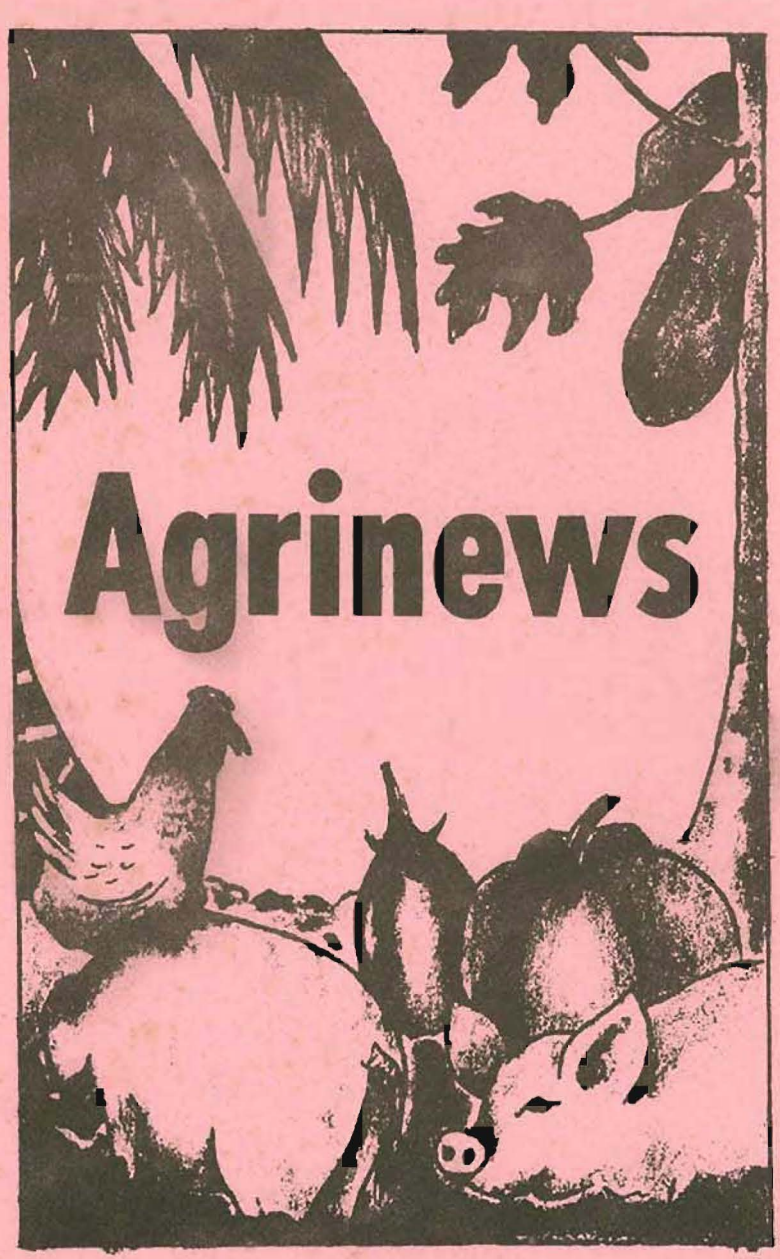
A SELECTION OF

REPRINTS



PUBLISHED BY

SCIENCE SECTION
NATIONAL INSTITUTE OF PEDAGOGY
MINISTRY OF EDUCATION AND INFORMATION

A SELECTION OF REPRINTS OF AGRINEWS

PUBLISHED BY THE SCIENCE SECTION
NATIONAL INSTITUTE OF PEDAGOGY
MINISTRY OF EDUCATION

EDITED BY
ALBERTA J. SEATON, Sc.D.

A C K N O W L E D G E M E N T S

We wish to acknowledge, as principal contributor, Mr. CLIFFORD S. ADAM, Ag. Director of Agricultural Promotion and Chief Research Officer, Agricultural Department of the MINISTRY of National Development. Mr Adam initiated the AGRINEWS series and, with the assistance of his staff, prepared the articles in this selection of Reprints, as part of the public information and extension services of the Grand' Anse Centre.

The enthusiastic supports and encouragement of Mr. Z. Pragassan, Director of the National Institute of Pedagogy and of Mr Patrick Pillay, Head of Science Section, have made possible the realisation of this project.

Thanks are also due to Mr. Maxime Renaud and his staff of the Reproduction Centre, N.I.P., for the technical production of this manuscript.

PROLOGUE

In this year of national emphasis on production, I am pleased to endorse the release of SELECTED REPRINTS OF AGRINEWS. This book is intended to instruct and guide teachers, pupils, as well as farmers-gardeners in using science and a relevant local technology to upgrade the production of that most important commodity, FOOD.

As a printed manuscript, this book represents the cooperative efforts of several local specialists in the PRODUCTION of text material, an important commodity in the domain of education and information.

It is PRODUCTION in these and other areas that lead ultimately to self sufficiency.

James Michel

Minister of Education and Information

INTRODUCTION

In our constant search for reference materials of local origin and relevance to support the Seychelles Integrated Sciences Course and other Agricultural training programmes, attention has been focused on the AGRINEWS series. These articles published in the Saturday issues of the NATION over the past two years, are not only rich in content and wide in their coverage but also are specially applicable to problems of crop production and animal rearing in the Seychelles. The information in these articles is mostly the results of research carried out in the several agricultural projects in Seychelles. Nevertheless the materials is clearly written and reinforced by illustrations, making it easily readable by the non-specialist or layperson. Publication of these informative articles in the NATION has indeed served to educate the community. It is thought that the reprinting of this material in the format of a booklet might be a reasonable step to conserve this resource of agroscientific literature for use by teachers and pupils in various local Agriculture Courses and projects.

The articles included have been grouped under seven major headings, for convenience of reference purposes. The full text of each selected article has been faithfully reproduced barring any typographical errors, together with its title and date of original publication in the Nation. The original illustrations accompanying each article have been reproduced, insofar as these are available. Although the articles may lend themselves to a variety of groupings, in this instance they have been placed under five major headings dealing with planting and crop production : SOIL; WATER; FERTILIZERS and NUTRIENTS; PESTS and PESTICIDES; and, SPECIAL CROPS. The sixth section contains those articles dealing with the REARING of ANIMALS under the three subheadings of poultry and rabbits, pork and cattle rearing. The seventh or final section contains articles on AGRICULTURE and its relationship to research and farmers. Its importance in schools, the N.Y.S. and in career selection are also included.

Concerning suggestions for use, teachers are advised to begin by familiarising themselves with the complete contents of this volume. Thereafter, they may select for study, articles from either of the seven sections, as may be appropriate for the topic under consideration in class.

It is not intended in school study that teachers should follow any specific sequence, such as the one used in grouping the reprints in this volume. Since the study of agriculture is being incorporated into each of the units of Integrated Science, the teacher may select and flexibly use these articles to complement a planned outline of the term's work. Teacher and pupils may also wish to clip additional Agrinews publications from the Saturday issue of the NATION to update and supplement the reprints that have been included here.

TABLE OF CONTENTS

I SOIL

1. Good Production Starts With Knowing Your Soil

2. Making Better Use of Garden Space

3. How to Manage Your Garden Properly

GOOD PRODUCTION STARTS WITH KNOWING YOUR SOIL

THE SOIL provides many things that are necessary for plants to grow well. It is a place where minerals and water are stored for uptake by plant roots. It is a medium in which plant roots can grow and develop, giving support to that plant. Soils contain air which is necessary for good plant root development.

The soil is a place where living things such as bacteria, fungi and insects live, which can aid in plant growth. Soils contain organic matter, that is rotted plant and animal debris, which is a source of nutrients as well as a material which helps to absorb and hold moisture and keep the soil loose.

To have good soil, there must be a balance between all of these things. Mineral nutrients must be available in forms plants can use. These minerals also must be in proper balance.

The soil must have the ability to hold these nutrients for a period of time. A good soil must have the ability to absorb and hold moisture but also be well drained so that it doesn't become waterlogged. A good soil is well aerated (has enough air); it should be loose enough that plant roots can enter and develop well.

When we look at the soils in Seychelles, it is important to remember those properties that make up a good soil, and when working with our soils we should aim to improve those areas in which they are deficient.

It is also important to know the different types of soil in Seychelles. There is more red soil than any other type here.

This soil is formed from the granite rock which breaks down and is weathered. It is composed of gravel, small pieces of rock, some sand, but mostly of clays and iron and aluminium-containing minerals.

It is the iron that gives this soil its characteristic red colour. It is normally extremely well drained and where it hasn't eroded it is very deep. It is a very stable soil and does not erode much unless it is disturbed or mishandled.

Red soils here contain a number of minerals which are essential for plant growth but it is also deficient in several areas. Minerals such as phosphorus, potassium, magnesium, sulphur and calcium may be in low supply and must be added.

Nitrogen is contained only in the organic matter (rotted material) that is mainly found in the top 20 centimetres of the soil; therefore, it must be added. Several trace elements (minerals plants need in small quantities) may be in low supply, such as molybdenum. Red soils are usually acid (very acid in some cases) which can affect uptake of minerals and plant root growth.

ORGANIC MATTER

How can we work with our red soils then ? First, to improve the rate water enters the soil and to increase the amount of water the soil can hold; organic matter in the form of composts, manures, or other rotted material should be added (if they are available).

Use of phosphorus-containing fertilisers, especially guano or single superphosphate, should be made to encourgae root development. This will aid the plant by getting roots deeper into the soil where more minerals may be available for uptake and where more moisture is available (making plants less susceptible to drought).

To make the soil less acid, calcium-containing materials should be added such as coral sand, lime or calcium fertilisers, such as guano, single superphosphate and limestone ammonium nitrate.

Fertilisers must be added to increase the nutrient supply of the soil. These must be added in a proper balance. Locally available materials such as manures, guano, ash and burnt coral are excellent sources of plant nutrients and are recommended for use with red soils.

Chemical fertilisers that are not very acid can also be used, but must be applied in proper quantities. Since these red soils are on steep slopes, care must be taken to prevent erosion of the top soil (the most fertile part of the soil).

Use of terraces, contour, planting, and strip cropping (mixing strips of grass in between cropped areas) will aid in slowing down this erosion.

The other type of soil which we have in large quantities is sandy soil (coral sand) or plateaux soil. This soil is formed through the breakdown and weathering of coral which has been deposited next to the sea.

This soil is extremely well drained. It contains small amounts of organic matter on the surface of the soil. It contains several minerals but is also deficient in many nutrients.

Because it has been derived from coral, it contains excessive amounts of calcium. This excess of calcium causes an imbalance in the soil making minerals such as potassium, manganese, iron and zinc and other minerals such as boron and copper either unavailable or difficult for plants to take up.

The excess of calcium is also responsible for making the soil alkaline. Since these soils are usually next to the ocean they may contain an excess of salt, which can cause scorching on plant leaves.

ADVANTAGE

THESE soils have an advantage in that they are flat, and machines can be used for production of crops. There is a small amount of this land on Mahe, Praslin and La Digue but it is more extensive on the outer islands.

To work with these soils there are two main alternatives. The first is to use plants that are adapted to these conditions, the main example being coconuts. The second alternative is to change this soil into one that is fertile enough for vegetable, fruit, and rootcrop production.

This can be done mainly through the use of organic materials in large amounts (such as composts and manures) and through intensive fertilisation. Since this soil is unbalanced to start with proper consideration must be taken when applying fertilisers and manure.

Acidic fertilisers such as ammonium sulphate should be used (but must be covered by soil). Superphosphate, Nitrophoska and Potassium sulphate are also good fertilisers to use.

Several trace elements are in low supply (iron, manganese, and zinc). To make these minerals more available, rotted cattle manure or peat from marsh areas may be added. They help in acidifying the soil, making these nutrients more available. These minerals may also be applied to the soil as sulphates or they can be sprayed on the plant as chelates or sulphate fertilisers.

The last major type of soil is alluvial or black soil. This is found mostly alongside rivers and marshes. These soils are usually deep and very fertile. The only constraint to their use is proper drainage (which must be provided). Fertiliser programmes are similar to those for red soils (although fewer nutrients may be needed).

These are the soils available to us in Seychelles. Crops of many kinds may be grown well on these soils if their deficiences are corrected and they are worked with in a correct fashion. Our soils are the basis for production and must be well cared for.

JAN. 30, 1982

MAKING BETTER USE OF GARDEN SPACE

USING intercropping, closer spacing, close staking techniques, diamond shaped planting patterns, training techniques and planning your sequence crops can give you higher yields in less garden space.

In this way a large amount of vegetables can be grown close to the house while those crops that require less care can be grown further away.

Intercropping or companion planting is when you plant two or more vegetables in the same area at the same time. Some good examples are beetroot, carrots, or radishes between rows of green bunching onion.

Radishes can be grown between almost any crops as they grow quickly and can be taken out before the other crops start to mature.

Vegetables such as melons and other vine crops can be grown well under maize. Egg-plant does well between rows of pole beans and lettuce can be grown between cabbages.

All crops needing shade can be grown well under a developing canopy of margoes or patal. Bush beans do well between okra plants.

If closer spacings are used, and the planting area has had plenty of manure or compost added, along with fertiliser, then you will get smaller vegetables but larger total weights. Although the vegetables are smaller there are many more of them.

One way to get more plants per area is through planting in a diamond or triangle pattern on your planting beds. Close staking techniques allow plants to grow higher or over a larger area and this, along with correct shaping or pruning techniques, will give added production per unit of area.

Planning your garden well so that new plants are ready to replace areas that have finished producing, along with planning crops that will use residues of fertilisers or manure left after a crop is finished, is also very important. At all times you should know what you are going to plant and where you will plant it.

March 28, 1981

HOW TO MANAGE YOUR GARDEN PROPERLY

HOW TO PREPARE SOILS, RAISE PLANTS FROM SEED AND KEEP THE GARDEN CLEAN AND HEALTHY - THESE ARE THE SUBJECTS OF THIS WEEK'S ADVICE FROM THE MINISTRY OF AGRICULTURE.

AFTER a garden site has been chosen, there are a number of cultural practices the grower must follow to ensure reasonably good growth and production of vegetable crops.

SOIL IMPROVEMENT :

It is possible to grow satisfactory crops of vegetable by special treatment of the infertile red and sandy soils.

1. Loosen the red soil for better drainage and aeration by adding manure or compost.
2. Apply commercial fertiliser.
3. Apply lime on red soils.
4. Irrigate often, avoiding excessive watering.
5. Improve surface drainage by using raised beds.
6. Cultivate frequently when the soil is moist.

SOIL PREPARATION

Firstly remove all the useless plants and their roots. If the soil is heavy deeper down, sub-soiling will help.

When the ground is properly cleared, put on farmyard manure or compost. After that plough or hoe the ground. After cultivation, apply a complete fertiliser e.g. Nitrophoska as a basal dressing at the rate of 20 gms per sq. and 10 gms of superphosphate.

Sandy soils are too light and must be made heavier. The best practical way is to use humus either as compost or green manure.

WATER-IRRIGATION :

The whole surface of the garden must be watered. Methods mostly used are hoses with nozzles and sprinklers.

The layout of the garden also matters. We must use different ways of watering for different kinds of ground. Different crops also need different ways of watering.

Sprinklers spread water evently and can be left on even during the night. Too much water is not good for the garden. Too much water can wash out fertiliser.

Sprinklers are not so good for such plants as tomatoes and watermelons. These need mosture from the soil. The parts of the plant above the ground are better kept dry.

We must use chemical spray for killing insects and to control diseases. Water from sprinklers must not wash off the chemicals. Always add soapy solution, Spreadite or Biofilm, to your spray mixture.

Sprinklers are safe with hardy crops. See Section II Water.

SOWING - TRANSPLANTING :

Most vegetable seeds are sown in a nursery. When seedlings are big enough, they are transplanted to a permanent position.

After locating the plot, selecting the vegetalbes to grown, buying recommended seeds, planning his garden and preparing the soil, the time comes for the gardener to plant the seed.

The seedbed must be well prepared. It is made of mixtures of earth, rotted manure, peat and gravel. Make the rows 1 cm deep and 10 cm apart. Put the seeds in the bottoms of the row and use the right amount of seeds.

Sow by hand and then cover with soil. Press down lightly. Seedlings come up evenly. There is no need for thinning out. Cover seed bed for two days with a gunny bag or coconut leaves.

Protect the young seedlings against fungi and insects by spraying early. One good practice is to disinfect the soil before sowing.

TRANSPLANING :

Seedlings are preferably transferred to pots. Soil preparation, proper spacing, hardening, trimming and time of planting are important points to remember. Spray on a routine basis against insects and diseases.

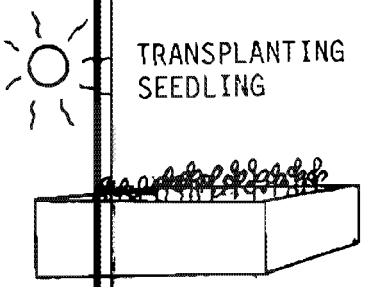
FERTILISER USE :

Some chemical substances we find in plants are called "minerals". Such substances are calcium, potassium, phosphorus and so on. Plants cannot grow without these minerals. Some soils do not have enough of some elements. We can put the missing element into the soil by using chemical fertiliser.

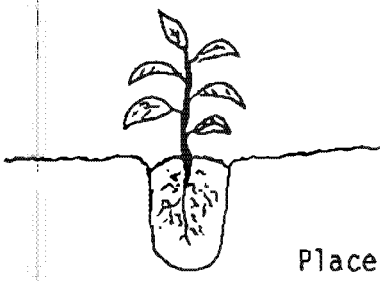
It is essential for the grower to familiarise himself with what fertiliser to use, how and when to apply. The fertiliser rate generally applied for most vegetables is 20 grams per sq. metre every fortnight.

You must use fertiliser because market crops take a lot of plant goods from the ground. If you do not use fertiliser, the soil soon becomes too poor for growing good crops.

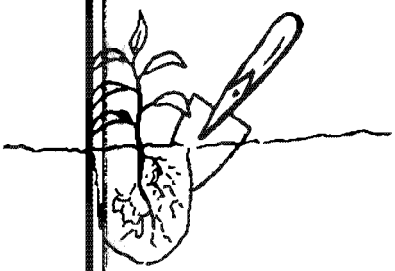
TRANSPLANTING SEEDLING



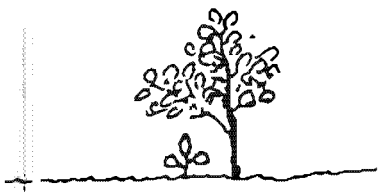
Harden seedlings in the sun.



Place seedling in the soil so that the roots are straight.

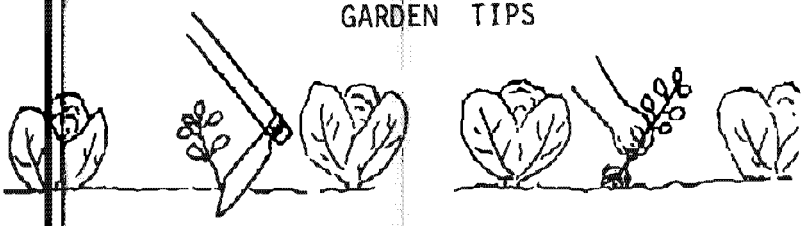


Dig out seedlings with wet soil around the roots.



Shade seedling.

GARDEN TIPS



a)
Keep garden clean of weeds and old weed piles.

(b)
Keep plants thinned to desired spacings.

CARE OF CROPS

Hoeing is essential to stop weeds from growing. It also loosens the soil and helps to keep the deeper layers of the soil moist. If herbicide is not used, hoeing must be carried out every 2 or 3 weeks.

Weeding is a must. Weeds compete with the crops and also harbour pests.

Mulching with plant material keeps the soil cool and moist.

Chemical weedkillers. On a large area, a farmer cannot cope with weeds manually. Herbicides must be used before planting and/or after in order to save time.

THINNING:

Sometimes young seedlings grow too quickly. Pick out the weakest. The best seedlings have more space to grow, more air and more plant food and water. It must be done early morning, or evening.

EARTHING UP:

Some plants develop a lot of side roots. They need light soil for these roots to grow properly. Pile up the soil around the plants. This gives them more room for their roots.

INTERCROPPING AND INTERPLANTING:

It is often good to grow two crops together on the same ground. It is best to pick two plants which grow in different ways. We can do the hoeing, weeding, mulching for both crops at the same time; eg. eggplant and Chinese cabbage, tomatoes and beans.

WINDBREAK

Windbreaks are very important. Strong winds and great heat spoil vegetable crops. Plant fast growing plants eg. Tauceana (cassi).

PEST CONTROL:

Very many pests attack gardening crops. They can be plants or animals which do a lot of damage to crops. The gardener must watch his garden all the time, maintain a high standard of crop hygiene, and follow a rigid programme of spraying with fungicides and insecticides.

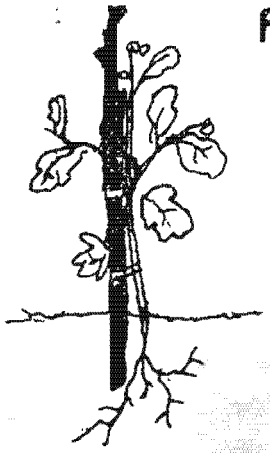
CUTTING (PRUNING):

This applies mostly to fruit-bearing vegetables such as tomatoes, peppers, watermelons. With pruning, we take off some parts of the plants. This lets other parts grow better. Be careful with pruning. It can easily spread diseases. Always keep your tools and your hands clean.

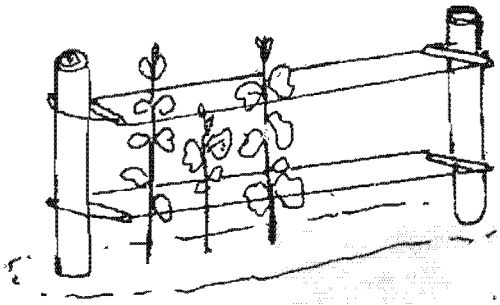
SUPPORT FOR PLANTS:

Some plants need support to keep them upright. Climbing plants need stakes or poles eg. tomatoes, beans. Stick the stakes firmly into the ground. The tie must be loose as it needs plenty of room to grow.

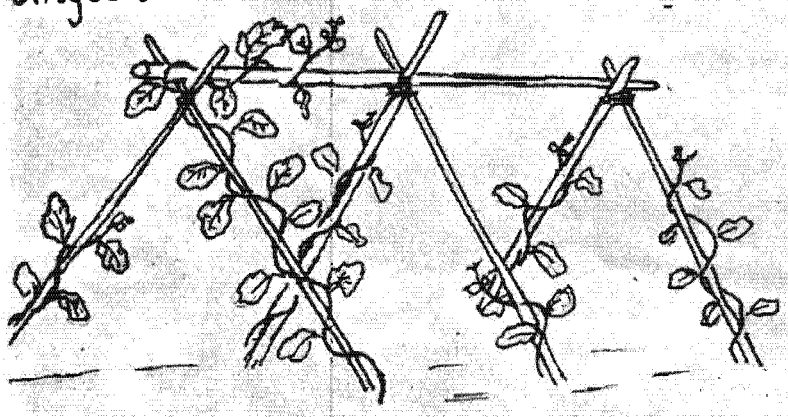
PLANT SUPPORT METHODS.



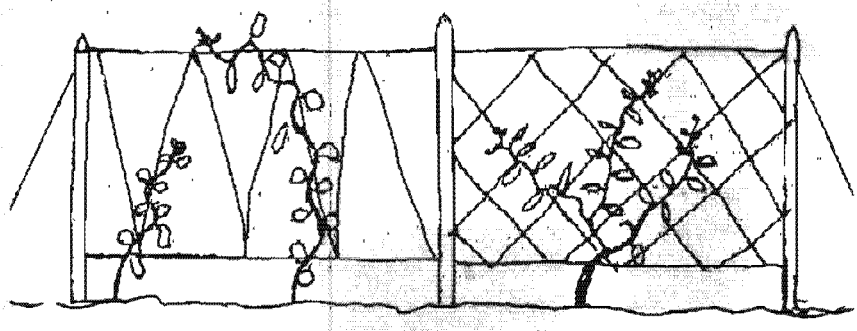
Single stake



cradle



Row stake



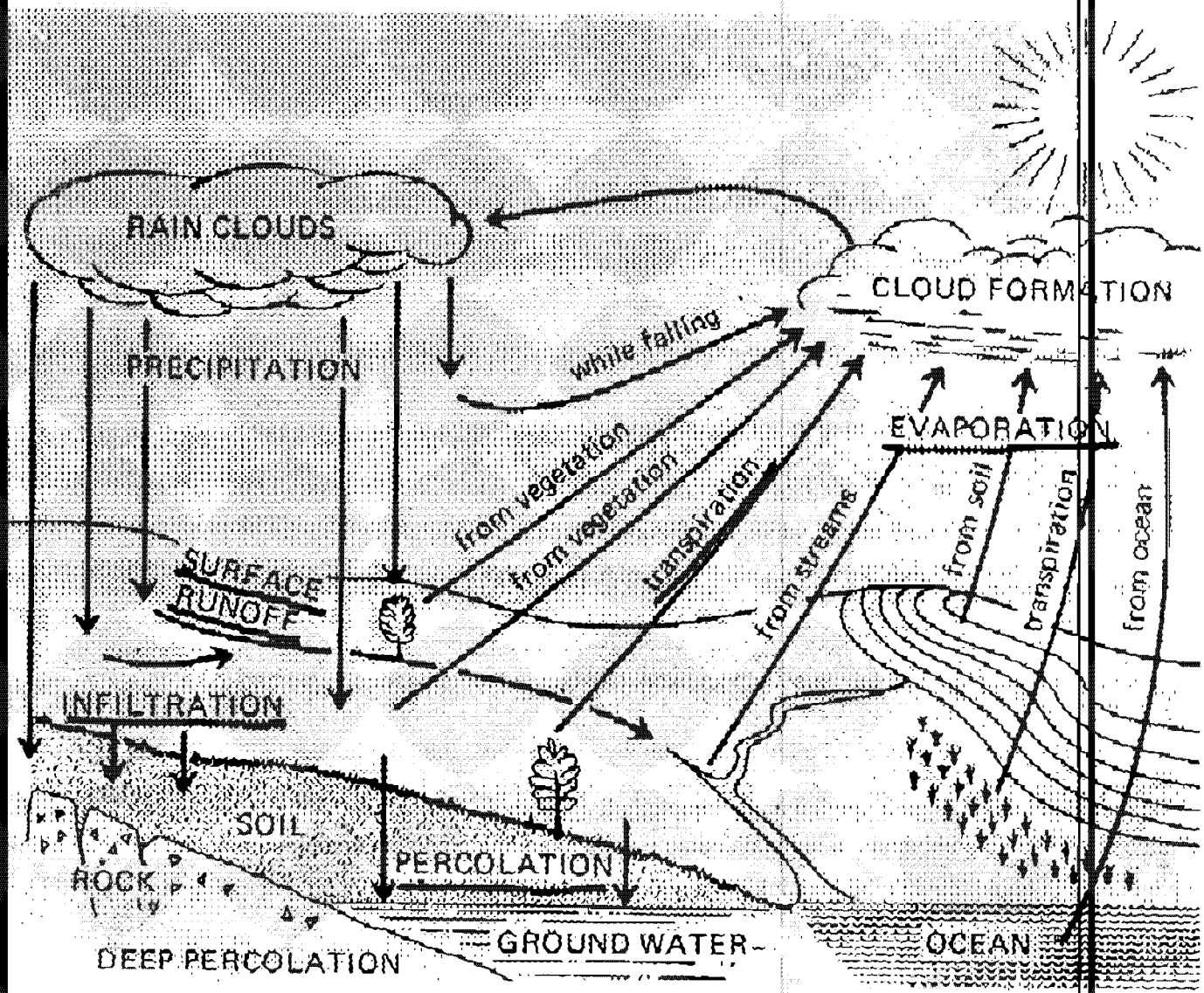
Trellis Net

Climbing plants such as tomatoes, beans and passion fruit have to be given support. Plants should not be tied too tightly.

April 24, 1981

II WATER

1. Making Sure Plants Get the Water They Need
2. Irrigation Is Vital for Plant Growth
3. How to Store Water for Your Crops
4. Save Water - It's Your Most Valuable Resource
5. Too Much Water Is Bad for Your Crops
6. How to Protect Your Crops in the Rainy Season
7. Water - Waste Not, Want Not



How water is lost.

MAKING SURE PLANTS GET THE WATER THEY NEED

- CROPS CANNOT GROW WITHOUT WATER AND THIS WEEK THE DEPARTEMENT OF AGRICULTURE DESCRIBE THE VARIOUS METHODS USED TO DELIVER THIS VITAL COMMODITY TO THE PLANTS.

THERE are several methods of applying water to crops, some naturally being more advantageous than others. There are hundreds of gadgets on the market with manufactures of each claiming to have solved everyone's watering problem. Some are very sophisticated and expensive, others are relatively cheap and simple.

Confronted with this array of advice the farmer finds himself confused and at a loss to decide which system would best meet his watering needs.

In this article we will describe the different irrigation techniques, giving their advantages and disadvantages, and hopefully farmers, backyard producers and even flower and pot enthusiasts might have a better idea on how best to water their plants.

GROUP 1

WATERING CAN

ADVANTAGES : No pressure required. Reasonably cheap.

DISADVANTAGES : Time and labour consuming. Wet leaves, creating desease problems.

HOSE

ADVANTAGES : Time consuming but little bit quicker than watering can. Reasonably cheap.

DISADVANTAGES : Wet leaves and can cause leaching in sandy soil.

GROUP 2

SPRINKLERS

HIGH PRESSURE

ADVANTAGES : Waters efficiently. Covers large area. Keeps leaves cool during hot weather.

DISADVANTAGES : Requires very high pressure. Wastes water. Encourages weed growth. Wet leaves causes leaching.

LOW PRESSURE

Requires much less pressure than above and is cheaper but has some other disadvantages.

MICROJET SPRINKLERS

ADVANTAGES : Efficient watering. Little leaching . Wets only small portion of plants.

DISADVANTAGES : Requires a lot of piping, thus expensive. Needs relatively high pressure. Needs efficient filter to prevent blockages of jets.

GROUP 3

DRIPS

ADVANTAGES : Wastes little water. Waters only around plants, reducing growth of weeds between rows. No leaching. Constant moisture around plants. Leaves are not wet. Less risk of diseases.

DISADVANTAGES : Very expensive. Efficient filter required. Needs relatively high pressure.

DRIZZLE

Less expensive than drips, but not as efficient.

BOTTLE DRIPS

Can be made cheaply locally.

BAMBOO

Can be used instead of polythene pipes. Cheap and efficient.

GROUP 4

FURROW IRRIGATION

High volume of water required. A lot of water is wasted. Not recommended.

GROUP 5

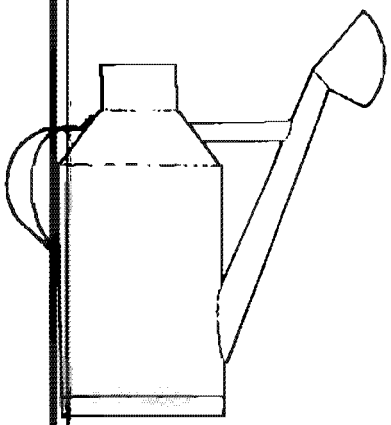
Now for the pot enthusiast.

WICK WATERING

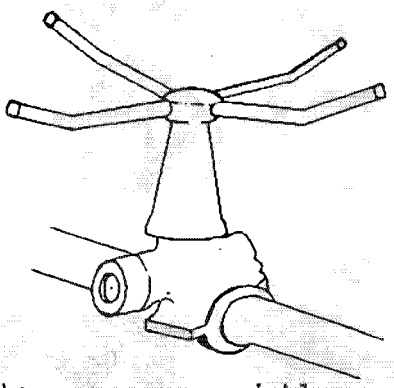
ADVANTAGES : Water moves through wick into soil. Saves times. Leaves don't get wet. Avoids over watering.

MAT WATERING

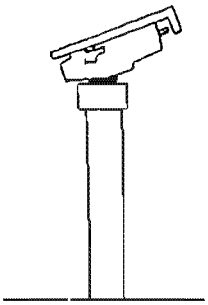
ADVANTAGES : Foam abosorbs water from dish which moves up through soil by capilliary action. Same other advantages as wick watering.



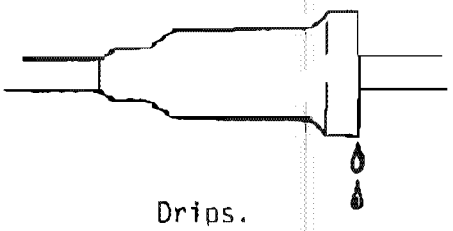
Watering can.



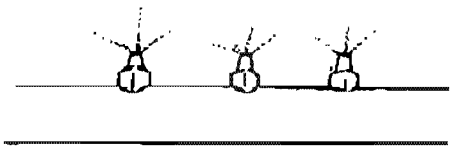
Low pressure sprinkler.



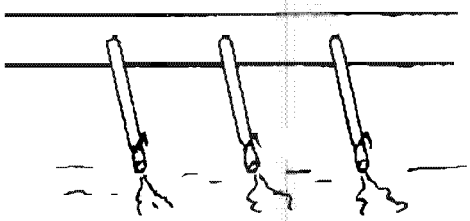
High pressure sprinkler.



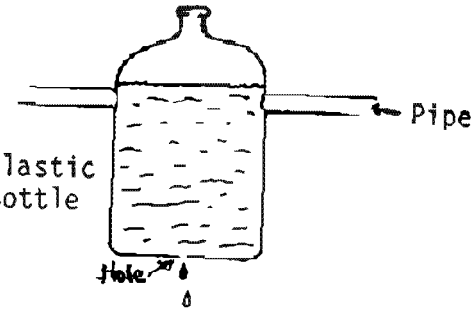
Drips.



Microjet sprinkler.



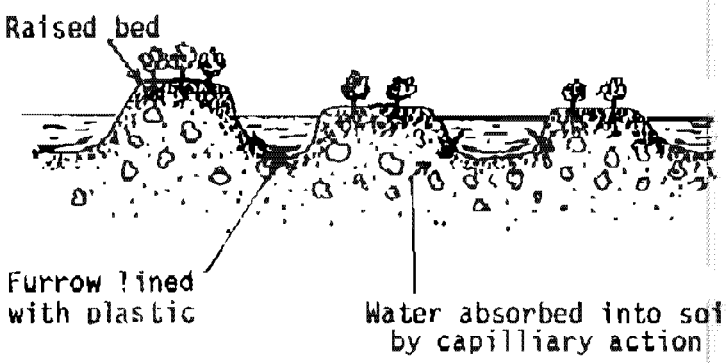
Drizzle.



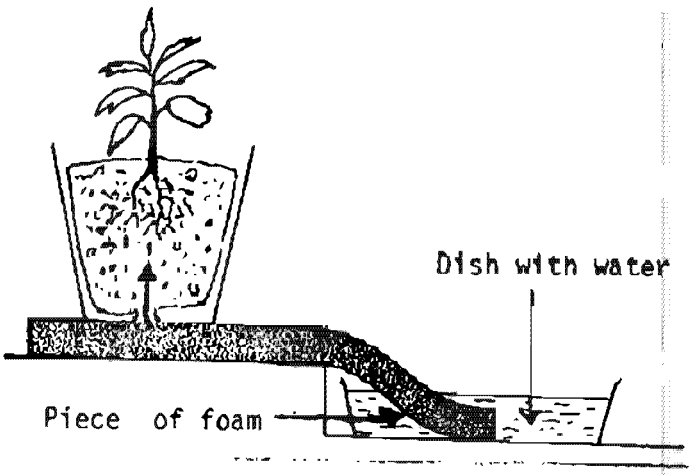
Bottle drips.

Bound by a piece of Polythene pipe
Bamboo drips.

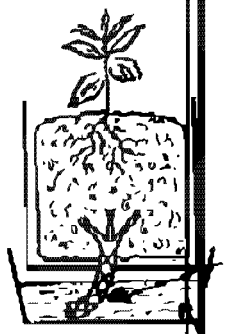
Hosepipes can cause leaching in sandy soils.



