

# GOOD GARDENING AND ROOT CROPS IN TIMOR-LESTE

*PRACTICAL WAYS OF GROWING LOCAL  
FOOD PLANTS AND DOING IT WELL*



**FOOD PLANT  
SOLUTIONS**  
ROTARIAN ACTION GROUP

*Solutions to Malnutrition  
and Food Security*



**ChildFund**  
Timor-Leste

[www.foodplantsolutions.org](http://www.foodplantsolutions.org)

A project of the Rotary Club of Devonport North and  
Food Plants International

# Good gardening and growing root crops in Timor-Leste



ChildFund Timor-Leste is a representative office of ChildFund Australia. ChildFund Australia is an international development agency that works in partnership with children and their communities to create lasting and meaningful change by supporting long-term community development and promoting children's rights and directly implements child-focused development programs in six countries—Vietnam, Papua New Guinea, Laos, Cambodia, Myanmar, and Timor-Leste.

ChildFund Timor-Leste has partnered with Food Plant Solutions to improve the health and nutrition for children under 5 years by promoting kitchen gardens and equip parents with skills to provide nutritious food to their girl and boy child, especially in the first 1000 days.

For further details about the project please contact us at [info@foodplantsolutions.org](mailto:info@foodplantsolutions.org).

We welcome and encourage your support.

**Food Plant Solutions** - A project of the Rotary Club of Devonport North,  
Rotary District 9830 & Food Plants International



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# Good gardening and growing root crops in Timor-Leste

*Practical ways of growing local food plants and doing it well.*

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**Other publications in this series:**

**Food Plants for a Healthy Diet in Timor-Leste**

**Potentially Important Leafy Greens and Vegetables in Timor-Leste**

**Fruit and Nuts in Timor-Leste**

# Good nutrition is simple

Grow and eat a wide range of food plants.

Then if a nutrient is missing from one plant, it will be included in other plants and produce a balanced diet.



# Healthy Diets

All people, and especially children, should eat a wide range of food plants to stay healthy. This should include some plants from each of the food groups – energy foods, growth foods and health foods. Then each of the nutrients required by our bodies will be met in a balanced manner.



Sweet potato

Energy food

Health food



Mango

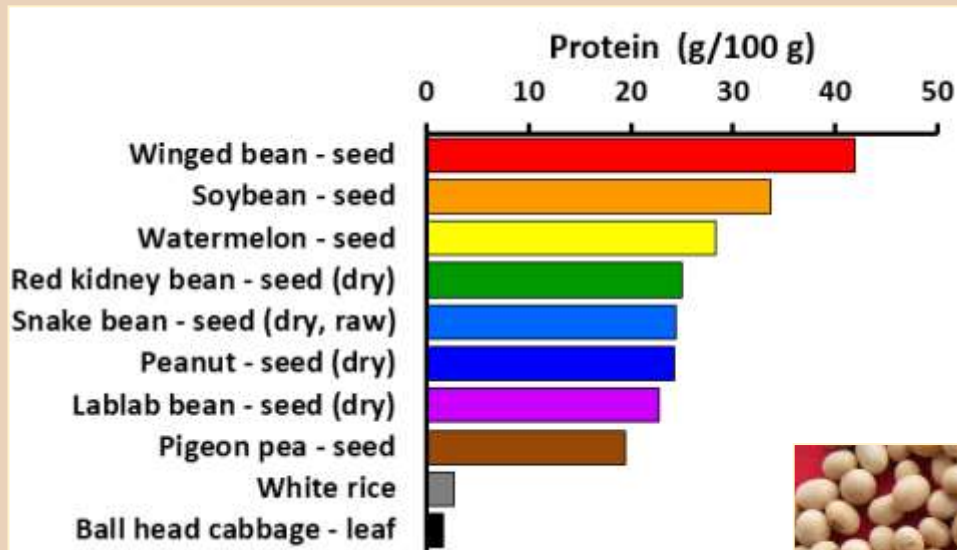


Peanuts

Growth food



# Protein foods



# Protein foods

**Food plants add an important amount of protein (growth food) into our diets. Fish and meat can improve the quality of the protein.**



**Many seeds can be roasted and eaten as snacks.**

# Local plants give a regular food supply

Because they are local,  
they will have already  
survived local conditions  
and pests.



