

Good Gardening and Growing Root Crops in the Western Pacific

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



**FOOD PLANT
SOLUTIONS**
ROTARIAN ACTION GROUP

*Solutions to Malnutrition
and Food Security*



www.twollamas.org.au

A project of the Rotary Club of Devonport North,
District 9830 and Food Plants International



www.foodplantsolutions.org

Good Gardening and Growing Root Crops in the Western Pacific



Two Llamas undertakes environmental and social projects that help Indigenous communities improve their health through improved nutritional awareness.

For further details about the program please contact us at: info@foodplantsolutions.org or info@supwildernessadventures.com (*Two Llamas*).

In addition to this booklet, other publications have been produced for the Western Pacific. All can be downloaded from our website - www.foodplantsolutions.org

We encourage and welcome your support.



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

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Other publication in this series:

Potentially Important Leafy Greens and Vegetables in the Western Pacific

Potentially Important Fruit and Nuts of the Western Pacific

Food Plants for Healthy Diets in the Western Pacific

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



Sweet Potato

Energy food

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.



Guava

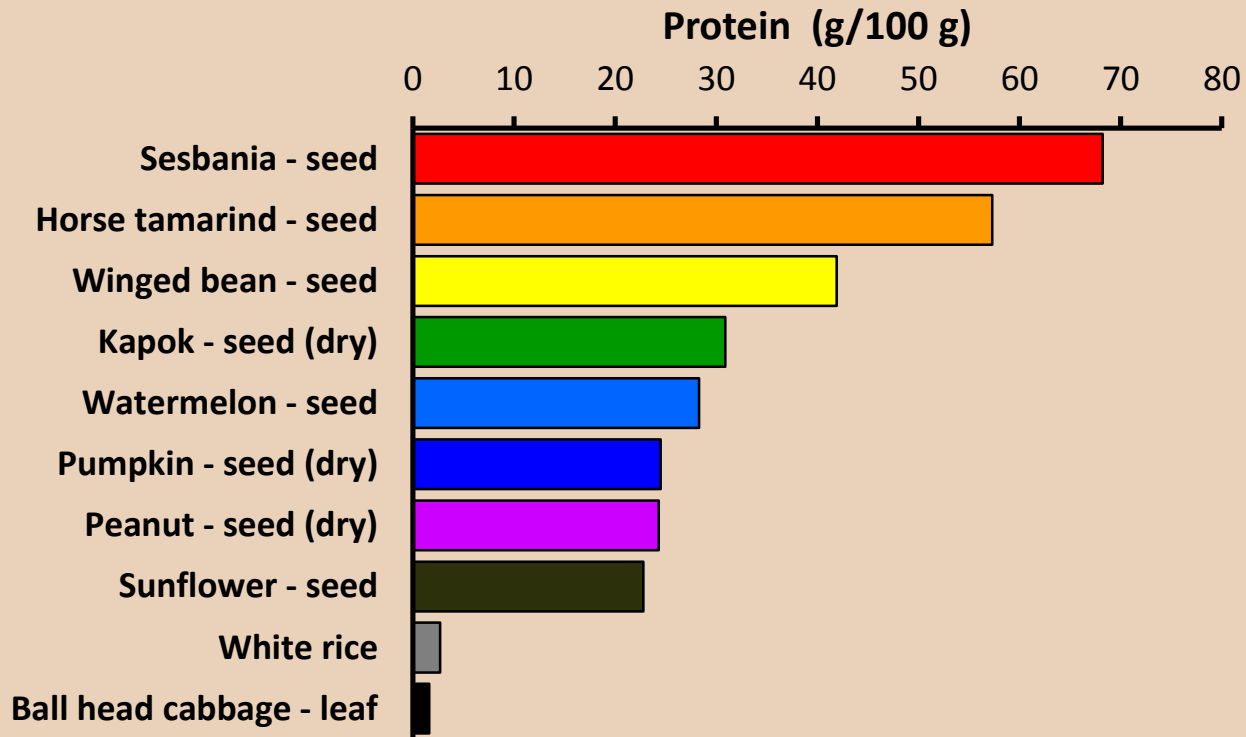
Health food



Peanuts

Growth food

Protein foods



Protein foods

Many seeds can be roasted and eaten as snacks.