Furrow irrigation.



Mat watering.



Dish with water

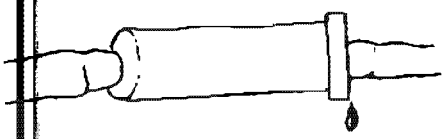
Wick watering.

IRRIGATION IS VITAL FOR PLANT GROWTH

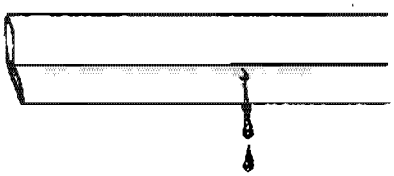
THESE three types of irrigation gadgets illustrated are designed specially to get your precious water delivered directly to the area where it will do the most good, the root zone of each tree, vegetable or root crop.

The advantages of these systems are numerous. No soil erosion takes place. Crop yields will improve dramatically.

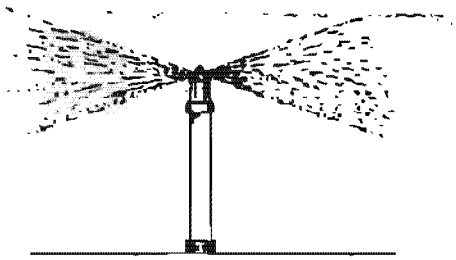
A programmed application of expensive pesticides is also facilitated so that pests are controlled when necessary and not when irrigation dictates. Consult your agricultural officers for more details.



Durodrip system (needs filter).



Gro-Quip non clog irrigation (needs no filter).



February 28, 1981

HOW TO STORE WATER FOR YOUR CROPS

- CONTINUING THE DEPARTMENT OF AGRICULTURE'S ADVICE ON HOW FARMERS CAN MAKE BEST USE OF THE AVAILABLE WATER.

FARMERS usually use various methods to obtain enough water for irrigation. These depend mainly on the water source available close to their farms, where the water can be exploited more economically.

Depending on the location of their farms, some farmers can make use of simple methods to obtain and store their water, whereas other have to apply more sophisticated methods.

But as water on a farm is essential for both plants and livestock, farmers must make use of one method or another to obtain adequate water. Although sometimes it is expensive to install the proper system, farmers can cover their costs after a certain period, provided they make proper use of the water available.

Let us look at the different systems commonly used on the different farms.

WATER CATCHMENT AND RESERVOIR :

This is the most popular system used on the different farms. A catchment or "barrage" is constructed on a stream, not too high so that there is an overflow and the flow of the stream is not affected.

A pipe is connected at a lower level. Here the water is stored to be used later for irrigation or other purposes on the farm.

It is important to place the reservoir at the highest elevation on the farm so that there is maximum pressure of water to irrigate all parts of the farm. It is also advisable to place a ball valve on the inflow of the reservoir so that when full, excess water returns to the stream. It is important to locate the best site on the stream to construct the catchment or "barrage" so that it remains full together with an over-flow, especially during the dry period of the year.

ROOF WATER :

This is a method which is not too popular with local farmers, but they should start considering the importance of such a system - especially the amount of water which can be collected during the rainy season.

It is a very simple method by which rainwater from the roofs of the different buildings on the farm can be collected and stored in a nearby reservoir.

UNDERGROUND WATER :

This method is practicable on farms on plateaux, where the water table is high. Holes can be dug at different sites on the farm, especially near to the different plantations, and water can be drawn by means of a watering can or bucket to irrigate crops.

The advantage is that it will not cost the farmer much to construct reservoirs and to install pipes, but the main disadvantage is that it will take a lot of the farmer's time.

He will have to use watering cans and it will take much effort to irrigate all his plantations daily.

To ease the farmer's task in this case, a pump can be used, and he can store water for later use. This means he will have to construct a reservoir - an advantage as he will be able to pump water to a higher elevation and make use of higher parts of the farm where previously water could not reach.

Pumps can also be installed on streams to exert higher water pressure , especially when the water source is almost at the same height as the farm or, more important, when the water source is below the farm level.

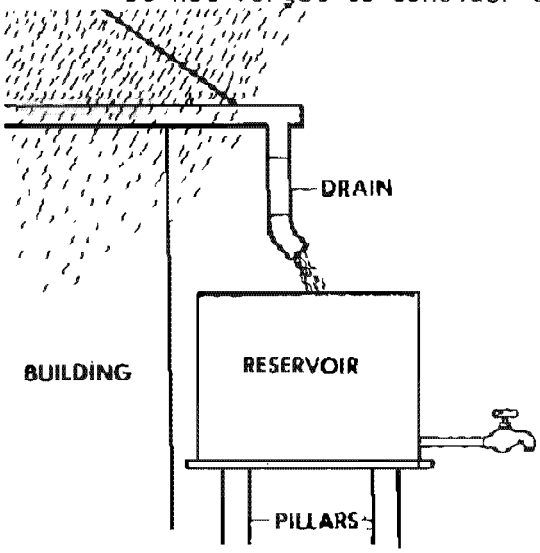
Pumps can be turned by electrical power if electricity is available or by water power if there is no electricity.

IMPORTANT POINTS TO REMEMBER :

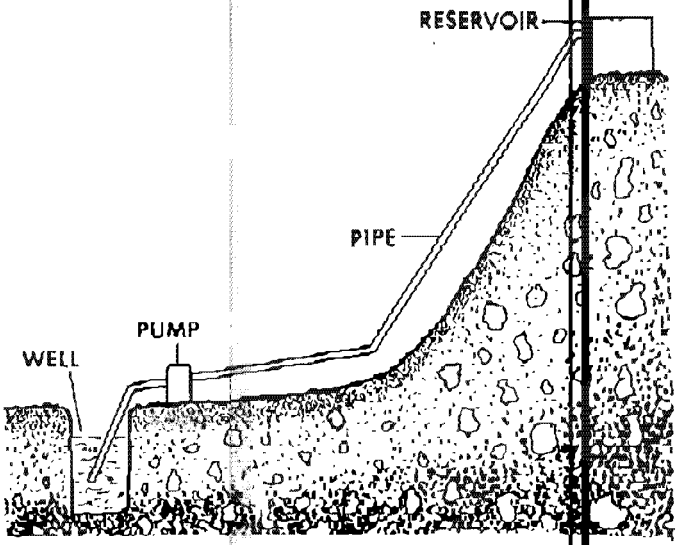
- Make sure that water catchments or "barrages" always have an overflow.
- Pipes of inflow water to the reservoirs should have a larger diameter than outflow i.e. more water should be flowing to the reservoir than going out of the reservoir.
- Always use a ball valve on the reservoir.
- Preferably use stones to construct reservoirs rather than bricks.
- Always use reinforcing metals when constructing a reservoir. Advice can be sought from the Extension Officers.
- Store as much water as possible.
- Reservoirs should be built at the highest elevation on the farm for maximum use of farm level.
- Avoid using time-consuming systems.

- Make use of pumps when there is a need to so so. Advice on different types of pumps is given by Extension Officers.

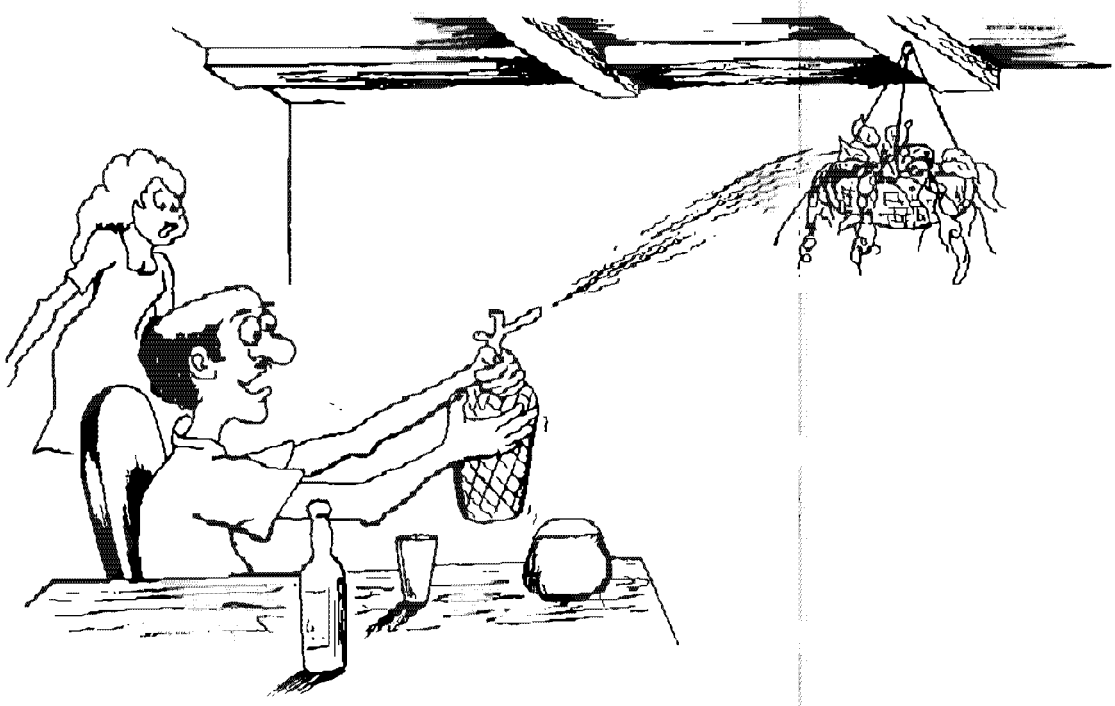
- Do not forget to consider using roof water.



More use could be made of rainwater draining off roofs of farm buildings.



A pump is a valuable aid in exploiting underground water.



"Who said I'm not interested in the garden ?"

SAVE WATER - IT'S YOUR MOST VALUABLE RESOURCE

- HOW TO STOP PRECIOUS WATER GOING TO WASTE - THAT IS THE THEME OF THIS WEEK'S ADVICE FROM THE AGRICULTURE DEPARTEMENT.

WATER is the most important resource in agriculture. It is important to know not only how to bring water to your plants with a good collection and irrigation system but also how to use that water effectively and how to conserve the limited amount that we have.

HOW WATER IS LOST FROM THE SOIL

Water is lost through :

- Run-off - water that flows and washes on the surface of the soil.
- Percolation - water that filters through and passes deep under the soil surface.
- Evaporation - water that is lost directly into the air.
- Transpiration - water that passes through a plant aiding it to remain cool.
- Direct plant use - water a plant uses to grow and retains inside it.

HOW TO CONSERVE WATER IN THE SOIL

The best way to conserve water is through the use of mulch. Mulch helps the soil to remain cooler, helps water enter the soil and reduces evaporation from the surface of the soil. Mulch also aids in reducing water run-off.

There are many materials that can be used for mulch.

GRASSES - elephant grass, fatak, rafe, zeb jon, gazon trelle, vetti verre and many other types of local grass.

LEAVES - Coconut leaves, cinnamon leaves, sugar cane leaves, banana leaves and leaves from most trees.

WASTE AND LITTLE USED MATERIALS - coconut husks, wood shavings, sawdust, seaweed, spent cinnamon leaves and bagasse cane.

ARTIFICIAL MATERIALS - plastic, paper, used plastic and burlap sacks, waste cloth.

With mulching materials the thicker they are applied the more moisture will be conserved in the soil.

Another way to conserve moisture is through the use of shading. Covering above the soil with shade cloth, with local covers (coconut leaves for example) or by the use of fruit and other tree crops will help reduce evaporation from the surface of the soil.

It is possible to improve the soil so it can hold more water. With the use of large amounts of organic matter such as compost, manure and other rotted material, which absorb large quantities of water, your soil will remain moist for a longer period of time.

Using plants that form sods and cover the soil will trap water that would normally run off, help water infiltration into the soil and slow surface evaporation. Tropical legumes such as pueraria are ideal for this.

BETTER USE OF WATER

Much water is wasted or not used well. Better use of this water should help prevent shortages during dry periods.

Excess run-off water can be collected through use of water absorbing cover crops and through catchmid systems.

Use of the drought-resistant crops can be made. These crops can live and grow with less water.

Cropping systems such as planting at the bottom of trenches, minimum and notillage planting, and using self-mulching crops use available moisture better.

Preventing wastage of water through leaks in pipes, basins, and connections, along with evaporation losses from uncovered basins and open channel piping would help to save much needed water.

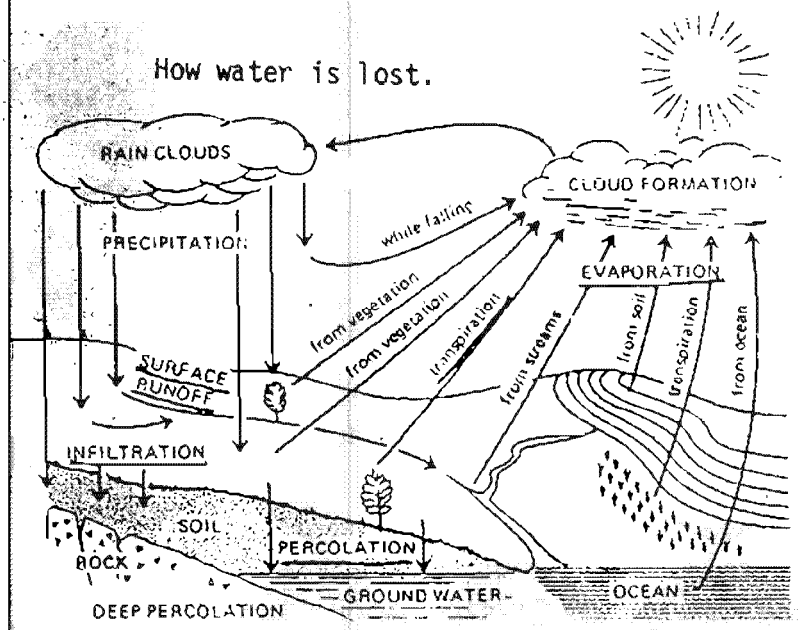
There are also watering techniques that use less water. If water is applied right next to your plant, on the surface, less water will be lost through evaporation, run-off and percolation. Drip, drizzle, and individual plant watering systems do this very well. Giving only enough water for the plant to grow well and not over-watering is also very important.

WATERSHEDS

The area that surrounds your water source must be managed well. The forest, shrub, and grass cover that is above and to the side of the water collection site is very important as it absorbs rainfall and allows it to flow little by little all the time.

If this area is cut over, cleared, or burnt, less water will be held and it may even dry out at times. This cover should be left at all times to absorb water.

If proper attention is paid to conserving water and using it better, then you will be able to grow with less water and there will be enough irrigation water available to use all the ime.



Mulch of grass and twigs or palm bunch refuse on soil surface.

Shading and mulching help to conserve water.

July 25, 1981

TOO MUCH WATER IS BAD FOR YOUR CROPS

DO YOU have a problem of excess water in your soil, such as a marsh ?

Too little water in the soil is not good for plant growth, likewise too much water in the soil is not good for plant growth either.

Adequate land drainage is fundamental to efficient, profitable crop and livestock production.

The importance of good drainange increases as farming systems become more intensive. The well-proven benefits of good drainage are :

- Improved aeration leads to better root development and function, resulting in higher yields. Improved root development increases drought resistance.
- Well drained soils promote early, vigorous growth.
- Poor drainage encourages plant diseases. Animal health deteriorates with increased incidence of foot problems.
- With poor drainage, cultivation and harvesting become more difficult, less effective and more expensive.
- Many weeds are encourgaed by inadequate drainage.

CAUSES OF POOR DRAINAGE :

Before an efficient drainage system can be designed, it is essential to determine the exact cause of the problem, which could be one of two types :

(A) top water

(B) ground water

Top water problems :

This is when water fails to percolate through the soil with sufficient speed.

This results from soil of low permeability; impervious subsoil; poor topsoil structure.

Ground water problems :

These results from a high water table, which may occur in a number of situations e.g. coastal marshes, topographical depressions, or an impervious subsoil causing a "perched" water table; seepage lines; springs which occur where undergound water reaches the surface at specific points.

In Seychelles, the most popular way of getting rid of excess water from the soil is by constructing ditches.

DITCHES :

The construction and maintenance of ditches is essential for all artificial drainage systems. A ditch fulfils one or more functions :

- Drainage water from land above.
- Intercepting an underground flow.
- Receiving and carrying water from render drainange.

CONSTRUCTION OF DITCHES :

When digging new ditches or clearing out old ones, the work should commence at the lowest point and progress up the gradient. Material dug from the ditch (spoil) should not be heaped on the edge of the ditch as this will cause the sides to collapse, but should be spread at least 61 cm away from the ditch.

Dimensions : These depend upon the function and amount of water it has to carry. As a general rule ditches should, for reasons of cost and loss of land, be as small as possible consistent with their function and ease of cleaning.

Bank slope depends on soil type. Banks may be almost vertical on red earth, while with sandy soils an angle to the horizontal of less than 30° should be used.

Gradients : Should be as uniform as possible. Variation may alter the speed of flow and cause trouble from either erosion or siltation. As straight a run as possible should be achieved and sharp bends be avoided.

Renovation : Many drainage systems become useless because the ditches are silted up. Ditches should be cleared to their original depth.

Ditch maintenance : Rubbish, soil from bank slips or weed growth check the flow of water and cause silting of the ditch. Routine maintenance should be carried out once a year to keep the ditch in good working order. Use of herbicides to control weeds in ditches can be dangerous and should be used with extreme caution.

MAINTAINING SALINITY CONTROL :

Many farmers, when there is a scarcity of water, use water from bore-holes to water their crops. In coastal areas, where the water table is high, farmers can encounter problems when bore-holes are too deep and fresh water is contaminated by saline water.

When using this type of water, an irrigation system should be used which prevents accumulation of salt in the root zone of plants.

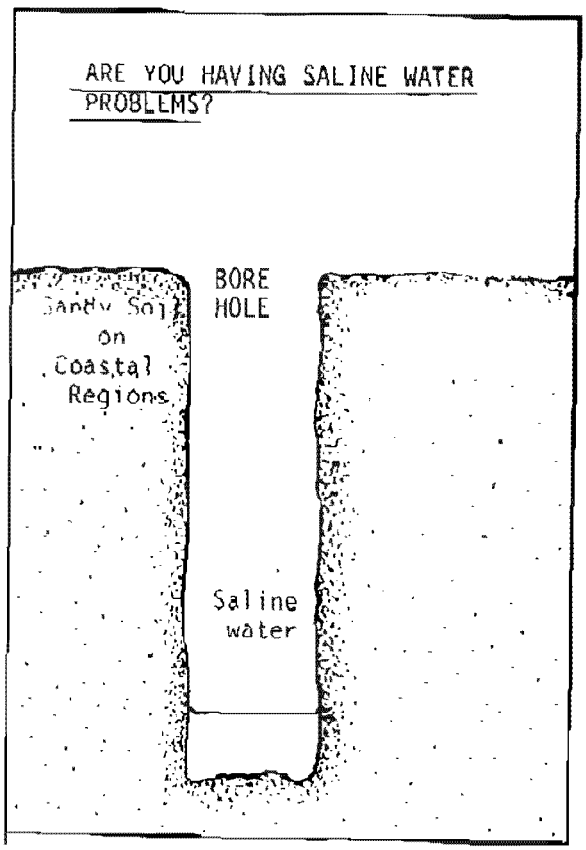
Do not use furrow irrigation because salt moves with the water and is left behind where water evaporates from the soil surface or enters the root, leaving a high concentration of salts at the soil surface.

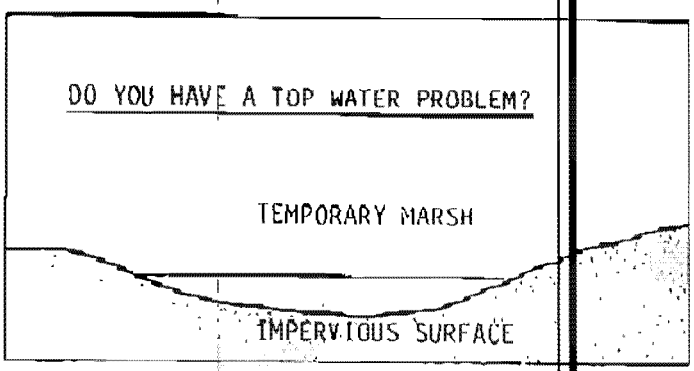
If the soil is loose and well drained, drip irrigation can be used because the salt will travel down in the soil out of reach of the plant roots.

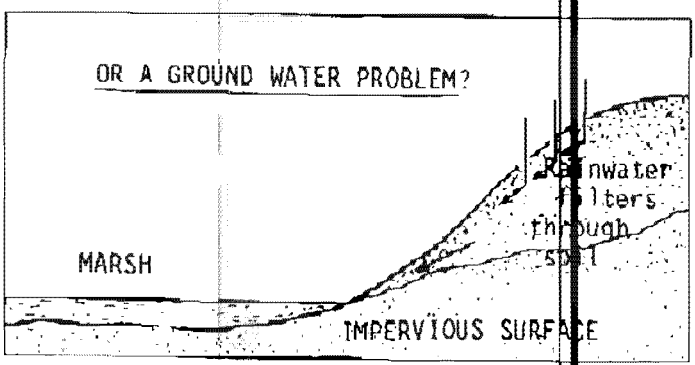
Sprinkler irrigation applied over the entire surface washes salt directly downwards, resulting in non salt accumulation at the soil surface.

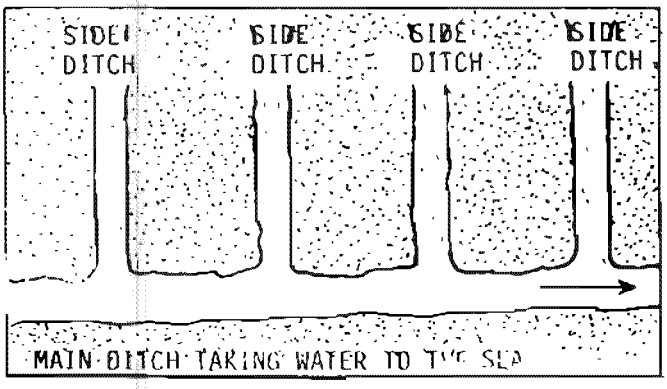
Salt is most easily managed by an irrigation system that supplies water over the entire surface because there are no zones of accumulation on the soil surface.

However, for crops that are sensitive to foliar uptake of salt, an irrigation system should be chosen that does not wet the foliage, if irrigation water is saline.

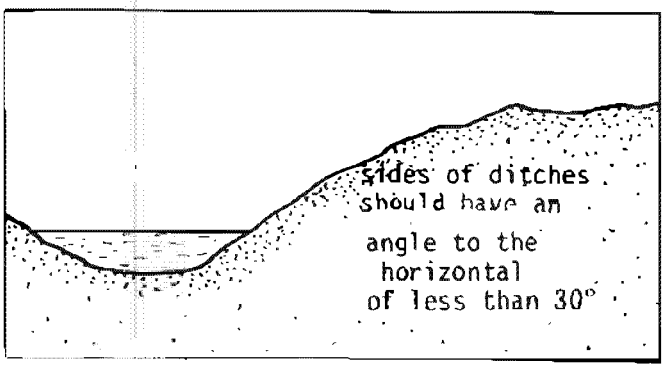








DRAINING WATER FROM MARSHY LAND.



Aug. 1, 1981

HOW TO PROTECT YOUR CROPS IN THE RAINY SEASON

AS THE RAINY SEASON COMES, SO DO THE PESTS AND DISEASES THAT CAN GIVE THE FARMER AND GARDENER SO MANY PROBLEMS. HERE, THE AGRICULTURE MINISTRY GIVES ADVICE ON HOW TO TACKLE THESE PESTS AND STOP THEM RUINING YOUR CROPS.

DURING the rainy season your crops are more prone to attack by pests, such as fungal diseases, bacterial diseases, insects, snails and slugs. Because of the rain you have to be extra careful in every thing you do.

SPRAYING :

(A) Spray more often.

(B) Check the weather very carefully and make sure that you get at least a few hours between your spraying and the rain.

(C) Take extra precaution to make sure your chemical adheres to the leaves. Use Spreadite which will help greatly towards achieving this.

MULCHING : This is essential because :

(A) It protects against soil erosion.

(B) It reduces spreading of diseases by rain splashes.

(C) It retards weed growth.

(D) It improves percolation of water.

STAKING : This practice will help greatly during the rainy season because :

(A) It prevents your plant from lodging, thereby reducing the chances of contracting diseases.

(B) It improves ventilation within the crop stand and facilitates other cultural practices such as fertilising, spraying, mulching, weeding, etc.

SHADE CLOTH COVER : Protecting your seedlings with nylon netting during this rainy season is worthwhile.

(A) It protects the young plants against the heavy impact of the rain.

(B) It prevents soil compaction.

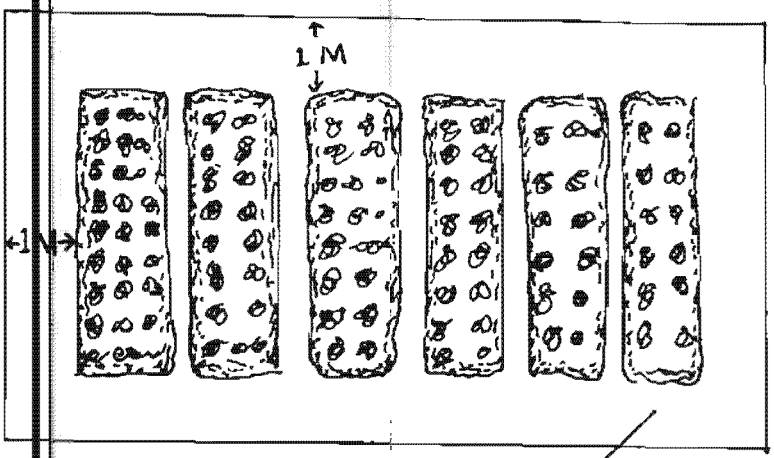
(C) It reduces the spread of diseases by rain splash.

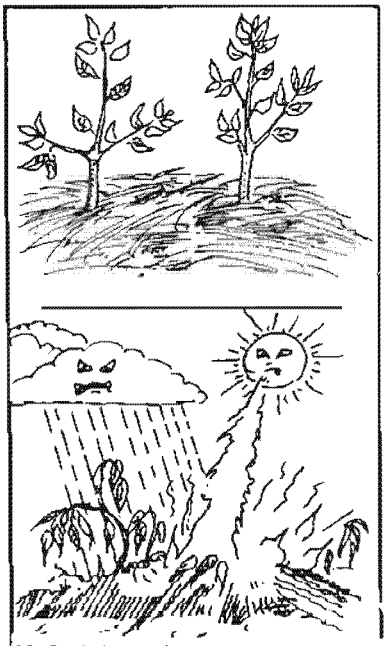
SANITATION : This is very important especially for the control of snails, slugs and rodents (rats).

(A) Remove all trash or possible breeding grounds for snails, slugs and rats.

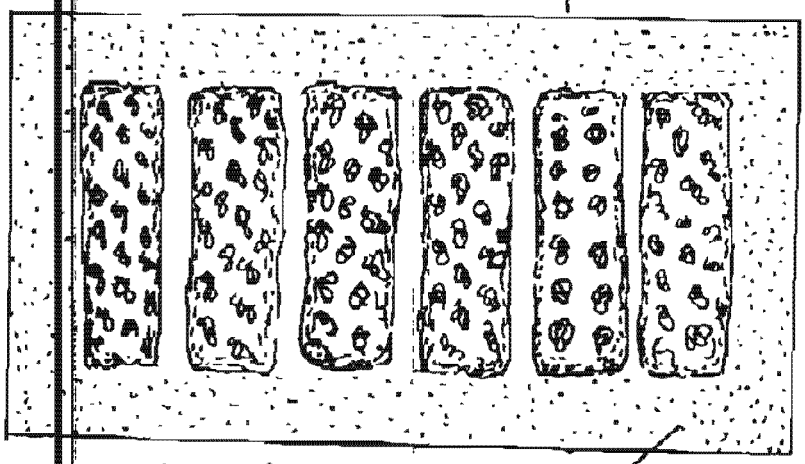
(B) Use Sluggit pellets and broadcast them all around your crops. Apply in the evening and after the rain when snails and slugs are more active. Apply more often as they may be washed away by the rain.

(C) Keep a wide clean strip all around your crops so that you do not provide any shelter for the pests.

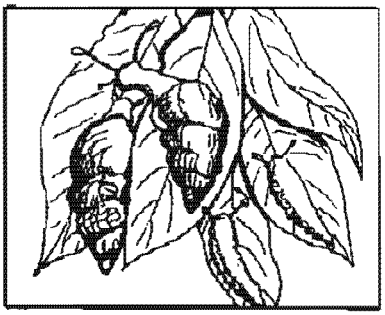




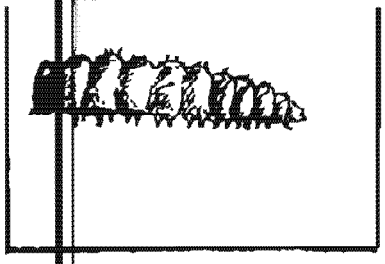
Mulching is essential.



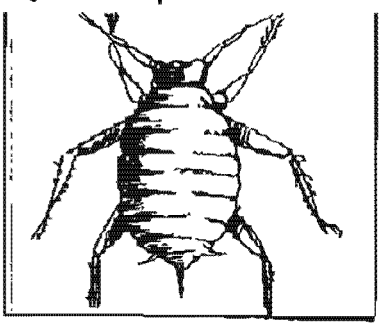
Keep a clean strip round your crops.



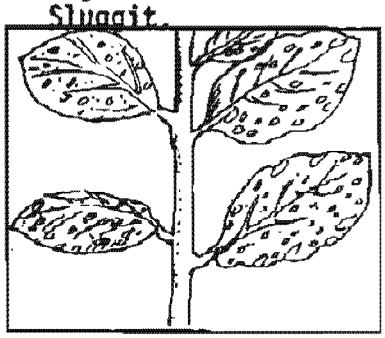
Slugs and snails - use Sluggit.



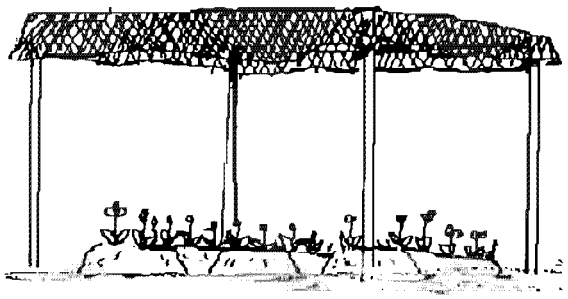
Caterpillars - use Decis.



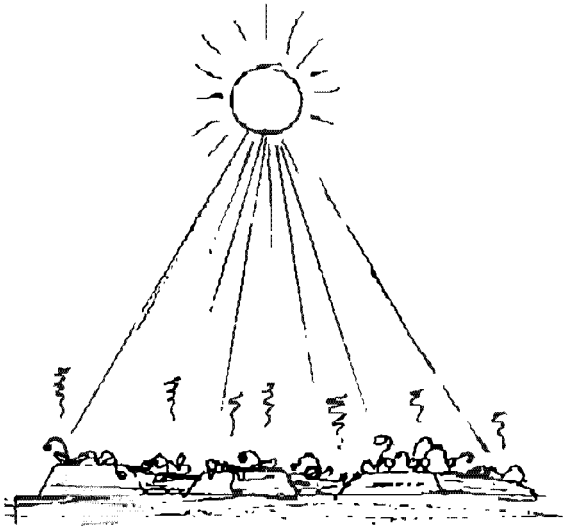
Aphids - use Decis.

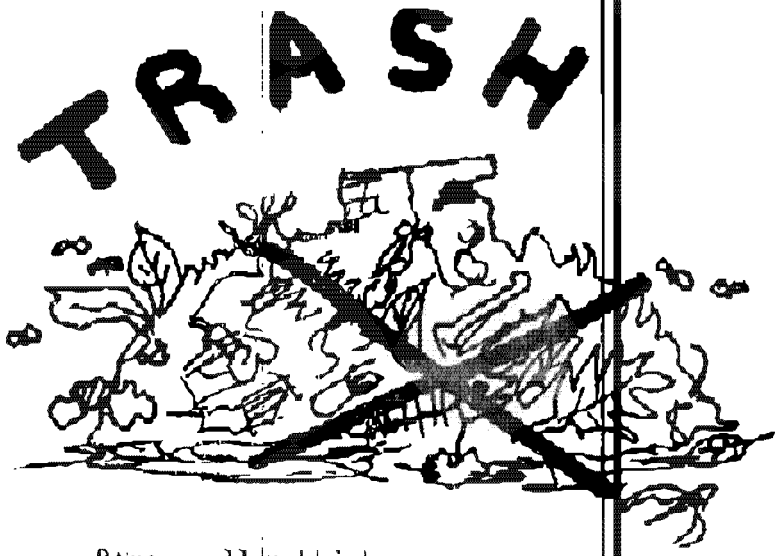


Grey leaf spot - use Benlate.

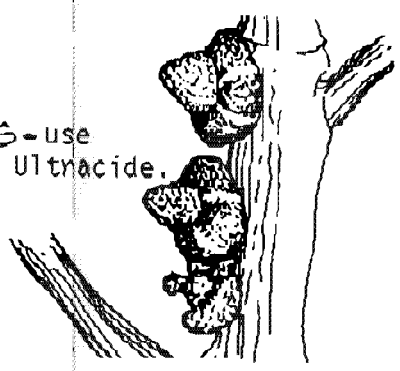


Shade cloth cover.



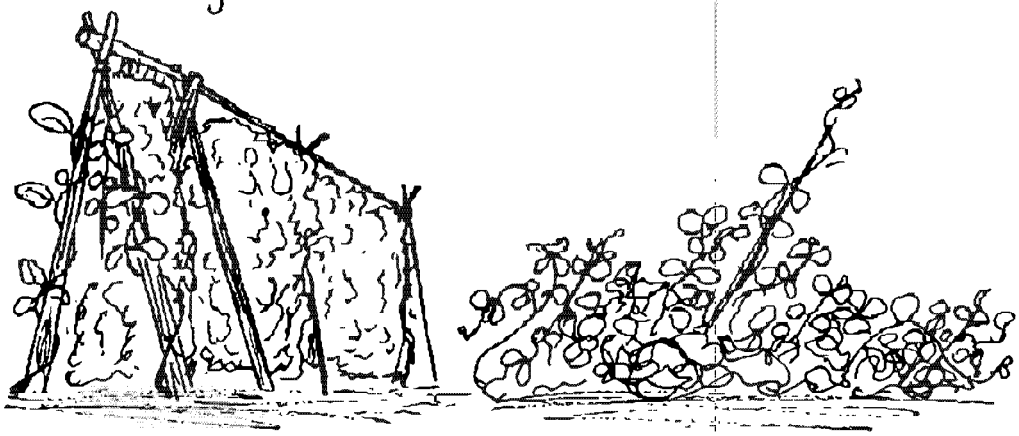


Remove all rubbish.



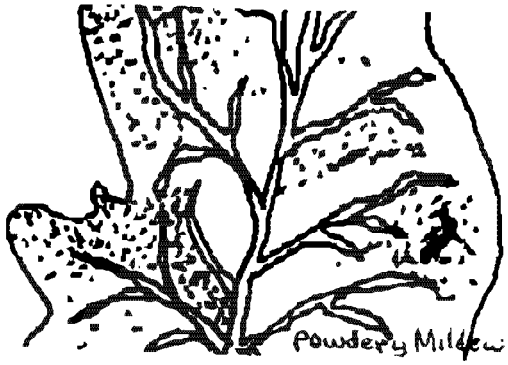
Scales - use Ultracide.

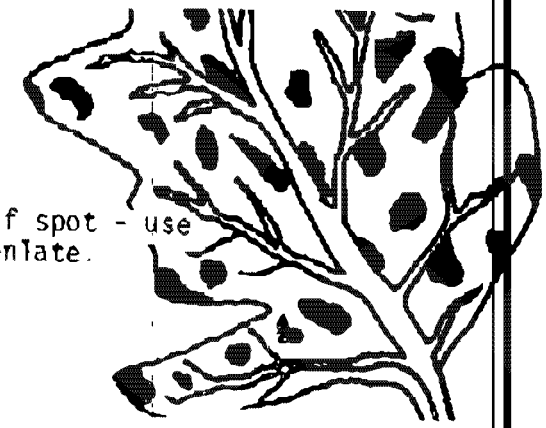
Staking



Staking improves ventilation.