Amaranth

Use a range of local or  
well adapted plants to  
get a regular supply of  
food.



Lesser yam

They each have  
different ways to  
survive bad  
conditions or bad  
seasons.



Lima bean



# Agro-ecology - growing plants a natural way



**Growing foods in a mixed garden is a good and simple way to reduce pests and disease.**



# **Agro-ecology - how plants grow in nature**

**Plants don't grow in rows in nature.**

**Growing only one type of plant is not used in nature.**

**Lots of varieties are maintained in nature.**

**In nature, the right plant grows in the right place.**

**In nature, fruit is produced in season.**

**Nutrients are recycled in nature.**

**Natural systems are sustainable.**

**In nature, the soil remains alive and humus rich.**

# Mixed cropping is good

**Amaranth and maize mixed.**



**Yams, bananas & vegetables.**

# Information on gardening

**Deficiencies**



**Seed-saving**



**We all need to learn  
together and to share  
what we know.**

**Pests**



**Diseases**



# Are your plants healthy?

**Plants show special signs when they are not growing well.**

**This maize leaf is indicating the plant is short of a nutrient called nitrogen. It shows a dry 'V' shape down the centre of the oldest leaves. Other grass plants show similar signs.**

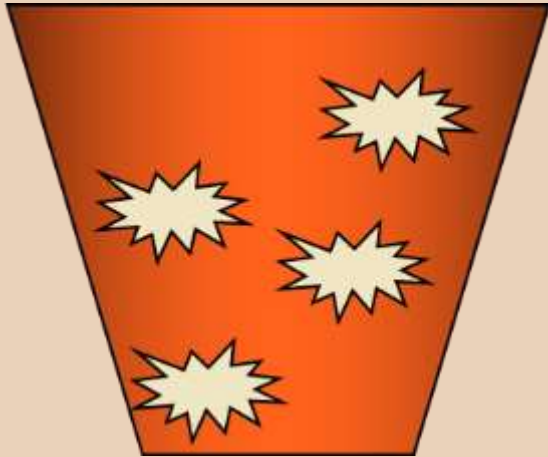
**Nitrogen is in the air, but plants cannot use it unless small bacteria in the soil, and on the roots of bean family plants, change it into a form plants can use.**





# A bucket of nutrients!

If we imagine soil as being like a bucket of nutrients, then we need to fix the lowest hole, (or add the nutrient which is in shortest supply), before the bucket can carry anything more.



We can learn to recognize which nutrients are in shortest supply by looking at plants carefully.

Phosphorus



Potash



Nitrogen



# Different plants grow on different soil types



Yams need fertile soil.



Taros need good soil.



Chinese taro survives on poorer soils.



Sweet potato can grow on moderate soils.



Cassava will produce on poor soils



# When nitrogen is short...



Pineapple plants turn red.

Nitrogen is important for plants to grow healthy leaves.



Grass plants have a dead 'V' shape in the old leaves.



Old leaves go yellow.

# Beans provide protein and restore soils

Beans have special bacteria attached to their roots that allow them to take nitrogen from the air and put it into the soil for plants to use.

**It is free fertiliser!**



Lima bean

Climbing beans can be allowed to climb up corn in gardens and still get good crops of both beans and corn.



Winged bean

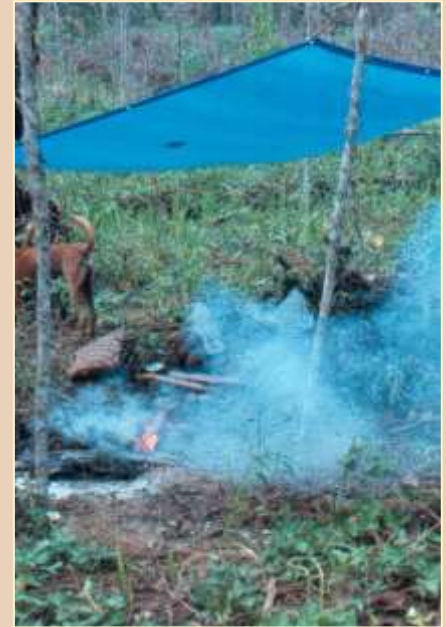
# Burning loses nutrients and destroys soils

Burning is a quick and easy way to clear up a garden site, but wherever possible, plant material should be left to rot back into the soil.

