



MANUAL ON HOME GARDENING

by

Anan Manarangi

NAURU HOUSEHOLD FOOD GARDEN DEVELOPMENT PROJECT –
EXTENSION PHASE
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MANUAL ON HOME GARDENING

NAURU HOUSEHOLD FOOD GARDEN DEVELOPMENT PROJECT

1. WHY IS A HOME GARDEN IMPORTANT?

- *It produces a variety of foods and agricultural products, including staple crop, vegetables, fruits, flowering plants, medicinal plants, herbs and spices, firewood, livestock and fish, both for home consumption or use and for income.*
- *Enough nutritious non-staple foods for all the family year round, including extra food stocks for processing and sale to obtain income and a reserve for special occasions or emergencies (e.g. sometimes a staple food crop is lost in a flood, eaten by pests or reduced because the farmer falls sick and cannot work for some time).*
- *Income from the sale of home garden produce.* Sales of home garden produce can contribute considerably to a family's income
- *Every family should have access to enough nutritious food* to ensure that all its members stay active and healthy. Food can be produced in the family's garden.
- *Growing your food at home saves money and effort* and ensures a regular supply of food. A well-developed home garden can supply sufficient food for consumption on a daily basis.
- *Fruit tree* can give a continuous supply of food throughout the year or in different seasons. Find out the harvest times of different fruits in your area and plant in such a way as to have fruit all year.
- *Root crops* are living food stores which can be left in the ground until you need them. Many also provide nutritious leaves (e.g. cassava, sweet potato, amaranth).
- *Chickens and pigs* can be fed on household scrap and home garden plants. You can sell them or for eating when you need to.

2. GROWING PLANTS FOR DAILY NUTRITION

Food is made up of a Combination of Nutrients

Most people eat because they are hungry. However, while the feeling of hunger tells you to eat, it does not tell you what to eat. This section gives a brief description of some of the main food that make us healthy and why each is needed and which kinds of foods provide different nutrient. Nutrients are needed for energy, protection against disease and for growth (building and maintaining the body).

- a. **Energy food** – banana, breadfruit, bread, rice, potato, etc
- b. **Protective food** – vegetable, pawpaw, pumpkin, banana, mango, etc
- c. **Body Building food** – poultry, fish, eggs, milk, beef, etc

Fresh is Best

Producing and eating your own fresh food, provides one with the three main groups of food mainly Energy, Protective and Body building foods. The food from the three categories provide carbohydrates, fats, protein, vitamins and minerals.

3. THE SOIL

Good Soil Grows Healthy Plants

To be able to continuously grow the necessary food crop, the soil has to be replenished with nutrient from organic matter or chemical fertilizer. Water is also necessary for good plant growth from sowing/transplanting until the end of the crop. Protecting the crop from pests and diseases, wind damage and animals will help the plant produce the quantity required. Grow different types of crop to have continuous food supply.

The Living Soil System

Most nutrients are naturally recycled from the soil through plant roots and back to the soil through fallen leaves and other organic matter. Earthworms, insects and microorganisms such as fungi feed on organic matter and change it into *humus* which makes topsoil dark and gives it a good structure. Humus is quickly lost or washed away if the soil is left exposed.

How to Manage Soil Fertility

Some nutrients in the soil are stable (e.g. phosphorus) while others are quickly lost or consumed (e.g. nitrogen). Manure and compost are needed to improve soil. The general method is to dig compost, organic matter, manure or chemical fertilizer into the soil just before planting. This is the basic application. After planting, apply small amounts of manure, compost or chemical fertilizer alongside plants about every two weeks until harvest.

Feed the Soil

- For the home gardeners, prevention is better than cure, the solution being to keep feeding the soil with fertilizer or compost into the garden soil rather than waiting for the deficiency symptom to appear. Feeding the soil with organic matter is very important. Waste from crops and livestock should not be removed from the home garden but should be used to feed the soil. Organic materials can be collected and buried to improve the soil or they can be decomposed into *compost*, which can be used as a fertilizer.
- Commercial fertilizer can also be used when soil fertility is low. The soil always has some nutrients for plants but usually not enough to grow healthy crops. Also, compost is not usually rich enough in plant foods to meet all the needs of fast growing vegetables. Therefore, compound chemical fertilizer, that have all the three major elements (N.P.K.), can be applied to the plants in the garden. However, chemical fertilizer can be harmful if used to much or without good judgement.

Plant Nutrition

Good crops will only grow if there are enough nutrients in the soil. The table shows the three main chemical nutrients that plants need.

Nutrients and their functions

Nutrient	Function	Deficiency symptoms	Sources
Nitrogen (N)	<ul style="list-style-type: none"> • Growth in leaves and stems • Green colour and pest/disease resistance 	<ul style="list-style-type: none"> • Pale green or yellow leaves • Poor growth • Leaf fall • Pest problems 	<ul style="list-style-type: none"> • Urea, ammonium nitrate, ammonium phosphate (MAP or DHAP), NPK or other nitrate fertilizer • Animal waste • Compost • Green manure crops
Phosphorus (P)	<ul style="list-style-type: none"> • Beans, seeds and fruit (early maturity) • Root formation • Drought resistance 	<ul style="list-style-type: none"> • Stunted growth • Diseases • Poor formation of side shoots and flowers 	<ul style="list-style-type: none"> • Super phosphate, MAP, DHAP, NPK • Chicken manure • Ash • Ground animal bones
Potassium (K)	<ul style="list-style-type: none"> • Strong roots and stems • Fat seeds and fruits • Helps move nutrients around the plant 	<ul style="list-style-type: none"> • Curled, wrinkled or burnt leaves • Uneven ripening • Poor growth 	<ul style="list-style-type: none"> • Potassium chloride (muriate of potash), potassium nitrate, NPK • Ash • Manure • Banana leaves and stems • Corn cobs • Compost

4. LIQUID FERTILIZERS FOR HOME GARDEN

When organic matter decomposes, it turns to be nutrients for plants. Based on this same principle in making compost, liquid fertilizer can be made from organic matter.