Unstaked.





Leaf spot - use Benlate.

CHEMICALS THAT COULD BE VERY HANDY DURING THIS WET SEASON

Names	How to use	Price	Against what to use
Benlate	Dilute in water and spray on foliage. Spray both under and on leaves. Dilution rate 3tsp/gal.	R. 97/kg	Powdery mildews, leaf spots etc.
Ridomil	Dilute in water and spray on foliage. Dilution rate $1\frac{1}{2}$ tsp/gal.	R. 98/kg	Control of air and soil borne fungal diseases in many vegetable crops.
Decis	Dilute in water and spray on foliage. Spray well on the undersurface of leaves. Dilution 1 tsp/gal.	R. 320/L	Caterpillars, aphids etc.
Ultracide	Dilute in water and on foliage. Dilution rate 1 tsp/gal.		Use especially on fruit trees against scales, aphids and mealy bugs.
Sluggit pellet	Broadcast around crops	R. 16/kg	Snails and slugs
Zinc phosphide	Mix with bait poison/ bait rats - 1:40. Place in area infested with rats.	R. 100/kg	Rats

Tsp = teaspoon. 1 tsp = 5 ml or 5 gm whichever is applicable.

Gal = gallon.

Jan. 9, 1982

WATER - WASTE NOT, WANT NOT

THE TWO most important things we need to stay alive are food and water. Water is essential for the establishment of most crops and for all livestock and human use. It is not only used for the irrigation of crops but also for washing and processing of produce.

There are vast areas in the world, the desert areas, that cannot support life due to lack of water. It is well known that a lot of present desert areas were once cultivated and flourished.

For example, large-scale irrigation farming continued for 30 centuries between the Euphrates and Tigris rivers in Mesopotamia. But now ruined cities in a waste of drifting sand are all that remain. These civilizations forgot the importance of water, its proper management and conservation.

Plants need for photosynthesis, to disolve nutrients in the soil for absorption by the roots and for translocation of these nutrients throughout the plant. In any growing plant a high proportion of its body weight consists of waer. The percentage of water in the plant as a whole is usually somewhere about 85%.

If a plant has insufficient water it begins to wilt. Its leaves hang down and its colour changes from a dark greeen to a lighter colour. This is a sure sign to the farmer that his plants are short of water. Wilting causes a severe setback to the plant.

If we have a look at the rainfall pattern in Seychelles, we have a period of very heavy rain from November to January. The rain falls quickly and often it falls in too great a quantity at one time for the ground to absorb it all.
This excess water runs off into drains or overflowing streams, and into the sea usually carrying with it valuable top soil.

As we start the main vegetable growing period from April onwards, the intensity of the rainfall diminishes and during some months very little or no rain falls at all.

This is a very critical period for farmers and unless they use the available water efficiently they can be in real trouble.

How is water lost and how can we prevent or reduce this loss ?

- Water can be lost in several ways. Moisture evaporates from the surface of leaves. This is a natural process over which we can have little control.

  We can, however, reduce the rate of evaporation by partially shading the plants by using shade cloth.

- Moisture evaporation from streams and rivers. Evaporation is greatest when there are no trees or shrubs growing close to rivers. Consequently it is essential not to remove any vegetation near streams or rivers as these will dry up much quicker.

Weeds can compete with crops for valuable moisture.

- Excess water from rivers flow into the sea. So as to conserve this water we build barrages across rivers. The water is diverted from there through pipes to storage tanks or reservoirs.

- Farmers and other individuals waste water. It can be wasted in several ways :

By leaving taps open un-necessarily. This is the most common cause of water wastage. It is important that all taps be closed when water is not being used.

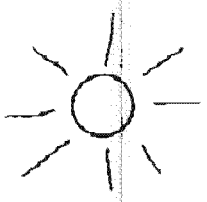
Through leaking pipes or taps. Make sure that all leaks are repaired immediately.

Through overwatering of crops. If plants are watered in excess of their need, a lot of the water will be lost through evaporation. On sandy soils some will soak away downward and carry with it some of the plant food.

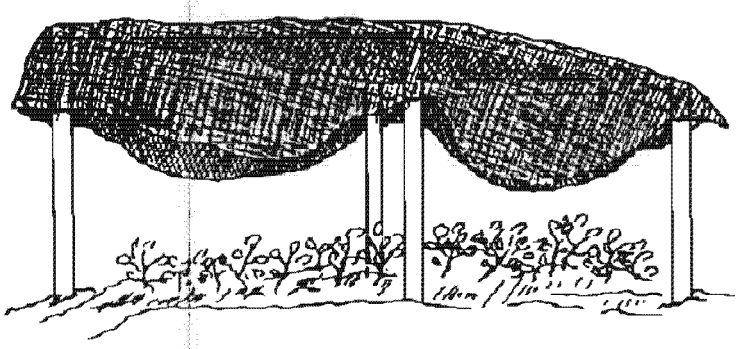
On poorly drained soils waterlogging will occur and on slopes the excess water will wash away soil thus causing land damage by erosion/ Correct irrigation methods must therefore be used to ensure that crops receive the right amount of water.

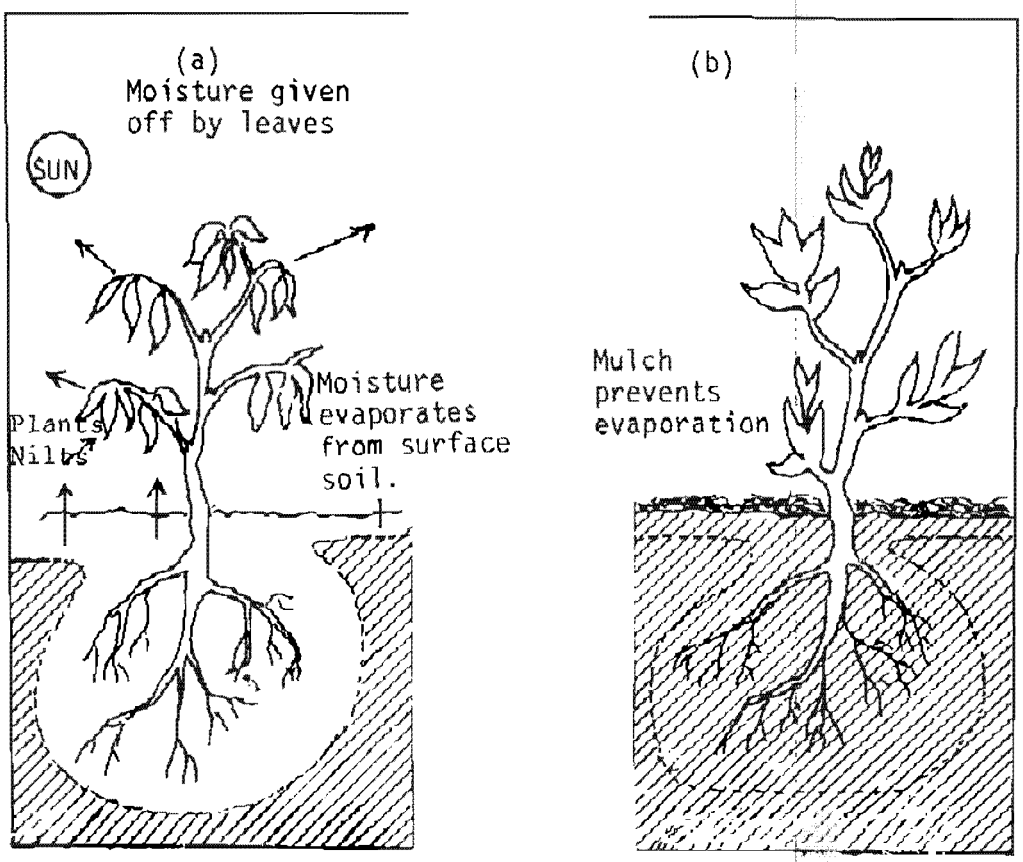
As we have seen, water is vital for our survival. With a growing population more and more water will be required for human and livestock consumption and irrigation of crops.

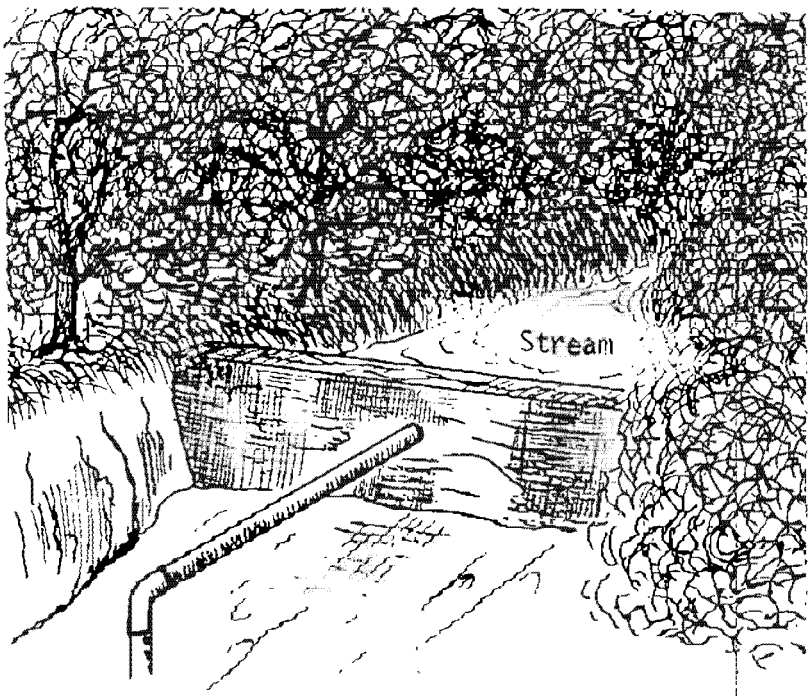
We in Seychelles are fortunate to have an abundant rainfall, but very often in the time of plenty we tend to forget that there is also a time of scarcity and fail to make provision. Let us therefore remember the old saying of "Waste not, want not".



Shade cloth cover reduces transpiration rate.





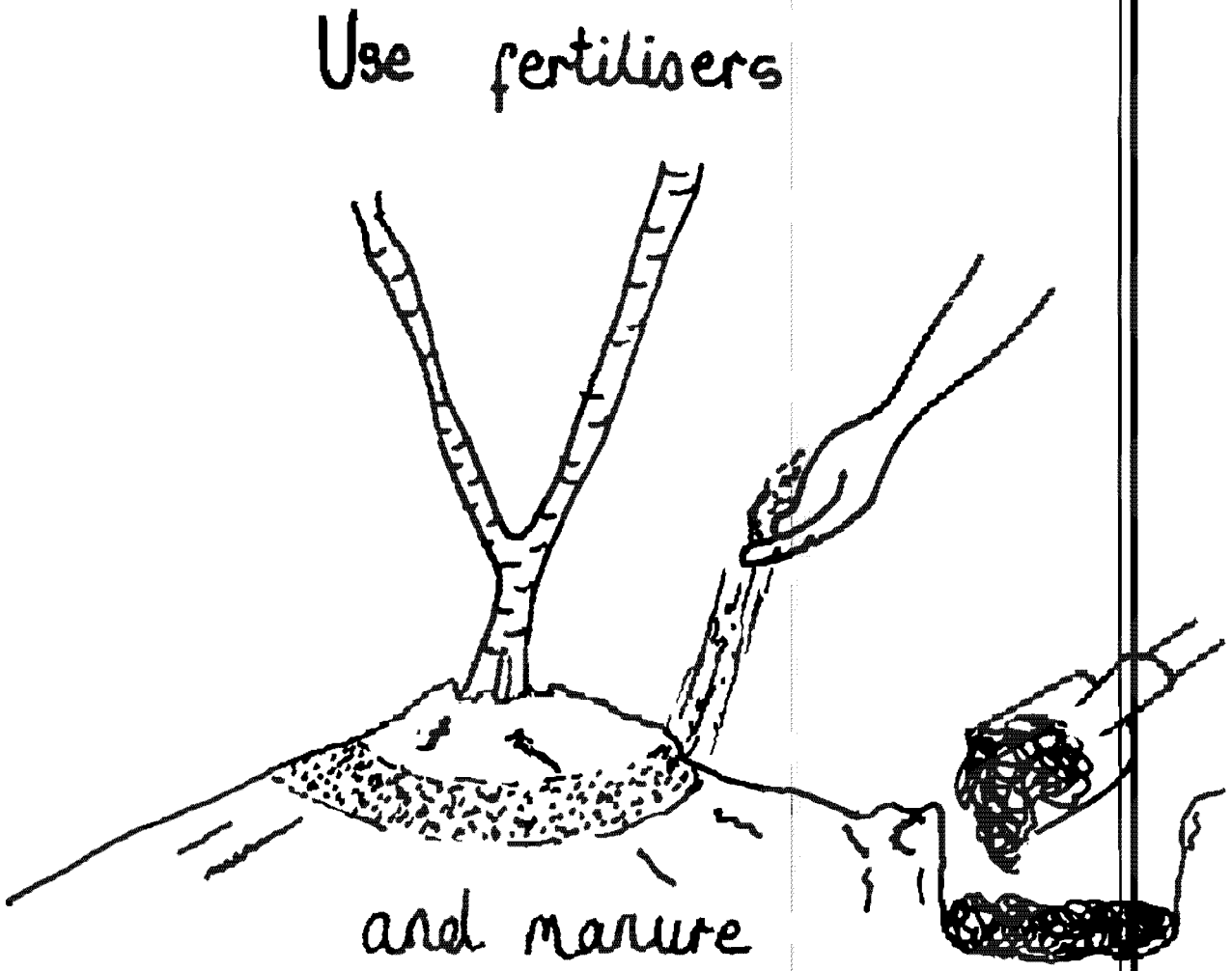


To reduce evaporation rate do not cut vegetation around the stream.

To reservoir.

III FERTILERS, NUTRIENTS

1. Plants Like People Need The Right Food
2. How to Tell Which Nutrients Your Crops Need
3. Fertilizers Give Bigger and Better Crops
4. Compost the Way to Feed Plants Cheaply
5. Help Manure to Help your Crops
6. Mulch for a Better Yield
7. Give your crops the Right Fertilizer
8. How you should Apply Fertilizer and Manure
9. New Fertilizer Can Replace Time
10. How the Sea Can Help Grow Better Crops


Use fertilisers
and manure

PLANTS, LIKE PEOPLE, NEED THE RIGHT FOOD

A HUMAN being needs a combination of things to grow and to stay healthy. Foods eaten should contain carbohydrates, fats, protein, vitamins, and minerals.

A plant, too, needs proper nutrition. We are lucky in that plants produce most of their own food using sunlight, air and water. Plants cannot produce minerals, though, and must get them from the soil. These minerals are very important for crop production.

Unfortunately, the soil does not always contain enough of these minerals to satisfy the plants. This is when we must look towards adding these minerals to the soil.

What are the minerals a plant needs and why are the needed ? To answer this, we must take a look at each mineral one by one. There are several minerals that a plant needs in relatively large amounts. These are nitrogen , phosphorus, potassium, magnesium, calcium, and sulphur.

NITROGEN :

Plants need nitrogen to make protein. It is the most necessary mineral for the early growth of the plant. It promotes the growth of shoots, stems, and leaves and is most responsible for the plant maintaining its green colour.

Nitrogen is found in many materials available locally, the best source chicken manure. All organic matter (rotted material) contains some nitrogent, though.

PHOSPHORUS :

This material helps a plant to use its energy. It is the most important mineral for root growth. It also aids in maturation, preventing diseases, and in producing good quality tubers and fruits. The best local source of phosphorus is guano. Manures also contain adequate amounts of this mineral.

POTASSIUM :

This mineral helps a plant produce strong stems. It is essential for the production of good quality fruits. It helps to make fruits sweeter. Many plants will not develop without good supplies of this Mineral.

Bananas are an example of crop which needs plenty of potassium. Most bananas in Seychelles suffer from a lack of the mineral. The best locally available source of potassium is ash (any kind of burnt material). Seaweed also contains a large amount of potassium.

CALCIUM :

This minral is important for the growing shoots of plants. If it is deficient, plants will not grow normally but will become deformed. It is also important for the growing tips of roots. Locally available sources of calcium include burnt coral, coral sand, and guano.

MAGNESIUM :

This mineral is important because it is necessary for the plant to make its food. Without magnesium, leaves of plants turn yellow and the plant does not produce well. There are no really good local sources of magnesium so it must be supplied with fertilisers.

SULPHUR :

This mineral is also needed for plants to make protein. It is important for plant growth and development, leaf and shoot growth, and the green colour in plants. Some locally available materials such as peat from marsh areas may contain sulphur but generally it must be added by use of chemical fertilisers.

There are also many nutrient minerals that plants need in only small amounts but which are just as important for good plant growth. These minerals are iron, zinc, manganese, copper, boron and molybdenum.

IRON :

Important for plant leaf colour and for plant food production. The best local source is red soil itself.

ZINC :

Important for stem growth. Not locally available but must be applied with fertilisers.

COPPER :

Needed for shoot growth and fruit development. Must be added with fertilisers.

MANGANESE :

Important for plant leaf colour and for plant food production. Must be added by use of manganese fertilisers.

BORON :

Important for shoot growth and development along with fruit formation and the quality of fruits.

MOLYBDENUM :

Important for plants to use nitrogen well and for growth of leguminous plants. If must be added with fertilisers.

All these minerals are necessary for good plant nutrition. They must be provided in adequate amounts and in proper balance.

Feb. 6, 1982

HOW TO TELL WHICH NUTRIENTS YOUR CROPS NEED

ONE of the most important aspectsof good crop production is in knowing when they are not getting enough nutrients. Plants will show this in a number of ways and farmers should be aware of these signs. Let's look at all the minerals plants need and how they will show if they are not getting enough of them.

NITROGEN :

A sickly yellowish green colour.
A distinctly slow and dwarfed growth.
Drying up or "firing" of leaves which starts at the bottom of the plant, proceeding upward.

PHOSPHORUS :

Purplish leaves, stems and branches
Slow growth and maturity
Small, slender stalks
Low yields of grain, fruit and seed

POTASH :

Mottling, spotting, streaking or curling of leaves, starting on the lower levels.
Lower leaves scorched or burned on margins and tips. These dead areas may fall out, leaving ragged edges.
Premature loss of leaves.
Plants falling down prior to maturity due to poor root development

CALCIUM :

Young leaves in terminal bud become "hooked" in appearance and die back at the tips and along the margins.
Leaves have wrinkled appearance. In some cases, young leaves remain folded.

MAGNESIUM :

A general loss of green colour which starts in the bottom leaves and later moves up the stalk. The veins of the leaf remain green.
Weak stalks with long, branched roots.
Definite and sharply defined series of yellowish-green, light yellow, or even white streaks throughout entire leaf.
Leaves curve upward along the margins.

SULPHUR :

Young leaves light green in colour, have even lighter veins.
Short, slender stalks, yellow in colour.
Slow, stunted growth.

BORON :

Boron need is indicated by cracked stem of celery, brown rot of cauliflower, and black heart of table beets. Sometimes results in lack of seed.

IRON :

Inron need is shown by pale-yellowish colour foliage in the presence of adequate amounts of nitrogen and on soils that are high in calcium or manganese. Light green band along margin of leaves. Short and much-branched roots.

MANGANESE :

Manganese deficiency is shown by pale green to yellow and red colours between green veins of leaves of tomatoes and beets. Resinous spots on leaves of citrus, and chlorosis of crops such as spinach and beans on coral sand soil.

March 7, 1981

FERTILIZERS GIVE YOU BIGGER AND BETTER CROPS

TO GET THE MAXIMUM PRODUCTION FROM FARM OR GARDEN PLOTS IT IS NECESSARY TO USE BOTH MANURES AND CHEMICAL FERTILIZERS. FERTILIZERS CAN SUPPLY THOSE NUTRIENTS A PLANT NEEDS IN LARGE AMOUNTS WHICH ORDINARY MANURE CANNOT SUPPLY.

Fertilizers help to give you strong, healthy plants that are more resistant to disease, insects and damage from rain and wind. Fertilizers help plants to produce more flowers, set more fruit, produce fruit and tubers quickly, and higher quality produce. There are several available with a variety of uses.

FOR GENERAL USE :

Nitrophoska - a complete fertilizer that gives most nutrients a plant will need. Use 1/2 to 1 kilo per 100 sq. ft. area.

ESPECIALLY RECOMMENDED FOR SANDY SOIL :

These fertilizers provide specific nutrients and make the soil less alkaline.

Ammonium sulphate - supplies nitrogen, especially good for leafy crops.

Super phosphate - a phosphorus source, for general use on most crops.

Potassium sulphate - a potassium fertilizer for general use on most crops.

ESPECIALLY RECOMMENDED FOR RED SOIL :

These fertilizers provide specific mineralsand also make the soil less acid.

Limestone ammonium nitrate (LAN) - a nitrogen fertilizer for use on most red soil crops.

Urea - also provides nitrogen, but must be mixed well with the soil.

Guano - an organic fertilizer that contains phosphorus and nitrogen.

Potassium chloride - a source of potassium, for general use.

Liquid fertilizers such as Bayfollan and Wellgrow are foliarly applied (sprayed on the leaves) on fast-growing crops. They can supply micronutrient to the plant.

Iron and manganese sulphates are to be used on sandy soil where yellowing occurs on the leaves of crops.

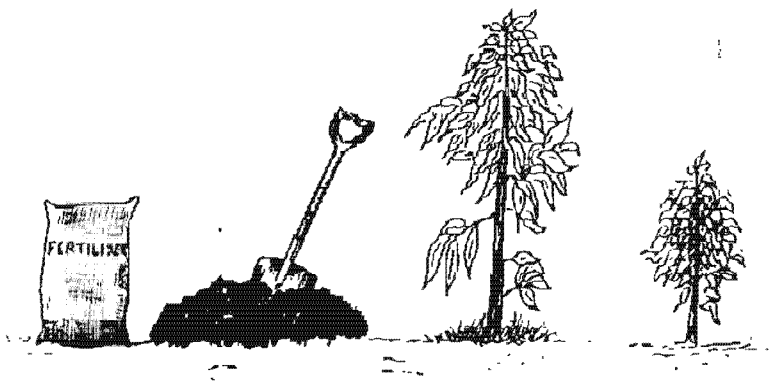
All fertilizers mentioned are available or will soon be available at Department of Agriculture requisite stores in all regions.

GIVE YOUR PLANTS A GOOD START :

DO YOU want to increase your yield ? Then start your seedlings in containers. By doing this you can;

- Avoid root damage when transplanting.
- Avoid set-back.
- Eliminate transplanting losses.
- Protect your seedlings from insect damage.
- Avoid the need to cover seedlings.

What kind of containers to use ? There is quite an assortment that can be used, some imported, which naturally cost more but a lot of containers can be made locally. These are, to name a few : Latanier leaf pot; Tami coco pot; Vacoua leaf pot; Bamboo pot; rotted coconut husks (ideal for starting cucumbers and tomatoes); empty milk cartons; any paper cartons; bottomless cans; plastic ice cream containers.



March 7, 1981

COMPOST - THE WAY TO FEED YOU PLANT CHEAPLY

COMPOSTING is an inexpensive way to provide nutrients to your soil.

- It uses waste materials and costs little or nothing.
- It can yield organic matter for fertiliser within several weeks, depending on the materials used, the climate, etc.
- It generates enough heat to kill eggs, larvae, bacteria and other pathogens which may cause diseaseif wastes are used directly.

HOW TO MAKE COMPOST

Compost is likely to be the most important resource available to the farmer or gardener for maintaining the fertility of the soil because he can prepare it himself using weeds and waste vegetation from his garden, grass cut from paths and unused corners, such animal manure as it available, and food wastes from the home.

Vegetation and food wastes should be dried in the sun before being placed on the compost heap, and any woody vegetation should be separated from the rest. There are several ways of making compost; one which is quite widely used in the tropics can be broken down into the following steps :

1. Clear a level space sufficient for a heap about 1.5 metres square. Drive stakes in at the corners, and extra stakes along the sides to support the heap.

2. Lay down a layer of vegetable materials (grass, leaves, straw, preferably chopped into short lengths). This layer should be about 20cm thick. On top of it spread a thinner layer (2.5 cm) of manure. Then sprinkle a little wood ash, and a little rich, fertile soil on top of the manure. Add a little water on each layer.

3. Add more vegetation, more manure, and more ashes in layers as in stage 2 and go on repeating the process until the heap is as high as it is wide. Finish it off with a final layer of loose grass or straw.

4. Push sharpened stakes into the sides of the pile at various points, forcing them into the centre, and leave them in. They are used for feeling the heat and wetness of the heap, and when they are withdrawn, they leave holes through which air can penetrate the heap.

5. The heap should be kept moist (like a damp towel) but not soggy. Cover it so that the sun does not dry it out too much, and also so that rain does not make it too wet.

6. After four or five days remove one of the stakes from the centre of the pile. If the stake feels hot and slightly damp, the bacterial action which produces compost is working properly. If the heap is too wet, the stick will feel wet rather than damp. But if the heap seems too dry sprinkle water on it.

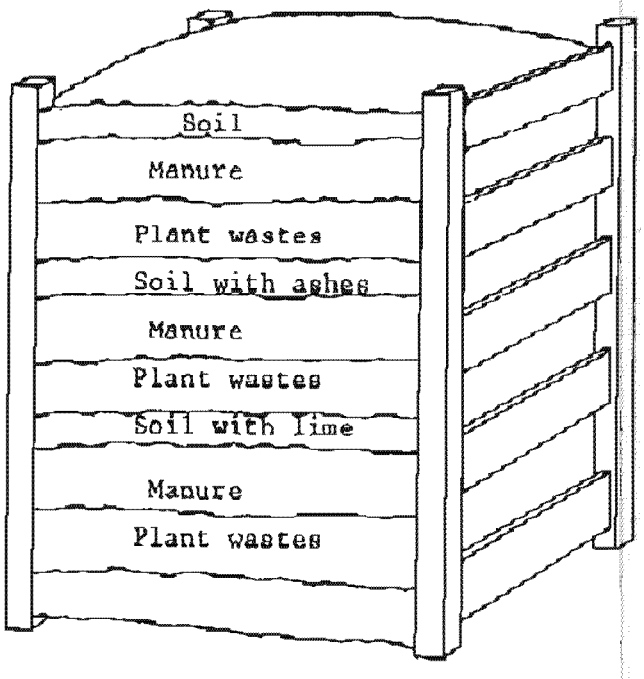
7. After about 14 days, the compost heap must be turned. This means rebuilding it layer by layer to form a new heap next to old one. The purpose of this is to mix the materials and allow the air to get at them.

8. If the pile continues to heat well, it can be turned a second time after another 10 days. Then after leaving the heap for another two months, making a total of about three months from the start, the compost should be ready for use - it should then have a sweet, earthy smell, and crumble easily between the fingers.

If the compost has not formed properly after three months, the heap should be turned again and left for a few more weeks. It should be understood that the process may not work if the compost heap is significantly smaller than the dimensions given because the heap will not heat up sufficiently.

If only a small quantity of material is available for making compost, the layers should be built up inside a wooden box, open at top and bottom, but with a light cover to keep out rain at the top. Another approach if only a small quantity of vegetation is available for compost making, is to return the material to the soil as a mulch rather than make compost with it.

One way of using compost is to mix it with the top-soil at the time when the plot is being prepared for planting. Alternatively, it can be used as a top dressing around growing plants. It can also be used when transplanting seedlings - one or two handfulls of compost should be placed in the hole in which the seedling will be planted.



A compost heap. Organic materials are added in layers and kept moist.

HELP MANURE TO HELP YOUR CORPS

How do animal manures benefit plants and why should they not be used when fresh ?

Animal manures are most valuable for adding nitrogen to the soil. Their other main quality is to improve soil structure by adding humus, which improves aeration and drainage.

Unfortunately, the nitrogen in fresh manure is not readily available to plants and it releases large amounts of ammonia, which burns plants. It must be broken down by micro organisms into a form which plants can readily use.

To help this process manure is best composted with other plant remains, kitchen wastes or any other vegetable wastes. Use of noxious weeds such as calumé and onion grass must be avoided.

Animal manure alone promotes excessive growth of vegetative parts but does not help root tuber, flower or seed production. If large quantities of manure are used, superphosphate and potash should be added.

MULCH FOR A BETTER YIELD

If you want a good yield, then you have to mulch your crops. Here in Seychelles there is no problem obtaining mulching materials, such as grass, coconut leaves, sawdust, banana leaves, to name only a few.

However, you should be careful not to use material which might cause problems later, such as calumé and onion grasses.

Mulching will :

1. Help your soil to retain water.
2. Stop weeds from growing among your crops.
3. Reduce diseases.

When the mulch decomposes, you will be adding organic matter to your soil, thus enhancing fertility by :

Improving water-holding capacity.

Increasing biological activity.

Improving soil structure.

March 21, 1981
9, 1982

GIVE YOUR CROPS THE RIGHT FERTILISER

PLANTS NEED FERTILISERS, WHETHER ORGANIC OR CHEMICAL, IF THEY ARE TO PRODUCE THE BEST POSSIBLE CROPS. IN THIS WEEK'S ARTICLE THE MINISTRY OF AGRICULTURE TELLS YOU HOW TO MAKE SURE YOU GIVE PLANTS THE CORRECT FERTILISER FOR BEST RESULTS.

VEGETABLES

STEP 1 : Add large amounts of rotted manure or compost and mix with the Soil. Manure from animal sheds should be composted before use.

MANURE :

Cattle manure - Use on all types of soils. It must be well rotted It can be used for all vegetable crops.

Pig manure - Use on all types of soils. It must be well rotted It can be used for all vegetable crops.

Chicken manure - Use only on red or black soils. It can burn plants if applied too close to them or if it is too fresh. It is best for fast growing crops and leafy vegetables such as lettuce and Chinese cabbage.

GUANO :

Use large amounts of guano on red soils before planting for all vegetable crops.

STEP 2 : Add fertiliser at planting.

STEP 3: Add fertiliser at certain times while the plant is growing.

FRUITS :

STEP 1 : Add manure or compost to fruit holes in large amounts.

STEP 2 : Add fertiliser to fruit holes.

STEP 3 : Add fertiliser at certain times while fruits are growing.

Fertiliser recommendations for certain fruits and vegetables :

Measurements - 1 ounce = 25 grams = 1/2 matchbox = 1 teaspoon.

For red soil add guano before planting.

For all soils put 50 grams per hole at planting of a complete fertiliser to each plant.

For every 2 or 3 weeks after, add another 50 grams of complete fertiliser to each plant.

TOMATO, CUCUMBER:

Put 50 grams of complete fertiliser per hole at planting and 50 grams every month after that.

To the complete fertiliser add 25 grams of LAN nitrogen for red soils or 25 grams of sulphate of ammonia for sandy soils at each application.

CABBAGE :

Put 50 grams of a complete fertiliser per plant at planting. Every two to three weeks after, add 25 grams of nitrogen fertiliser until heads are formed.

CANTELOUPES, WATERMELONS :

Apply 50 grams of a complete fertiliser per planting hole. Every month after, apply 50 grams of complete fertiliser and 25 grams of nitrogen fertiliser.

LETTUCE :

Fill bed with compost or manure at planting. Add 50 grams of nitrogen fertiliser for every metre of bed. Repeat this every two weeks until heads start to form.

PEPPER :

Put 50 grams of a complete fertiliser at planting and every 3 to 4 weeks after that.

EGGPLANT :

Put 50 grams of a complete fertiliser at planting and another 50 grams every month after that.

BEANS :

Put 50 grams of a complete fertiliser at planting along with some ash or potassium fertiliser. Fertilise with the same mixture every 2 weeks after. Apply per metre of row.

BEETS :

Apply ash or potassium fertiliser before planting then add 50 grams of complete fertiliser per metre of bed. Seaweed is recommended as a compost addition or as a mulch.

BANANAS :

Put 1/4 kg of a nitrogen fertiliser plus ash or 1/4 kg of a potassium fertiliser when planting. Every 2 to 4 months after, repeat this application.

PINEAPPLE :

Add guano to the planting site at the rate of 50 grams per plant before planting. Just after planting, add 25 grams of a nitrogen fertiliser and 25 grams of a potassium fertiliser per plant.

Four months later apply the same fertilisers in the same amounts . This is for red soil.

PAPAYA :

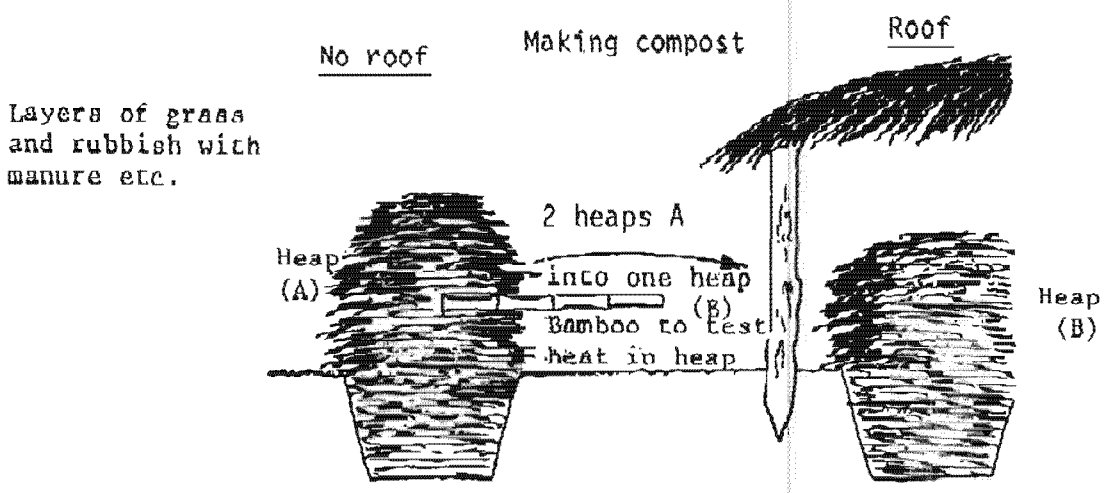
Add 1/4 kg of a complete fertiliser plus 1/4 kg of a nitrogen fertiliser to each plant at planting or soon thereafter. Every 6 months add double this amount to the plant.

TREE FRUITS :

For most tree fruits use the following fertiliser programme :

At planting - for red soil add 1/4 to 1/2 kg of guano in the planting hole. For sandy soil fill partially with red soil and add 1/4 kg of superphosphate per hole. For the following years follow this guide :

Year 1-1 kg of complete fertiliser.
Year 2-2 kg of complete fertiliser.
Year 3-3 kg of complete fertiliser.
Year 4 and after 4 kg of complete fertiliser.



HOW YOU SHOULD APPLY FERTILISERS AND MANURE

IT IS just as important to know how to apply fertilisers and manure to the soil as to know what fertilisers to apply. If fertilisers and manures are not use properly, you risk damaging your plant or losing many of the nutrients in those materials.

Improper application of these materials can also be very costly because the results you obtain from your plants can be affected.

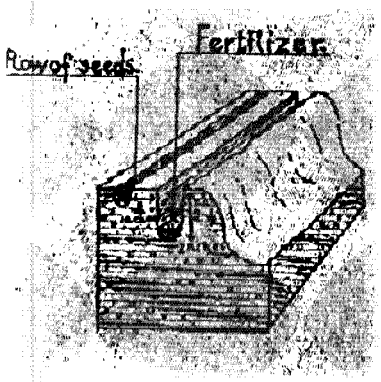
There are several rules to follow when adding manures and fertilisers. Let's look at these one by one :

MANURE USE :

Rule 1 - Always mix your manure with the soil. It is true that you can grow plants in pure, well-rotted manure, but to build your soil up it is much better if it is mixed with it very well. Any manure that is not well rotted must be mixed with the soil.

Rule 2 - Never leave manures just on the surface of the soil. They should always be covered with a little bit of soil. This is because several nutrients can be lost directly to the air is left uncovered.