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

Local plants give a regular food supply



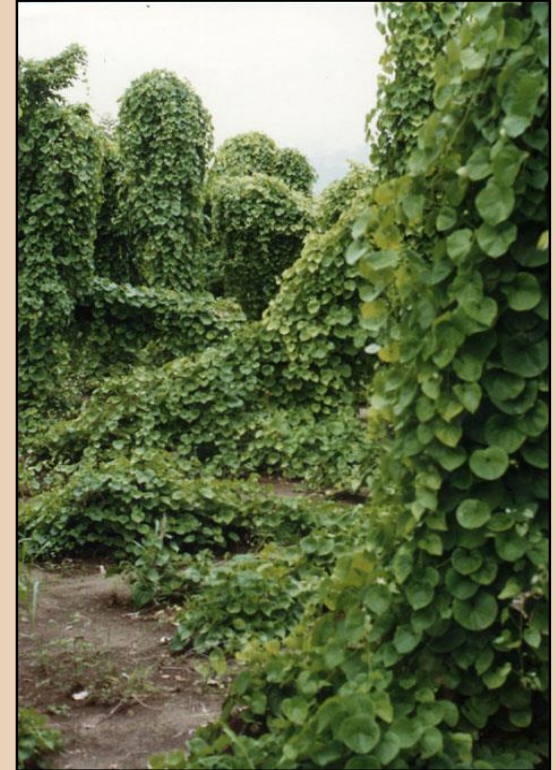
Use a range of local or well adapted plants to get a regular supply of food.

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



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

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 & corn mixed



Yams, bananas & vegetables



Mixed garden of taros & greens

Information on gardening



Deficiencies



Pests



Seed saving

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



Disease

Are your plants healthy?

Plants show special signs when they are not growing well.

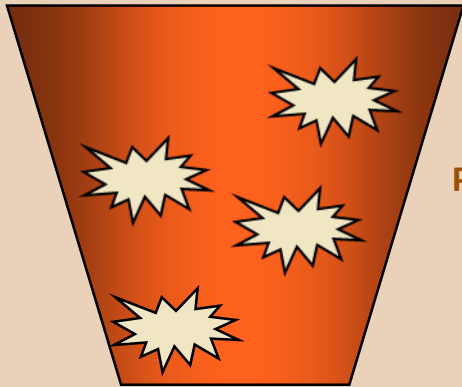
This corn leaf is indicating the plant is short of a nutrient called nitrogen. It shows a dry 'V' shape down the centre of the oldest leaves. Other grass plants show similar signs.

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.

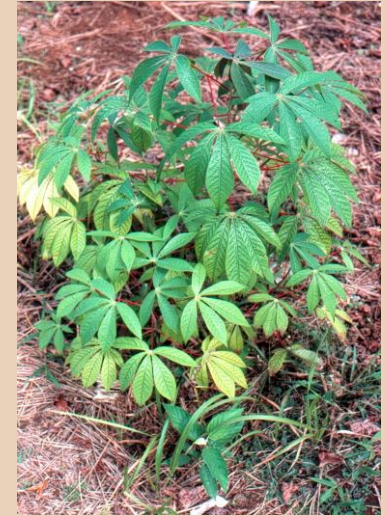


When nitrogen is short...



Pineapple plants
turn red.

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



Old leaves go
yellow.

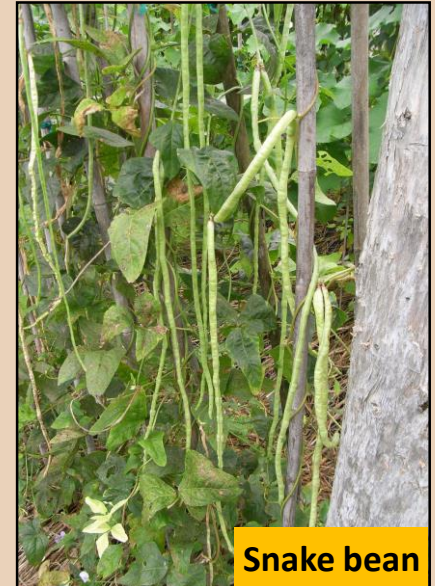
Nitrogen is important for plants to grow
healthy green leaves.