What is Liquid Fertilizer?

Liquid fertilizer is decomposed organic matter in a liquid form. There are many ways to make liquid fertilizer.

A technique developed by the Fiji National Food and Nutrition Centre is being described below:

A sack load of fresh manure is put in a 200-L drum of water and allowed to ferment naturally. Various other organic materials, such as fresh leaves of nitrogen-fixing trees, grass clippings, fresh weeds, vegetable wastes, fruit peels, etc., or compost can also be used.

What is Needed?

- A 50 kg jute bag or rice sack.
- Fresh (wet) animal manure of chicken, cattle, pig, etc, or fresh leaves, or compost.
- A big stone or few large rocks.
- A water-tight container or 200-L drum.
- Water.
- Lid or cover for the drum.

How to Prepare?

1. Fill the 50 kg bag to $\frac{3}{4}$ full with wet manure, fresh leaves, or compost.
2. Tie the open end and place the bag into the container or empty drum.

3. Fill the container or drum with water at the ratio of 2 L of water to 1 kg of wet manure, to produce about 100 L of liquid fertilizer. Place a big stone to hold the bag down.
4. After 3 weeks, remove the bag from the drum. Prepare the mixture at the ratio of 1 part liquid fertilizer to 4-6 parts of fresh water.

How to Apply?

Apply the liquid fertilizer around the base of the plant at the rate of 500 ml (2 beer can) per plant. To prevent damaging tender stems, leaves and flowers, avoid direct contact with plants.

When to Apply?

Apply 2-3 weeks after germination, or immediately after transplanting. Repeat after 3-4 weeks.

Cautions

- Avoid any direct contact with the plants.
- Left over fertilizers should not be kept, to prevent foul smell. (Use undiluted fertilizer to control weeds as its concentration kills weeds).
- Small quantities of liquid fertilizer can be produced in smaller containers (if a 200-L drum is not available), using the same ratios.
- Liquid fertilizer preparation should be regularly prepared to ensure a continuous supply of fertilizer for your gardens or nutrients for the plants.
- The residue in the bag can be used in compost-making, or mixed into new garden beds, or used as mulch to preserve soil moisture.

5. MAKE YOUR OWN COMPOST

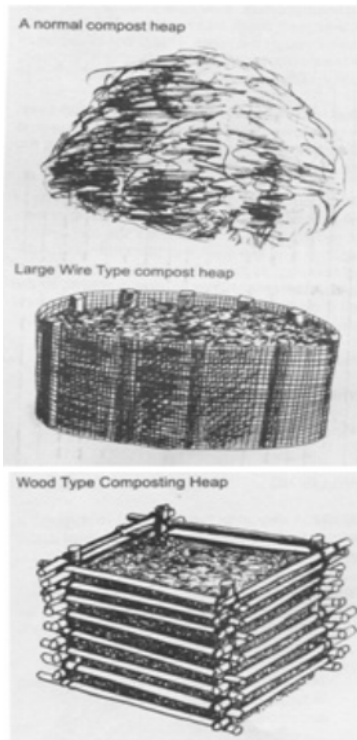
The Roles of Compost

1. *Facilitates circulation of water and air:* The addition of compost to sandy soil, which tends to allow water to drain away quickly to form a crumb structure which holds more water; would allow plant roots to penetrate and obtain their nutrients and water better.

2. *Provides a continuous balance of nutrients:* Compost can be a source of nearly all the known elements needed by plants. These include the major elements like nitrogen (N), phosphorus (P), and potassium (K), as well as minor elements like calcium, magnesium, iron, and zinc, in which small amounts of these are needed by plants, yet they are important to the healthy growth of plants. Unlike commercial fertilizer, compost releases a constant supply of available nitrogen. When there is too much or too little nitrogen in the soil, crop productivity declines.

3. *Influences the availability of nutrients:* Plant nutrients are held in a readily available form for growing plants by sticky substances, called *colloids*, found in organic matter. These same substances help increase the water-holding capacity that prevents erosion. Compost also helps make minerals that are already present in the soil, like iron, copper, zinc and manganese available to the plants. It does this through the presence of substances called *chelators*, which grasp and hold on to minerals which were previously unavailable to the plants.

Methods of Composting



1. *Compost bins:* Bins can be built in many different ways from secondary materials. Wood, concrete blocks, stones, or wire fencing can be used. Just add any organic matter to the bins every day. It is advisable to add some animal manure or even soil in order to fasten decomposition process. Make a few bins in order to have the compost for use all year round as it takes 45-60 days before fresh organic matter completely turns into compost.

2. *Open compost heaps:* Large compost heaps can be made without an enclosure. If the supply of compost materials is limited, build a smaller heap. When enough materials are accumulated, build another compost heap. A compost heap which is built gradually contains layers of materials which are in different stages of decomposition. The finished compost is on the bottom of the heap, not easily accessible for use until the rest of the heap is fully decomposed. It is suggested that several small ones are made instead of one large one, unless you have a large amount of organic matters available all at once.

Good insulation of an open compost heap is important, especially if it rains frequently. A layer of soil and a thick covering can provide additional insulation. Plastic is not a good material because it does not allow air circulation.

3. *Compost pit:* This method results in better insulation, but poor air circulation. The pit can be of any convenient width or length. The depth should be 30 cm or more, depending on the volume of materials to be composted. Fill the pit slightly over ground level since the original materials will lose some volume as they decompose. Once the pit is filled, cover the materials with a layer of soil to reduce odor and prevent flies from laying eggs into the compost materials. A cover layer of coconut leaves will help to insulate the materials and lessen the evaporation of moisture which normally occurs.

Composting Materials

A variety of materials from different sources provides a variety and balance of nutrients in the compost. Among the common sources of compost materials are:

1. *Leaves:* Leaves are made up of large amounts of fibrous organic matter, giving them a good soil-building quality. It is best to mix green leaves with other materials as they tend to obstruct air circulation in the compost heap by matting. Dry leaves can be crushed.