If manure is left on the surface, you also run the risk of losing much of it to erosion and washing by heavy rains.



Rule 3 - Poultry manure and pig manure are very strong and contain a lot of nitrogen in the form of ammonia. This can be dangerous to seeds and young plants. These manures, therefore, should be used with care. They should be placed at a reasonable distance from the seed or plant (6 to 12 inches) and should be mixed with the soil.

Another alternative is to let them become well rotted before using them (although in the rotting process you lose much of the nitrogen in those manures).

Rule 4 - Manure containing a lot of material that rots slowly such as coarse grass, straw, and sawdust should be allowed to become extremely well rotted before applying to the soil. If it is added directly it will cause a nitrogen deficiency in the soil (if it must be used, a large amount of nitrogen fertiliser should be added with it).

FERTILISER USE :

Rule 1 - When planting seeds in rows, always put your fertiliser 2 inches to the side of the seed and 2 inches deep in the soil.

Rule 2 - When planting in small holes or when trans-planting small plants, place your fertiliser 2 to 4 inches below where your seed or plant will be in the hole.

Rule 3 - When planting plants such as bananas and fruit trees in large holes, place the fertiliser 6 inches to 12 inches below where the plant will be in the hole.

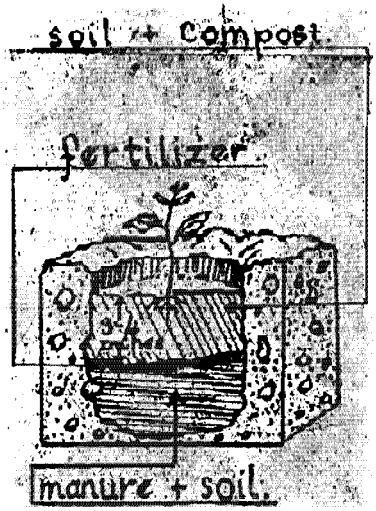
Rule 4 - When applying fertiliser to plants that are growing and are in rows, place the fertiliser 2 to 4 inches to the side of the row and 2 inches deep in the soil.

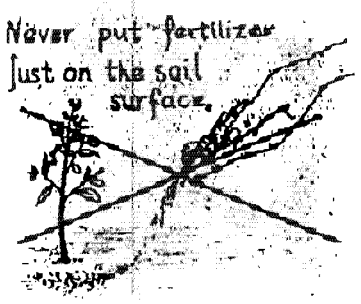
Rule 5 - When putting fertilisers with crops grown on ridges, place the fertiliser 2 to 6 inches below the plant or cutting in the ridge. When adding additional fertiliser to plants that are growing on ridges, make a small trench half the way down on the side of the ridge about 2 inches deep, add your fertiliser and cover again.

Rule 6 - When applying fertiliser to plants grown in small holes, make a ring around the plant about 6 inches from the stem and about 2 inches deep. Apply your fertiliser and cover. When applying fertiliser to large plants such as fruit trees, gently break the soil in a ring 1 to 5 feet (depending on the size of the plant or trees) from the stem or trunk, add your fertiliser and cover with soil or mulch.

Rule 7 - Never leave fertilisers on the surface of the soil. Nutrients can be lost to the air or washed away.

Rule 8 - Most fertilisers are types of salts and as such can burn your plant or seed if put too close or if they touch the plant.





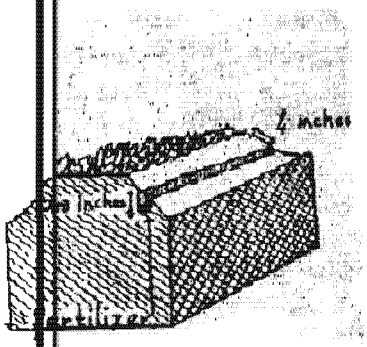
Rule 9 - It is best not to add large amounts of fertilisers during times of moisture stress (drought). It is always best to apply when the soil is moist or to water your plants a bit after fertiliser application.

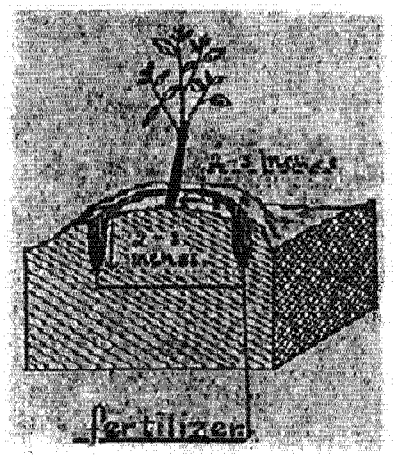
Rule 10 - When applying fertiliser to small beds (for crops such as lettuce and cabbage) broadcast it over the surface of the bed and then mix well with the soil and cover with at least 3 inches of soil.

Rule 11 - Some fertilisers can be applied to the leaves of plants. These are called foliar fertilisers. Only foliar fertilisers that are made specially for this type of use should be used. Do not use ordinary fertilisers on the leaves of plants.

Providing the nutrients a plant needs is not an easy job for a farmer. He must know the type of soil he is dealing with and its charecteristics, he then must know the properties of a good soil and how to change his soil where it is lacking. He must know what nutrients his plants need and in what amounts. He must then be able to apply these nutrients using fertilisers and manures in a proper fashion. All these steps are necessary for good production.

The Ministry of Agriculture, through its Extension and Research Sections, is willing to help all farmers with the problems they have with their soils and with use of fertiliser materials. In the near future a soils-testing laboratory will be set up where farmers can take their soils and plant problems to get them analysed and receive good advice.





February 20, 1982

NEW FERTILISER CAN REPLACE LIME

WE now have for sale a fertiliser that is recommended for use by farmers who plant on red soil or alluvial soil. This fertiliser is Limestone Ammonium Nitrate - LAN.

LAN is a nitrogen-containing fertiliser (20%) that is being strongly recommended for red soils to use at planting and especially as a material to sidedress (to fertilise alongside growing plants) all crops.

It is a neutral fertiliser, which means it will not make the soil more acid (red soil is extremely acidic to start with). It also contains 10% calcium and 7% magnesium which are nutrients in low supply on red and alluvial soils.

We encourage all farmers on red soils to use LAN in place of sulphate of ammonia which is a highly acidic fertiliser. LAN is, however, not recommanded for sandy, calcareous soils because nitrogen may be released into the air in the form of ammonia upon application.

LAN can be mixed with superphosphate and potassium chloride or potassium sulphate to form a high quality fertiliser for red soil or it may be used to supplement applications of Nitrophoska on crops which require high amounts of nitrogen (cabbage, lettuce, Chinese cabbage, spinach, cucumbers, melons, etc.).

May 16, 1981

HOW THE SEA CAN HELP US GROW BETTER CROPS

WITH the onset of the south-east monsoon, many of our beaches will soon become littered with washed-up seaweed. In this seaweed we have a valuable supply of organic matter which should be used and not just left to rot on the beaches.

All Seychelles' soils, both on the hillside and the plateau, are very short of organic matter and all crops will respond remarkably well to applications of organic manures.

At Grand'Anse Experimental Station in 1965, using seaweed in the form of organic manure, we increased the yield of sweet potatoes by four times compared with the yield where no manure was used.

Fresh seaweed has a nitrogen content similar to farmyard manure. It is about twice as rich in potash but much poorer in phosphate.

Although the organic matter content is of the same proportion as in farmyard manure, its nature and that of the more readily available nitrogen is such that the decay is rapid and the breakdown of straw or grassy manure can be hastened by composting with seaweed.

The proportions of plant nutrients actually present will depend on the kind of weed, the amount of water and sand and the degree of decomposition but as it is normally collected in a wet condition the quantities shown may be taken as a general guide.

As well as the major nutrients listed above, seaweed contains useful quantities of trace elements particularly iron, manganese and zinc, the amount depending on various factors but those normally required by plants are present in no greater quantities than in farmyard manure.

When seaweed is heaped and exposed to the weather, readily available potash is washed out. For this reason, seaweed should be spread and dug in at once to retain the potash in the soil.

The wet weed may be composted with farmyard manure - preferably containing a large proportion of litter. Dried seaweed can be stacked and stored with little loss of potash.

No experimental work has been carried out on the use of seaweed direct on to the land in Seychelles as seaweed at Grand'Anse is used in compost-making but it is safe to say all root crops such as sweet potatoes, cassava etc. would benefit from manuring with seaweed, as would vegetables and most tree crops. Additional super phosphate or guano may, however, have to be added.

Seaweed extracts which are marketed commercially and widely used by farmers in many parts of the world induce an usually high degree of porosity, and that leads directly to an improved capillary action

bringing the nutrients up from the mineral subsoil to plant rootlets.

This is to be compared with artificial top-dressing where plant rootlets are not being encouraged to search down for the natural deposits of minerals further down.

The best way of assessing the vitality of soil is often to watch animals on it, and in this context, report was made of someone using seaweed concentrate on a stud farm in Gloucestershire, UK.

"The lady who owns the stud farm tried seaweed concentrate for the first time and found that the horses for the first time would manage without any supplementary feeding... they are evidently getting all they need from the grass. They are also completely ignoring the much lusher, greener grass stimulated by nitrogen fertiliser in adjoining paddocks and are walking straight through to the seaweed applied paddocks where they are grazing very evenly.

"For the first time the mares are coming into season spot on time whereas they were experiencing very irregular rythms on the nitrogen paddocks, and the foals born subsequently have had very noticeably stronger and straighter bones. Best of all, the ground appears to be clearing of redworm, and the foals on their first worming have been free of worms, which has not happened before".

As well as the plant nutrients it contains, seaweed is a complex base-exchanging substance having alginic acid which acts as a collector of various elements and as a soil conditioner.

Decomposed seaweed contains plant hormones which encourage root development especially in the germinating and developing seedlings, and the humic and alginic acids in seaweed will increase the water-holding capacity of the soil, a vital factor on the sandy soils of Seychelles.

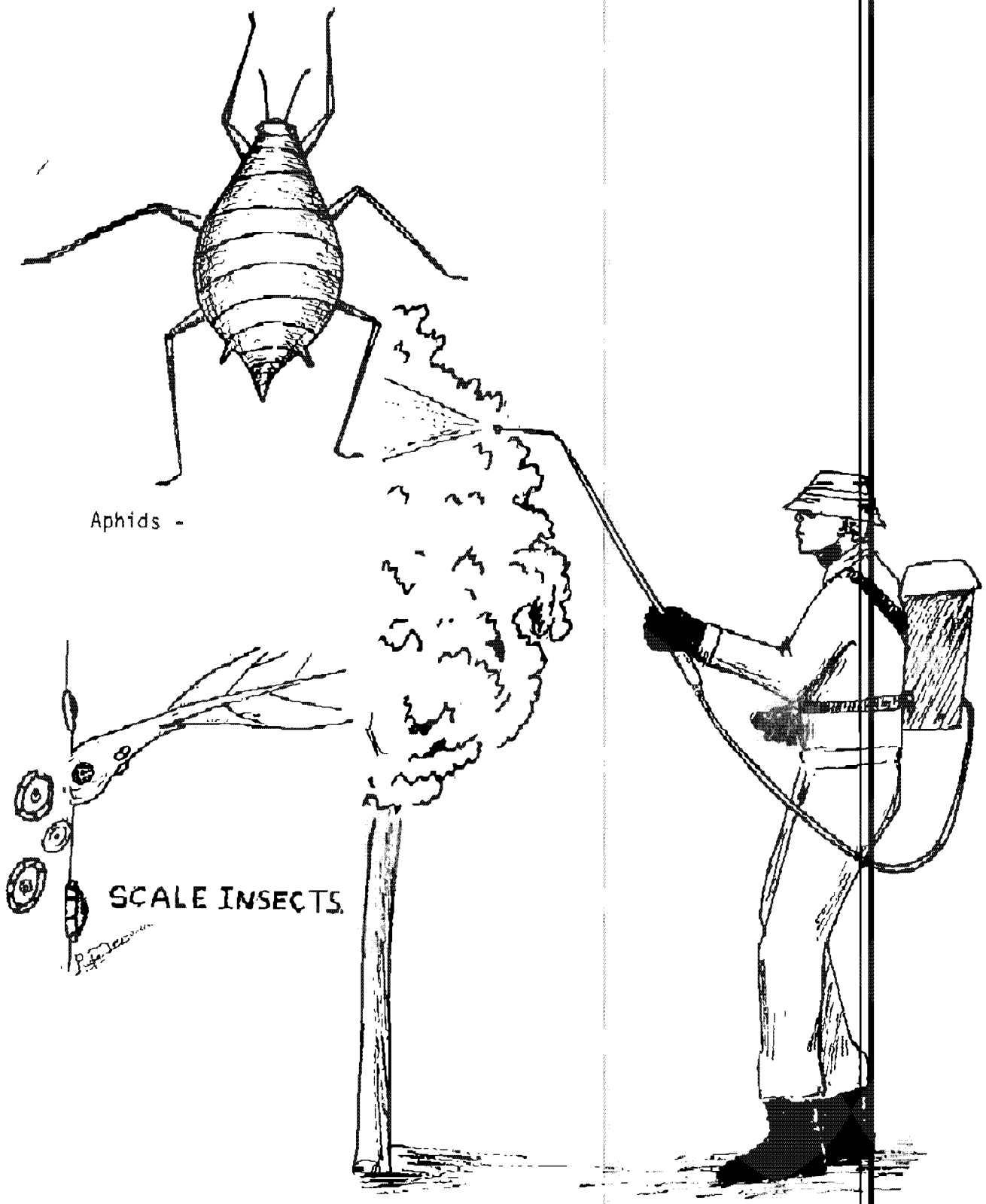
It helps the soil to form a crumb structure and of course such a crumb structure can prevent heavy rain from washing away soil nutrients, seedlings and fertiliser.

The people of Seychelles have always looked to the sea to provide a high percentage of their food. We should not forget that the sea can also provide us with many raw materials to enrich our notoriously poor soils and so provide more food and crops from the land.

June 19, 1982

IV PESTS AND PESTICIDES

1. How to Identify Crop Pests
2. How to Spot Plant Killers
3. How to Tackle Virus Diseases
4. PESTS - Spot Them and Stop Them
5. PESTS - How to Spot Them and Stop Them
6. Insects, Our Deadliest Enemies
7. Caterpillars - Our Deadly Enemies
8. How to Control Snails in Small Gardens
9. Help Stamp Out the 'Makabe'
10. Making Sure the Pests Don't Reap Our Harvest
11. Kill Those Pests Before They Eat Your Food
12. Kill Those Pests Before They Eat Your Food (Safety In Handling Pesticides)
13. No to Pests and Diseases
14. Chemicals are not the Best Solution
15. Be Careful With Pesticides, They Can Kill You Too


Aphids -
SCALE INSECTS

HOW TO IDENTIFY CROP PESTS

MAN is engaged in a perpetual struggle against crop pests in order to feed and clothe himself. Many pests attack and destroy fruits, root crops, vegetables, seeds, etc. Different measures must be taken to reduce losses against these pests.

The first step in the control of agriculture pests is proper diagnosis of the type of disease or identification of the pest which is causing the damage.

Each type of disease or pest requires a different control procedure or method. Consequently, the original identification of the pest is a very important step towards effective control.

PLANT DISEASES

Plant diseases are identified on the basis of the type of pathogen (fungi, bacteria, viruses, etc.) responsible for the disease and on the basis of the symptoms produced after being attacked. Each pathogen produces specific symptoms on the host (the plant attacked).

LEAF SPOTS

The most common and easily recognised symptoms of plant diseases are the leaf spots. Most of these leaf spots diseases are caused by either fungi or bacteria.

Example of leaf spot diseases are :

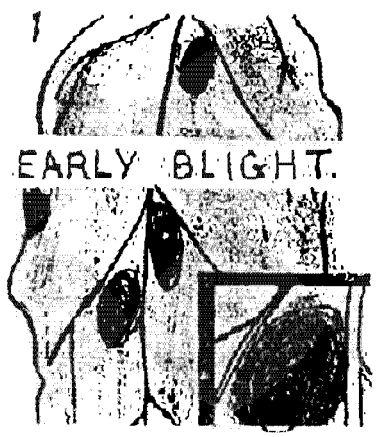
Early blight of tomatoes - fungal disease 6-8 mm circular, necrotic lesions with a target spot appearance (sketch 1).

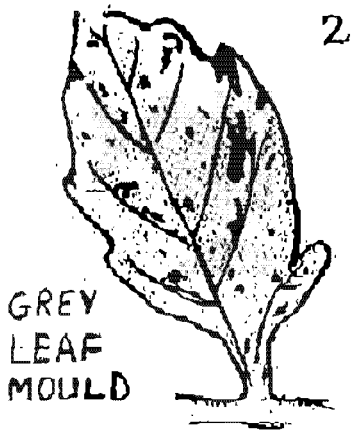
Grey leaf mould of tomatoes - fungal disease (sketch 2). Irregular yellow leaf lesions on upper part of infected leaves and sooty grey areas on the lower leaf surfaces.

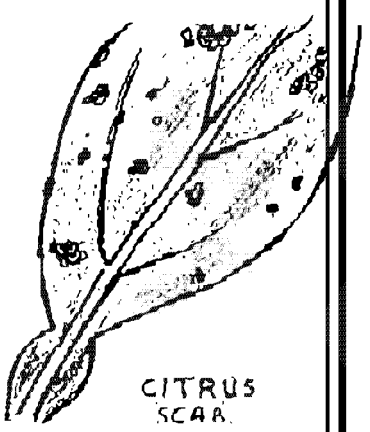
Corynespora leaf spot of tomatoes. Fungal disease with small, angular, grey to brown leaf lesions on fruit stalks, petioles and leaves.

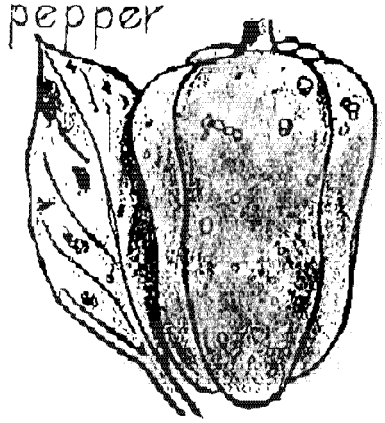
Citrus scab attacking citrus especially grapefruits. Produces small brown, rough lesions on leaves and fruits (sketch 3).

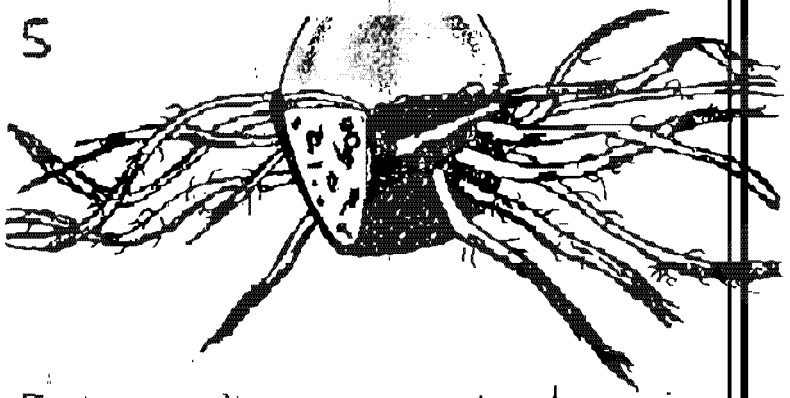
Bacterial spots on peppers. Produces small, brown, watersoaked spots on leaves and fruits. The spots start as minute grey specks surrounded by lighter coloured areas. As the spots enlarge they become brownish in colour (sketch 4).











ROOT DISEASES

Root diseases, caused by fungi, bacteria or nematodes are another important group of disease of crops and plants in Seychelles.

Nematodes are small, round worms, or eelworms which are capable of attacking the roots of plants in order to obtain their food. These feeding activities result in damage to the roots and also will produce symptoms on the upper portion of the plants.

Damage to roots may appear as black, discoloured areas as in the case of burrowing nematodes in bananas (sketch 5).

The root knot nematode feeding causes oval to round irregularly shaped galls to form on the roots of infected plants such as cucumbers, tomatoes, okra, peppers and papaya (sketch 6). The roots may become stunted and distorted.

The first noticeable symptoms of nematodes activity are chlorosis and wilting of the leaves of the plant. These symptoms are due to the restriction of upward movement of water and minerals as the nematodes destroy the roots.

Several bacteria also invade the roots and the lower stems of tomatoes, eggplant, and pepper. The bacteria then enter the vascular system responsible for upward movement of water and minerals to the leaves. This restricts availability of water and minerals thus causing the plant to wilt and die. This disease is refereed to as bacterial wilt (sketch 7).

Fungi also are important pathogens on roots of a variety of crop plants in this country. Sclerotium wilt of beans is a classic example. The fungi produces a white cobweb-like growth of mycelium on the lower stem.

SEEDLING DISEASES

The seedlings of plants are susceptible to attack by pathogenic fungi, nematodes and bacteria from the time of emergence onward. The pathogens responsible for starting the disease may be present in the soil or on the seeds of the plants. The symptoms of seedling diseases may be root rots or stem rots. The young, diseased seedling will collapse on to the soil. This disease is referred to as damping off.

VIRUSES DISEASES

Viruses are not classed as micro-organisms, but rather, are complex combinations of biochemical structures capable of infecting and duplicating themselves in living plants.

Examples of virus diseases are :

. Cucumber mosaic (sketch 8)

. Cassava mosaic

. Watermalon mosaic.

The mosaic symptoms in which leaves assume a motled pattern of various shades of yellow and green colours are the most common of virus diseases.

Nematode in okra roots

6

Bacterial Wilt

7

Cucumber mosaic virus on tomato leaves.

August 14, 1981

HOW TO SPOT THE PLANT-KILLERS

A PLANT is diseased when it suffers some structural or physiological change brought about by causal agent, unfavourable environment or nutritional imbalances. There is often no clearly defined line between healthy and diseased plants.

Plant diseases may be divided into two classes - parasitic and non-parasitic.

PARASITIC DISEASES :

These are incited by causal agents such as fungi, bacteria, nematodes, viruses, mycoplasmas.

Living green plants manufacture their own food. The agents causing plant diseases cannot do this and so they must either attack healthy plants and obtain food from them, in which case they are regarded as parasites, or they must live on dead plant tissues as saprophytes. Viruses and mycoplasmas can only multiply in living tissues.

FUNGI :

These are low forms of plant life which do not possess chlorophyll. To exist they make use of organic matter from plants or animals, living or dead. The growing part of a fungus consists of numerous fine threads known as mycelium.

Just as green plants are often propagated by seeds, fungi are generally spread by spores, but they can grow from the mycellium. When fungi attack plants, they generally send out tiny, rootlike projections or haustoria into the plant cells, ultimately killing these cells and portions of the plant.

Fungi usually attack young plant tissue. On leaves, entrance is often gained through the lower surface where the number of stomatal openings is usually greater than on the upper surface. Many of the fungi that fall on leaf surfaces never infect the plant because they dry out before they can germinate or, having germinated, they cannot penetrate the tissue.

Some fungi are highly paratitic and can attack healthy susceptible tissue e.g. leaf spot of bananas and rust of piments. Others are weak parasites and can attack only plants that are not growing vigorously. Some fungi such as those causing anthracnose on mangoes, pawpaws, bananas and citrus fruits can attack only one or a few closely related plants.

Fungi in general favour moist conditions brought about by dews and mists and also by rainfall. Wet weather will produce humid conditions suitable for fungal growth and it is usually during wet seasons and in wet places that crops suffer most. Some fungi, however, e.g. those causing powdery mildew, favour dry conditions.

BACTERIA :

These are low forms of plant life which are very small and may be seen only with the aid of a powerful light microscope and usually with special staining techniques. They thrive under wet and hot conditions and are largely responsible for many of the soft rots and spoilage of fruits and vegetable. Bacterial diseases can also result in spotting of fruits and leaves, as well as cause wilts and blights.

NEMATODES :

Also known as eelworms. They are not related to earthworms but are microscopic worms and live mainly in the soil. They feed on living and dead plant tissues, usually roots, but are sometimes found in stems and leaves.

The plant-parasitic nematodes are characterised by piercing mouth parts, whilst the non-parasitic eelworms are without the piercing mechanism.

Damage caused by the root-knot nematodes (Meloidogyne spp.) generally results in abnormal enlargement of a portion of the roots. Attack by these nematodes usually leads to blockage and distortion of the water-conducting tissues in roots resulting in wilting of plants, even in the presence of adequate water supply.

VIRUSES :

They live in the sap of the plant and sometimes in dead plant materials. Viruses are too small to be seen with an ordinary light microscope.

They are often carried from one plant to another by insects (aphids, leafhoppers, white flies etc.) which feed by sucking sap. Viruses can attack healthy plants in vigorous growth.

Some viruses are transmitted mechanically by handling affected plants and then healthy plants. They are also transmitted through vegetative propagating materials. Only occasionally viruses are carried in seeds.

MYCOPLASMA-LIKE-ORGANISMS :

These are very small disease-causing agents somewhere between viruses and bacteria in size and characteristics. They may be carried by insects, usually leafhoppers. Diseases caused by mycoplasma include : lethal yellowing of coconuts; pawpaw bunchy top; corn stunt.

NON-PARASITIC DISEASES :

These can be caused by agents such as high or low temperatures, nutritional disorders (deficiencies or excesses of chemicals), lighting, poor drainage, atmospheric impurities, too much or too little water, and poor light.

SYMPTOMS OF DISEASES

PLANTS affected by disease show various symptoms or signs produced by parasitic or non-parasitic agents. In many cases more than one symptom may occur together.

Anthracnose : A dark brown to black discolouration usually on leaves, stems and ripening fruits e.g. mangoes, bananas, citrus.

Blight : The rapid discolouration, wilt and death of tissue over various parts of the plants. This often results in sudden browning of leaves, blossoms and fruits. Sometimes the entire plant dies e.g. late blight of tomatoes.

Chlorosis : Overall yellowing of normally green tissues, due to failure of chlorophyll to develop. Iron deficiency often produces this condition in soils with high lime content.

Damping Off : The wilting and death of seedlings due to attack of the roots or young stems at soil level by soil-inhabiting fungi.

Die Back : Progressive death of branches, shoots and twigs from the tips backwards e.g. die-back of citrus.

Powdery Mildew : A white coating produced on the leaves, stems and fruits of some plants by certain fungi. This may affect plant tissues causing them to become yellow and die prematurely.

Mosaic : Irregular dark green, light green, white, yellow or other discolourations of leaves or fruits may be caused by the presence of a virus. E.g. water melon mosaic of cucurbits, tobacco mosaic of tomatoes.

Rot : A state of decomposition produced by fungi or bacteria which often gain entry to fruits, vegetables, tubers or stems through wounds or abrasions e.g. rotting of tomatoes and sweet peppers on the plants, black rot of cabbage.

Rust : A disease in which certain fungi grow inside the green tissue but reproduce on the surface giving rise to a yellow or rusty brown coloured mass of spores usually on the underside of leaves e.g. citrus rust.

Scab : A brown crust-like formation on leaves, stems, tubers and fruits produced by overgrowth of epidermal or cortical cells e.g. scab on citrus.

Sooty Mould : A balck cob-web like fungal growth on the upper surface of leaves as well as on stems and fruits. This is normally associated with the exudate of aphids and mealybugs on which particular fungi grow.

Spots : Localised lesions (or dead areas) produced on leaves, fruits or stems due to attack by fungi, bacteria or nematodes. A barrier is usually formed by the plant around the point of entry of the causal agents, and when these are numerous they may combine, killing large sections of the plant e.g. early blight of tomatoes, leaf spots of bananas.

Wilt : Loss of turgor, causing plants or parts of plants to droop due to shortage of water inside the plant cells. This condition is usually caused by soil-borne organisms damaging the roots, blocking the water-conducting vessels, or causing plant roots to rot. Wilting can occur even in the presence of adequate amounts of water e.g. Panama disease of banana, fusarium wilt of tomatoes, bacterial wilt of pepper etc.

June 13 1981

HOW TO TACKLE VIRUS DISEASES

VIRUS DISEASES AFFECT A LARGE NUMBER OF VEGETABLES HERE IN SEYCHELLES. TOMATOES, CAPSICUMS, TOBACCO, BEANS, CUCUMBERS AND MELONS CAN ALL SUCCUMB TO VIRUS DISEASES OF ONE SORT OR ANOTHER.

It is very difficult to control virus diseases, because of several facts about how they behave.

Viruses have no chemical preventive control : once a plant is infected there is no way to stop the infection from spreading and they can be spread through direct contact, through infected seeds, and through insects and nematodes that carry the viruses with them.

To understand how viruses can be controlled we can take a look at the example ofmosaic virus on tomatoes (bouklé tomate). This disease commonly decreases the yields of up to three-quarters of the tomatoes grown in certain areas.

It starts as a slight mixing of yellow areas surrounded by greener areas on the leaves in a mosaic or quilted pattern.

This will affect a certain part of the plant but then will quickly spread to cover the whole plant as the virus multiplies within the plant.

The leaves of the tomato will begin to curl and fold and become distorted, thus giving the name "bouklé" to the disease. This plant then will become the source of infection for the plants next to it as insects such as aphids and leafhoppers go from one plant to another to feed.

How can this disease be controlled then? First you should keep all the areas around your plantation clean as well as your neighbour's land. All dead or diseased plant material should be collected and burnt. Other plants related to tomatoes such as tobacco, capsicum, eggplant, hot peppers, wild eggplant which can harbour the disease should be kept at quite a distance from the tomatoes.

The tomatoes should be sprayed regularly with an insecticide that will kill aphids and other insects that transmit the virus. Use of such insecticides as Thiodan, Pirimor, Diazinon, or Malathion will help to control these insects.

The tomatoes should not be touched or handled after working with eggplants, tobacco, or peppers until you have washed. You should never smoke tobacco while handling tomatoes. Most important, though, is removing all diseased plants at the first sign of virus attack and burning them far from the garden site. If you remove a few diseased plants when they first show signs of the disease, this will save many more plants nearby from having the chance to become infected later.

It has been found recently that aphids which carry the disease

will stay away from areas mulched with white plastic or silver coloured material. There has been some success also in using yellow coloured aphid traps for collecting and killing these virus carriers.

Certain plants can be used to attract insects that carry viruses where they can be killed with insecticides. It has also been shown that spraying a light film of oil over the leaves of plants from the time the plant is small will aid in keeping viruses from entering the plant.

Choosing plants that are tolerant to viruses is something researchers work on but is also something the small farmer can do a bit of. If seeds are collected, only choose seed from those plants that do not get the disease and are not next to any virus-infected plants.

The most common mistake farmers make is to leave infected plants in the garden. Although some tomatoes may form, the yield will be very low compared to a healthy plant. These diseased plants will then infect the whole area and it will be impossible to grow healthy plants.

So keeping your garden clean destroying diseased plants, and controlling insects that carry the disease should give you good control of these virus diseases.

June 27, 1981

PESTS - SPOT THEM AND STOP THEM

THESE are some of the main pest problems that farmers may meet in fruit production :

BANANAS

PANAMA DISEASE : Causes wilting. A yellow discolouration starting from the tips and along the margins. The leaves break at the petioles and hang down alongside the pseudostem.

CONTROL : Panama disease is spread mainly by infected planting material, by water, agricultural implements and by soil. The causal agent is fungus Fusarium oxysporium.

The causal organism can live for many years in the soil and is very difficult to eradicate. To control, plant resistant varieties Lacatan, Robusta, Valery.

BLACK HEAD (NEMATODES) : Some of the nematodes attacking bananas are external feeders and remain in the outer section of roots and corms producing dark brown to blackish discolouration.

The roots are eventually cut and this reduces the absorption of food and water. Leaves go prematurely yellow, fruit size and weight are reduced and plants fall easily.

CONTROL : Black head is caused by nematodes particularly Radopholus similis. Other nematodes also attack banana roots, sometimes causing severe damage. (Rotylenchulus reniforms, Meloidogyne spp. etc).

Plant only clean suckers and treat plantation with an appropriate nematicide regularly every 4-6 months. Nemacur 10% granule has proved very effective. To clean suckers, pare off all trace of brown discolouration.

PREMATURE YELLOWING POTASH DEFICIENCY) : It affects several of the older leaves in quick succession. The leaves become yellow at the tips and edges and the discolouration spreads rapidly down the edges until the entire leaf is a bright yellow colour.

Affected leaves die prematurely usually remaining erect even after they become completely brown.

One or two normal green leaves may be seen below the yellow or dead leaves. In the corm of severely affected plants a brownish water-soaked area may be present.

This condition can occur in both young and mature plants but it is much more common on plants that are starting to fruit. Bunch development therefore can be greatly affected.

CONTROL : This condition is aggravated by drought, by high lime content in the soil and by nematode attacks. This condition can be corrected by controlling nematodes and by addition of nitrophoska or a high potash fertiliser.

BANANA WEEVIL (COSMOPOLITE SORDIDUS) : Bores tunnels in corms and pseudostems. These tunnels provide entrances for other pathogens.

CONTROL : Spray around pseudostems with insecticide. Dip planting materials in insecticides.

PINEAPPLE

BASE OR BUTT ROT (FUNGUS) : The bases of pineapple suckers are sometimes affected by a fungus causing the base of the stem to rot and become black in colour. Affected plants wilt and can easily be broken off at ground level.

CONTROL : Proper curing of the planting materials after they have been dipped in a fungicide (Benlate, Difolatan) will help to prevent this condition. Pineapple plants should be established on free draining soil.

MEALYBUG WILT : Pineapple plants often harbour mealy-bugs (Pseudococcus brevipes) and when these are present in large numbers they produce a toxic secretion which causes root growth to cease and eventual death of the roots. The tips of leaves go brown, curl downwards and in severe cases the plants wilt and die.

CONTROL : As ants serve to transport mealybugs, controlling the ants with an insecticide and controlling the mealybugs by spraying the plants will help to control the spread of the bugs thereby controlling the disease.

NEMATODES : Affected plants show dieback of leaf tips, poor growth and can be easily pulled from the soil.

CONTROL: Several nematodes such as the root knot (Meloidogyne spp). the reniform nematode (Rotylenchulus reniformis) etc. can cause damage to the root of pineapple.

Treating the soil with a nematicide (Nemacur) before planting and at 6-8 month intervals will help to eliminate this problem. Thorough drying of the base of plants before planting will help to control both nematodes and butt rot.

DEFICIENCY DISEASE : Chlorosis and mottling of leaves.

CONTROL : If plant suffers from nitrogen and iron deficiencies, this can be corrected by applying nitrogen fertiliser and 1% ferrous sulphate foliar spray.

PAWPAW (PAYAPA)

POWDERY MILDEW : A white coating on the leaves. The leaves tend to be yellowish.

CONTROL : The disease is not very serious and can easily be controlled by spraying with Benlate or Milcurb.

ANTHRACNOSE : Round areas scattered on the fruits. During wet weather a pinkish growth of the causal fungus. Colletotrichum gloeosporioides

can be seen in the soots. When attack is severe, the fungus spreads all over the fruit.

CONTROL : This disease affects the fruits. It can be controlled by regular spraying with fungicide. Benlate or Dithane.

Saturday 27 June, 1981

PESTS - HOW TO SPOT THEM AND STOP THEM

PAWPAWS (PAPAYA)

ROOT ROT: If water is allowed to stand around the roots for several hours a root rot condition will develop. The collar portion (portion between root and soil level) disintegrates in a few days and the plants fall over.

CONTROL : Caused by a soil-borne fungus (Phytophotora spp.) To control, pawpaw plants should be established on free draining soil or on mounds and not in areas subject to flooding. Treating the soil with Dexon or Captan will help to control the disease.

NEMATODES (ROOT KNOT): Nematodes of the Meloidogyne spp infect the roots of pawpaw causing swelling on the roots. Affected roots enlarge in size and the plants may wilt in hot weather.

CONTROL : Affected plants may be treated by sprinkling Nemacur around the base of the plant. Pawpaws should not be planted in fields that are known to have a high population of Meloidogyne spp.

MANGOES

ANTHRACNOSE : The blossoms, leaves and fruits may be affected. Small black spots appear on the open flower clusters. On young leaves, there are small, dark irregular spots. On fruits, dark or black spots which may be cracked and sunken and sometimes joining together, damaging large areas.

