop biodiversity through preserving locally adapted varieties



- Provides seed and food security during instability, natural disaster and climate change



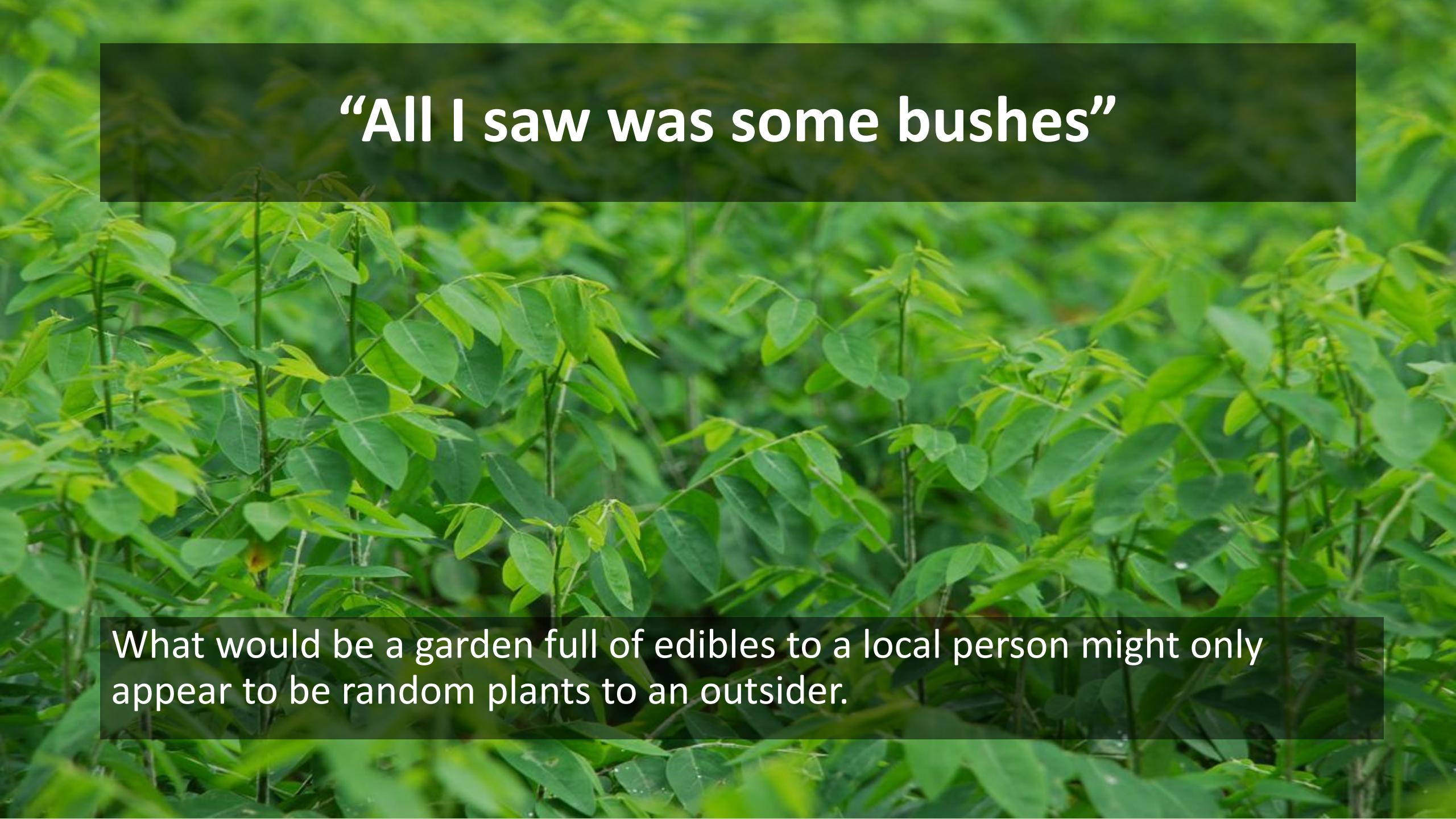
Find out about
NUS in your place

Activity!