2. *Weeds:* Nutrients accumulated in weeds can be returned to the soil through composting. They should be cut and dried in the sun before being added to the compost heap; otherwise they may continue to grow in the heap. Weed seeds are not a problem if the compost heap is built correctly. The heat produced in the heap is sufficient to make the seeds, or even pathogenic microorganisms, dead.

3. *Soil:* Soil contributes a large population of microorganisms which help to decompose organic matter, as well as minerals which nourish plants. Use thin layer of soil on the compost heap. Microorganisms present in the soil are necessary as the starter to decompose compost heap.

4. *Manure:* can make better compost as it contains nitrogen and large population of bacteria. If some kind of straw or sawdust litter is used as bedding for the animals, urine is absorbed and nearly all the nutrients passed by the animals are preserved.

5. *Sawdust and wood shavings*: These are helpful in absorbing excess moisture in the compost heap. They decompose slowly and need to be combined with manure or another nitrogen source. When added in thin layers or mixed with other materials, sawdust and wood shavings help give the compost heap structural strength.

6. *Seaweed*: Seaweed is a good material to add to a compost heap, but it should be quickly rinsed to remove excess salt and used in the compost heap immediately. Seaweed contains some nitrogen and is particularly rich in potassium and other minerals. *Alginic* acid which is present in seaweed acts as a *colloid* in the compost heap, combining with minerals and holding moisture, helping to prevent the loss of nutrients through leaching. Combined with manure or other nitrogen source, seaweed makes a good mixture that aids in the rapid decay of grass or similar compost materials.

Methods of Using Compost

When the organic materials have decomposed completely, the materials turn into *humus*, the dark uniform looking substance of the compost.

1. *Add to the soil directly*: Spread a layer of compost and lightly mix it with topsoil. Compost will not burn the plants as commercial fertilizers do when too much is used.

2. *Use in seed trays*: Compost used for germinating seeds needs to be a fine texture. Use a sifter to screen off large particles. Mix equal parts of compost, sand and soil, and use as planting mixture.

3. *Use as mulch or top dressing*: Partially decomposed or matured compost can be used as a mulch or top-dressing around growing plants. Lightly cultivate the soil and spread a layer of compost around the plant. When fertilizing trees with compost, spread a ring of compost around the trunk. A thick layer of compost will conserve soil moisture and provide plants with additional nutrients.

4. *Use in transplanting*: Compost increases the survival rate of transplants by helping the soil retain moisture and supplying essential nutrients. Apply mature compost liberally around the roots of transplants. Spread a layer over the soil surface after the plant is in place.

5. *Use in house plants*: Sifted compost, combined with equal parts of rich soil and sand, makes a good potting soil mixture. Older house-plant soil can be rejuvenated by adding a thin layer of sifted compost and lightly scratching it into the soil surface.

Green Manure and Compost Crops

Another way to feed the soil is to grow green manure crops and dig them into the soil after cutting. These crops are also very good for compost, especially legume plants (such as leucaena (nito), flemingia, pigeon pea and centro) which collect nitrogen. Legume trees such as leucaena can be grown above or near the food crops and their branches occasionally pruned off and left on the ground as manure. Low legume plants can be planted with a food crop to help improve the soil and keep out weeds.

Using Compost and Manure

Animal manure can be dried in the shade and stored for later use. Fresh manure may burn plants especially vegetable crops if placed too close. Compost and dry manure can be mixed into the soil in a hole before planting a tree or dug into a garden before planting vegetables or food crops. A compost trench is useful for a row of new crops or for feeding established crops. Compost and manure can be sprinkled on the soil surface, but it is better if it is protected from full sunlight. Fully rotted compost is good to mix with sandy soil for use in a nursery.

Another way to feed the soil is using mulch, which protects soil from erosion and reduces weeds. Mulch materials such as coconut leaves or green manure cuttings should be spread about 4 to 6 cm thick around plants.

6. HOME GARDEN MULCHING

Mulching is a way of composting directly on the land. The main difference between mulching and composting is that the organic materials used in mulching are not exposed to the high temperatures characteristic of compost heaps. Mulch is a layer of material which covers the soil surface.

Benefits of Mulching

Mulching benefits the garden soil and plants in the following ways:

1. *Conserves soil moisture:* Layer of mulch helps to conserve soil moisture by reducing evaporation. Soil underneath an area which has been mulched is kept moist and loose.
2. *Insulates the soil:* The soil is insulated from extreme temperature fluctuations, keeping the cool in hot weather.
3. *Reduces erosion due to rainfall:* Mulch protects the soil from pounding raindrops, thus reduce soil erosion caused by rainfall and running water.
4. *Keeps the plant clean and dry:* Mulch keeps the plant clean and dry, protecting the fruits of melons, squashes, strawberries, tomatoes, etc. from diseases.
5. *Controls weeds:* Mulch controls the growth of weeds by depriving them of sunlight.
6. *Contributes organic matter and nutrients to the soil:* As mulch decomposes, it contributes organic matter and nutrients to the soil. Earthworms feed on the underside of the mulch, mixing it with earth in their castings. This helps to condition the soil.

Mulching Materials

Most of the organic materials used in a compost heap are good mulches. Among the most common ones are:

1. *Organic materials used in making compost:* Dry grass clipping, vegetable wastes, weeds, seaweeds, chopped leaves and partially decomposed compost. Fine-textured materials, like sawdust, should be combined with other materials because they compact when wet.
2. *Plastic:* Black plastic sheet can be used as mulching material although it does not decompose, and will not contribute to soil nutrient. However, this kind of material lasts much longer, particularly, if moisture conservation and weed control are of prime importance.
3. *Materials high in carbon contents:* These include rotted sawdust, wood chips, etc. If they have not been weathered and partially decomposed, they should be supplemented with a source of nitrogen. Without additional nitrogen, the microorganisms decomposing these mulch materials will use the soil nitrogen, depriving the plants of the essential nutrients. Treat the soil with manure or other materials high in nitrogen before spreading this kind of mulch.