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!

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

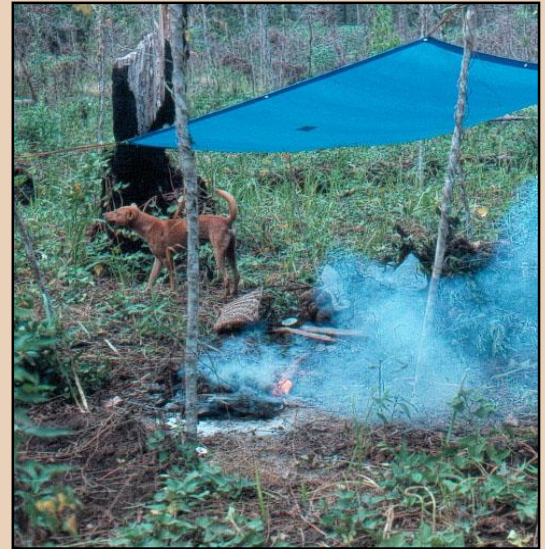


Burning loses nutrients and destroys soils

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.**



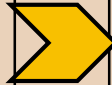
How to make compost

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.

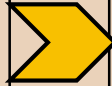
The reasons for compost

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.

Pests and diseases damage plants

Peanut rust



Taro blight



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.

Leaf spot in bananas



Winged bean false rust

Some diseases tell a story

Elsinoe scab on sweet potato usually tells us 3 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.



Improve
the soil.
Choose a
resistant
variety.



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.



Save your own seed

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



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.



Air-layering of guava

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.

Root Crops in the Western Pacific

Root crops are perfect plants for hot humid tropical climates.

Swamp taro



Banana



Sweet potato



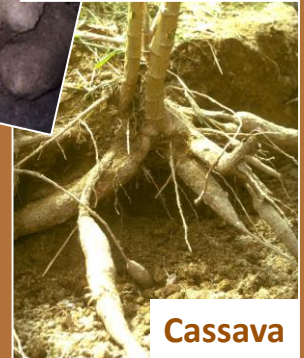
Lesser yam



Common sago



Cassava



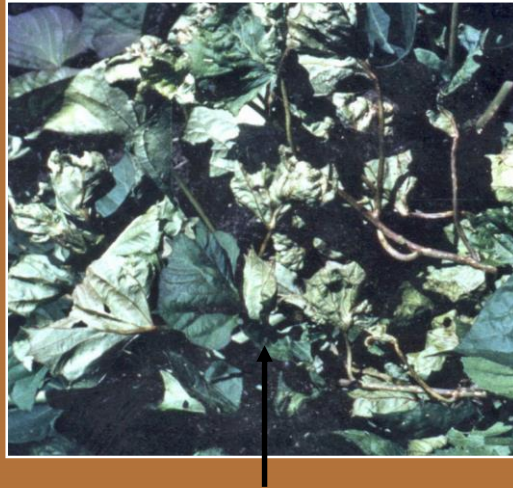
Chinese Taro



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

Pests, diseases and deficiencies

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



Wrinkled kumara 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.



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

Swamp taro is grown from the top of the corm, can grow in swamps, and takes 2-3 years to be ready to eat.



Swamp 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 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



Aphids sucking
sap



Taro hawkmoth



Grasshopper nymphs

Taro insect pests



White fly

Cluster caterpillar



Taro beetle

Growing kumara (sweet potato)

Sweet potato needs:

- Air in the soil. Plant them in mounds if soil is wet or clay.
- A position in full sun.
- A soil rich in nutrients especially 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.

Sweet potato pests & diseases

Avoid serious pest and disease problems by improving the soil so plants grow quickly and well. Many insects chew sweet potato leaves. This has little affect on yield if plants are growing well.

Leaf spot



Sweet potato borer



Leaf miner

Growing Bananas



Bananas are normally grown from suckers.
Seeded varieties are needed for breeding and crossing.