CONTROL : The fungus causing anthrcnose on mango is Colletotrichum gloeosporoides. Control may be achieved by spraying at monthly intervals with a fungicide (Captan, Difolatan or Benlate).

CONTROL: A fungal disease. Can be controlled by spraying the flower clusters with Benlate. Although many flower clusters may be affected, a good deal of fruit may still set.

SOOTY MOULD : A black cob-web like fungal growth on upper surface of leaves, stems and fruits.

CONTROL : The causal agent is a fungus. To control, destroy aphids and scales with Ultracide and remove fungus with summer oil.

INSECTS (APHIDS,SCALES AND MITES) : The presence of sooty mould is an indication that these insect pests have been there. They usually affect young shoots and leaves. Scales could also affect older shoots. Mites affect the leaves and fruits.

CONTROL: To control spray with Ultracide or Rogor at 20-30 days interval.

FRUITFLIES: Affect the fruits. The adult fly pierces the skin of the fruit and deposits her eggs in the pulp. The larvae from the eggs feed on the pulp of the fruit causing it to rot. Other rotting agents can get access to the fruit thereby accelerating the rotting.

CONTROL: Installation of traps with fruitfly attractant and poison. Spray the orchard with Diazinon or Diptrex.

AVOCADO

ROOT ROT (FUNGUS): Affected plants become droopy and have yellow to brown leaves which may die back at the tips. Branches also show die-back. There could be excessive leaf fall accompanied by heavy flowering and production of many small fruits.

CONTROL: Root rot of avocado is caused by the fungus Phytophotora cinnamoni which kills the young root-lets, especially in clay soils and under poorly drained or wet conditions. Varieties should be grafted on root-stocks that are resistant to root rot.

Avocado seedlings should be started in disinfected, free-draining soil. Avocado should not be planted in soils that are likely to become waterlogged. The young seedlings could be sprayed with Aliette (aluminium) tris (ethyl phosphate) at intervals of 2-3 months. The soil around the plant could also be treated with Dexon (Fernaminosulf).

LEAF SPOT: Minute brown spots on avocado leaves.

CONTROL: This condition is caused by a fungus Cercospora spp. and is usually not very serious, but if serious it may be controlled by spraying with a copper fungicide or Dithane or Benlate.

CITRUS

SCAB (ELSINOE FAWCETTI): The fungus causes brown corky scabs which disfigure the stem, leaves and fruits. The fungus attacks mostly young tissues. It is more common on grapefruit and tangelos.

CONTROL: May be obtained by spraying the young seedlings with Benlate at flushing time and at 3-weekly intervals. Control on fruits may be obtained by spraying with a copper fungicide or Benlate at blossom time. Destroy all infected plant parts by burning or burying.

CANKER(BACTERIAL): The disease appears as brown spots with yellowish haloes. It resembles scab except that it is smoother and can attack older tissues.

On fruits the lesions are similar to those on leaves, but the yellow halo is lacking. Canker differs from

citrus scab on leaves in that canker spots appear the same on both sides of the leaves, and surrounded by a yellowish halo.

CONTROL: Affects leaves, twigs and fruits. Spoils attractiveness of fruits. Limes are specially susceptible. A copperoxychloride etc.) may help to check the spreading of the disease. Roguing of infected plants is the control method.

ANTHRACNOSE (COLLETOTRICHUM GLOEOSPOROIDES): The disease takes several forms ,die-back of twigs, spotting of leaves, spotting and decay of fruits. These are dark brown to black, more or less circular, dry and hard and sunken below the level of the surface.

CONTROL: It is usually a problem of weak trees. Dead twigs ought to be cut back to the point of union with a healthy branch. A neutral copper spray such as Cuppravit or Perenox with improved cultural practices may assist the plant to recover.

GUMMOSIS: The first symptom is the appearance of gum on the surface of the bark, and the bark may split slightly. The young lesion appears to heal and a thin layer of bark sloughs leaving a buff-coloured scar. Gums may again appear and the cycle is repeated until the wood may be exposed.

CONTROL: The cause of the disease is not well known. The disease in itself is not very serious but if the bark is killed to the wood then the exposed area may be invaded by bark or wood decay fungi.

Avoiding injuries and proper treatment of pruning wounds may prevent some infections.

PSEOROSIS (VIRUS): Early symptoms are cracking and scabbing of the bark on the main stem and branches. The lower ends of the bark may curl outwards from the stem and gums may be present. The affected branches may die in a year or two. Leaves on affected trees become yellow.

CONTROL: Pseorosis usually originates from the bud-wood but does not show outward symptoms in the diseased plants for 6-8 years. Use of budwood from trees certified to be free from the disease is the most practical method of preventing the disease.

TRISTEZA: Infected trees are dwarfed and there is usually a swelling of the bud union. If a section of the bark is removed at the bud union, spiny outgrowth may be seen on the stem or honey-combing on the underside of the bark, which in healthy plants should be smooth.

CONTROL: This disease is cause by a virus and can be spread by infected butwood. The only practical way of controlling the disease is to use disease-free budwood. Diseased trees should be removed from the orchard because the virus may be transmitted by aphids. Buds on infected plants grafted on to lime seedling will result in yellow flecking in the new lime leaves, thereby identifying diseased plants.

SOOTY MOULD (CAPNODIUM CITRI): This commonly seen as a black, velvety coating on the leaves and fruits.

CONTROL: It is due to fungi which grow on the "honey dew" or sweet

sticky substance secreted by sucking insects, such as aphids, scales, white-flies and mealy bugs, that feed on citrus leaves. The mould is superficial; it reduces photosynthesis, discolours the fruits and weakens the plant. Spraying the plant with an insecticide, such as Ultracide will control the insects that secrete the "honey dew" thereby preventing the growth of the fungus. Addition of summer oil or kerosene soap emulsion will help to remove the sooty mould.

APHIDS: Aphids are small, soft-bodied insects, most of which are wingless. Leaves infested with aphids are reduced in size and become tightly curved.

CONTROL: Several species infest citrus. Aphids are vectors of virus disease (tristeza) and they produce "honey dew" on which fungi grow, producing sooty mould. Aphids may be controlled by spraying with Ultracide or another insecticide.

SCALES AND MEALYBUGS: The symptoms commonly associated with these pests are: retardation of flowering, discolouration of leaves, defoliation or premature dropping of fruits. Accumulation "honey dew" which is invaded by fungi thereby producing sooty mould.

CONTROL: There are more than 100 species attacking citrus. These insects with sucking mouth parts prick the plant tissue, causing small, inconspicuous wounds serving as entrances for secondary parasites. The insects may be controlled by spraying with an insecticide such as Ultracide or Rogor 20.

SPIDER MITES: Yellowing of the leaves and streaks and spots along the midrib on the upper surface and blotches of a rusty brown on the lower sides.

In addition minute black spots appear which are the excrement of the pests. Skin lesions when coalescing form whitish silvery patches.

CONTROL: Damage caused by spider mites may be quite substantial. Females are considerably larger than males both are covered with a certain number of stiff hairs ofering protection. Spider mites may be controlled by spraying with Kelthane or an insecticide like Rogor 20 or Ultracide.

RUST MITES: On oranges and grapefuit dark brown and on lemons silvery spots appear. These spots are probably dut to secretion of essential oils from the gland damaged by the mites and the subsequent scarring of the fruit surface. The damage is not restricted to fruits. The leaves and twigs may also be damaged.

Heavily damaged leaves lose their gloss and assume a dark green, crinkled and dusty look.

CONTROL: The rust mite is minute and is visible under considerable magnification only. Rust mites prefer shady places and hence damage particularly the lower side of the fruits. They can be controlled, by spraying with Kelthane sulphur (Kumulus)
Rogor, Ultracide or copper sprays.

July 4, 1981

INSECTS - OUR DEADLIEST ENEMIES

INSECTS thrive in more environments than any other group of animals. They live not only on the earth's surface but within the soil and in water. They eat the choicest food of man's table. They can even eat the table.

Many types of insect affect agricultural crops and cause damage in a variety of ways. They can :

- Feed on leaves.
- Tunnel or bore in stems, stalks and branches.
- Feed on and in seeds and nuts.
- Suck the sap from leaves, stems, roots, fruits and flowers.
- Carry plant disease agents.

The plants attacked by insects are damaged and weakened or killed. This causes reduced yields, lower quality and unattractive plant products that cannot be sold

Insect damage does not stop in the field but continues in the stored products. Some insects are vectors or carriers of plant disease agents and they assist in spreading plant diseases.

However, not all insects are pests. Some insects are beneficial to man and they help in pollination or feed on other insects that are pests.

Some of the more common insect pests are :

Caterpillars or larvae of moths and butterflies.

Grubs or larvae of beetles and flies.

Beetles.

Aphids, leafhoppers, mites, scale insects, whiteflies.

Mole crickets.

Snails and slugs.

CATERPILLARS :

These are the larvae of moths and butterflies and they cause damage to plants by feeding voraciously on plant tissues - eating away the leaves, boring through stems and fruits and cutting off young plants. Some classic example of caterpillars affecting crops are :

Larvae of diamond back moth (plutella spp.) : These larvae feed voraciously on leaves of cabbages, cauliflowers and Chinese cabbage. They feed on the lower surface of the leaves, chewing small holes through the leaves. They may also penetrate into the heart.

The plutella larvae are difficult to control unless we use the right kind of insecticides. Insecticides that are effective include Decis, Lannate and Thuricide.

Because the plutella larvae can develop resistance to insecticides rather quickly, it is advisable to alternate insecticides every now and then to defeat his ability. It is also advisable to control the caterpillars before heading stage otherwise they could be protected against the insecticides if they are within the heads.

Because they feed on the underside of the leaves it is very important that when we are spraying we make sure that the undersides are well sprayed.

The bean pod borer (maruca testulalis) : This caterpillar attacks a variety of leguminous plants including beans. The young caterpillars bore into buds, flowers and pods. The caterpillars can cause severe losses by destroying the flowers, thus preventing fruit set and also destroying the pods.

To control, start spraying early with Thiodan or Malathion. Remember preventive measures are much better than curative. After flowering, use only Thiodan because the other insecticides are too dangerous. Never use Lannate on beans after flowering stage.

BEETLES :

This class of insect can do a lot of damage to agricultural crops. The damage is done by both the adults and larvae or grubs. Common examples of damage caused by beetles are :

Rhinoceros beetles : They damage coconut plants. They bore into the crown at the base of one of the young fronds, eating away a large portion.

Banana weevil borer (cosmopolite sordidus) : The grubs bore into the corm and do extensive damage to the plant. The suckers from infested stools are also attacked. Damaged plants may fall down, and production is greatly reduced. The wounds made by the borer provide entrances for disease agents such as fungi and bacteria.

To control the weevils spray around the pseudostems with an insecticide such as Malathion or sprinkle Primicid 10% granule around the pseudostems. Paring the suckers and dipping them in an insecticide will help to rid the planting materials of any borer.

Sweet potato weevil (cylas formicarius) : This is an insect pest attacking sweet potato. The grubs burrow in the stems and tubers.

To control, practise crop rotation and use clean planting materials. Dip vine cutting in 1% solution of Thiodan or Diazinon before planting.

Chafer beetles : These insects affect many plants such as mangoes, citrus, roses, Chinese cabbage etc. The damage is done by the adults which eat away the leaves. Heavy infestations cause the destruction of most of the leaf surface of young plants and can result in the death of the plants.

The beetles are seldom seen on the plants because they feed at night and during the day they are hiding in the soil and under leaf litter. To control, spray with Sevin (Carbaryl) or Thiodan (Endosulfan). It is preferable to spray in the evening. Light traps also may be used to catch the beetles.

LEAFHOPPERS :

These are sucking insects which feed on plant sap. They jump very quickly when disturbed and are vectors of disease agents (virus diseases). Affected plants become chlorotic and in severe infection they may wilt. To control, spray at 15 day intervals with Ultracide, Thiodan or Malathion.

Aphids, scale insects, mealy bugs and whiteflies : These are all sucking insects which feed on plant sap by inserting a proboscis into the tissues. The presence of these insects is often indicated by sooty mould which appears on the leaves and fruits as in citrus and mangoes. Besides causing direct damage to the plant by feeding on the plant sap, these insects are vectors or carriers of virus diseases.

To control, spray at 15-20 day intervals with an insecticide such Ultracide or Rogor.

Fruitflies and flies : Fruit-flies can cause a lot of damage in fruit orchards and vegetables. They can affect crops such as mangoes citrus, guava, passion fruit, peppers etc. To control, spray with an insecticide like Dipterex or Malathion. You can also use attractants and insecticides in traps. Sanitation within the orchard will destroy the flies' breeding ground, thereby reducing the population to acceptable or controllable levels.

Leaf miners : These are maggots of fly species that feed between the upper and lower surfaces of leaves, thereby causing blotching.

To control, spray with a systemic insecticide like Rogor or Nuvacron. Leaf miners attack crops like beans, cabbages etc.

Ants : Ants can cause damage to plants by protecting and transporting scale insects, mealybug and aphids. These insects that are protected by ants are vectors of virus diseases and parasites of plants.

To control ants, one may spray with an insecticide such as Malathion.

Mites : These are tiny, spider-like creatures which are difficult to see with the naked eye. The attacked portion of the plant develops a silvery appearance accompanied by the development of rust, as in the case of attack by citrus rust mites.

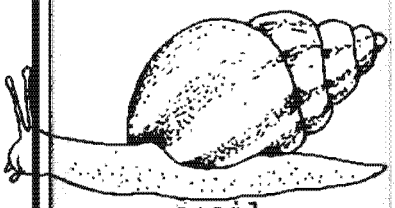
Mites may attack crops such as citrus, guava, mango, bean, cucurbits etc.

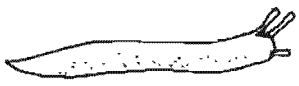
To control, spray at 15-20 day intervals with wettable sulphur (Kumulus), Kelthane or an insecticide with acaricidal properties such as Ultracide or Rogor.

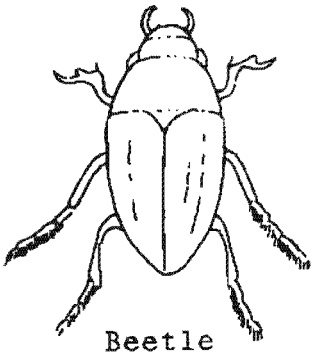
SNAILS AND SLUGS :

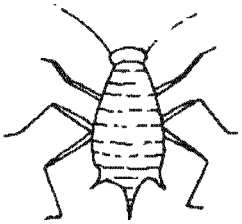
Snails and slugs can do an awful lot of damage to crops by eating leaves and young shoots. They can also ringbark the plant, causing it to wilt and die.

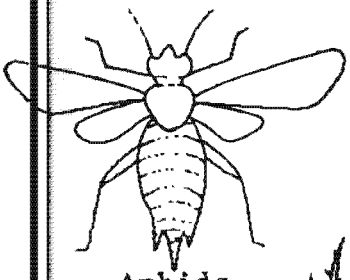
To control, broadcast Sluggit pellets around your garden. Keep your garden neat and clean so as to remove any hidding place or breeding grounds for snails and slugs. Mulching with seaweed also tends to repel snails and slugs.


snail


slug


Beetle


Aphids


Aphids


caterpillar


Mite

June 20, 1981

CATERPILLARS - OUR DEADLY ENEMIES

THEY CAUSE an awful lot of damage to many crops in Seychelles but what are they? Well, caterpillars are the larvae of moths and butterflies. They hatch from an egg, feed and grow quickly, and then form a resting stage or pupa. From the pupa emerges the moth or butterfly.

Caterpillars may be hairy or smooth and their colours vary greatly. They have a hard head, armed with strong mandibles to bite and chew their food.

Caterpillars may be leaf-chewers, removing whole pieces of leaf with each bite; leaf surface feeders, which do not chew right through the leaf; leaf miners feeding between the upper and lower surfaces of the leaf; shoot borers, boring tunnels down the centre of the young shoots; surface feeders on fruits; borers in pods of leguminous plants; leaf rollers, webbing portion of a leaf into a tunnel in which they feed ; leaf webbers, webbing together leaves and flowers; borers in fruits of plants; flower feeders; and cut worms; which cut off young plants at the base.

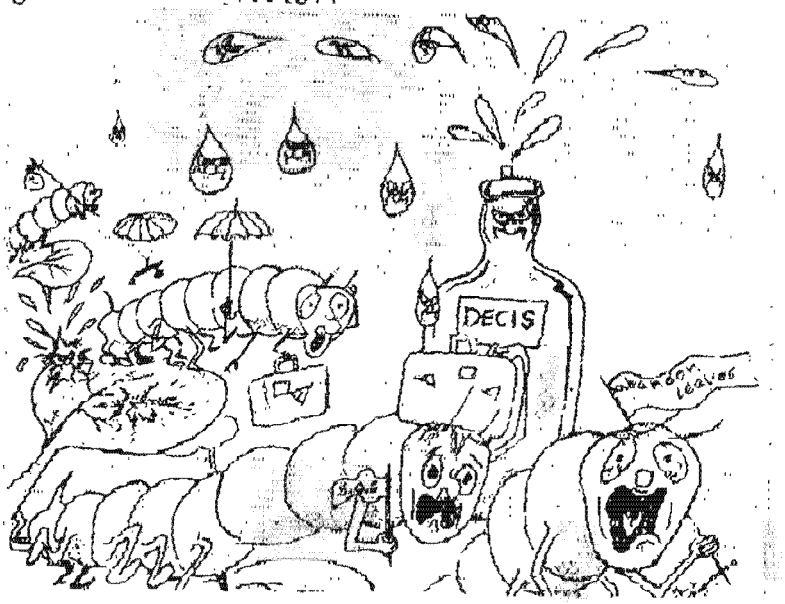
Caterpillars are among our greatest enemies and we have to get rid of them. But how? Extension officers will help you so confide in them.

Here are some hints :

Larvae of diamond-backed moth (plutella maculipennis) are common pests of brassicas (cabbage, Chinese cabbage and cauliflower). To control them use Lannate and Decis Pyrethroid. Since these caterpillars have a great tendency to develop tolerance to chemicals, it is advisable to alternate chemicals.

Control treatment should begin at a very early stage. Prevention has always been better than cure.

Dilution rate-4 teaspoons 3 gallons water (Lannate); 1 teaspoon/ gallon water (Decis).



Caterpillars do great damage — they must be controlled with insecticides

. Bean pod borer (maruca testulalis) is a caterpillar that attacks a variety of leguminous crops and in particular green beans.

To control use Thiodan. Start spraying early, especially before flowering. Dilution rate-8 teaspoons 3/4 gallon water.

. Caterpillars in watercress :

Decis Pyrethroid gives very good control. Dilution rate-1 teaspoon/gallon water.

N.B All pesticides are poisonous so follow instructions very carefully.

One tablespoon = 4 teaspoons. When available in the stores substitute Lannate by Thuricide

HOW TO CONTROL SNAILS IN SMALL GARDENS

TIPS FOR THOSE WHO DISLIKE USING CHEMICALS

Some people loathe the use of any type of chemical. Others, especially small or backyard gardeners, find it impractical to use them because of the threat to young children and their own and neighbours' animals. Consequantly snails play havoc in their flowers and vegetable crops.

Yet these people should not despair. Here are a few suggestions to help them over-come their snail problems without the use of those dreaded chemicals.

. Mulch crops with sea-weed if available. Snails dislike sea-weed and therefore will turn round and find other plants to eat.

. Mulch with sawdust or put a barrier of sawdust around your plants. Snails cannot progress through loose sawdust.

. Put some wet dairy meal or pig meal in a heap in the garden at night. This will attract the snails and they can be picked up and destroyed the next morning.

March 28, 1981

HELP STAMP OUT THE 'MAKABE'

AN earlier article in the Nation (9th Feb. 1981) explained how the virology staff are working on a virus against the rhinoceros beetle (makabe) at Grand'Anse Research Station.

On St. Anne Island, where our biggest experiment is running, between 40 and 50 per cent of the adult beetles are now infected with the virus. There are still a lot of beetles and it seems that the larvae are not so easily infected in the field as they are in the laboratory. Therefore, control may rely on what is called an "integrated" approach.

This used in many good pest control programmes and simply means using several different methods together so that the overall result is more effective. In this case, it would mean destroying the dead logs where the larvae breed, as well as infecting the adults with virus.

Although the larvae do no damage, reducing their numbers by attacking their breeding sites will reduce the number of adult beetles.

On Farquhar, this integrated approach is being tried. The island has already been thoroughly cleaned by the I.D.C. management, so that very few rotten coconut logs remain. We have released virus carrying beetles, so the virus should be established by now.

If we now find that the number of beetles drops, this will be a success, and we will have to try it on Mahé as well. We have already released the virus, so getting rid of the old coconut logs is the big job remaining.

You can help by smashing open any rotten coconut logs on your property; you can either kill the larvae or leave them for rats and birds to eat. There are plenty of uses for coconut wood instead of leaving it to rot, as we will show in a future article.

Larvae of the rhinoceros beetle.

MAKING SURE THE PESTS DON'T REAP OUR HARVEST

IN THE year 2000 the earth's population will be 1 1/2 times that of today and unless we are very careful in protecting our crops, the food we produce will be instead of our people.

We know also thqt the struggle against pests is a perpetual struggle and that the people can never give in.

In most cases, when man is fighting agricultural pests, he has to resort to chemicals. These chemicals are meant to KILL and therefor anyone handling pesticides has to be extremely careful.

Keep all pesticides away from children. Always label your pesticides and keep them in safe containers.

Pests may be controlled by different methods.

1. Use of chemicals (pesticides).
2. Biological control (predators/others).
3. Using resistant varieties.
4. Sanitation.

Better controls are often obtained when a combination of the above methods are used.

In order to get good control the following steps must be observed.

(1) Identify your pests (insects/diseases).

(2) Know the habits of your pests. (If it is an insect, what kind of insect and at what stage is it most dangerous? If a disease, what disease? Fungus? Bacteria? Virus? What?)

(3) Identify the most appropriate methods of control.

Recently, we visited some farmers and we were surprised to discover that most of them were using the pesticide lannate on almost any pest problems they encountered be it insect or disease.

Our farmers have been told and we repeat that lannate is a potent insecticide and should be used with extreme caution. In no circumstances should it be used on beans or cucumbers that have started to bear. Some people are using lannate against mildew and cercospera, both of which are fungal diseases.

Unfortunately, they are pouring their money down the drain because lannate, which is a very expensive chemical, will NOT control fungal/bacterial diseases.

ATTENTION all farmers ! ! ! If you have a pest problem and you are in doubt of what chemical to use, please contact your Extension Officer or the Research Station. We exist solely to help you, so give us a chance.

Here are some examples of how to control some of the most serious pests that destroy foodcrops in Seychelles :

Protect your citrus and other fruits against pests.

Use ULTRACIDE (insecticide) at the rate of 1 tablespoon per gallon of water plus COPPER OXYCHLORIDE (fungicide) at the rate of 1 tablespoon per gallon of water.

Spray every month. Alternate copper oxychloride with Difolatan (fungicide) at the rate of 1 tablespoon per gallon of water. The use of Difolatan is very effective against rust mites, a most common insect in Seuchelles.

Before spraying always add Bayfolan (foliar feed) at the rate of 2 tablespoons per gallon and Spreadite (sticker) at the rate of 1/2 a tablespoon per gallon.

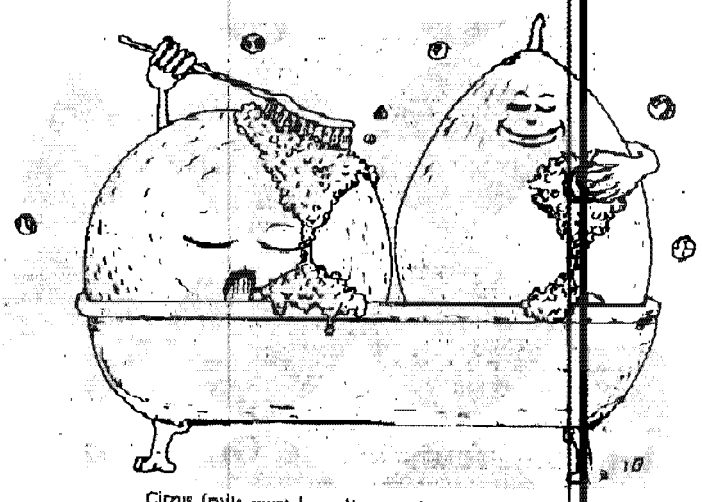
Ultracide: controls scales, white flies, aphids and mites.

Copper oxychloride: controls a wide range of fungus diseases.

Protect your cabbage and Chinese cabbage against Plutella caterpillar (a serious pest).

Use DECIS (pyrethroid insecticide) at the rate of 1-2 teaspoons per gallon of water . Start spraying one week after planning at weekly intervals. After two sprayings with Decis, alternate with THURICIDE (bacillus thurigensis insecticide) at the rate of 1tablespoon per gallon of water. In the case of cabbage which is a 2-3 months crop, alternate Decis with Thuricide every 2 weeks.

The crop can be harvested three days after the last spraying.



Citrus fruits must be well sprayed and kept clean.

Plutella Caterpillar
A serious pest of cabbages

February 21, 1981

KILL THOSE PESTS BEFORE THEY EAT YOUR FOOD

PESTS are a major problem for vegetable production in Seychelles. A wide variety of pests, such as insects, spider mites, snails, birds, fungi, bacteria, mycoplasmas, viruses and nematodes attack and destroy much of our vegetable crops, thus reducing the amount available for us to eat.

INSECTS CONTROL

Use the correct insecticide : Insects respond differently to different insecticides. It is important to know which insects you are dealing with before the correct insecticide can be decided upon. Your extension agent can help.

The proper control can be achieved. For example, never use Sevin (carbaryl) for aphids. This compound cannot control these pests and there are many examples throughout the world where Sevin actually encourages the growth of aphid populations. On the other hand, Sevin is excellent for most species of beetles, such as the rose chafer.

Be sure to read the label and recommendations provided by your extension agent and buy the correct insecticide for the particular insect pests.

Proper application of insecticides : One of the major problems associated with using insecticides is improper application. Even though the correct insecticide is used, the manner in which it is applied may determine whether control is effective.

First, consider the formulation or mixing of the insecticide for the correct dosage. An error in mixing may result in poor or no control if too little insecticide is used.

On the other hand, if too much insecticide is mixed into the spray tank, besides being wasteful and expensive, there are environmental hazards to consider, such as contamination of streams and bays and even poisoning of fish and other non-target species. The pesticide overdose problem has had serious consequences in many areas of the world, and farmers should be aware of the hazards.

Another major problem with using more than the recommended amount of insecticide is the development of resistance in the pest species. There is some evidence that this might be happening in the case of plutella, the small green caterpillar which attacks cabbage in Secyhelles.

This pest has become resistant to Decis in Taiwan.

When resistance occurs, the insecticide loses its effectiveness as the insects are able to tolerate higher and higher doses. The end result over a period of time, is that the insecticides is no longer able to control the insect pest.

Another consequence of insecticide over-use is that most of the natural enemies of insect pests such as predators and parasites are destroyed. This often causes insects which were considered "minor pests" to become major pests. Also, use of excessively high rates of chemical may actually cause damage to the plants.

Resistance to the biological insecticide Thuricide has not been reported. Use of this material is recommended for plutella, the major insects pest of cabbage. The grower must realise, however, that a longer time is required for control by Thuricide because the caterpillars must eat the material to become infected by it. Thus, a few days are required before the insects are killed.

With regular applications, however, good control can be achieved and insecticides like Decis can be reserved for more critical situations when it is necessary to bring larger populations of pests under control quickly. This approach should lead to much longer and more effective use of chemicals such as Decis.

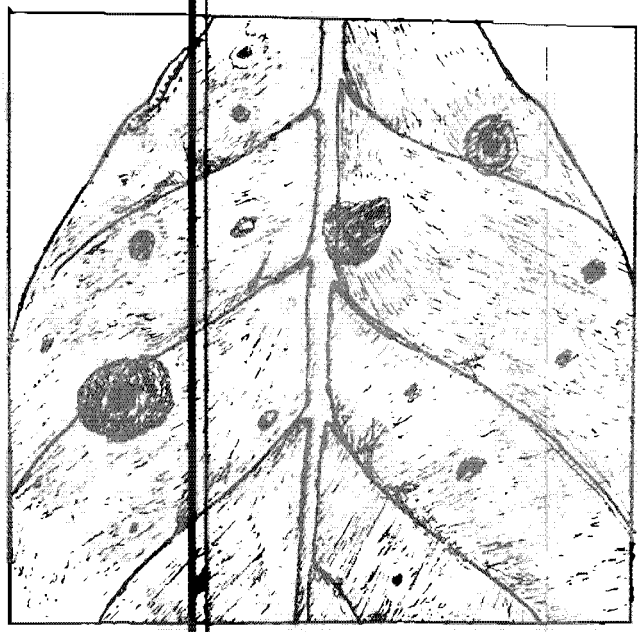
In addition to proper mixing of insecticides, it is important that they are delivered at the correct rate. The extension agent can provide information about the calibration of equipment. The insecticide should be applied to areas of the plant where the insects are found. For example, it is necessary to make sure that the spray reaches the undersides of cabbage leaves in order to control cabbage pests such as plutella.

Other insect control methods : There are other methods which can be used to reduce the numbers of insect pests. One of the most effective techniques is cleaning up crop residues once vegetables have been harvested. For example, an abandoned field of cabbage can produce thousands of cabbage caterpillars.

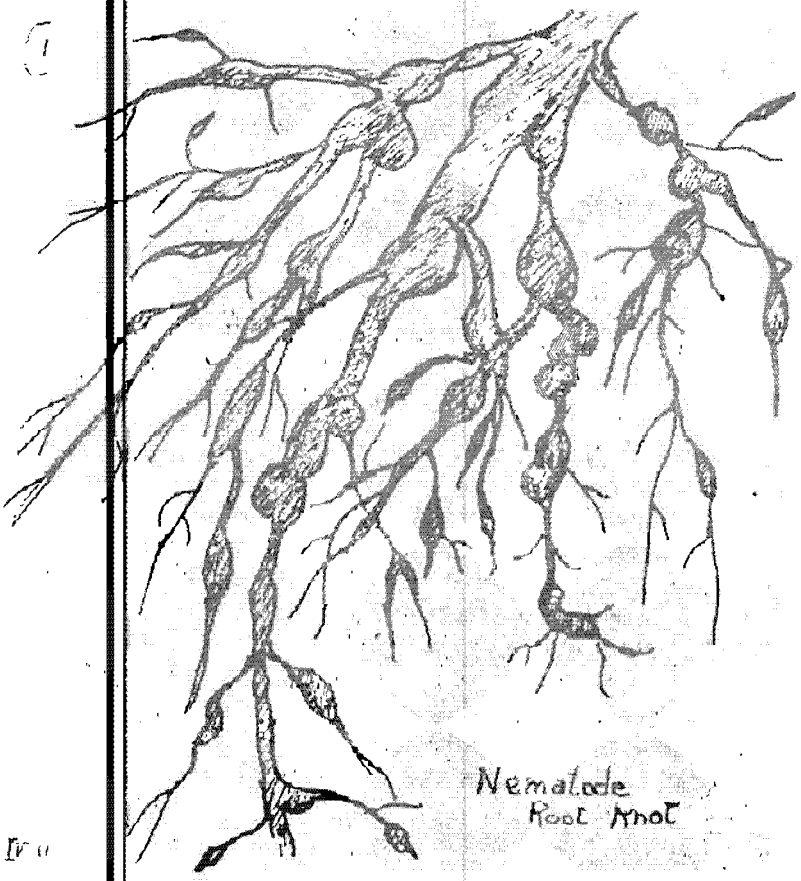
The importance of cleaning up fields after harvest cannot be overemphasised. Fields of crop residues are a breeding ground for insect pests which will invade other crops or even your neighbour's farm. Any fruit, such as citrus, guavas, mangoes, etc should not be left lying on the ground. These should be collected and buried at least 20 cm deep or burned in order to destroy developing fruit fly larvae.

Removing any parts of crops left in the field or fruit which has fallen from trees will reduce the overall numbers of insect pests.

Alternaria leaf spot.



New Fungus Disease of Tomatoes



Nematode
Root Knot

June 26, 1981

KILL THOSE PESTS BEFORE THEY EAT YOUR FOOD

SAFETY IN HANDLING PESTICIDES :

Most pesticides are very dangerous when improperly used. However, poisonous compounds may be used safely when a few simple precautions are followed. Be sure to keep pesticides in their original container and keep them out of reach of children, pets and livestock. There are many deaths each year due to pesticides being placed in a container other than the original one and being eaten, especially by children.

Read the manufacturer's label carefully and completely. It is wise to wear a long-sleeved shirt and long trousers during pesticide application. Most pesticides can be absorbed directly through the skin.

Remove clothes after using pesticides and bathe with plenty of soap and water. Wash work clothes before using again. Do not eat or drink while using pesticides and avoid getting pesticides on the skin. Do not breathe pesticide spray or fumes. Wash hands often while using pesticides, especially before eating.

If pesticides are accidently spilled on the skin or clothing, remove clothing at once and wash the skin thoroughly with soap and water. Mix pesticides in a ventilatad area; never mix pesticides in an enclosed area. Repair any leaking hoses and connections on pesticide sprayers.

Never use hands and arms to mix pesticides or reach into a container of pesticide to retrieve tools dropped into them. When pesticide application equipment is not being used keep it where children and livestock cannot get to it. It is a good idea to wash spray equipment after using it. Dispose of empty pesticide containers. Check with your extension agents about the best way to handle this.

With adequate precautions, pesticides are safe and effective. They still provide our most powerful and practical control of pests that attack our fruit and vegetables.

Snails are a major and persistent problem since there are large numbers around all vegetable plots which feed on a wide variety of plants. Clean cultivation in vegetable plots and removal of vegetation in the vicinity of vegetable plots is an important control measure for snails.

This eliminates food sources, breeding areas and shaded, cool resting areas for snails which will migrate into vegetable plots to feed.

A commercial "snail pellet" containing a chemical toxic to snails is also available for soil-surface application around vegetables. In many cases physical removal of snails may be feasible on a limited scale.

PLANT DISEASES AND THEIR CONTROL

Fungi are micro-organisms which grow into and use plant issues as nourishment. These fungi complete their life cycles in the plant and then re-produce by producing spores which commence the cycle over again.

Plant, leaf, stem, flower, fruit, seed or root tissues are injured

or killed by the activities of the fungi as they develop in these plant parts.

The powdery mildew fungi are especially serious on leaves of cucumbers and water-melons and can be identified by the powdery, white growth on the surface of the leaves and by the irregularly shaped scars on the leaves.

Some varieties of plants are more resistant to the powdery mildew fungi than others. Several fungicides, such as Benlate and Bayleton, are effective for powdery mildew control.

Several different fungi cause leaf-spot diseases of tomatoes and will result in serious yield reductions if not controlled. Early blight is a leaf disease which is characterised by circular, target-shaped, brown to black lesions.

Irregular, diffuse patches of light yellow to grey-brown or brown areas on tomato leaves are the characteristic symtom of grey leaf mold. The discoloured areas will be light chocolate brown in colour on the underside of the leaf as a result of the masses of spores produced by the fungus, and as a result of the death of the plant cells.

Small, two to four mm, irregularly-shaped lesions on leaves, stems and petioles are caused by a fungus responsible for corynespora leaf spot disease.

Foliage sprays with fungicides, such as Bravo, copper oxychloride, Dethane M-45 Difolation or Zineb, are important control measures for these diseases, which are caused by fungi living on old leaf debris in the soil.

Consequently, removal of old plants and thorough tilling of the soil are other important control measures. Irrigation water should be applied to the soil, rather than to foliage, whenever possible, since the moisture on the leaves increases the opportunity for growth and development of leaf pathogens.

Many fungi are able to attack the root systems of vegetable crop plants causing decomposition (root rot). Movement of water and minerals.