Good Mulching Practices

1. *Condition the soil:* Condition the soil with compost before mulching, rather than assuming that the mulch will take care of conditioning the soil. After that, the mulch will help maintain soil fertility, continually decomposing and contributing organic matter and nutrients. Both composting and mulching are important for conditioning and fertility.
2. *Moisten the soil:* Before spreading the mulch around the plants, moisten the soil. Keep the mulch material moist. When rainfall is light and the mulch is dry, little moisture penetrates to the soil surface and below. Although the need for watering is reduced dramatically when mulch is used, it is important to check the soil underneath periodically, and water when dry.
3. *Varying materials used:* When a layer of mulch decomposes and needs to be replenished, use a different material to replace it. The various mulch materials contribute different nutrients to the soil.

7. WATER MANAGEMENT

There are ways to manage soil moisture above and below the soil surface. Following are some appropriate techniques for different kinds of soil and different seasons



Plant Roots Need Water and Air

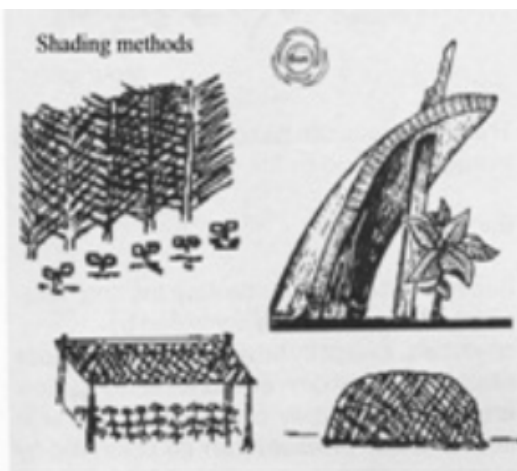
About 90 percent of a plant's weight comes from water. No food plants produce a good harvest if they do not receive the right amount of water at the right time. Most of the water is taken in by plants through their roots. The soil must be able to hold the correct amount of moisture to promote growth. At the same time, there must be enough air trapped in tiny holes in the soil to allow the roots to breathe.

Sandy, fine-grained soils are too loose to be able to hold water before it drains away. Plant roots cannot find enough water for growth and the plant suffers. The regular application of organic matter will improve the ability of the soil to hold and release enough of both water and air.

How to Manage Soil Moisture in a Dry Climate or Season

General:

- Select crops that will grow well under drier conditions (e.g. mungbean, cassava, eggplant and trees). They may not be favorite foods but at least something can be produced.
- Select short-term vegetable crops that can be grown near a source of water such as Chinese cabbage and water well, with the drain from washing areas or a water tank.



Above the Soil Surface

The aim is to keep the soil surface cool and to prevent loss of moisture through evaporation.

- Cover the soil around plants with a mulch of leaves or cut grass.
- Provide young plants with shade to keep them cool.

- Remove weeds because they compete with the plants' moisture intake.

Below the Soil Surface:

The aim is to retain moisture in the soil. Organic matter in the soil will soak up and hold moisture.

- Incorporate compost or organic material in the soil. One large sack of composted organic material should be sufficient for an area of about 10 sq.m (about 3m x 3m). Use one sack at the start of the wet season and one sack at the start of the dry season.

8. COVER CROPPING

How Cover Crops Work

By covering the soil with trailing vines and leaves, cover crops *shade* the soil surface and protect it from the impact of falling rain which wears away the soil. A dense mat of cover crop provides strong *competition* against any weed seed which finds its way into the crops. The competition and the shade make the cover crop the winner over most weeds. For example, kumara (*Ipomea batata*) will smother weed seeds. Mulching is a short-term technique to keep weeds from getting established

9. WEED AND PEST MANAGEMENT

Problems with weeds, insects and animals can reduce the production of a home garden. Often the problems will disappear if plants are chosen to suit their location and if the soil and water are managed well.

Problems from Weeds

Competition from weeds is a major problem for food crops in many gardens. Weeds compete for nutrients, water, sunlight and space, so food plants grow poorly and die. Areas where weeds are dense can harbour rats, and insect pests. If not well-managed, weeds can cost labour that would otherwise be used for cultivating useful plants in the home garden.

How to Control Weeds

The key factors in the control of weeds are shading them from sunlight and keeping the soil covered so that they cannot find a place to grow

- Cut or dig out weeds using a knife or hoe.
- Cover the ground with 6 cm of mulch to prevent weeds from receiving sunlight. Weeds cut by hoe or knife can be used as mulching material.
- Quick-growing vine plants will also reduce weeds by covering the ground. Examples are legumes, pumpkin and sweet potato.

Pests and Diseases

Domestic and native animals as well as insects and diseases can damage plants. Insect and diseases problems tend to be seasonal, with the greatest problems occurring in the rainy season.

How to Prevent and Manage Pest and Disease Problems

- Weak plants suffer more from attacks by insects or disease than healthy plants. Good crop management, including attention to water, soil and weeds, will help reduce damage from insects and disease.

- Choose crops according to the season and the location. If an annual plant does best in full sunlight and grows best when planted at the beginning of the dry season, then the grower should try to make sure it is planted in these conditions.
- Select plants that will grow well in the local climate. Plants originating from another climate may not grow well.
- Do not grow the same vegetable crop in exactly the same place as it was planted before. Plant the vegetable crop a few meters away from where it was grown before, and plant a different crop (such as a legume) where the vegetable crop was planted before. This will help prevent a buildup of disease infection in the soil.
- Remove diseased leaves and other plant parts. This will reduce the amount of material that insects and diseases can feed on.
- Grow plants, such as chili, lemongrass, basil, marigolds, etc., which are known to repel certain insects.
- Use home-made pest sprays produced from tobacco, chili or soap and water to deter chewing and sucking insects.