Write on your sheet of paper your country of origin (or country where you work) and a list of:

1. Some examples of NUS's
2. If they are used at all, how? (how they are cooked, use for medicine, animal feed, etc.)





“All I saw was some bushes”

What would be a garden full of edibles to a local person might only appear to be random plants to an outsider.

Are there NUS of interest **already** in your focus area?



- How might you locate them?
- How might you understand their role in local nutrition and in the economy?
- Are they very common among a small population or region but unknown beyond?
- Are they widespread but still considered minor?
- Where can you locate scientific information about these crops?

Are there possible **non-local** NUS that might be useful and appropriate for your focus area?



- Are there any particular non-local underutilized crops that might grow well under local environmental conditions?
- Would such crops be adopted by local growers and consumers?
- How might these crops be located, imported, and evaluated?

*Introducing plant species



Field Work

- Market surveys
 - Survey local markets to determine the availability of major crops as well as underutilized crops
- Community-based surveys
 - Talk with locals, families, cooks to find out what's being consumed daily and what taste preferences are
- Local farmers and gardeners
 - Ask what they grow and learn if they grow any underutilized species/varieties and whether any new crops may be useful or welcome
- Seed swaps
 - Allows you to inventory seeds and gives you material to share with other farmers with permission

Evaluation before introduction

- **Culturally appropriate**
 - Tastes, preferences, cooking styles, etc.
 - Cultural sensitivity
 - Use local assets
- **Ecologically appropriate**
 - Invasive or weedy species
 - May require different farming practices
 - Benefits and suits the land, adapted to the climate





NUS PLANT PROFILES

Chaya, Moringa and Katuk nutrition (100g serving of fresh leaves)

- Chaya

Protein –	6-7g, same as one egg
Calcium –	200-330 mg
Iron –	9-11 mg
vitamin A –	1,357 IU
vitamin C –	165-205 mg

- Moringa

Protein –	7g
Calcium –	440 mg
Iron –	0.85 mg
vitamin C –	220 mg

- Katuk

Protein –	6.4 g
Calcium –	233 mg
Phosphorous	98 mg
Iron –	3.5 mg
vitamin C –	164 mg



Leaves



Tamarind (*Tamarind indica*) grows throughout the tropics and is valued in northern Thailand, as elsewhere, for its pulpy pods.

Additionally, the tender leaf shoots and flowers are added to soups as well as curries for a sour flavor.



Leaves



A clump of fiddlehead fern in a home garden.

Fiddlehead fern (*Athyrium esculentum*) is an herbaceous perennial native to northern Thailand. Commonly found in the wild along stream banks, this fern is also cultivated as a minor crop.

The tender shoots and fronds are stir fried, curried and blanched or eaten raw as a dipping vegetable.



Edible fiddlehead fern shoots and fronds.

Leaves



Leaf pepper (*piper sarmentosum*), also a non-woody perennial indigenous to the forests of Thailand, is valued as both a food source and an ornamental ground cover.

The tender new leaves of this non-climbing pepper are eaten raw as a dipping vegetable or used as an edible wrapper for a local treat called *miang kham*. They're also added to curries.



Fresh leaves in the market



miang kham

Flowers



Sesbania (*sesbania grandiflora*) is not native, but has been long adopted by people in this region for its edible flowers. The white-flower variety is generally preferred over the more bitter red flower type.

Sesbania flowers are most abundant during the end of the rainy season as well as the hot season. The flowers can be steamed or blanched for dipping or included in curries.

Flowers



Certain types of banana blossoms are edible, including the Thai cooking banana (*Musa acuminata x balbisiana*) and forest banana. The blossoms are eaten raw in salads, stir fried and curried.

Pods



Indigenous Indian trumpet (*Oroxylum indicum*) has edible pods and flowers. Its tender young pods are harvested in the late rainy and early cold seasons and are roasted over a flame to remove the tough outer layer. The inner portion of the pod can be used to dip pepper sauce and larb. Otherwise, it is added to salads, fried with pork or curried.