July 3, 1982

NO TO PESTS AND DISEASES

IN accordance with the Plant Pests (Amendment) Act 1958, and the Animals (Diseases and Imports Act, 1981, a person who intends to import into Seychelles, live plants or animals and their products, MUST apply for a permit from the Ministry of Agriculture. In the event of plant importation, permits should be obtained from the Plant Protection Service (Control Division), and as regards animals, permits are issued by the Veterinary Division. The permit should then be forwarded to the supplier for compliance with the condition laid thereon .

At the time of arrival, the plants or products, must be accompanied by a Phytosanitary Certificate signed by a duly qualified official of the Plant Production Services of the country of origin to the effect that the products were thoroughly examined and are believed to be free from dangerous pests and diseases and that they comply with the conditions specified on the import permit.

Similarly, all birds, live animals, meat and meat products, must be accompanied by a Veterinary Certificate signed by a duly qualified state surgeon to the effect that the consignment has been examined, is believed to be free from animal pests and diseases and complies with all conditions laid down in the import permit or otherwise stated.

When plants, animals and their products are imported without the necessary documents they are confiscated and destroyed with no liabilities attached to the Ministry of Agriculture.

The airport, the Port and the Post Office are the three main points of entry for agricultural products covered by the Plant and Animals Imports Act. Since the airport presents a greater risk of pest and disease infiltration, an Agricultural Control Officer attends every international flight to ensure that no uncertified plans or animals enter Seychelles.

The enforcement of the Plant Pests (Amendment) Act 1951, and the Animals (Diseases and Imports) Act 1981 depend to a certain extent on the cooperation of various government and private organisations, namely: Customs, Police, Immigration, Aviation, staff and Air line representatives.

EXPORT OF PLANTS, PLANT MATERIALS AND PRODUCTS

As a party of the Phytosanitary Convention 1951, an organisation aimed at preventing the spread of plant diseases from one country to another, Seychelles offers a Phytosanitary Service at tha Head Office of the Ministry of Agriculture, Botanical Gardens, where outgoing plants and plant materials are inspected and treated in compliance with the current regulations of the importing country.

In further support of the Phytosanitary Convention 1951 and in a strive to maintain high quality standard and market price for our two main cash crops, copra and cinnamon, a special inspection team is based at the Customs Export Shed with the specific assignment of inspecting each bag of Copra, Cinnamon and other agricultural products awaiting shipment. No products can be exported unless scrutinized and passed by the Produce Inspectors. Export permits and Phytosanitary Certificates

are issued for standard quality products at the time of shipment, whilst substandard quality or adulterated goods are regraded or rejected at the time of inspection.

EXPORT OF LIVE ANIMALS, MEAT AND MEAT PRODUCTS.

The Ministry of Agriculture, through its Veterinary Services at Union Vale, provides clearance services for persons who intend to leave Seychelles with live animals, meat or meat products. The Veterinary Services can be contacted for further information and advice.

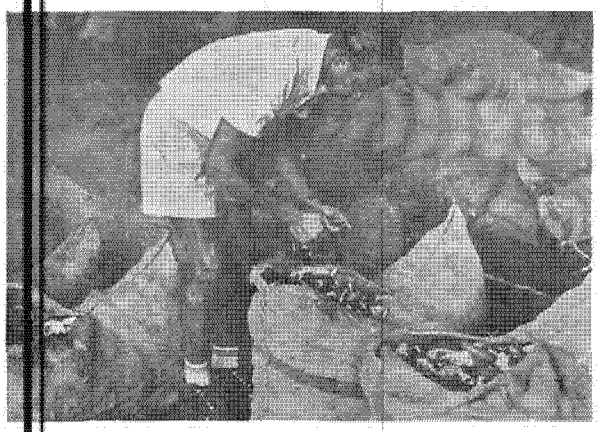
PESTS AND DISEASE CONTROL

Pests are enemies of man and must be controlled. Certain fast-breeding foreign pests and diseases may spread rapidly and cause substantial destruction to plantations and livestock before they can be detected and placed under control. In these circumstances, control takes a different approach - it has to be effected at a national level. As the organisation responsible for this task, the Ministry of Agriculture has trained groups of workers for this purpose.

Melitoma insulare (coconut pest) and (Anoplolepis Longipes) Fourmi Maldive are two classical examples of such pests. To this end, two teams of melitoma workers on Mahé and one on Praslin are currently engaged in checking and treating coconut plantations against Melitoma. In the late sixities, a special unit was opened at Union Vale for the control of Fourmi Maldive. Special poison baits are prepared and sold at the Agricultural Requisite Store, Union Vale, for field control of Fourmi Maldive. For indoor control the unit offers a spray service.

Alongside melitoma and Fourmi Maldive control, the Unit undertakes to control pests of stored products by insecticidal sprays and fumigation. It is worth noting that tremendous lost and deteriation of stored grains and animals feeds may be incured through pests infestation and it is thus advisable to ensure that your store is always free from pests.

Every citizen should join hands in a strive to protect our country from foreign pests and diseases which constantly threaten ourselves, our plantations and livestock.



Copra inspection at the New Port before exportation

CHEMICALS ALONE ARE NOT THE BEST SOLUTION TO OUR PEST PROBLEMS

IN THE vegetable garden, there will always be problems due to insects and other pests. These are part of the environment, exist as numerous species, and stand ever ready to move into the vegetable plot in search of their own livelihood. The problem is then to tolerate them or to control them without damaging other aspects of the environment.

It is often impractical or even impossible to eliminate insect pests. The use of chemical insecticides is associated with many hazards, the danger of killing beneficial insects, of contaminating other plants, the short and long-term poisoning of human beings, the problems of storage of poisons around the house.

In addition to the use of chemicals to control pests, the vegetable grower must seek other alternatives. These should be practical, simple, efficient, inexpensive and should not create new problems. Since such approaches have seldom been investigated by agricultural researchers, recommendations given below must necesarily be based on simple observations.

Nevertheless, a considerable body of experience lies behind these recomendations. In a certain sense gardening is like a war consisting of numerous battles. Some of the battles are won, and some are lost.

The gardener who is just beginning may lose more battles than he wins at first. But later, as experience is gained, more and more battles will be won. These principles are written with the hope that the gardener will begin to win battles sooner.

Use of pesi-resistant varieties : Perhaps the most effective solution to the problem of insects in the home garden and larger units of crop production is to use varieties that are resistant to them. Resistance depends on many factors, but species with strong odours are often insect-resistant. On the other hand, the odours of the brassica vegetables, cabbage, Chinese cabbage cauliflower, seem to attract the insect pests that are especially troublesome with these crops.

Thus, odour is a hint of resistance, but only practical experience over several years in one location can demonstrate truly resistant varieties.

A common form of resistance to insects and disease is rapid growth. Very susceptible varieties of vegetables can be grown to maturity under ideal conditions before insects become a problem. This is particularly true of annual green-leafed - vegetables, especially amaranthus (payater). Successive planting of these vegetables should not overlap.

Resistance of a vegetable variety to insects and disease is often known and reported in seed catalogues. Farmers are well aware of certain varieties of vegetables, root crops and fruits recommended by the Ministry of Agriculture with resistance and/or tolerance to pests. Many resistent varieties recently released by seed firms remain to be introduced and tested in order to discover their values.

Apparent resistance of vegetables to insect pests may be only a chance phenomenon. When susceptible varieties are grown on a small scale, insect pests may not discover them on time to damage them. Thus, it is

common in the home garden to experience several successful crops of a given variety followed by one or more failures. The avid gardener will learn from his mistakes, and hopefully will discover truly resistant varieties. If not, other methods of insect control can still have the crop.

Protection of one species by another : Insects and other pests use a variety of stimuli to find their way to suitable host plants. These stimuli include those affecting the vision, the sense of smell, and the taste. If insects can be confused, they often will not become a problem. Mulches of various colours confuse insects. In addition, plants themselves protect one another from insect attack.

The first type of protection might be called passive. When two plants of different types are placed side by side, the odour and appearance of one will tend to detract from the odour and appearance of another.

On the other hand, large numbers of plants of the same type planted together produce an effective odour and appearance that attracts readily the pests of that crop if they are near. Therefore, dispersing plantings of crops, or mixing them with other crops will reduce insect infestation.

In addition to the passive effect, plants can have general effects on insect pests, and repel indiscriminately many kinds of insects. This is generally due to the strong odours of such plants. The French marigold (pisanli) is one of the most useful species in this respect.

Garlic and onions are also very effective. In the tropics, rows of spring onion (oignon vert) or individual plants can be interspersed with insect - sensitive vegetables. The space is not wasted since the leaves of spring onion are very popular in the market, and used like those of chives. Herbs which are useful in the kitchen can be planted around or within the vegetable plot. Oregano and basil are particularly effective. Mints of all varieties repel some insects.

Research is still needed of the tropics to identify the best species of plants as general repellants, and the best way of using them. But meanwhile, use can be made of those already available. We recommend that whenever possible plants that are selected as repellants be also plants that are edible in one form or another, thus using the space while effecting control.

There is still a third form of protection of one plant by another that is frequently called "companion planting". It is true that two species of plants can be effectively planted together due to many different kinds of effects, such as light shading of one by the other, or fixation of nitrogen by one that is then used by the other.

Although many cases are known of combinations of plants that grow better together than separately, known. In a few cases it is known that one species has the effect is not the same as the general effect due to the strong odour of one species repelling insects in general.

Specific combinations of plants that mutually aid one another have seldom been studied in the tropics, especially with respect to vegetables. Thus exact rules cannot be supplied to gardeners, but the following principles are appropriate. Plant vegetables in combinations and observe the effects. Develop a body of experience based on such observations. Plant harmonious combinations where vegetable yields are high and pests are at a minimum. Thus the vegetable grower himself will develop a body of useful experience.

A few suggestions taken from experience in temperate countries are given here below. These have not been tried experimentally in the the tropics.

Combinations of plants that are mutually beneficial :

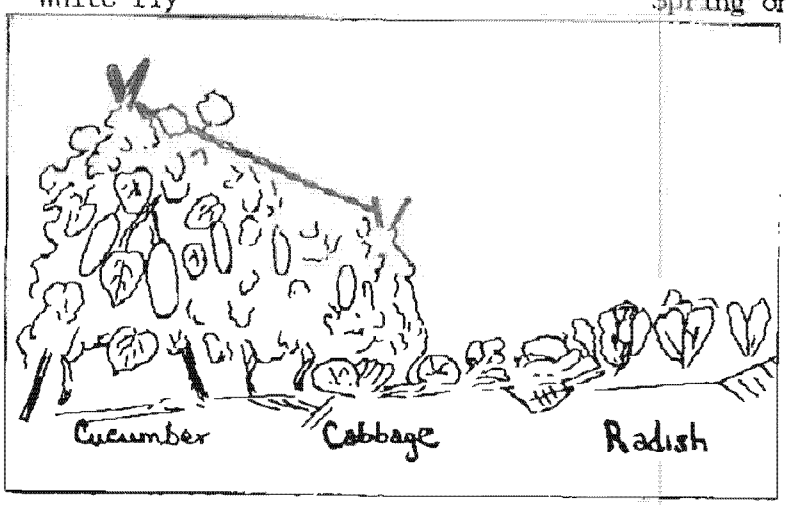
Beans-carrots, maize.
Beet-bush beans, cabbage, lettuce, spring onions.
Cabbage (and relatives)- beets, herbs, tomatoes.
Carrots-chives, lettuce, radish.
Maize-beans, cucurbits.
Cucumbers-cabbage, radish.
Eggplant-beans.
Lettuce-beets, cabbage.
Beans-cabbage, maize.
Tomatoes-parsley.

The information below suggests that certain plants should be grown in every tropical vegetable plot. This practice apparently was quite popular in Seychelles with our traditional vegetable growers but unfortunately it is today almost forgotten.

We recommend strongly the use of marigold, garlic, spring onions, mint, basil and other herbs. These should be planted in a pattern that does not interfere with the principal vegetables grown.

Some suggestions of plants that are suspected of being useful to repel specific insects are given below :

Insect or pest	Plant that protects from it
Ant	Mint
Aphid	Garlic, mint
Maize earworm	Marigold
Leaf miner	Herbs
Nematode	Marigold
Weevils	Garlic
White fly	Spring onion



BE CAREFUL WITH PESTICIDES - THEY CAN KILL YOU TOO

A lot of farmers in Seychelles use pesticides to protect their plants from diseases and also to control weeds in their plantations.

These chemicals are designed to kill insects, fungi, weeds and even rats. They are poisonous and must be used in a careful and sensible manner so as not to expose other forms of life (man or live-stock) to danger.

When you buy your pesticides, keep the concentrates in a very safe place i.e. keep them under lock and key so that they are out of reach of children, other people and animals.

Put a label on the container.

When mixing or diluting pesticides wear protective clothing and try to avoid SPILLAGE AND SPLASHING, especially on to skin, on to the face or into eyes.

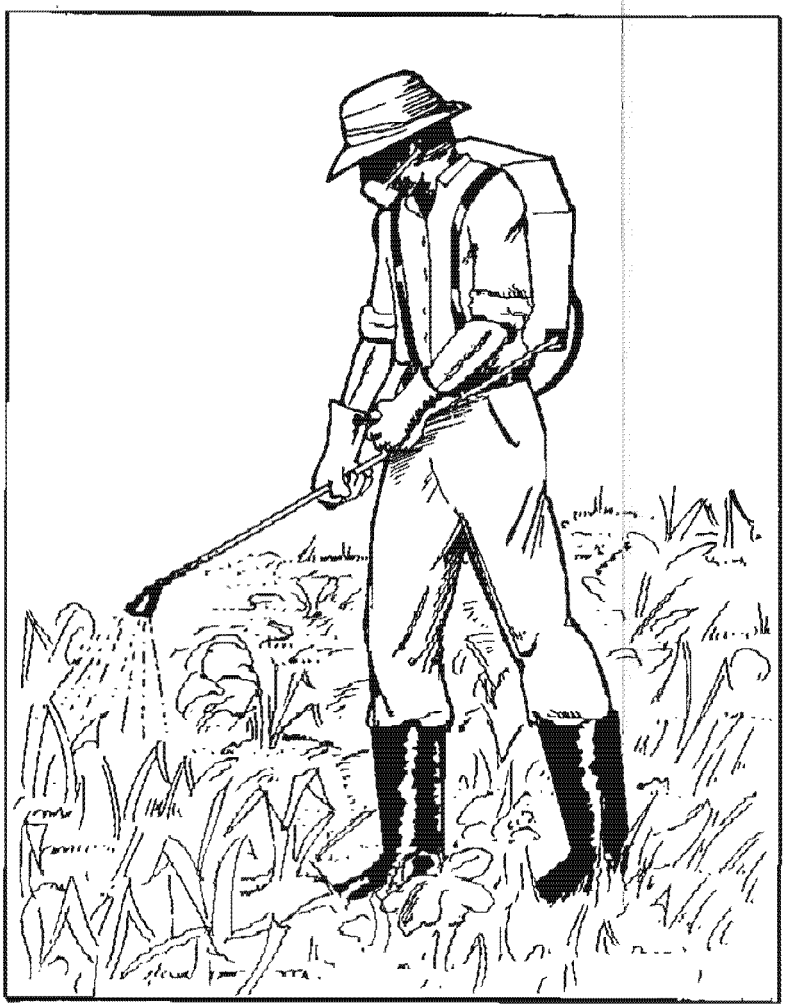
During spraying, make sure nobody is standing where they will be affected.

After spraying ensure that any pesticides left in the sprayer or water used to wash the sprayer do not get into rivers or streams. Pour into a pit and cover up.

Destroy empty concentrate containers by burning, smashing or burying. Do not use such containers to carry water for domestic purposes.

Immediately after spraying ensure that no domestic animals enter the sprayed area.

Wash hands and other parts of the body with soap and water after spraying or before eating, drinking or smoking. A change of clothing is a good idea but essential only if serious contamination has occured.



Sensible protective clothing should be worn when using dangerous pesticides.

March 21, 1981

V GROWING SPECIAL CROPS

A VEGETABLES

1 Choose The Right Vegetable for The Best Results

2 New Varieties Suitable for Our Climate

3 Grow Better Vegetable Seedlings for Improved Crops

4 Make Sure You Know the Best Vegetables

5 Know When and How to Harvest Your Crops

6 Managing Vegetable Crops for Greater Yields

i. Weeds Decrease Your Yield

ii. Are Your Yields and Profit Being Pulled Down?

CHOOSE THE RIGHT VEGETABLE FOR BEST RESULTS

RESEARCH studies on the performance of plants of the same variety, grown on the similar soils but in a different environment show that climate in particular has a distinct influence on their growth and development.

It is important to choose varieties that can give good results under Seychelles' conditions, the ideal variety being the one best able to adapt to a wide range of climate factors and resistant to pests throughout the year.

Within each species of vegetable the ideal varieties (or those which offer most of the desirable qualities) are, of course, very difficult to identify.

Nevertheless. in recent years certain varieties have been cultivated successfully and around to be best adapted to the cool south-east season and/or hot and humid north-west season.

The Grand'Anse Experimental and Food Production Centre and agricultural extension officers can provide information on the results of variety trials in both seasons.

However, it is sometimes only by trial and error that the grower discovers specific varieties from the list of recommendations which are best suited to the soil and micro-climatic conditions of his plot of land.

RECOMMENDED VEGETABLE VARIETIES FOR SEYCHELLES 1982

BEETROOT

Dark Red, Topmarket.

BITTER GOURD

Karela, Known you No 1, Known You No 2.

BUNCHING ONION

Local strain, Tsukuba long white.

BUSH BEAN

Tendergreen (cool season), Topcrop, Harvester.

CABBAGE

K K. Cross (cool season), Spring light.

CALABASH GOURD

Early Green Skin, Long large.

CANTALOUPE

Supermarket, Hales Best Jumbo, Yellow, Jade, Green Jade.

CARROT

New Kuroda, Royal Cross (cool season), Ideal.

CAULIFLOWER

Early Market (cool season), Summer Crown (cool season).

CELERY

Tall Utah, Cornell.

CHINESE CABBAGE

Hamamedore (cool season), Tropical Delight, Tropical Pride.

CHINESE RADISH

40 Days, Mino Early Sakata Imp. No. 1.

CORN-ON-THE-COB

Super Sweet, U.S.D.A. 34.

CUCUMBER

Dream Green, Sky Green, New Market No. 2.

EDIBLE COWPEA

Mississipi Silverskin, Pinkeye Purple Hill.

EGGPLANT

Farcis, Muktakeshi, Slice Rite No. 23, Ping Tong Long, Kurume long (Red Soil).

HOT PEPPER

Hungarian Yellow Wax, Passion, Pretty Red, Long Horn.

KOHL RABI

White Vienna, Grand Duke.

LETTUCE

Mignonette Bronze, Mignonette Green (cool season); Minetto, Salad Bowl.

LONG YARD BEAN

Extra long Black Seed, Kaossiung No. 1, Green Pod.

MELON

Pickling.

POLE BEANS

Witza, Lazy Housewife, Jade, Hawaiian climbing, Kentucky Wonder Flat Pod, Dade

PUMPKIN

Phoenix, Papaya type.

RADISH

Comet. French Breakfast, Comet.

SNAKE GOURD

SPINACH

White Round leaf Amaranth, Water Convolvulus large long.

SWEET PEPPER-CAPSICUM

Pluto, Neptune, H.A.E.S. 74 (for red soil).

TOMATO

U.H.N. 52 (sandy soil, cool season); U.H.N. 11 (sandy soil, hot season), U.H.N. 69 (sandy soil, hot season), All soils: Big Red, Apple, Canner, Creeper, F6 N8. 48, F6 No. 10.

WATERMELON

Sweet Carnival, Sugar Baby, Rich Bomb, Beauty Venus.

ZUCCHINI

Blackjack.

When buying seeds at the Ministry of Agriculutre's Stores, do check whether the varieties are non-hybrids (i.e. seeds can be collected) or whether varieties are hybrids (packets marked F1 hybrids in which case seeds must not be collected for replanting). Varieties not marked cool or hot season can be grown.

July 17, 1981

OKRA

Suttons Improved Sawani, Kaohsiung No. 1, Clemon Spineless.

ONION

Yellow Granex, Tropicana Red hybrid.

PARSLEY

Champion Moss Curled, Paramount.

PATSAI

Canton Pak Choi, Gracious Green.

NEW VARIETIES SUITABLE FOR OUR CLIMATE

THE Grand'Anse Research Station has information on new varieties of vegetables that should grow well in Seychelles.

There are tomatoes with resistance to bacterial wilt and tolerance to hot conditions for all soils.

New non-hybrid tomato selections for red soils are 110 - F5 - 1, 110-F5-4 110-F5-29, 110-F5-37, 109-F5-10, 108-F5-48.

Non-hybrid tomato selections also available for sandy soil are Canner Star, Cracker, Apple, Big Red.

Seeds and plants are obtainable from the Grand'Anse Experimental Station and Extension Officers. Growers are asked to select their best plants and fruits for their own seed supply.

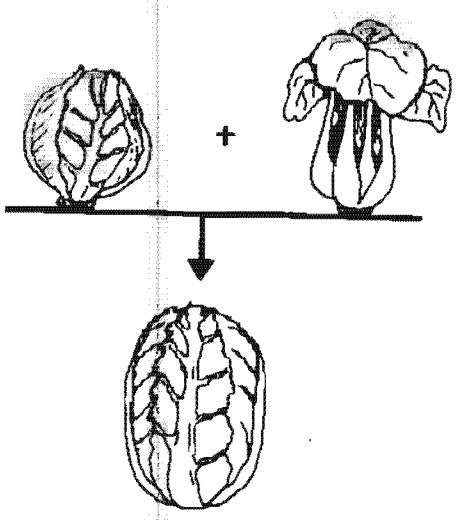
These tomatoes may wilt if mulching is not used. Use of mulch such as gazon trelle, elephant grass, cassi, is strongly recommended as it will keep the soil moist and reduce the activity of the bacteria.

The new vegetable Hakuran, an interspecific hybrid, has been developed by Dr Sadao Nishi of the Vegetable and Ornamental Crops Research Station, Tsu City, Japan.

They are easier to transplant, more resisant to hot or cold weather and also to soft rot than Chinese cabbage.

Head is rather similar shaped to Chinese cabbage, however it is sweet-tasted, tender, juicy and suitable for fresh use as cabbage. It grows to 1.5-2kg in weight.

Seeds will be received soon for testing.



Hakuran has features of both Chinese and Ordinary Cabbage.

March 7, 1981

GROW BETTER VEGETABLE SEEDLINGS FOR IMPROVED CROPS

THE crop you harvest can be no better than the seedling you begin with.

The production of healthy seedlings must begin with the selection of the right variety. The Ministry of Agriculture recommends specific varieties of many vegetable crops of many vegetable crops which have been locally tested and are well-adapted to the growing conditions of the islands (see April 17 Agrinews).

All seeds of a particular vegetable crop look alike, but the selection of the right variety for your growing conditions can make the difference between success or failure. Be sure to consult your extension agent concerning the right vegetable varieties for your conditions. The right vegetable variety is one which has the following characteristics:

- Well-adapted to the climatic conditions of the tropics and to your particular locality.
- Grows well in the soil type of your locality. Some varieties produce well in both sandy soils and red clay soils. Others grow well in only one soil type.
- Has resistance to major diseases. Not all recommended vegetable varieties are resistant to diseases, but the search for disease-resistant varieties is continuing. If a variety lacks resistance, growing it successfully may depend on the use of fungicides, which increases the cost of production.
- Gives a high yield and is early-maturing. The longer the crop is in the ground the greater is the exposure to insects and diseases which lower yield and reduce quality.
- Produces a quality product acceptable to the market. The difference in the quality between varieties of vegetables can be tremendous. Choose a variety which has proven acceptability on market.

CARE OF THE SEED :

Seed deteriorates quickly in the tropics due to high temperature and humidity. For best results use fresh seed in seal-foil packets. If you must store seed, choose a dry, cool place to store it.

Seed stored in a sealed container in a refrigerator will usually last from one planting season to the next, if the seed was relatively dry when it was stored.

The Ministry of Agriculture imports the best quality of seed available from countries specialising in seed production. However, the high temperature and humidity of the Seychelles make storage of seed for long periods very difficult, particularly seed like beans which deteriorate quickly.

For this reason the Ministry has tried to avoid ordering more seed than is needed, in order to avoid waste. However, when farmers demand more seed of a particular variety than was anticipated, there is often a delay in re-ordering from the supplier, because the produciton of seed is seasonal.

The Ministry is trying to improve the service to farmers by installing improved cooling facilities at the main store and better seed storage facilities at the extension offices.

SIMPLE SEED TEST :

A simple test of the germination of a seed sample requires no special equipment and can prevent a crop failure. If there is any doubt about the viability of the seed to be planted, simply place 10 seeds on a saucer covered with a few discs of newspaper and wet thoroughly.

Allow the excess water to drain off and cover the saucer containing the seed with another saucer of identical size. This creates a moist germination chamber in which the seed should germinate in a few days indoors at room temperature.

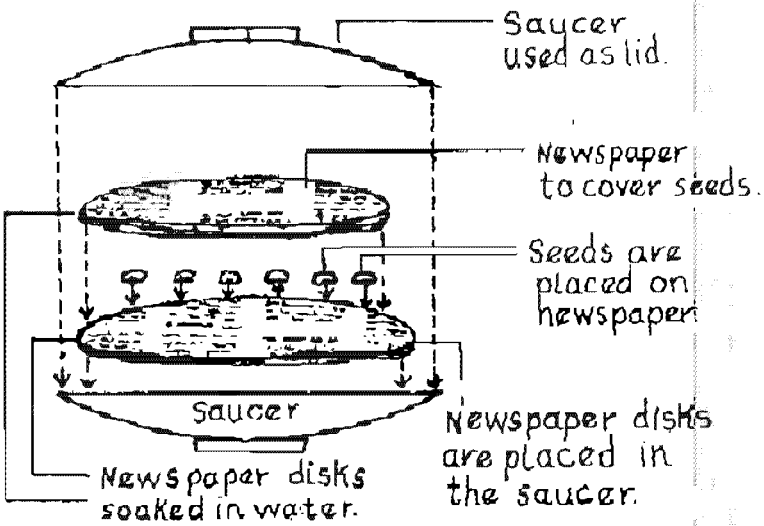
After a few days, open your home-made germinator and count the number of seeds which have germinated. Since you placed exactly 10 seeds in the germinator, the percentage germination equals the number germinated times 10. If you find that only 50 percent of the seeds germinated, for example, it will be necessary to double the normal order to get a good stand.

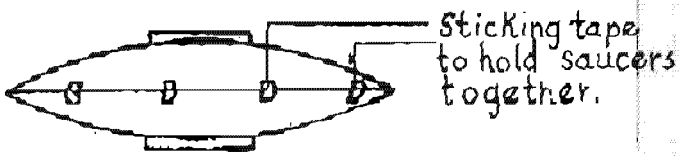
PREPARATION OF SEED BED :

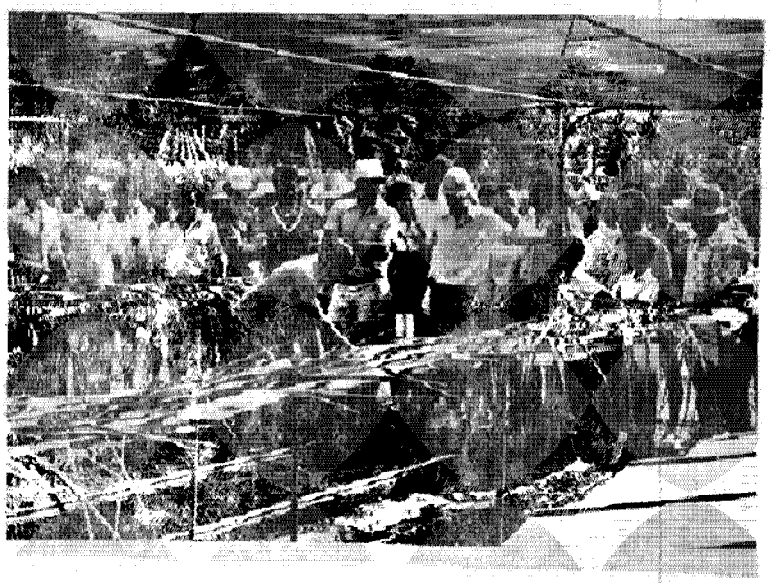
Even good, viable seed of the best vegetable varieties will not succeed if the seed-bed is not prepared properly. In the April 24 Agrinews, a mixture of soil, well rotted manure, peat and gravel was recommended. Well rotted coconut fibre can be substituted for peat according to the materials you have available. The important objective is to provide a good medium for root growth which is not too heavy. Sand or light gravel in the mixture gives better results than a heavy clay soil which is not easily penetrated by the young seedlings.

At the Grand'Anse Experimental Centre it was found that well-washed river sand in the seedbed and as a potting mixture gave much better results than sand taken from near the shoreline. Soil tests showed that the "river sand" was less alkaline and much lower in calcium carbonate, which in large quantities can inhibit the growth of the young seedlings.

CONSTRUCTION OF A GERMINATOR.







Coconut leaves, placed on the plant bed prevent drying out during seed germination.

SOWING :

When the right variety is selected and the seedbed is well prepared, you are ready to sow the seeds. The technique of sowing by hand is simple but very important. Seeds sown deeper than the recommended depth of 1 cm may give poor stands or never emerge at all. Sowing too thickly wastes valuable seed and adds to the work of thinning.

After sowing at the proper, depth in rows 10 cm apart, cover the seed with a light mixture of soil and sand. Water thoroughly but avoid over-watering which can cause rotting of the seed. Placing gunny bags or coconut leaves on top of the seedbed until germination will help prevent drying.

It is common practice to shade young seedlings against direct sunlight and hard driving rains. Coconut leaves, ferns or shade cloth can all serve to protect the young seedlings. However, vegetable seedlings should not be over-shaded.

The seedlings of crops like cabbage and tomatoes, which grow best in full sunlight, should be exposed to full sunlight in the seedbed as soon as it is practical to do so. This practice of removing shade gradually until the seedlings are exposed to full sunlight is known as the "hardening off".

Excessive shading producing seedlings are very susceptible to attack by diseases and insects and must be protected in the seedbed. Disease can easily be spread from one plant to another in the seed and the cost is not so great because the area of the seed-bed is relatively small. The young seedlings should be protected against insects and diseases by regular spraying.

DISEASE AND INSECT CONTROL:

Good quality seed should be free of diseases, but young seedlings are very susceptible to attack by diseases and insects and must be protected in the seedbed. Disease can easily be spread from one plant to another in the seedbed because of the concentration of seedlings in a small area. "Damping off" is the name given to the diseases which kill young seedlings at the time of germination.

It is a good practice to disinfect the soil before sowing and the cost is not so great because the area of the seedbed is relatively small. The young seedlings should be protected against insects and diseases by regular spraying. Consult your extension agent for the right pesticide and the correct rate for the particular crop you are growing.

MAKE SURE YOU GROW THE BEST VEGETABLES

THE land devoted presently to raising vegetables in Seychelles should meet the vegetable need in our diet. But although considerable progress has been made, there is still low productivity per hectare and low quality vegetables in the market, especially during the wet season.

This characteristic of our vegetable industry is attributed partly to adverse conditions during the north-west monsoon but mainly to poor cultural practices and limited knowledge in post-harvest handling.

Pest and disease control is a problem in most of the vegetable crops grown, in spite of the research findings. This is due partly to the poor implementation of recommended pest and disease control measures.

Recommended practices on vegetable production are aimed at increasing the vegetable supply in the market all the year round and also making available good quality vegetables.

After a planting site has been chosen, there are a number of practices the farmer must follow to ensure reasonably good growth of crops. The level of crop husbandry can usually be measured at harvest time in the form of quantity and quality of produce.

Usually, the site will not be ideally situated in all respects. A diversion ditch is sometimes necessary to prevent heavy rain from flooding the planting site. Trees may have to be removed to prevent competition from roots and shading.

Fencing may be needed to prevent intrusion by wandering animals and pilferers. More often than not, however, soil and water are the factors that most limit crop growing in Seychelles.

The best soil for cultivation is a well-drained, sandy loam high in organic matter. Such a soil is rare. However, it is possible to grow good crops of vegetables, fruits and root crops by special treatment of the heavy red earth and infertile sandy soils.

Most soils can be made better. There are the things you can do to make the soil better :-

- Cultivating.
- Soil improvement.
- Using fertiliser and manures.

First remove all useless plants and roots. If the soil is heavy deeper down, sub-soiling will help. It will provide a better tilth and drainage. When the ground is cleared, put on organic manure and then cultivate.

The red soil is very compact. It can be made lighter with compost and liming. Some chemical fertilisers can also make it hard. Rain or watering can sometimes make the top of the soil split, or dry into a hard crust.

This is bad for plants. Air cannot get into the soil; gases from the soil cannot get out. The hard crust squeezes around the stem of

the plant.

Sandy soils can be made heavier. It is best to use humus and we can do this with compost or with green manure. Add some nitrogen fertiliser before turning green manure under. The humus sticks around the grains of sand, forms lumps and these hold moisture well.

We must always take care to have enough humus in the soil. Each crop uses up some humus and we must replace it with each crop. If possible, we must try to build up more humus in the soil.

WATER -
IRRIGATION:

A good supply of water is vital to the growers. The following kinds of water are suitable for watering vegetable gardens.

Rain water is the best, it contains plenty of air.

Stream water is almost as good as rain water.

Water from pools and ponds. It is not as good as rain water or running water because things rot in pools and ponds. The water is stagnant. Do not use water if it looks bad or stinks.

Water from wells has little air in it. It is also often cold. It is better to put such water in an open tank or a reservoir. The water will get warmer in the open tank and will take up some air.

WAYS OF WATERING:

We can water a small garden with a watering can. A better way is to use a hose with a nozzle at the end. We can also fit the hoses with sprinklers, swinging or rotating. The lay-out of the garden also matters. We must use different way of watering for different kinds of grounds. Different crops also need different ways of watering.

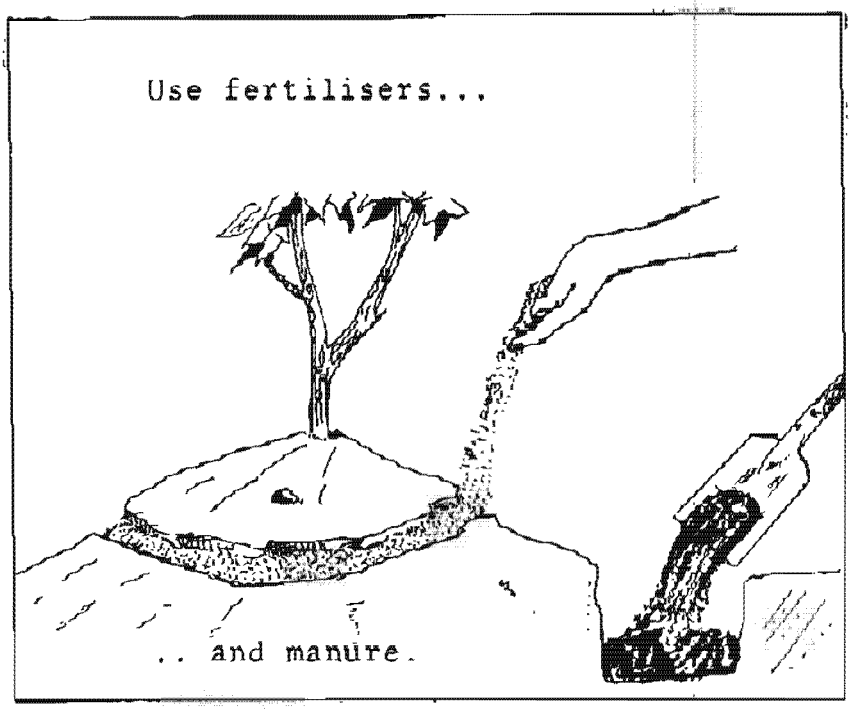
We can pump the water into the garden and spread it under pressure. It is best to ask an expert before you buy a pumping plant for your garden. Sprinklers make water fall like rain. It does not damage fully grown crops. Hardy crops are also safe.