Banana types

Bananas belong to three different breeding groups:

Diploid



Triploid



Tetraploid



Diploid bananas are smaller and harder to grow. The best cooking bananas are triploid. Triploid and tetraploid bananas usually get less disease, and often grow in poor soils.

Banana diseases

Black spot



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

Sigatoka leaf spot



Banana rust



Black cross and leaf spot



Diamond leaf spot



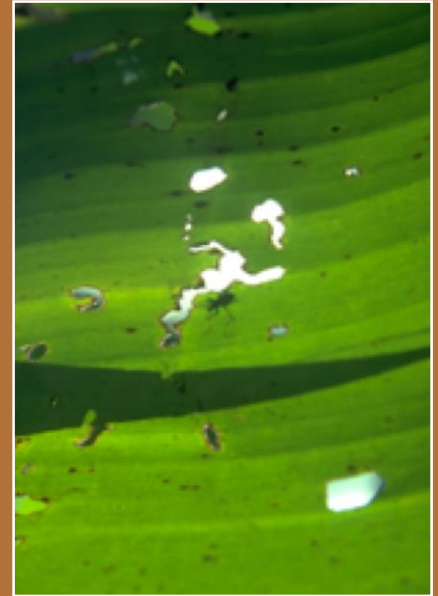
Choose banana varieties that show less of these diseases.

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.



Banana insect pests



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

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.



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.

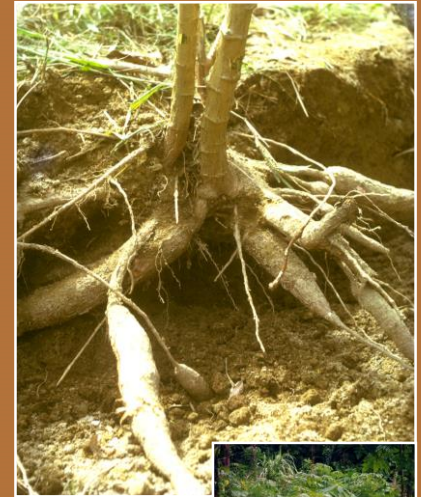
Plant woody sections of the stem (about 15cm long) in the ground at any angle.

If the soil is loose, it does not have to be dug first.

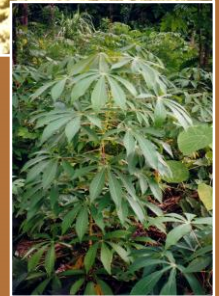
Crops are usually harvested 10 - 14 months after planting. Yields of roots are lower in very acid soils and in shady places.



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.



Leaves can be cooked and eaten.



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.



Young leaves turn yellow when the soil is sour; - in limestone and coral sites.

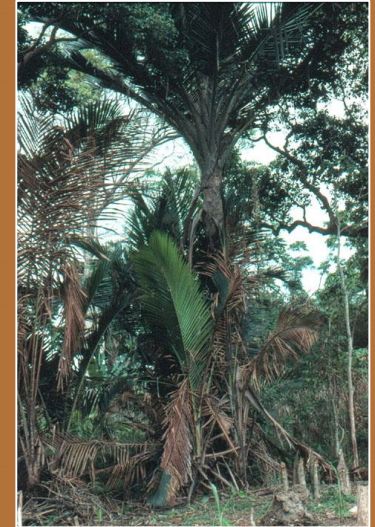
Like most root crops, cassava produces more food if the soils are rich in potash. Ashes from fires have potash.

Growing sago

Common sago is usually grown from suckers. Sometimes it is self-sown from seeds. A sucker of the preferred type is cut off and planted into damp soil. It will grow well in swamps, and is a good way to use swampy land.



Sago is a very good energy food, but has no other food nutrients.



Always eat other foods as well as sago.

Acknowledgements

This publication has been developed as part of a program undertaken by Food Plant Solutions Rotarian Action Group and *Two Llamas*.

It would have not been possible without the commitment and support of the various volunteers who have shared the vision, and unselfishly given their time and energy to support this project.

Review, layout and formatting – Lyndie Kite, John McPhee, Melanie Bower and Karalyn Hingston.

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