Damage from Animals

- Chickens and pigs commonly roam free in home gardens. Although they can catch insects and leave manure to fertilize the soil, they can become pests when they attack and seriously damage plants in their search for food.

10. SAFE AND EFFECTIVE CROP PROTECTION

What are Pests and Diseases?

- *Pests and diseases* are living things. Generally, they cannot survive for long without a place to live and without food.
- *Insects* can sometimes be seen on plants or in the soil. They mostly damage plants by chewing holes in roots, leaves and fruit or by sucking sap out of the leaves, stems and fruit. Not all insects are pests, some (e.g. bees) pollinate flower so that crops have fruit and seeds.
- *Diseases*. They attack all parts of plants. Signs of disease may be a powdery substance under leaves, rotten patches, black spots on stems, leaves and fruit, or wilting because of rotten roots. Disease may spread through rain that is splashed up from soil on to plants or they may be carried by wind and insects from one plant to another.

Good Practices Prevent Problems

There are important and simple ways to help plants stay healthy and productive.

- *Grow plant where soil, water and light conditions suit them.* Pawpaw needs full sunlight, coffee needs shade. Taro likes wet soil but pawpaw might get root rot and die in the same place. It is important to select the correct plant for each place in your garden.
- *Feed your crops and they will feed you.* Yellow leaves, poor growth and small fruits are often due to a lack of water or nutrients in the soil. Healthy plants prevent the development of diseases.
- *Minimize competition.* Plant crops with just enough space for each one to grow to full size. Weeds can sometimes grow faster than crops and they take soil nutrients necessary for crop growth. Weeds should be removed before planting. Mulch between crops will prevent many weeds from growing until the crop is well established and covers the soil.
- *Protect plant from strong wind, seasonal dry winds or salty winds from the sea.* Wind can reduce growth and damage leaves and flowers.

One way to keep diseases away from vine plants (such as cucumber) is to grow them on a trellis.

Physical Control Methods

Remove and burn plants affected by diseases before the disease spreads. Dead branches, fallen fruit and tall, dense weeds can house pests and diseases. Remove and burn or compost materials where pests and diseases live and breed. Keep the compost heap away from growing vegetables. Do not replant the same kind of crop in the same place; plant a different kind of crop instead.

Natural Pesticides and Deterrents

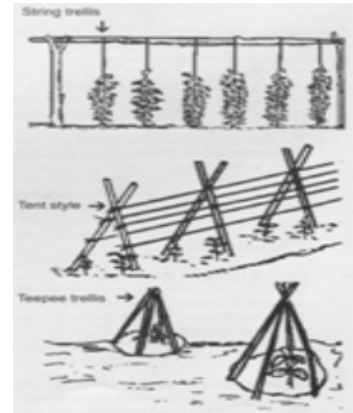
There are many household items which can repel insects. Sucking insects such as aphids can be deterred by sprinkling ash over the insects. They are usually on the underside of leaves. Ash sprinkled around the base of plants can deter some crawling insects. Soapy water poured or sprayed over sucking insects can also be effective. Slugs and other pests can be trapped in a half-buried bottle with a little beer remaining in the bottom.

Certain plants are known to repel many types of insects, and some farmers plant these as companions to food crops. Marigold and lemongrass are some of these plants.

Certain plants, seeds or fruit which can be mixed with water and sprayed on to plants. Some common examples are tobacco, neem leaves, and chili fruit. In general, a farmer must experiment a little to find an effective mixture which is easy to prepare. Do not forget that these natural pesticides can also be poisonous to animals and humans. Follow the same safety rules as with chemical pesticides.

Protection with Production

Food crops need protection from animals and sometimes from people. The idea behind a living fence is that certain plants make good fences and at the same time produce useful things for people, for livestock and for soil improvement. As an example, bele, (*Abelmoschus maihot*) which can produce a good fence and at the same time the leaves can be plucked and cooked like any leafy vegetable for human food. It can also be used for animal food.