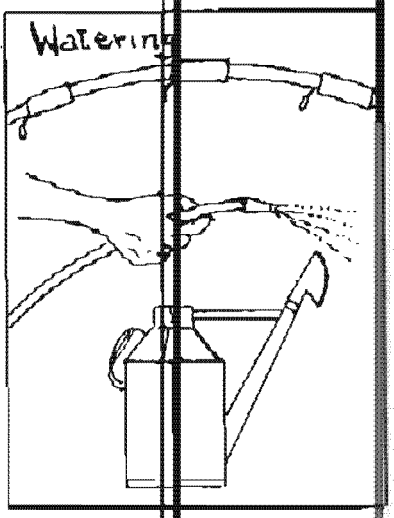
For all such plants use sprinklers. They have high output under pressure, for such sprinklers cover a large area.

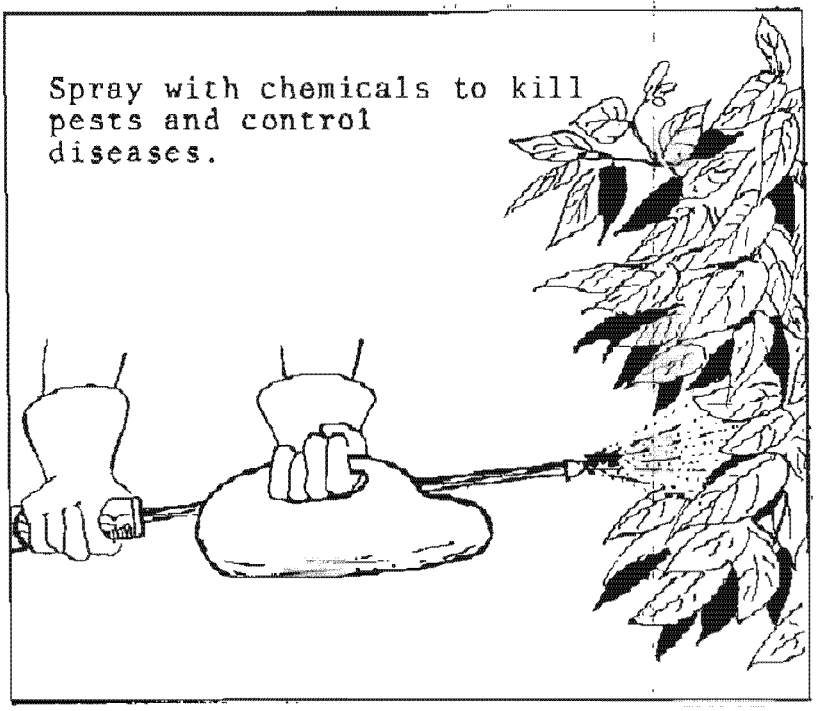
Sprinklers are not so good for plants such as tomatoes and watermelon. These plants need moisture from the soil. The parts of the plants which are above the ground are better kept dry.

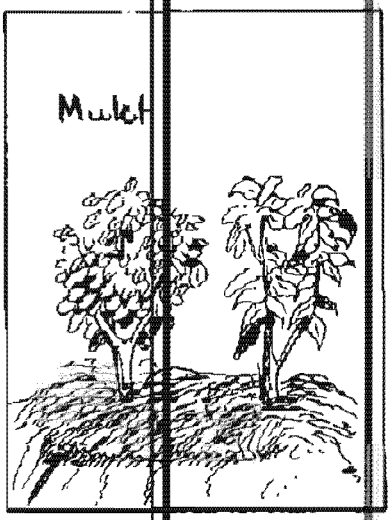
Sometimes we must spray plants with chemicals. We must use chemical sprays for killing pests and controlling diseases. Then we must be careful with sprinklers. Water from the sprinklers must not wash off the chemicals.

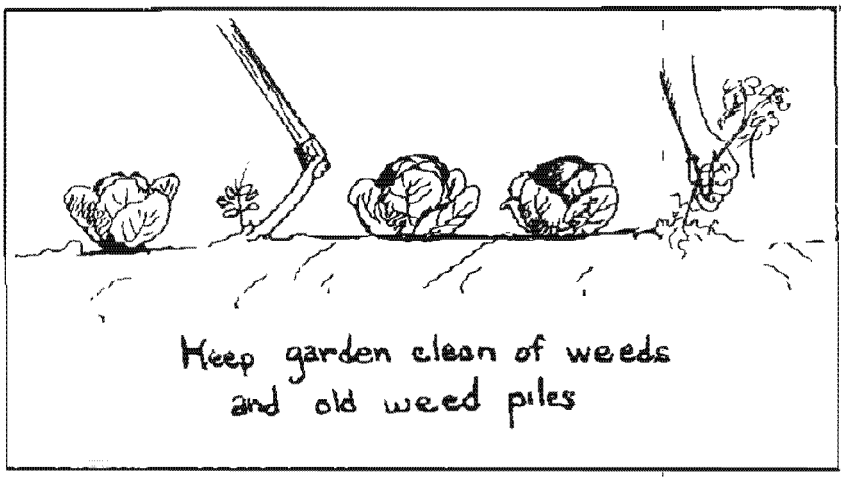
Apart from soil and water requirement, there is a whole chain of activities, i.e. from sowing to harvest that must be followed by the grower.


Use fertilisers...
.. and manure.


Watering


Spray with chemicals to kill
pests and control
diseases.


Mulch


Keep garden clean of weeds
and old weed piles

KNOW WHEN AND HOW TO HARVEST YOUR CROPS

ALL too often, farmers do not pay great attention, as to when they harvest their crops and how they go about doing it. After spending considerable time and effort in choosing a suitable variety and using the correct cultural techques, they tend to forget that harvesting techniques are just as important as choosing a suitable variety and using the correct cultural methods, and as a result, they provide poor quality produce on the market and also their crop yield is not often as high as it should be.

TOMATOES:

It is important to know exactly when to pick your tomatoes. Premature picking will lead to :

1. Less of flavour and taste.
2. Poor appearance - colour and shape.
3. On ripening, your tomatoes will not have its natural colour.

Likewise, delayed harvest results in :

1. Difficulty in handling because the fruits are soft and can easily be damaged especially while transporting.
2. Your fruits will have a short shelf life.
3. You will get a reduction in your total yield since the plant will use a lot of its food ripening the tomatoes instead of producing more flowers, thus more fruits.

As a guide, you should pick your tomatoes just as the fruits start to turn yellow. This is specially true for farmers living on Praslin and whose fruits will take two to three days before they arrive at the market. Farmers living in close proximity to the market can pick their fruits at a more advanced stage.

BEANS, CUCUMBERS, CHILIES:

Farmers in Seychelles tend to think that the bigger (heavier) a particular fruit is, the more money they will get in the end. This is not often true, specially in the beans, cucumbers and chilies.

1. If you do not harvest your beans, cucumbers and chilies at the right size or weight, then you will get a reduction in your total yield, specially if you delay your harvest.
2. Oversize cucumbers will do more damage to your plants, because they are heavy and your plant will not be able to support the weight. Thus you will get only one crop, after which your plant will die. This is true if you are using props as support and not letting your plant grow on the soil surface.

As a guide, harvest these three crops, when they are still green, soft and the seeds are not fully developed inside the fruit. Consumers would like to have a fruit (in this case, cucumbers) in which the whole fruit is edible, including the skin and immature seeds.

In all cases, when harvesting, do not damage your plants by breaking branches and flowers. Use appropriate tools to harvest your crop.

HARVESTING TIME:

It is best to harvest your crop when it is not too hot; i.e. early morning or late evening. In the case of lettuce, Chinese cabbage and other leafy vegetables, harvesting should be done in the morning, on the same day you are going to sell your crop. This will ensure that your product will still be fresh, with a good appearance when it arrives at the market.

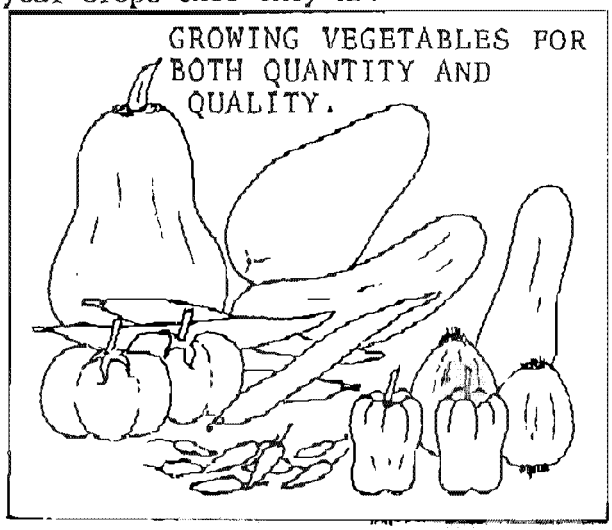
HARVESTING ROOT CROPS:

When harvesting root crops such as cassava, yam and sweet potatoes, it is best to avoid damaging these tubers, because any damaged part will encourage rotting of that particular tuber. So if you are using a sharp harvesting tool, such as a fork, be very careful.

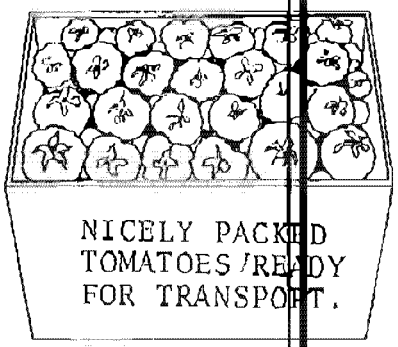
With sweet potatoes, contrary to farmers' belief, it is best to harvest when the soil is dry.

With yam if any damage is done to the tuber(s) when harvesting, use lime to threat the damaged part.

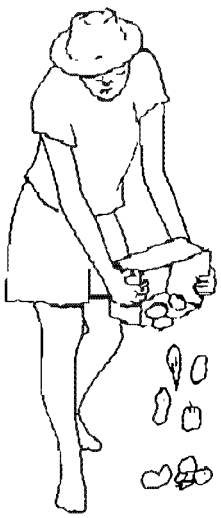
Next week we will tell you how you should handle, store and transport your crops once they have been harvested.



GROWING VEGETABLES FOR BOTH QUANTITY AND QUALITY.



NICELY PACKED TOMATOES READY FOR TRANSPORT.



THIS FARMER DOES NOT CARE HOW HE HANDLES HIS FARM PRODUCE ONCE HARVESTED.

August 22, 1981

MANAGING VEGETABLE CROPS FOR GREATER YIELDS

LAST WEEK'S article gave methods for the production of healthy, vigorous seedlings ready to transplant. However, not all vegetable crops are transplanted. Some can be grown successfully by direct seedling in the field.

Others survive transplanting with difficulty. Vegetable crops can be divided into three groups according to the success with which they can be transplanted.

Group I - successfully transplanted :

Tomatoes, cabbage, egg-plant (bringel), sweet pepper (capsicum), cauliflower.

Group II - Transplanted with special care :

Lettuce, onion (seedling), Chinese cabbage.

Group III - transplanted with difficulty better to direct seed in field :

Bean, carrot, beetroot, asparagus, sweet corn, cucumber, squash, pumpkin, radish.

For crops which can be successfully transplanted, there are a number of advantages :

- Transplanting permits earlier planting in the field and a shorter growing season.
- Transplanting allows the selection of only the most vigorous and healthy plants for planting in the field.
- Transplants can be established in a soil where direct field sowing, especially of small seeds, would be unlikely to succeed.
- A crop can be established more quickly from transplants than with seed sown directly in the field.
- Transplanting saves valuable seed.
- Transplanting increases root branching of many vegetable seedlings.

CARE OF THE TRANSPLANT:

Transplanting is more likely to succeed if special attention is given to the young seedling at the time of transplanting. Seedlings grown in pots, if available, or in small plastic bags can be transplanted without greatly disturbing the root system, because a protective ball of earth is retained with the young transplant.

Watering the transplant as it is placed in the soil will increase changes of survival. However, if a dilute solution of a fertiliser known as "starter solution" is used instead of water at the time of transplanting, the young seedlings will grow quickly and yields will increase.

A good starter solution can be made by mixing 1 pound of Nitrophoska in 12 gallons of water, one half pint of this solution placed around the plant as it is set in the field usually results in faster growth and higher yields.

Shading immediately after transplanting can be critical to the survival of young seedlings. Local materials like palm leaves or ferns can be used, but shade should only be used until the transplant is established in the soil, usually requiring only a few days.

Thereafter, the palm leaves or other shading material should be gradually removed. If shade is kept over the young seedlings too long, tall and weak plants and reduced yields will result.

SOIL PREPARATIONS FOR TRANSPLANTING:

Success in transplanting plants in the field will depend on the preparation of the soil as well as the care and condition of the seedlings. Healthy, vigorous seedlings transplanted into a hard, lumpy soil in poor physical condition, with insufficient nutrients are likely to be seriously set back in growth or to become weak and die.

Add as much compost and farmyard manure to the soil as you have available and work it in the soil with a plough or hoe. If farmyard manure is used, be sure it is well-rotted. Fresh manure and manure which is often full of undecayed grass and stalks adds little in the way of nutrients to the soil and can often be detrimental.

However, fresh manure and crop refuse decomposes quickly in the tropics, and if held for a few months before use, can be a valuable source of compost and nutrients.

CARE OF CROP IN THE FIELD:

Watering and irrigation

Even though Mahé, and to lesser extent Praslin and La Digue receive enough total rainfall to produce most vegetable crops, insufficient water is often the most serious factor limiting yields. Although many farmers still irrigate by hand or with a hose-pipe, there are a number of relatively simple and inexpensive irrigation systems available.

The Ministry of Agriculture has tried various irrigation systems in an effort to find one which is effective but not too expensive for small farmers. Sprinkler systems require large, expensive pumps, pipes and connections. Sprinklers have the added disadvantage of wetting the foliage from above, which can actually spread disease.

The most effective and economical system in use in Seychelles is the drip system, which supplies water right to the root zone without wetting the foliage. Drip systems require only low pressure to force water slowly through the small holes in the long polyethylene dripper lines.

However, special care must be taken to use a relatively clean water source to prevent clogging of the system. A simple filter will also help keep the drip irrigation system functioning. The Ministry can provide farmers interested in drip irrigation with information on how to install and use the system.

FERTILISER USE IN THE FIELD

If you have followed the recommendation of applying generous quantities of compost and farmyard manure to the soil, some nutrients will already be available to the plants. However, manure does not contain enough of all the nutrients needed for plant growth, so adding a complete fertiliser like Nitrophoska will increase yield. Single superphosphate is needed in some soils, and must be applied before planting to be effective.

After incorporating the compost and manure in the soil, apply a complete fertiliser as a basal dressing. The April 24 Agrinews article recommended 20 gms per sq. metre of Nitrophoska and 10 grams of superphosphate. However, you should consult your extension agent for recommendations for a particular crop.

Nitrogen fertilisers, like ammonium sulphate or calcium nitrate, should be applied at planting and again after about six weeks for most crops. The reason for using split applications of a nitrogen fertiliser is that it is very soluble and easily washed out of the soil.

Since vegetable crops vary greatly in their nutrient requirements, you should consult your extension agent on fertiliser recommendations for a particular crop.

Land preparation traditional methods. Ridges improve drainage and facilitate cultivation of root and vegetable crops.

Transplanting allows the selection of only the most vigorous and healthy plants.

June 12, 1982

WEEDS DECREASE YOUR YIELD

"We kill the weeds-you reap the profits". That is the slogan to remember when using herbicides such as ROUNDUP.

Roundup is a post-emergence herbicide. It is absorbed by the leaves and then travels down through the stem to kill the roots thus offering complete control over perennial weeds and annual grasses including onion grass (herbe oignon), couch (calume) and broad-leaf weeds-Jean Robert, bonbon plume, etc.

Slash weeds and 7-10 days after, spray regrowth at the rate of 3 tablespoons per gallon of water.

For easier weeds such as gazon trelle, use the cheaper herbicide GRAMOXONE - spray at the rate of 1 tablespoon per gallon of water.

These herbicides give you :

. Effective control over nutrient-robbing weeds;

. Good crop yield increases;

. Certain control of insects and diseases;

. Substantial labour savings;

. Far more profit.

They are recommended for use in fruit orchards and with vegetable and root crops. When spraying, protect your crop plants to avoid damage preferably using a shield made of galvanised iron.

Round up herbicide helps you get bigger crop yields.

February 28, 1981

ARE YOUR YIELDS AND PROFITS BEING PULLED DOWN?

RESPONSE to fertilisers will be reduced if there are other factors holding down crop yields. For example, weeds may be reducing crop growth. Control all the limiting factors possible.

Fertilisers are one of the most important factors that can contribute to increased productivity. But fertiliser alone will not solve all crop-production problems.

Other factors or practices can limit and affect crop yields:

1 Sufficient moisture (use irrigation where available, or cover the soil with mulch).

2 Proper soil tillage to prepare the seed bed.

3 Crop varieties (select high yielders).

4 Seeding rate - (a) plants per hectare; (b) spacing between plants or rows.

5 Weeds (use hoeing, cultivation, or chemical control).

6 Crop diseases (use resistant crops or use fungicides).

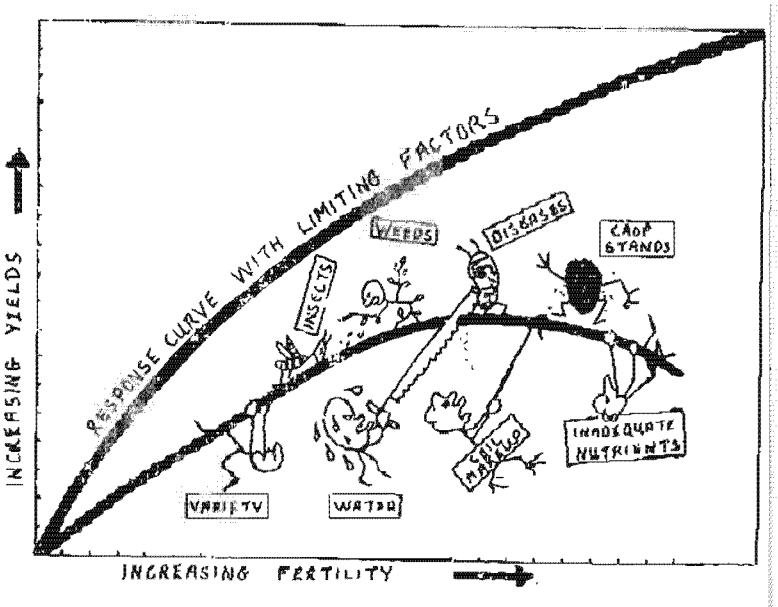
7 Crop insect pests (use proper chemicals when available).

8 Use crop rotations that will reduce diseases, weeds, and insects.

9 Adequate drainage (take away excess water by surface or tile drainage).

10 Soil structure (improve through crop rotation, temporary grassland, or manure).

11 Soil organic matter (maintain through rotations or bulky manure).



March 14, 1981

GROWING SPECIAL CROPS, CONT'D

B FRUITS

1 Together We Can Reap the Fruits of Success

2 Know Your Fruits

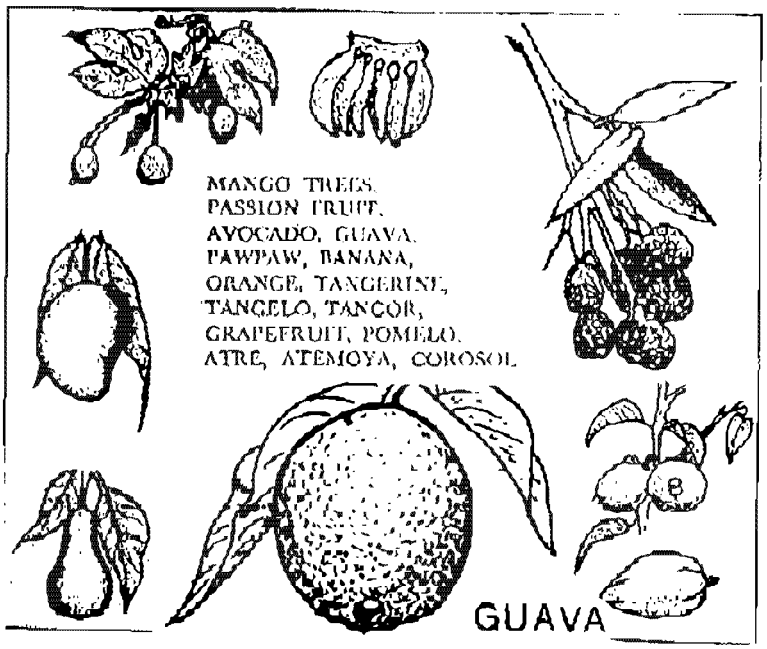
3 Passion Fruit - Great Potential But It's Badly Neglected

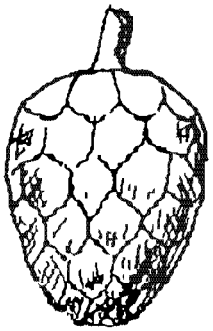
4 Close-Planting Pineapples for a Better Yield

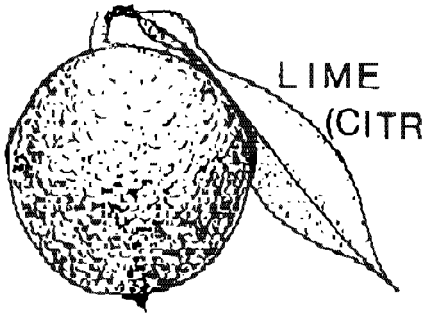
5 Now We Can All Grow Beautiful Tasty Bananas

6 Pruning Fruit Trees Gives a Better Yield

7 How to Plant and Fertilise Fruit Trees


MANGO TREES,
PASSION FRUIT,
AVOCADO, GUAVA,
PAWPAW, BANANA,
ORANGE, TANGERINE,
TANGELO, TANGOR,
GRAPEFRUIT, POMELO,
ATRE, ATEMOYA, COROSOL
GUAVA


BULLOCK'S
HEART


LIME
(CITRUS)

TOGETHER WE CAN REAP THE FRUITS OF SUCCESS

SEYCHELLES is potentially a highly productive area of tropical fruits due to its particular agro-climatic conditions. To meet increasing demands for fruits, Government has directed funds to our Research Centre and production areas in the development of fruit crops.

Fruits have been very much neglected in Seychelles. One limiting factor in fruit research and development was minimum funding, inadequate facilities and staff.

Fruit production is encouraged to reduce imports; diversify crop production and reduce imports of canned fruits and juices); improve the vitamin status of the population with cheaper local produce and encourage both exports and fresh juice consumption by the young generation.

To meet these objectives, we are faced with two limiting factors :

Certain fruits are plagued with serious pests and diseases; tristeza virus of citrus, bacterial and fungi diseases and fruit fly attacks. As well as sound management techniques, it is imperative that the grower is well educated on fruit production as this can help to minimise the high costs of pest control measures.

Setting up an orchard is a costly and long-term investment. It is wise to integrate tree crops with annual and biennial fruits such as pineapple and pawpaws and even vegetable and livestock production.

CLIMATE

Our climate is "lowland tropical" with relatively high day temperatures and warm nights. Our high humidity has the advantage of reducing water loss but also provides good conditions for spread of plant diseases and vigorous growth of weeds, which implies frequent application of control measures.

We also have at altitude cooler areas which make it possible to grow sub-tropical crops such as atemoya and lychee. The use of introduced cultivars at altitude can contribute to break the seasonality and thus promote out-of-season varieties and extend the harvesting period.

RESEARCH WORK

A good selection of varieties is a key to a good orchard, which no doubt shows the importance of an experimental programme. In 1978, an active programme was launched in the introduction and testing of new cultivars from research centres and institutes all over the tropics. These varieties are tested at sea-level and at 350 metres above sea level.

As varieties prove to be adaptable to our conditions, research proceeds on selection criteria, sceening superior cultivars, propagation methods, cultural requirements, disease and pest control, harvesting and storage.

Research is also anticipated on marketing in future. In which way should we tackle our improvement programme of tropical fruit crops? We must first distinguish fruits intended for the local market and that for processing.

Requirement for local consumption and anticipated export markets may also differ. Our aim is to develop from existing local sources and introductions a collection of varieties for evaluation, selection and eventual distribution to fruit growers.

We have already located some superior fruit species such as mangoes and avocadoes and these have been bulked up.

With relatively small islands to work with, as a beginning, great progress can made in a short time. Many fruits have proved to be well adapted. Most of our well-known fruits grown on a small scale such as bananas, mangoes, citrus (limes, oranges, mandarines, grapefruits) pineapples, pawpaws, passion fruit, anonas (sugar apple, bullock's heart, soursop, cherimolia) avocado and breadfruit show promise of expansion in the future.

Various other fruits seen only as isolated trees which could also expand in the future are: lychee, mangosteen, guava, golden apple, jackfruit, pomelos, sapote, carambola and sapodilla.

Other minor fruits which could be developed in the future include tamarind, starapple, atemoya, durian, pomegranate, grapes, jambu (jamalaque), jamun (jamblong), rose apple (jambrosa), macadamia, lansat, mamey sapote, Malay apple, loquat, acerola (Barbados cherry) and canistel.

Adaption is not considered to be a limiting factor since most of the above-mentioned fruits occur as isolated trees or in the Botanical Gardens.

However, species such as mamey sapote, canistel, durian, star apple, atemoya, srinark wax jambu, langsat, namtansai, wanmaprong, which are of excellent quality, are still unknown in Seychelles.

As fruits become known, better varieties will be introduced. In the case of minor fruits, it must be stressed, though, that in order to make an impact, we feel we should put more emphasis on a smaller number, which show more promise such as mangosteen, rambutan, star apple, pomelo, mamey sapote, atemoya, jumbu and canistel.

Our aim is to obtain germ plasm of all the species in the form of seeds, cuttings, marcotts, grafted trees and to multiply them at out station. At present, we have a good stock of fruit plants for sale to growers.

A National Fruit Nursery at Grand'Anse coupled with publicity through the local media and video, publications and technical pamphlets are the current techniques envisaged. It will also be necessary to advertise new fruits and acquaint the public with these fruits via the local news media.

Progress has already been made with some fruit species. Further activities will provide a continuous assessment of applied research over a ten year programme. I would like to comment on progress made in connection with varietal charecteristics, production, quality and resistence to pests and diseases of some species.

Here are the introductions made to date in addition to local selections.

PASSION FRUIT

It provides a good example of a newly introduced fruit which has gained popularity. Release is being made of two yellows and one yellow X purple to growers. The fruit fly problem is under control with the use of traps containing fruit fly attractant and Dipterex insecticide.

PAWPAW

Several improved cultivars as regards quality and production are being sold to growers - Solo Sunrise, KW 20, Tainung No. 1, and Co. 1. The best commercial varieties are Tainung No. 1 (hybrid). Solo Sunrise and Coimbatore 1.

MANGO

Four-year-old grafted trees of an introduced cultivar bearing two crops a year and of excellent quality are showing great promise. In addition to our best local varieties, seven single trees of excellent quality have been located and named Nyasa, Rouge, Sansfil, Lisse, Raie, Grosse Maison, Fine.

Spraying of potassium nitrate has been shown to induce flowering on several non-bearing trees. By spraying potassium nitrate in April and September we can obtain two crops - i.e. July and December. We have to date a collection of over 200 varieties under evaluation.

Local cultivars are known to be shy bearers at altitude. A spray programme will be started soon to assess the response of local and introduced cultivars to spraying at 350m above sea level and screen out-of-season varieties. Programmed spraying with fungicides including copper-based fungicides and insecticides is a must to control anthracnose and mango hoppers, to obtain good yield and high quality fruits.

AVOCADO

Judging from results obtained in other tropical countries, we should be able to spread the harvesting period of avocado at least to six months with the 40 introduced cultivars. These include West Indian X Guatemalan, Guatemalan X Mexican hybrids. Growing at altitude can also help to extend the fruiting season.

LIMES

Although our local lime (W. Indian or Mexican) is well adapted and productive under our conditions, it is susceptible to tristezia virus which could become serious. The superior quality and tolerance to tristezia should popularise the newly introduced Tahitian lime which has a thin skin and few seeds.

MANDARINS AND ORANGES

Of the improved 30 introduced mandarins and 12 oranges, there are early, normal and late varieties. Due to their different flowering habits, these should contribute in spreading the harvesting season.

The well known rough lemon rootstock has been discarded and replaced by superior rootstocks which give better quality fruits, higher sugar levels and acid content and better tolerance to diseases. We now recommend different rootstocks for sandy and red soils.

GRAPEFRUIT

GRAPEFRUIT

The bitter taste of the grapefruit does not appeal to everyone. Hybrids such as the tangors (tangerine/orange hybrid) and tangelos (tangerine/pomelo hybrid), which are very juicy and well flavoured, should become popular.

POMELOS

Sweet-type pomelos and hybrids are being tested in contrast to our local pomelo which is somewhat bitter.

ATEMAYO

A hybrid of cherimolia and atre (custard apple) of excellent quality is promising at altitude.

BANANAS

Several of the 28 new varieties have already fruited, three of which - Valery Robusta and Gran Nain - have good resistance to Panama disease.

PINEAPPLES

With the use of ethrel or calcium carbide, it is possible to control the fruiting period.

GUAVA

In addition to our local yellow and pink, some improved guavas such as Pink Indian, Ka Hua Kula, Beaumont, Processing type, Allabad Safeda and Lucknow 49 have been released to growers. A few varieties which show good resistance to attack by the chaffer beetle, have been screened. It is possible to obtain two good guava crops per year by spraying with urea.

The Grand'Anse Experimental Station programme is geared to the prospects of making fruit production a realityh and success in Seychelles.

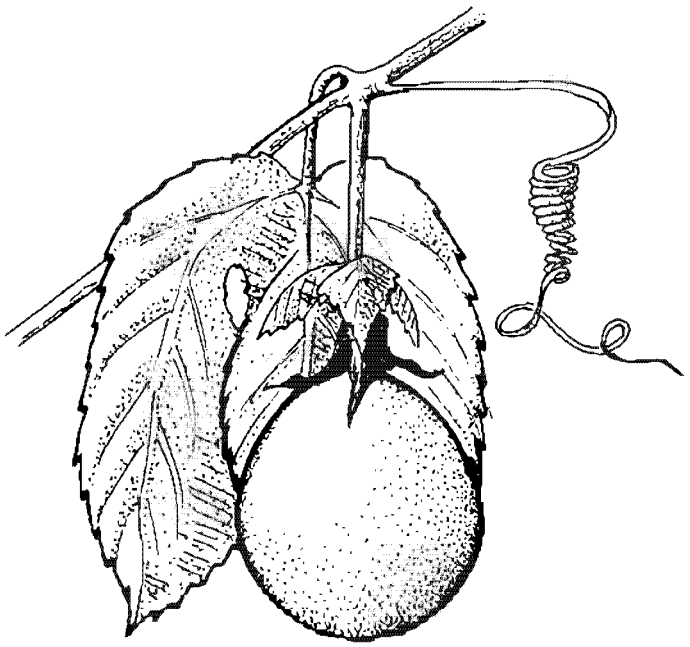
We are anxious to progress so that the "fruits" of this programme can be reaped soon.

A lot of research has been carried out in developed countries in the culture of fruits such as mango, avocado, guava and citrus.

These fruits are utilised fresh and as processed products. Obviously, the developing countries must make good use of this available technology.

It must not be forgotten that the development of new fruits takes a great deal of team effort. Co-ordinated research in culture, harvesting, handling, transport and processing is important for the establishment of a viable fruit industry.

This can be done by a cooperative effort between everyone involved and thus should all form part of a Seychelles National Fruit Programme.



Passion fruit - one of the most popular of introduced fruits in Seychelles.

April 4, 1982

KNOW YOUR FRUITS

PAWPAW

1. Germination : Preferably put seeds in warm water for two days before sowing.

2. Area : Sloping ground and on the flat. It must not be planted in a depression.

3. Nursery : Transplant seedling to P.V.C. plastic bag (10 x 8 cm) filled with good soil mixture and well-rotted compost.

   Varieties : Tainung No.1 and Solo Sunrise. Put one seedling per bag. These are hermaphrodite i.e. male and female flower on the same plant.

   Variety Co. 1 Put two seedlings per bag. Male and female flowers borne separately.

4. Culture : Prepare mounds for planting. Within row spacing, 300 cm. Apply farmyard manure and Nitrophoska to the planting hole.

5. Fertilizer : Well rotted compost 5 tons/acre. Additional fertilizer : 3 - 4 split doses per year. Apply fertilizer 15 cm round the plant.

Time	Nitrophoska/ Plant
6 months	0.25 kg.
6-12 months	1 kg.
1-2 years	2 kg.
over 2 years	3 kg.

6. Irrigation : At least one week good watering per week.

7. Weeding : From planting to six months - preferably remove weeds by hand. If Gramoxone is used, use a shield when spraying.

   Roundup : 0.75 litre/acre

   Gramoxone 0.50 litre/acre. Use mulch round the plant.

8. Re-planting : After 3-4 years, plants become old. Pull them out but before re-planting, apply Nemacur to control build-up of nematodes.

9. Diseases, Pests, and Disorders :

Anthracnose : Captam 50%. Phytophtora blight : Difolatan.

Powdery mildew : Karathane or sulphur.

Root rot: Virgin soil is the best control method. On replant sites, use Dexon.

Deformed fruit: Use 5-10 kgs. Borax mixed with fertilizer before planting.

Red spider and rust mite: Use combination of sulphur and Kelthane.

Snails: Around seedlings, plants and growing trees, use Slugit pellets.

10. Harvest: The first fruits will ripen 6-8 months after planting. Avoid bruising fruits at harvest. Dried Mazon trelle is excellent for protection of fruits during transport.

N.B. Refer to pesticide booklet for details of chemicals and dosages.

MANGO

1. Planting material: Use grafted trees only.

Rootstocks used: Sabre, Maison Rouge, Blanc.

2. Area: Adapted to a wide range of soils except for sandy soils. The soil must be deep and not waterlogged.

3. Nursery: Grafted plants in P.V.C. bags must be watered at least twice a week, sprayed monthly and fertilized with Nitrophoska and diluted slurry.

Best local varieties: Dophine, Rouge, Lisse, Fine, Ampalavie, Maison Rouge, Nyasa, Alphonso, Torche.

Introduced varieties: Rose, Neelum, Malgoa, Bangalora, Neeluddin, Neelgoa, Swarna Jehangir, Au Rumani, Mallika.

Top working: Mature trees of poor quality mango should be topworked with improved varieties.

4. Culture: Spacing: within the row, 20 ft. Between row.

   Planting out: Holes must be well prepared and plant when trees are nine months old. Keep area round the tree weed-free and well mulched.

   Spread 15-20 kgs of manure per year round each tree, during the rains.

   Fertilizer: 1 year - 1 kg; 2nd year - 2kg; 3rd year - 3 kg; 4th year - 4 kg; 5th year - 4 kgs. onwards.

5. Irrigation: Before the trees begin to bear, irrigate at least every week during the dry periods. After this, they should rely on the rains.

6. Formative pruning: Cut the main shoot at 3 ft and choose wide-angled branches to make the frame of the tree. Remove all shoots below.

7. Bearing: At four years old, a reasonable crop is obtained . Use potassium nitrate to induce two crops per year.

8. Routine spray: Spray Ultracide (insecticide) and copper oxychloride (fungicide) monthly. Spray Bayleton (against powdery mildew as soon as flower buds appear until fruit set. Copper oxychloride gives good control of anthracnose.

9. Harvest: Remove fruits from the tree with 5 cm of stalk and handle gently. Wash fruits in cold water to remove gum and dirt and grade.

AVOCADO

THE MAIN types of avocadoes are : West Indian, Guatemalan, Mexican, West Indian-Guatemalan hybrids and Guatemalan-Mexican hybrids. Our local avocadoes (purple and green) originate from the West Indies.

Material recommended 28 best local selections.

Rootstock used: Lula, Edrarol, Black Round. Introduced varieties which are under evaluation at sea-level and altitude should help to spread the harvesting season. Use only grafted plants.

Area: Level or slightly slopping land. There must be no waterlogging because of Phytophtera. Land must be well prepared.

Spacing: 8 cm x 8 cm.