Pods



Moringa (*M. oleifera*), or drumstick tree, is another naturalized perennial vegetable. Both the tender, young pods and leaf shoots are edible with pods being available during the dry season and leaves harvestable during the rainy season.

Pods and leaf shoots are added to curries whereas leaves are steamed for dipping and also added to soups.



Shoots

Dozens of bamboo species, most of which indigenous, are found in northern Thailand. Besides offering important construction materials, the shoots of many types of bamboo, such as giant bamboo (*Dendrocalamus giganteus*), play a major role in the local diet.



Shoot of *Dendrocalamus giganteus*.

Bamboo shoots, available mainly during the rainy season, may be boiled for dipping, curried or stir fried.



Bamboo shoots for sale in the market.

Shoots



Chopping a mature shoot from a rattan clump.



The rattan shoot with the thorny bark trimmed off.

Although numerous rattan species are indigenous to northern Thailand, they are increasingly rare in the wild. Most famous as canes used for weaving baskets and wicker furniture, these thorny palms also have shoots with an edible core.

The thorny outer bark of large shoots can be trimmed off to access the core. The bitter cores are sometimes eaten raw as a dipping vegetable, roasted and added to dipping sauces or cooked in curries.

Hearts



The multi-trunk red fishtail palm (*Caryota mitis*).

Fishtail palms (*Caryota spp.*) are also native to Thailand. Though increasingly rare in the wild, the species has gained popularity as an ornamental plant.

Unlike rattan palms, the fishtail palm lacks thorns. The outer bark is removed to access the sweet, edible heart that's cooked in curries.



The edible heart of red fishtail palm.



Honorable Mentions

- Mulberry
- Neem
- Jackfruit
- Starfruit
- Jujube
- GMCCs

Including Lab lab, Velvet bean, Sunn hemp, Rice bean, and more



Thank you!

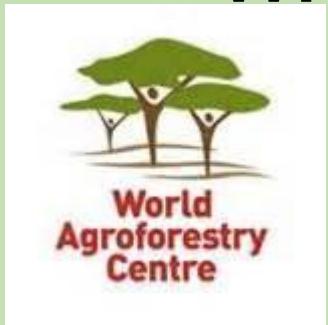
NUS RESOURCES

Where to Start: Using What is Already Available

- The Food and Agriculture Organization (FAO) of the United Nations offers a tremendous wealth of technical resources covering a wide range of food production topics, particularly for the developing world.
- Use the search engine of the FAO homepage to locate possible resources for underutilized crops in particular regions of the world.



Where to Start: Using What is Already Available

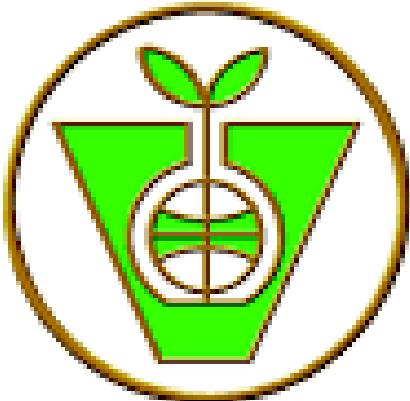


CGAIR (Consultative Groups on International Agriculture Research) is an international organization which funds and co-ordinates research into agricultural crop breeding with the goal of “reducing rural poverty, increasing food security, improving human health and nutrition, and ensuring more sustainable management of natural resources.”

CGAIR has a network of 15 research centers, of which those most likely to have some focus on underutilized crops include:

- Bioversity International
- International Center for Agricultural Research in the Dry Areas (ICARDA)
- International Center for Forestry Research (Bogor, Indonesia)
- International Crop Research Institute for the Semi-Arid Tropics
- International Center for Tropical Agriculture
- World Agroforestry Center (ICRAF)