This provides nutrients, and helps the bacteria and other living things in the soil that are so important for plant growth.

A soil with humus, or rotted plant material, does not lose nutrients during heavy rain.

Nitrogen (and Sulphur) get lost into the air as plant material is burnt. Other plant nutrients, like potash, remain in the ashes.





# Making compost



**Don't burn rubbish - compost it!**

**Compost is perfect for small  
backyard gardens.**



# How to make compost

## The rules for compost making:

- Build a simple, open box to keep animals out.
- Add some old rotting material to start the process.
- Mix green leafy and dry plant material.
- Allow air to get into the compost.
- Keep the compost bed moist.
- Add anything that has been living before.
- If possible, turn the heap to allow it to heat up and break down properly.

# The reasons for compost

Small bacteria and other living things work hard to break down old plants and other living things into compost.



Because the bacteria are living, they need continual air and water, and a balanced diet of green and dry waste, or they die.

Living things already have plant nutrients in perfect balance for new plant growth, so it is the perfect fertiliser.



To stay healthy, soil needs lots of compost and organic matter to do all the amazing work that goes on unseen within the soil.

Compost should become hot to kill weeds and pests.

# Save your own seed

Plants grown from seed that is saved locally usually get a lot less disease, as they are adapted to the area.



Mildew

Many pumpkin family plants get mildew and other diseases.

# Air-layering

Air-layering is a special way of taking cuttings. A shallow cut is made around a small branch while it is still on the tree. Some soil and mulch is wrapped around this and covered with plastic. It soon forms roots. It can then be cut off and planted.



If a sweeter or preferred fruit or nut is found, it is best to grow it from cuttings, or air-layering, so the new tree is the same as the old.



# Some diseases tell a story

The first rule in managing pests and diseases is to grow the right plant in the right place, and to grow it well, so it can stay healthy.



**Peanut rust**



**Leaf spot in bananas**



# Some diseases tell a story

**Elsinoe scab on sweet potato usually tells us three things:**

- **The soil is getting poor and low in nutrients.**
- **The sweet potato is a variety that gets the disease more easily.**
- **The variety of sweet potato may have come from another country without the disease, so it has no resistance.**



**Reduce the risk by:**

- **Improving the soil.**
- **Choose a local, resistant variety.**

# Banana diseases

**Black spot**



Several different fungi cause leaf spots on banana leaves, especially in wet seasons.

**Sigatoka leaf spot**



**Black cross and leaf spot**

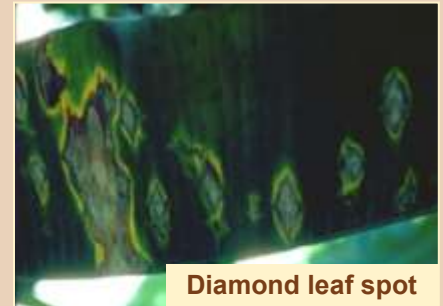


Choose banana varieties that show less of these diseases.

**Banana rust**



**Diamond leaf spot**



# Banana pests

Using a range of crops, and a mix of varieties, is normally a good safeguard against bad insect pest damage.



**Banana scab moth — pull the flower bracts off, because the small moth hides under these to keep out of the sun.**

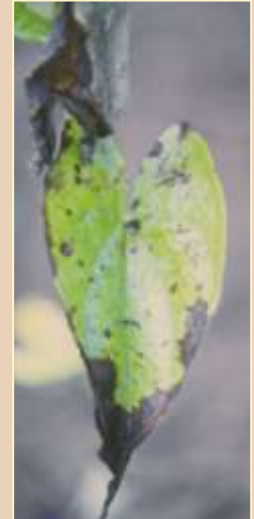
# Pests, diseases and deficiencies

**Taro blight fungus  
washes in the rain  
on hot wet nights.**



**Wrinkled sweet potato leaves.  
This fungus scab gets bad when  
soils are poor, and also on varieties  
that are not resistant.**

**Yam anthracnose -  
this fungus makes  
leaves die off early  
when the leaves get  
damaged.**





# Banana insect pests



**Banana scab moth** - is a very small moth that hides from the sun under flower bracts. The grubs spoil the fruit. Pull flower bracts off and use varieties with widely spaced fruit.