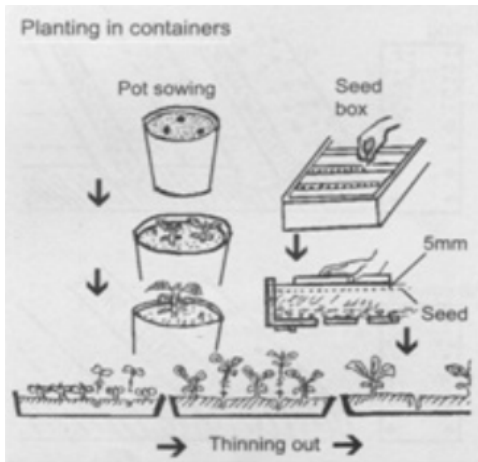


11. BOTANICAL PESTICIDES

CHILI SPRAY	FLOUR SOLUTION
<p><i>Many medicinal plants and spices have the insecticidal properties which can be used to control home garden pests. Chili, has an effective ingredient present in the fruit, called capsaisin, the same chemical substance that makes chili hot. It is present in the skin and seed. Chili spray can be used to control aphids (sucking insects) and caterpillars (chewing or rasping insects).</i></p> <p>How to Prepare</p> <p>A. Chili Solution</p> <ol style="list-style-type: none"> 1. Pulverize about 100 g of chili in a blender. Empty tin can of about 425 g or coconut shell can also be used for mashing the chili, with the help of a piece of wood. 2. Mix the content with 1 L of water in any suitable container and shake vigorously. 3. Strain the concentrate through a cloth or fine mesh wire. <p>B. Soap Solution</p> <p>Mix 1 tablespoon of liquid soap or dishwashing detergent with 1 gallon of water.</p> <p>How to Use</p> <p>Mix 1 part of the chili solution with 5 parts of soap solution then spray the insect pests.</p> <p>Cautions</p> <ol style="list-style-type: none"> 1. Too strong solution can cause burning of leaves. So try to use different proportions of soap to find the right strength for your spray solution. 2. To avoid skin burning or irritation from capsaisin, always wear rubber gloves. 3. Keep solution out of reach of children. <p>Reference: Garden to Kitchen News, Vol. 1, No. 6, June 1996.</p>	<p>Ingredients</p> <p>Fine white flour 2 cups Water 5-10 L</p> <p>Method</p> <ol style="list-style-type: none"> 1. Mix flour in water and apply in the morning when the sun's heat increases. 2. Mixture dries out leaving the insect encrusted in flour. 3. The insect will shrivel and die. 4. The flour coat will fall off the leaves or will wash off when the garden is being watered or when it rains. 5. Photosynthesis will not be affected. <p>Insects Controlled</p> <p>Aphids (sucking insects) and mites.</p> <p>Source: Prepared by Dhana L. Raghuwaiyu – Food Security Office, NFNC, 1 Clarke St., Suva, Fiji.</p> <p style="text-align: center;"><u>NEEM SPRAY</u></p> <ol style="list-style-type: none"> 1. Collect 1kg leaves in a bucket and add 5 litres water. 2. Let the leaves soak in water overnight 3. Grind or pound the leaves after soaking set aside the water. 4. Press and filter the grinded leaves and at the same time, adding the water used for soaking. 5. Add one tablespoon liquid soap to 5 litres and spray the crop. 6. The grinded leaves can be spread around the plant. <p>Collect 1kg green seeds grind and add 5litres of water and follow instructions number 2, 4 and 5.</p> <p>Source: DSAP</p>

12. HOME GARDEN NURSERY

A nursery in the home garden can be used to grow seedlings for the family garden. Locating the nursery within the home garden and close to the homestead means that seedlings and cuttings can receive regular watering and protection from pests and weed competition.



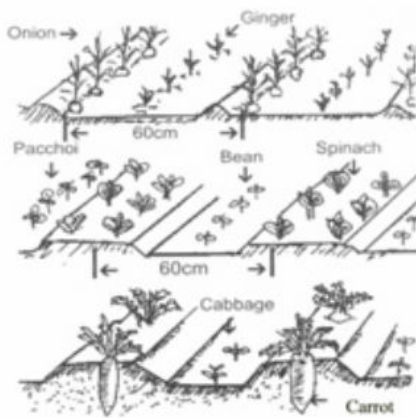
Container Sowing

Plants with expensive seeds and those that take a long time to grow (such as vegetable and fruit trees) can be grown in containers such as poly bags or pots made from strips of banana leaf. Make sure the pot is big enough for the plant's roots to grow without becoming cramped. The plant will transplant better if the roots have been allowed to grow long and deep. Soil in the containers should include some compost or a little fertilizer to feed the growing plant.

13. MULTIPLE CROPPING

Avoid Total Crop Loss through Plant Diversity

Inter Cropping & Mixed Cropping



Farm crops are sometimes ruined by animals, drought, flood, pests or diseases, especially if monocropping system (planting single crop) is practiced. Planting different types of crops in the garden reduces the spread of plant diseases and ensures that many food plants survive even if there is a flood or drought.

Growing different crops gives Healthy Plants

Growing different crops together minimizes pest problems and makes efficient use of soil nutrients. Legumes (such as beans and peas) will provide some nitrogen nutrient to other crops such as corn or tomato when planted together. Some plants such as chili and marigold flowers can keep certain pests away from neighbouring plants. These companion plants and others can be mixed into or around a planted area.

Interplanting and Rotation Planting

Plants belonging to the same family should not be planted repeatedly in exactly the same place for more than two years, otherwise pests and diseases will build up in the soil. For example they may be replanted in the next row. It is best to plant legumes before crops of the other families. Cassava, corn and other food crops can be interplanted between crops.

14. GROWING CROPS IN CONTAINER

Crops for home use can still be grown during drought or months of no rain. When the soil in the field is too dry to grow crops and water is limiting, tomato, cucumber, Chinese cabbage, spring onion, eggplant etc can be grown successfully in containers. Containers can be anything that you can successfully grow your crop inside. Container growing uses less water and it prevent water escaping too fast. Really wet the soil at transplanting and continue watering every three days. After transplanting or at seedling stage, shade and mulch the soil from the sun. This prevents water evaporating from the soil and keeps it cool.



Type of containers to used



Shade and fence to protect from sun, wind and animal Compost can be matured in plastic tubs

15. FIELD GROWING OF VEGETABLE CROPS

Tomatoes Transplanting

Seedlings are ready for transplanting in the field at 30 days after sowing. Transplanting is best done in the late afternoon to minimize transplant shock.

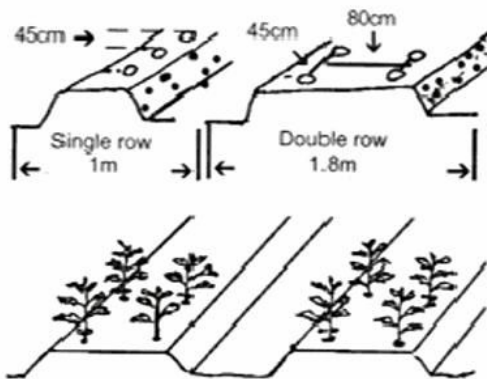
SPACING

Single row

- 1m between rows and 40-50cm within row

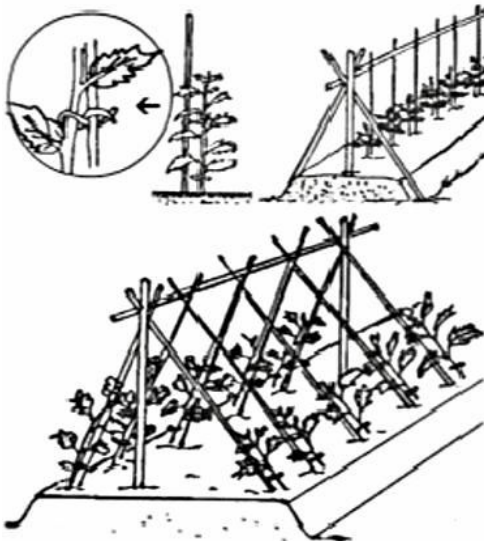
Double row

- 80cm between double rows and 45cm-50cm within row



STAKING

One week after transplanting, stakes should be setup beside each plant at 10cm away from the plant. Stakes should be about 1.5-2m tall.