Where to Start: Using What is Already Available

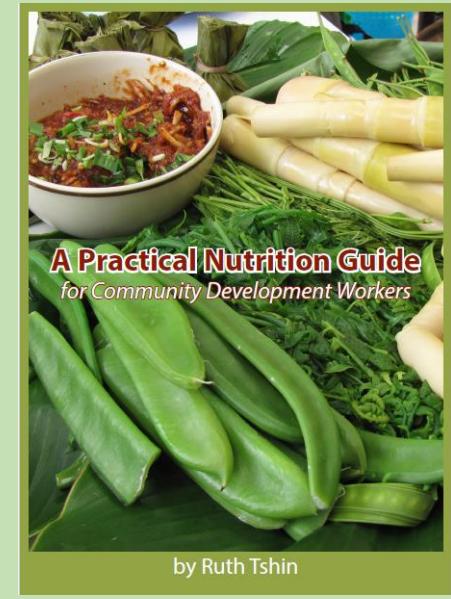
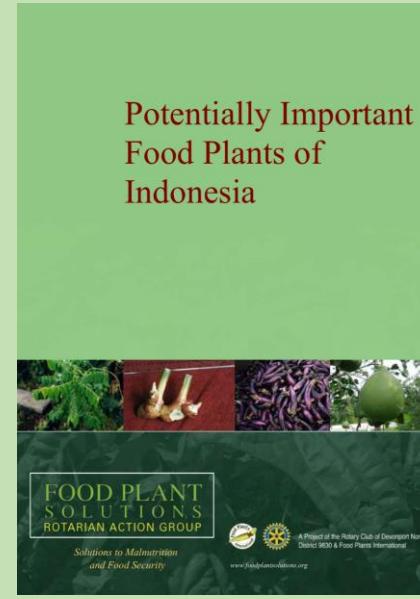
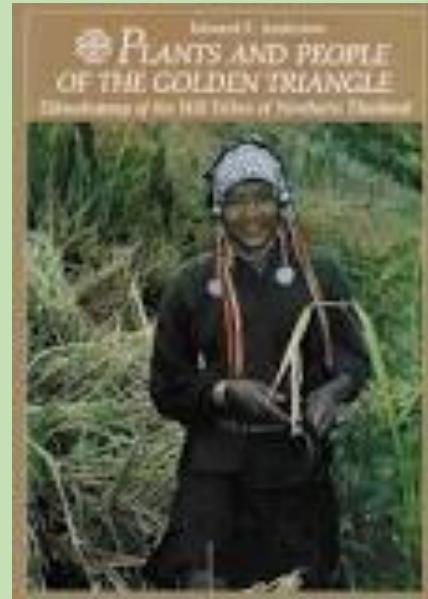
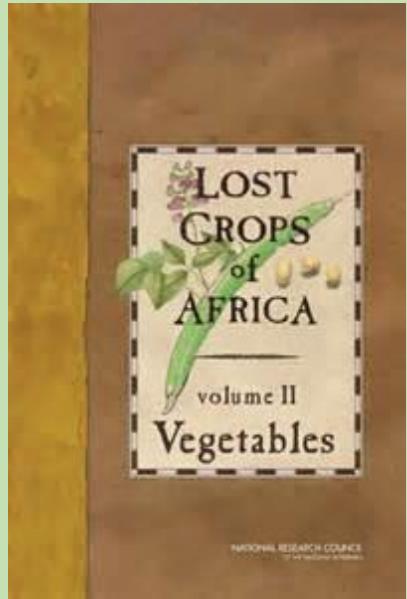


AVRDC

The World Vegetable Center

- The World Vegetable Center is committed to alleviating poverty and malnutrition in the developing world through the increased production and consumption of nutritious and health-promoting vegetables.
- Founded in 1971 with a mandate to work in tropical Asia with its headquarters campus in Taiwan open in October 1973.
- As the Center gained expertise and capacity, it expanded into sub-Saharan Africa, Central Asia, and South Asia. In 2008, the organization adopted a new name – AVRDC – The World Vegetable Center – to reflect its global scope.

Resources: Local/Regional Reference Books



Look for authoritative regional publications.
Do not forget to consult guides in local/regional languages.

Resources: Local Experts

- Regional, natural, and local contacts with underutilized crop expertise
- National or local universities
- Local governmental agencies
- Non-governmental organizations



Cambodia Department of Agriculture



Royal University of Agriculture