**Banana weevil borer** - can dig into the roots of banana plants causing them to fall over.





# Banana insect pests



**Rhinoceros beetle** - some Rhinoceros beetles and taro beetles can dig into banana stems and roots and make plants weak.

**Shot hole weevil** - several caterpillars, grasshoppers and weevils chew banana leaves. Grow plants well so that new leaves grow quickly.



# Root crops in Timor-Leste

Cassava



Root crops are perfect plants for hot tropical climates.

Taro



Sweet potato



Chinese taro



These foods are the backbone of the country, so we need to get to know them very well.

Lesser yam



# Growing yams

- Yams should be planted into a loose, friable, fertile soil.
- They need plenty of sun.
- They should have strong stakes about 2 m tall.
- A large section of the top of the old yam tuber is the best planting material.
- Yam tops are normally stored in a cool, dry place until they develop shoots.



Planting tops



A well staked yam

# Yam diseases

**Yam anthracnose – leaves can turn black and die early due to a fungus that gets worse in older plants, in wet seasons, and when plants get damaged.**



**Yam rust – yellow rust-coloured lumps can occur in some varieties and damage leaves.**



# Yam diseases

**A virus-affected yam with small yellow leaves. It should not be used for planting material.**



**This obvious leaf spot due to a fungus does not cause serious damage if plants are growing well.**



# Growing taros



Chinese taro

Chinese taro is best grown from the top of the corm in soils that are not wet. It takes about 9 months to be ready to eat. It can grow in moderate shade.

Taro grows best from the top of larger corms. It can grow in moving water and light shade. It takes 6-9 months to be ready to eat.



Taro

# Taro diseases

**Taro blight and Alomae / Bobone virus are the most serious taro diseases.**



**Alomae / Bobone virus**

**Use a mix of varieties and mixed cropping to reduce damage.**



**Taro blight - a devastating fungal disease.**

# Taro diseases



**Taro shot hole - a  
minor fungal disease**



**Taro mosaic virus**

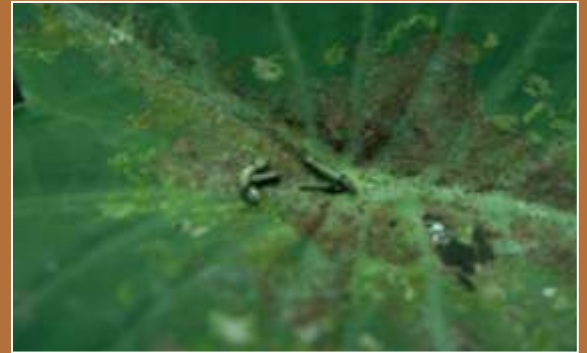


**Taro diffuse yellow  
leaf spot**

# Taro insect pests



**White fly**



**Cluster caterpillar**

**Taro beetle**



# Taro insect pests



**Aphids sucking  
sap**

**Taro hawkmoth**



**Grasshopper nymphs**





# Growing sweet potato

## Sweet potato needs:

- Air in the soil. Plant them in mounds if the soil is wet or clay.
- A position in full sun.
- A soil rich in nutrients, particularly potash (ashes).



There are many different kinds of sweet potato. Some grow quickly, but only give small amounts of food. Grow a mixture to make meals more interesting.

# Growing cassava

Cassava is a root crop that is easy to grow, can be stored in the ground, will grow in poor soils and survive dry times. Plant woody sections of the stem (about 15 cm long) in the ground at any angle.

If the soil is loose, it does not have to be dug first. Crops are usually harvested 10-14 months after planting.

Leaves can be cooked and eaten.

Cassava should always be well cooked as it contains a bitter poison called cyanide that can build up in the body and damage nerves. Cooking removes this.



# Some problems with Cassava

Older leaves going yellow means the soil is short of nitrogen.



Leaves often get brown spots due to a fungus. It does not normally get too bad in good soils.

Like most root crops, cassava produces more food if the soils are rich in potash. Ashes from fires have potash.



Young leaves turn yellow when the soil is sour, as in limestone and coral sites.

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