Capsicum Transplanting

Seedlings are ready for transplanting in the field about 40-50 days after sowing or at 7-8 leaf stage. Transplanting should be done in late afternoon to minimize transplant shock.

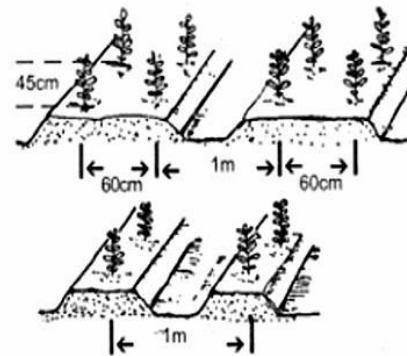
SPACING

Single row

- 1m between rows and 45-50cm within row.

Double row

- 60cm between double rows 45-50cm within a row.



STAKING & TRAINING

After the first flower appears, all branches below are removed.

- 2-3 weeks after transplanting, stakes should be setup at the side about 10cm away from the plant and tie the stem to the stick.
- Stakes should be about 50cm-70cm tall.

Staking



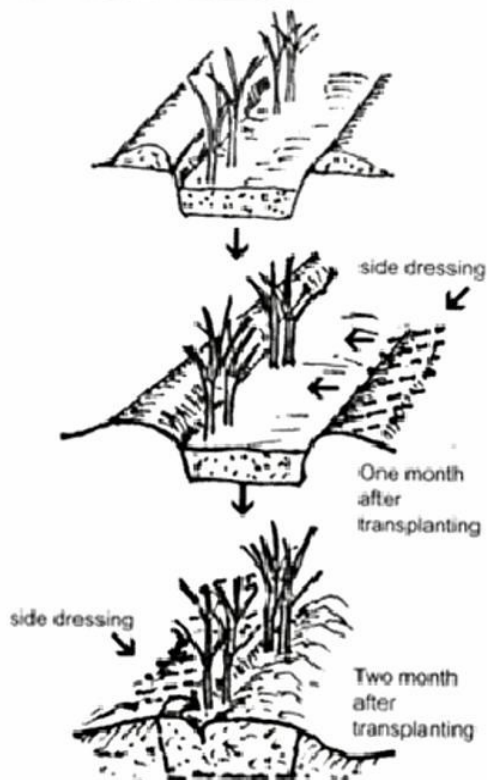
Transplanting Spring Onion

- The transplant setting should be done 60-70 days after sowing.
- About one week before transplanting, leaves should be pruned by cutting off the top quarter of the leaves with sharp scissors to prevent evapotranspiration and withstand transplanting shock.
- The planting ditches are settled in 50-70cm intervals with 10-15cm width and 10cm depth.
- The seedlings are set in the line two by two at 15cm intervals.
- Put the seedlings straight for ditches leaning against the dug up peaks of the rows.

EARTHING UP

In order for plants to grow vigorously, earthing up is done immediately after every sidedressing but rather shallow.

Side dressing & Earthing up

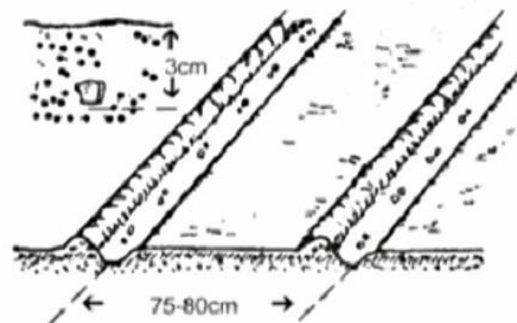


SWEET CORN



TIME OF PLANTING

All year round
(Hot season planting is recommended for better harvest.)



SOWING

Direct sowing

- Sow 2-3 seeds per spot, at 3-4cm depth.
- The spacing between row is 75-80cm and within row is 30cm apart.
- Plants are thinned out, when they reach the 3-4 leaf stage to one plant per planting spot.

CHINESE CABBAGE



TIME OF PLANTING

All year round

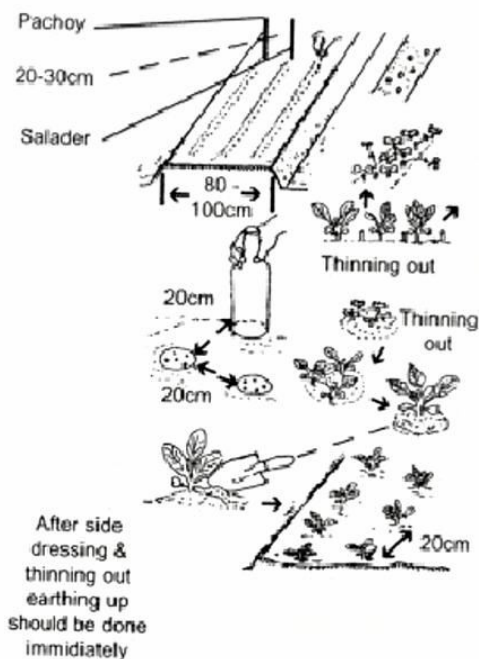
SOWING

Direct seeding.

Prepare bed 10cm high and 80cm to 1m wide

Make three lines for sowing at 20cm-30cm intervals and 5-10cm width along the bed

Broadcast seeds in furrow at 2cm apart. Thin to single seedlings at 20cm apart.



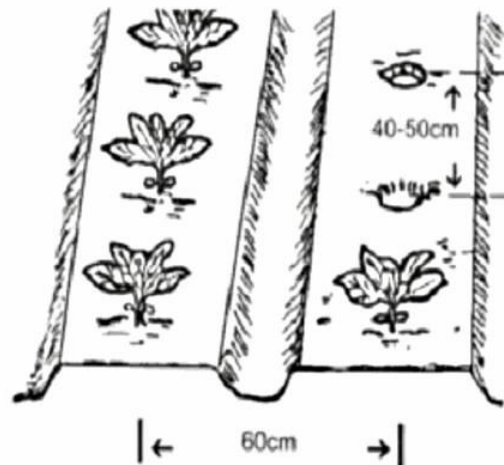
Transplanting Cabbage

- Seedlings are ready for transplanting in the field about 40 days after sowing.
- Transplanting should be done late in the afternoon to minimize transplanting shock

SPACING:

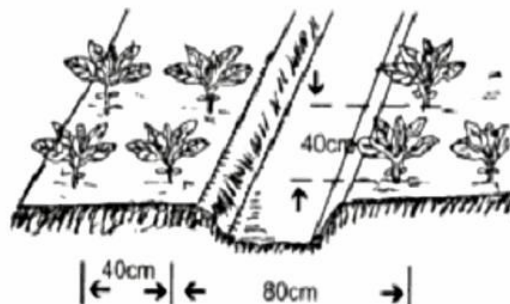
Single row

- 60cm between rows and 40-45cm within rows between plants.



Double row

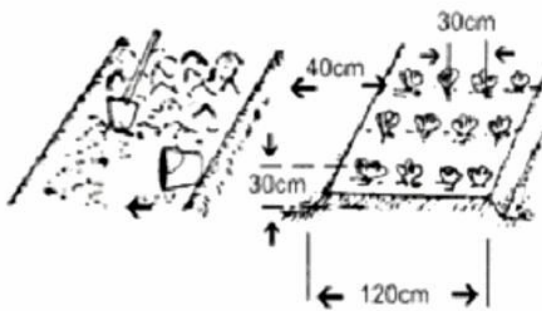
- 80cm between rows 40cm within rows between plants.



Transplanting Lettuce

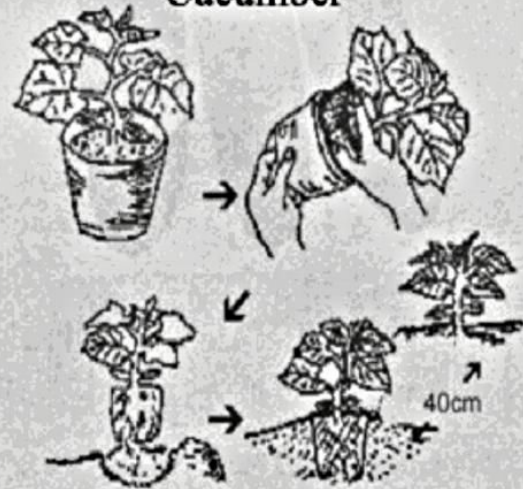
- Seedlings are ready for transplanting out in the Field when the plants reach 4-5 leaves.
- Transplanting should be done during late afternoon to minimize transplanting shock.
- The distance between plant within row is 30cm and between row is 30-60cm.

Butterhead type

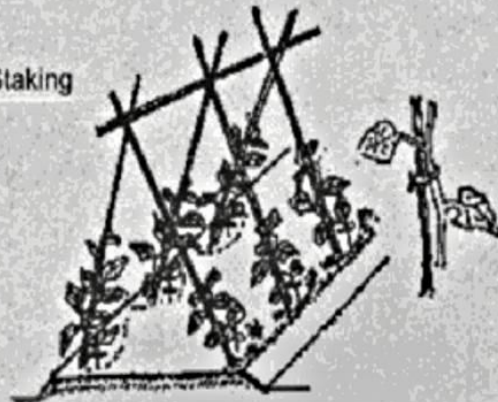


- The plants are watered immediately after transplanting and thereafter when the soil becomes dry.

Cucumber



Staking



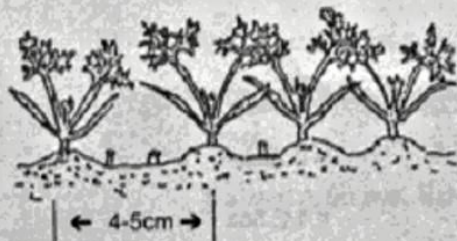
THINNING CARROT

Plants should be thinned as follows.

A) First thinning

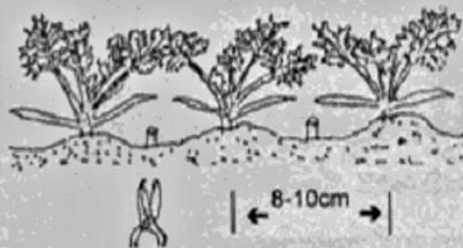
- 2-3 true-leaf stage, leave plants at about 4 to 5cm apart.

Thinning - Out



B) Second thinning

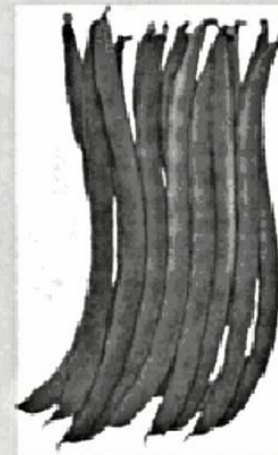
- 5-6 true leaf stage, leave plants at about 8 to 10cm apart.



HARVESTING

- Carrot is normally ready to harvest about 90-100 days after sowing.
- Harvest carrot before it over matures.
- Over matured carrot will crack and have a woody texture, therefore reducing its value.

BEANS



TIME OF PLANTING

All year round

SEED SOWING

Direct sowing

- Sow 2 seeds per spot at 2-3cm depth

Pole beans

- Spacing is 90cm between rows and 25-30cm within a row

Bush beans

- Spacing is 60cm between rows and 25-30cm within rows.