Orchard management and maintenance: Trees should be kept healthy by application of fertilizer. Do not use a nitrate form of nitrogen fertilizer, hence do not use Nitrophoska. Preferably make use of single fertilizer: a combination of sulphate of ammonia, superphosphate and potassium sulphate (1 : 1: 1 mixture).

During the first year, apply 1/2 kg of fertilizer. Fertilize in three split applications. Apply 15 to 20 kgs of farmyard manure per year at the start of the rains and zinc sulphate as a foliar feed at the rate of two tablespoons per three gallons of water.

Diseases and Pests: The more predominant diseases are anthracnose, surface rot and phytophtora root rot. Copper sprays will control anthracnose.

Alliette controls phytophtora. It is sprayed every six months at the rate of two tablespoons per gallon of water. The most common pests are scales, thrips, beetles, and mites.

Thrips: Use Kilpest.
Scale: Use Ultracide.
Beetles: Use Kilpest or Carbaryl.
Mites: Use sulphur.

Harvesting: Unlike many fruits, avocadoes are never picked fully ripe on the tree, but must be picked mature green and allowed to ripen off the tree.

Flowering behaviour: All varieties can be placed in two groups. Group A and B. In commercial plantations, mix A types with B types to ensure good pollination. For home gardener in residential communities, there are enough trees of both A and B types to permit adequate cross pollination for fruit set. Contact your Extension Officer for more details about Group A and B flowering behaviour.

GUAVA

GUAVAS are permanent fruit trees and easy to grow.

Planting material: Preferably use budded plants or those propagated by cuttings to ensure "true-to-type" plants.

Varieties: Pink Indian Luckrow 49, Allahabad Safeda, Chong Sueng, Beaumont, Ka Hua, Elizabeth, Processing.

Area: Choose deep and drained land.

Spacing: 15 ft x 15 ft.

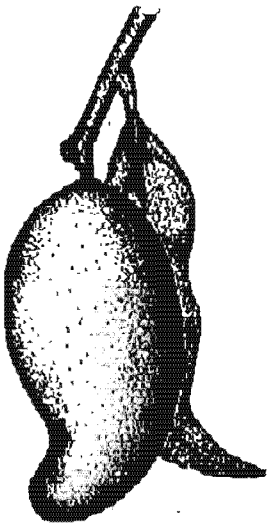
Orchard management and maintenance: Apply manure round the plants every year (15-20kgs). Plant out trees when 2-3 ft high, cut back the branches and stake. Ensure

good formative pruning and thereafter remove branches which are dead or diseased.

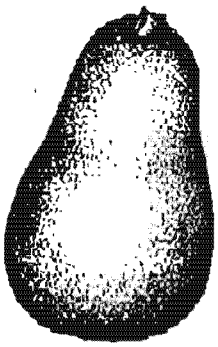
Always keep the area round each tree well mulched, always leave a space of 20 cm between the mulch and stem. The mulch will also protect dropping fruits from bruising. Apply Nitrophoska fertilizer with the rains.

Routine spray: Once a month with Decis or Thuricide to control the leaf-eating caterpillar. Apply separately copper fungicide and Ultracide to control other pests and diseases. Use fruit fly attractant and Dipterex to control fruit flies. Do not leave any rotting fruit on the ground.

Harvest: Trees start bearing 12-18 months after planting. Harvest as soon as the fruits show the slightest colour change.



Mango



Avocado

PASSION FRUIT - GREAT POTENTIAL BUT IT'S BADLY NEGLECTED

THE passion fruit is a relatively new fruit in Seychelles. It can now be seen growing next to homes and also providing shade.

Unfortunately, low yields have been obtained due to poor crop management.

It is a sun-loving plant which grows vigorously. If the growth is unchecked, over-crowding of the fruiting branches occurs and what's left is a great mass of branches and decaying leaves lying on top of each other, resulting in a sharp drop in yield.

Here are some cultural tips :

1. Variety : Hawaiian, local yellow.

2. Spacing : Vertical trellis - commercial scale planting. 3m. between rows 4m. between plants. Horizental trellis - small scale planting. 5m x 5m.

3. Use wooden or growing posts (glyricidia) 2.5m. high and 4" x 4" for support, spaced every 5 metres.

4. Treat the bottom of the post by burning and when still hot dip in used oil.

5. Run 12 G. galvanized wire at 1.2m and 2m above soil level.

6. The planting hole must be well prepared (see Agrinews, March 14).

7. Remove all side branches to the growing plant which is supported by a small wooden stake. At 1.2 metres high, prune and allow the growing lateral branch to run parallel and twine along the wire.

Allow the other vertical branch to climb higher and prune when it reaches the level of the other wire and follow same procedure.

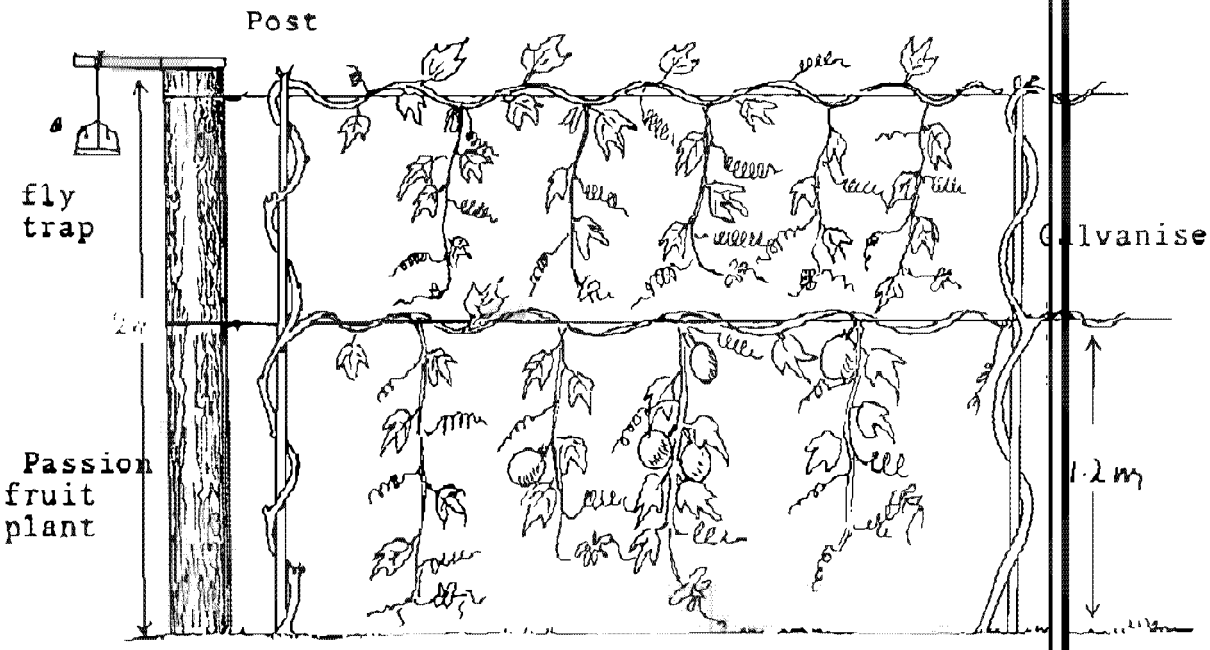
8. Apply 1/2 kg per plant of Nitrophoska four months after planting and 1 kg per plant nine months after planting. Thereafter 1.5 - 2 kg per plant per year. Fertiliser is the most important input to obtain high yields.

9. Water at least twice per week and mulch.

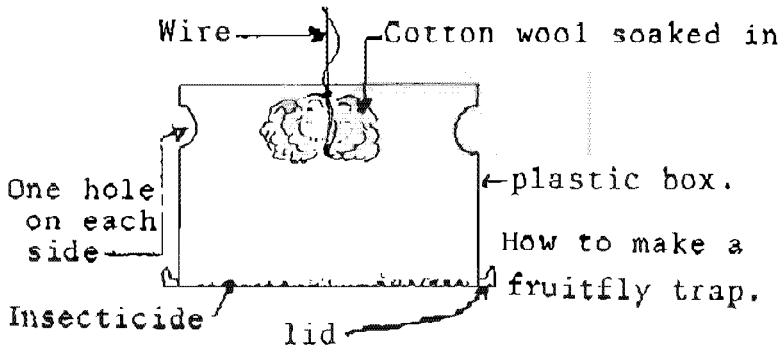
10. Apply 15 to 20 kg. of manure nine months after planting.

11. Use traps with TRIMEDLURE attractant and DIPTEREX insecticide to control fruit flies.

12. The fruiting branches must be well aerated. Remember, prune at least once a year.



The vertical trellis method of growing passion fruit.



March 28, 1981

CLOSE-PLANTING PINEAPPLES FOR A BETTER YIELD

ADOPT close-planting techniques and get more money per unit area...

CONVENTIONAL TECHNIQUE:

Spacing - 76m x 92 m. Plant density - 14,300 plants/ha.

Average yield - 4kg/plant. Total yield - 57,200 kg/ha.
Unit price - R 3/kg. Total revenue - R 171,600.

CLOSE-PLANTING TECHNIQUE:

Spacing - .35 m between plants and between three lines of a triple row; 1.2 m between triple rows.

Plant density - 40,000/ha. Average yield/plant - 2 kg.
Total yield - 80,000 kg.
Unit price - R 3.
Total revenue - R 240,000.

The above comparison shows that a pineapple grower can increase his revenue per hectare by as much as R 68,000 if he adopts the close-planting technique.

Of course there are other adavantages with the close-planting system :

Cultivation and other field operations are made easier because of the wide footpath.

Once the plants are established, weed growth will be checked considerably.

Sunburn of fruits is reduced considerably because plants are supported by each other, and therefore the risk of a plant falling over is reduced.

Fruit sizes are more attractive.

So the next time you plant pineapple, do not forget to adopt the close-planting technique to get more revenue from a unit area.

March 28, 1981

NOW WE CAN ALL GROW BEAUTIFUL TASTY BANANAS

CLEAN SUCKERS TO CONTROL INFESTATION

IT IS quite obvious that most of our banana plantations are attacked by nematodes to a greater or lesser extent. Some varieties are more susceptible e.g. St Jacques and others like the Mille are more tolerant.

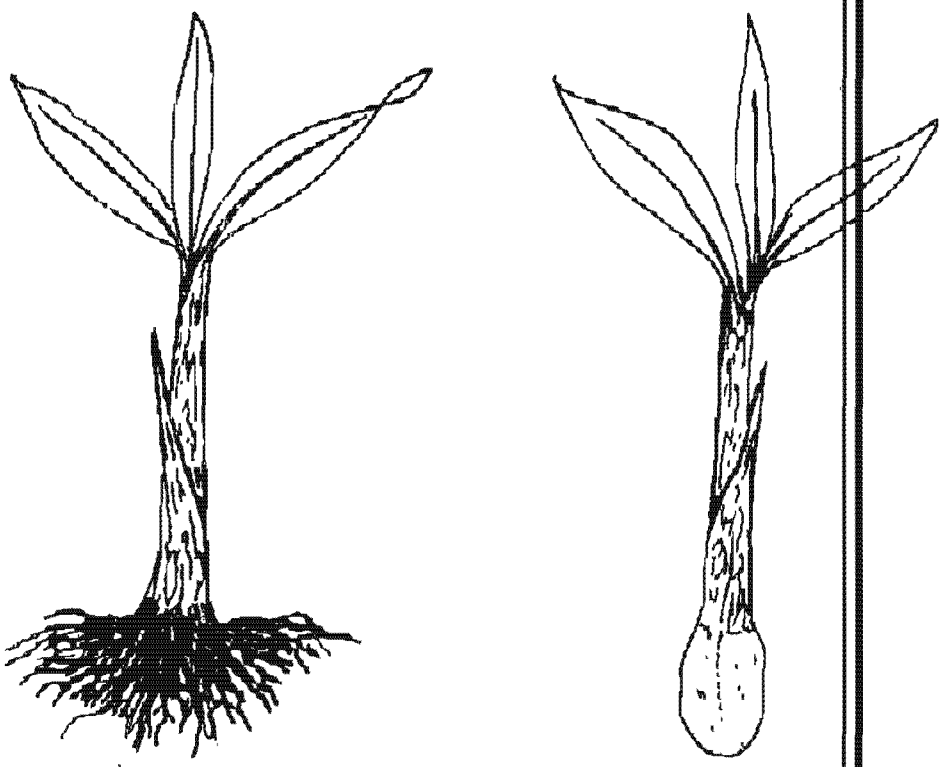
In order to control nematode infestation, the farmer should plant clean suckers (planting materials). He should also control the population nematodes in his plantation by using a nematicide.

One nematicide that has proved quite satisfactory is Nemacur and this is applied at the rate of 50-60 gm per plant. Your extension officer will advise on how to apply it.

To clean the suckers one has to pare off all of the infected areas of the corm. That is, one has to remove all portions of the corm that have started to rot or that have been bored by banana weevil or other borers.

If one has to remove too much of the corm because of heavy infestation then it would be wiser to discard the entire corm. There again your extension officer could help you on how to clean your banana suckers before planting.

If you are getting planting materials from other premises and you have to transport them to your own plantations, please ensure that you clean them before you transport them.



BAGGED FRUIT LAST LONGER

RESEARCH Scientists have developed a simple and cheap method for storing bananas so that now you can eat your banana - and store it, too.

Devised by Mr. Kevin Scott, a scientist with the NSW Department of Agriculture working with the SCIRO Division of Food Research, it uses the common plastic bag.

Bunches of bananas are placed in a sleeve which is tied at both ends of the bunch to provide a modified atmosphere around the fruit. This results in a build-up of carbon dioxide and a reduction in oxygen in the bag.

According to Mr. Scott, these conditions dramatically delay ripening, even at temperatures of 25-30°C and are all that is necessary to hold the bunch in an unripened for week or so.

EVERYONE CAN GROW GOOD BANANAS WITH THE RIGHT SOIL AND FERTILISER

WE ALL can grow good bananas if we choose the right soil and the right fertiliser.

All soils on which bananas are grown should have good structure and depth. In other words, all soils for growing bananas should have good DRAINAGE.

What kind of fertiliser to use?

At planting and in planting holes-1kg. nitrosphoska/plant.

Second application, 3-4 months later-1 kg. ammonium sulphate, 1/2 kg. potassium chloride.

Third application, 7-8 months after planting-1/2 kg. ammonium sulphate. 1/2 potassium chloride.

This cycle should be repeated threafter.

March 14. 1982

PRUNING FRUIT TREES GIVES A BETTER YIELD

1. INSTRUMENTS : A pruning saw which is preferably curved. It must be sharpened with a triangular file.

A pair of secateurs. Keep blade sharp and screw tight. Do not use a secateur for a branch thicker than the small finger.

2. HOW TO CUT : Bend the wood away from the blade of the instrument and the wood cuts easily.

When removing branches, cut them near the stem of branch from which they arise.

When cutting along a branch, cut just above a bud.

Paint cut surfaces with STERISEAL (plastic paint) or FLINKOT.

3. PRUNING : Trees have two stages of pruning.

Formative pruning - is done early, to give the shape you need for the plant.

Maintenance pruning - begins usually after the tree has started to fruit. This is a MUST to remove a) dead or diseased wood, b) remove branches that cross each other, as these can cause damage to fruit and other branches, c) help the tree to produce new wood which will bear fruit.

Each kind of tree has its own formative and maintenance pruning. For example :

MANGO, formative pruning - cut the main stem at 1ft from soil level and choose branches (3 - 4) which come out at a wide angle to make a strong frame. Cut further up at 5ft from soil level.

AVOCADO, formative pruning - do not cut the main stem. Remove all branches which occur below 3ft. Above this, remove branches which cross. Keep a strong leader and select well spaced branches which grow outwards and upwards. Remove branches which arise at an acute angle from the leader.

March 7, 1981

HOW TO PLANT AND FERTILISE FRUIT TREES

This is the best way to plant fruit trees such as citrus, avocado, mango, guava :

Dig holes 2 1/2 ft x 2 1/2 ft x 2 1/2 ft. Fill half of the hole with semi-rotten coconut husk of other organic debris. Put on top of that a layer of topsoil. Firm the soil while filling the hole.

On top put 15-20 kg of farm yard manure. Sprinkle 1 kg of superphosphate or guano on the manure, put another layer of top soil and build into a mound.

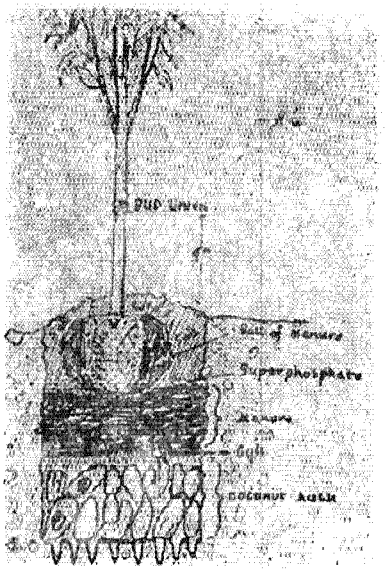
Open a hole, wet the container, remove the plant from the polythene sleeve without breaking the soil. Plant on top of the mound and surround the plant with a ball of manure to give the roots a good start.

MANURE AND FERTILISER

The growing plant should always have a mulch round it, either coconut leaves, gazon trelle or coconut husk to retain the moisture.

Apply Nitrophoska fertilizer in split doses at the beginning of the November rains, and the S.E. season short rains in May : 1st year - 1 kg; 2nd year - 2 kg; 3rd year - 3 kg; 4th year - 4 kg; 5th year - 4 kg; 6th year - 4 kg; 7th year - 4 kg.

Do not disturb the mulch. Sprinkle the fertiliser on the mulch, and if available add 15kg of manure to each tree per year.



March 14, 1981

GROWING SPECIAL CROPS, CONT'D

C. ROOT CROPS

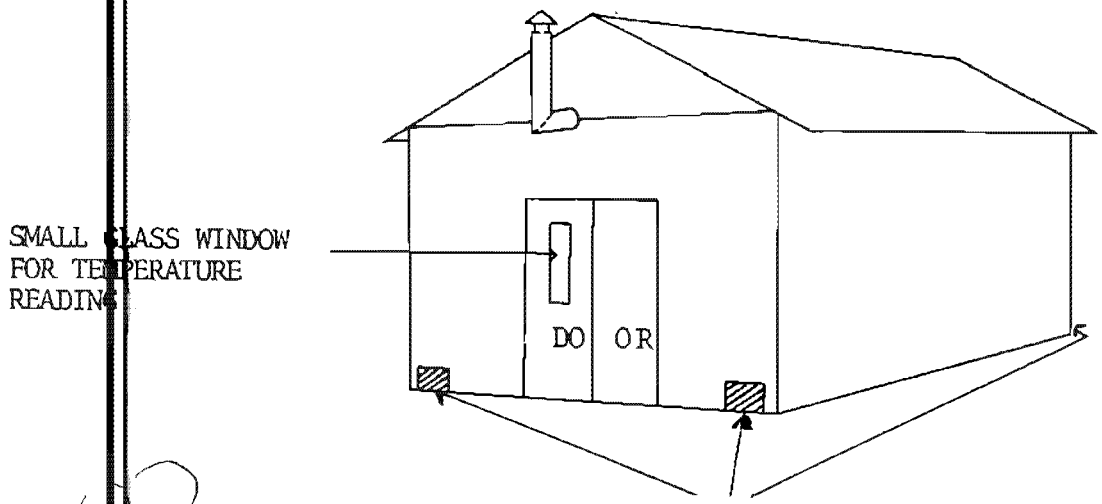
1. Yam - The Best Liked Root Crop

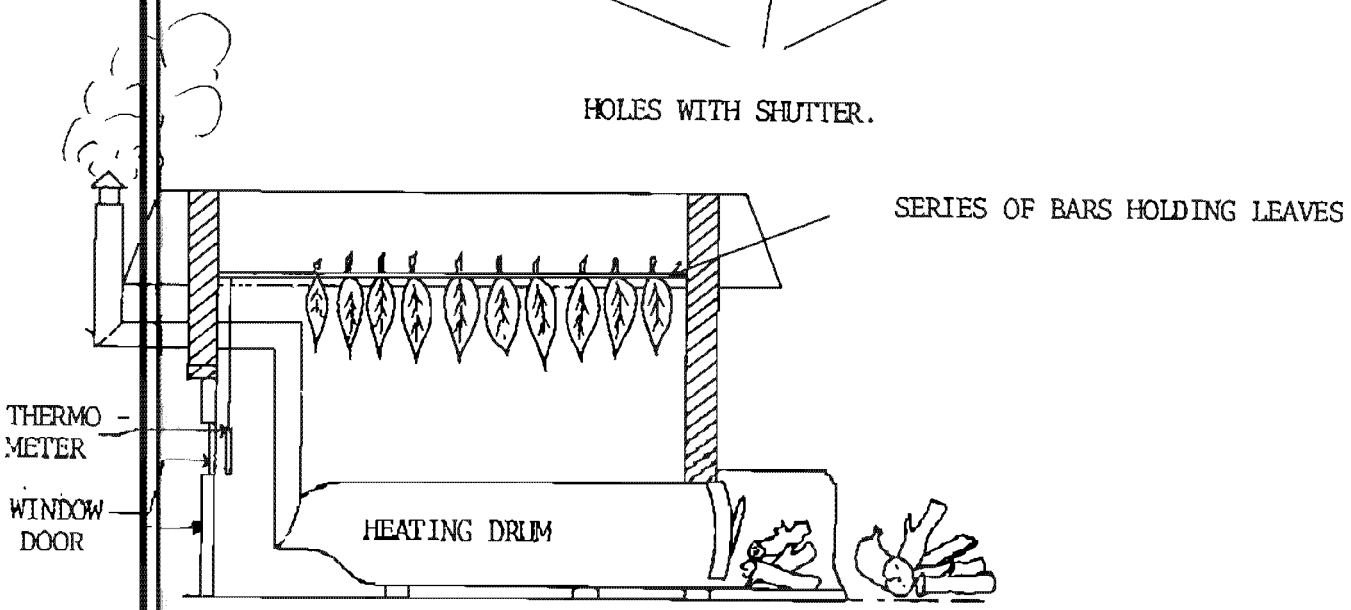
2. Make the Most of That Oh - So Sweet Potato

33. Cassava - One of the World's Best Known Foods

With reservations, the possibility of some form of association with other agricultural activities is obviously attractive. It would perhaps work best if it were run in the form of a co-operative.

If the idea of tobacco as a commercial crop gets off the ground then a plan of action with targets should be drawn up soon. The Department of Agriculture would give all its support to such adventure.





TOBACCO CURING KILN.

Tobacco leaves for cigarette making must be harvested one by one as they mature on each plant.

In 1977, the Grand'Anse Experimental Station evaluated several new varieties of tobacco. These have resistance to bacterial wilt, which is also the problem with sweet pepper and tomatoes on red soils. Trials were laid out on red oisls. Excellent results were obtained in quality and yield.

The flu-cured tobacco was sent to the tobacco factory at Anse des Genêts. After blending with some tobacco from Zimbabwe, 50 packets of cigarettes were made from this tobacco. The product was of high quality.

Recently trials were also laid out on Poivre Island on the shioya (calcareous) soil. The results were also very encouraging. In tobacco growing, it is important to rotate with other crops in order to keep disease to the minimum.

Varieties presently recommended to farmers are Yellow Mammoth, Bonanza, NC 95. (all Virginia tobacco) with resistance to bacterial wilt.

Tobacco is a fairly easy crop to grow both on the sandy and red soils. As with vegetable growing, farmyard manure or composts and fertilisers must be used to ensure high leaf weight production. Irrigation has also an important part to play.

HIGHER YIELDS

Application of iron and manganese on sandy soils is a must to prevent chlorosis. On red soils, due to better water retention, higher yields are obtained with less dependence on farmyard manure. Pest problems are minimal.

If we are to grow enough tobacco for Seychelles' cigarette factory the farmers must use only the new varieties recommended and not the local variety "Gros Cote" which is too strong for cigarettes.

The recommended flue-cured tobacco varieties can yield on average 3000 kgs dry leaf per hectare. In terms of production, the local tobacco variety 'Gros Cote', if well managed and manured, can yield very near to that of the improved introduced varieties.

As a matter of interest, this variety was introduced a few years ago from Seychelles to the IRAT Research Station in Reunion and has been used widely in their breeding programmes as an excellent source of germplasm with resistance to disease and good adaptation to satisfy existing demand for tobacco plugs (carrote tabac).

The tobacco factory will probably require 10 hectares of locally grown tobacco if planted continously. A dual-purpose barn or kiln could be examined for Praslin, sharing according to season with other crops.

TOBACCO - THE FLAVOUR OF SUCCESS

SOUTH America is the centre of origin of tobacco.

The use of tobacco for smoking began with the American Indians for ceremonial purposes, and they introduced tobacco to European settlers who developed a trade in tobacco with Europe during the 1600s and early 1700s.

Tobacco is now cultivated in all parts of the world which have the proper climate and soils for tobacco growing. It is used habitually world-wide by a large number of people as a wild narcotic.

It would appear that with our level of consumption, there would be a ready market for locally grown tobacco for use in commercially manufactured cigarettes here on Mahé.

About half the cost of cigarettes made in Seychelles is duty, most of which is accounted for in the duty on the tobacco imported from Malawi, Zimbabwe or the United States.

This cost difference should provide an extra advantage to farmers who grow tobacco for local commercial production. For several reasons, however, none of our tobacco enters commercial changes, but rather is used exclusively for local consumption.

The tobacco used in cigarette manufacture is a flue-cured leaf, which has been passed through a series of controlled temperature and moisture periods to produce the final flavour characteristics which are essential to the cigarette made from the cured leaf.

No flue-cured tobacco is currently being produced here in Seychelles.

Tested seeds of flue-cured tobacco, information on curing and barn construction, can be obtained from the Grand'Anse Experimental and Food Production centre.

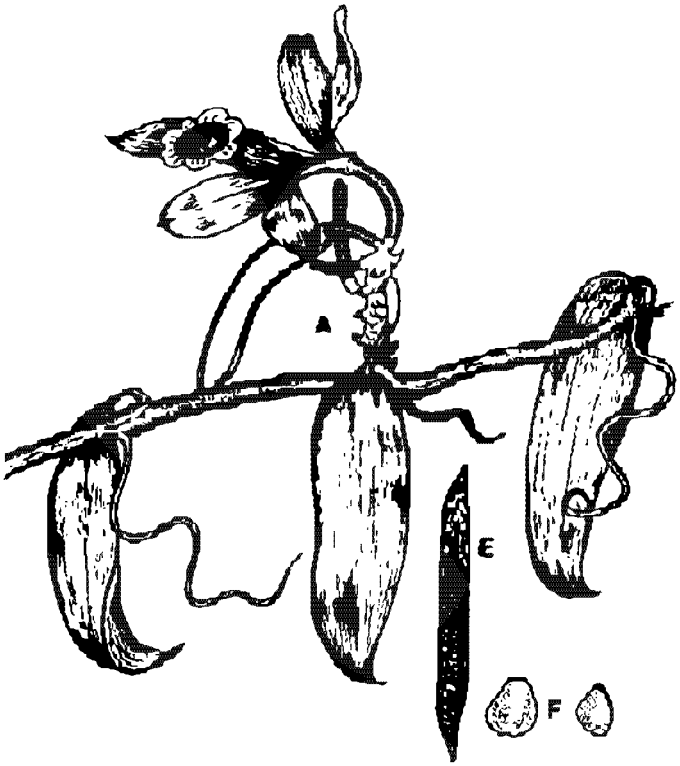
CURING BARN

A single standard sized (12' x 8' x8') curing barn should be sufficient to cure each 2000 kilos (fresh weight) of tobacco. This is approximately the amount produced on 1/4 acre of well-managed tobacco plantation.

The curing barn is a closed structure with movable vents, regulators for controlling the temperature and moisture during the curing process. Heat is suplied from a wood or oil-fired stove with flues within the barn and opening to the outside.

Temperatures must be accurately controlled for a period of about five days with progressive increase from 90 to 140° F during the cure.

Moisture content of the leaf also must be controlled or the curing leaves will become too dry or too moist. Both temperature and moisture are controlled by adjusting the heat source and the ventilators.



A - Portion of vanilla plant with inflorescence E - Vanilla fruit. F - Vanilla seeds.

October 3 , 1981

SUPER CINNAMON!

CINNAMON used to be (in the 60's) the second in importance of Seychelles' industries after copra, but is now somewhat neglected and not fully exploited.

The cinnamon plant is reported to have been introduced to Seychelles in 1771. Since then it has spread and is now growing wild on Mahé, Silhouette, Praslin, La Digue and some other granitic islands.

It is a plant that has adapted very well to Seychelles' soils and climate and is very easy to grow and maintain. If taken seriously, it can contribute a great deal to the income of small farmers and Seychelles' economy as a whole.

It can help small farmers to use the whole of their plot, especially where the land is steep and rocky and where it will not be economic to grow other crops. The annual rain-fall on Mahé provides enough water for the plant's requirement.

Farmers growing cinnamon can make sure that the whole plant is used.

THE BARK:

Three main types of cinnamon bark are produced in Seychelles.

UNSCRAPED BARK:

Which consists of dry pieces of bark of different size and thickness, obtained from bushes of various ages.

SCRAPED BARK:

Which is usually made from younger and therefore thicker bark, whose outer corky layer has been scraped off before drying.

CINNAMON QUILLS AND QUILLINGS:

Which consists of thin, scraped bark tightly rolled or, in the case of quillings, of broken quills and trimmings which have been dried in the shade.

The bark is mainly used in the spice industry, being ground into cinnamon powder to be used on its own, or for blending with other types in the preparation of ground spices.

and mulch, which should be raised above the soil surface.

On account of the very superficial roots, cultivation is not done after planting. Clean-weeding of the vanillery is not recommended, but rank growth of climbers and other weeds should be controlled. Mulching has a very beneficial effect and should be done regularly.

Under good conditions the growth of the vine is very rapid and may range from 50 - 100 cm per month. The vines are twisted round the lower branches of the supporting tree so that they may hang down. The top 7.5 - 10 cm of the vine is usually pinched out 6 - 8 months before the flowering season to encourage the production of inflorescences.

Vanilla usually starts flowering in its third year after planting, depending on the size of cuttings used, and reaches its maximum production in 7 - 8 years.

Given proper care this may continue for several years, but in some vanilleries the productive period is shorter.

The pollination of vanilla flowers is usually done by hand. It is a lengthy and time-consuming process. The time between flowering and harvesting is 6 - 9 months. The pods are harvested rotationally when they are fully grown and the tips have turned yellow.

If the pods become too ripe, they split. They may be harvested by sideways pressure of the thumb at their base or cutting with a sharp knife. About 6 kg of green pods produce 1 kg of cured beans.

After fruiting, the old stems and weal branches are pruned off. The tree supports or shade should be pruned to provide 30 - 50% of full sunlight and to induce branches at the correct height for training the vines.

VANILLA COULD AGAIN PLAY LEADING EXPORT ROLE

Vanilla is a crop that is fairly easy to grow and maintain and depending on planting material used, farmers can expect a first harvest in about 2 - 3 years after planting.

PROPAGATION :

Commercial vanilla is always propagated by stem cuttings. These should be taken from healthy, vigorous plants, and may be cut from any part of the vine.

The length of cutting is usually determined by the amount of planting material available. Short cuttings, 30 cm in length, will take 3 - 4 years to flower and fruit.

Cuttings 90 - 100 cm in length are usually preferable. Cuttings 2 - 3.5 m in length may be used, when available, with their free ends hanging over supports these will flower and fruit in 1 - 2 years.

It is usual to remove 2 - 3 leaves from the base, which is inserted into the humus layer and mulch. With short cuttings, at least 2 nodes should be left above ground.

The portion above ground should be tied to the support until the aerial roots have obtained a firm grasp.

Because of their succulent nature, cuttings may be stored or transported for periods of up to two weeks, if required.

HUSBANDRY :

The vines of vanilla require some form of support up which to climb and also light shade; too dense shade and full sunlight are both bad for the plant.

Usually small trees are planted and used as supports. The trees should be quick growing, so as to be established before the vanilla, should provide light shade, have sufficient low branches over which the vines can be trained to hang down, with a type of growth providing easy access to the vanilla.

They should be strong enough to support the vines in strong winds, and be easily pruned when necessary. If the vanilla is grown up posts or trellises, it will also be necessary to supply some form of partial shade. Wind breaks should be planted when required.

SOIL TYPE :

Vanilla requires a soil rich in humus and an adequate supply of vegetable mulch. The cuttings are usually planted about 3 m apart at the foot of the supporting trees or poles.

A spacing of 1.2 - 1.5 m apart in rows of 2.5 - 3 m is also sometimes recommended. The planting holes are best filled with humus

Pruning so that you get more branching is advisable in many branching is advisable in many cases such as with sweet basil. Likewise flowering should be delayed in many cases by pinching the buds or pruning.

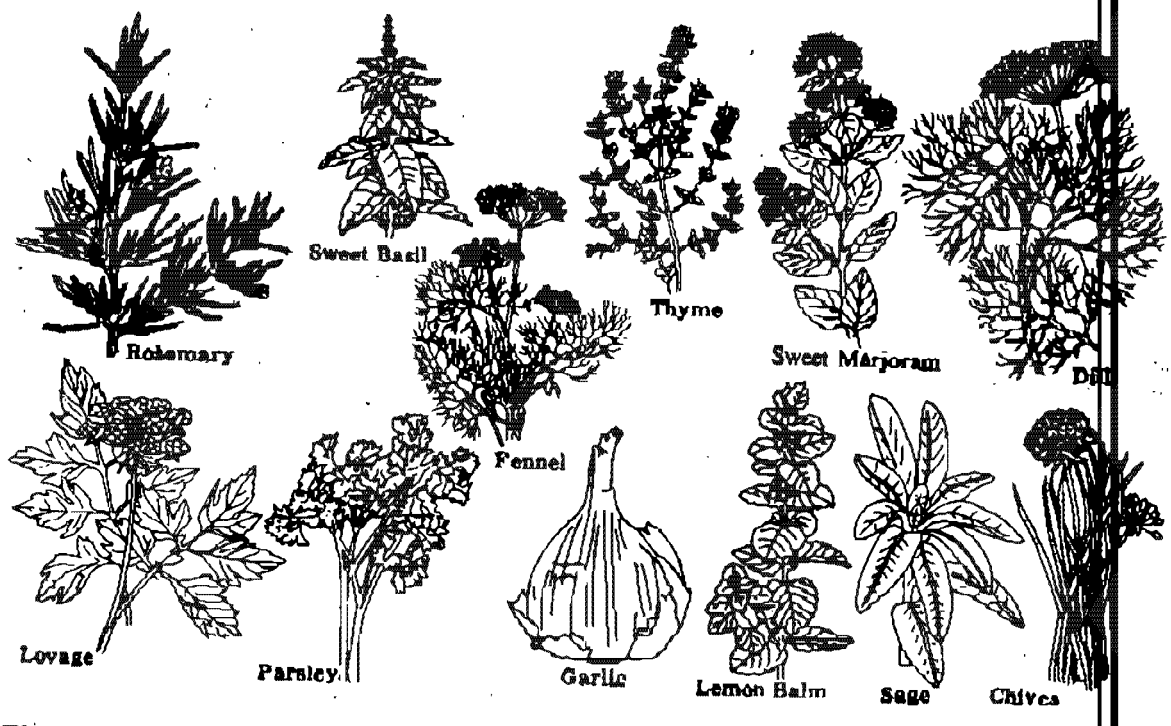
When harvesting these herbs it is important to cut the stems or leaves with a pair of scissors or pruners, do not pinch or break them off the plant. Only remove the oldest leaves or stems. Look at each plant and decide how you can get the maximum branching.

Cut the uppermost or leading stem and you will get more branching coming from the buds below. With herbs such as parsley and thyme only nip the lowest leaves or stems. Do not over-harvest-only take two or three stems per plant.

If these procedures are followed, you will have a longer harvesting period for your herbs. If there is a surplus of your herbs they can be dried and kept for a long time. Tie your herbs in small bundles and put into a dark area with good air circulation (similar to curing tobacco).

When the leaves are dry, separate them from the main stems and put into light-proff boxes or packets. Sage, thyme, dill, and parsley are easy to dry in this fashion. Basil, tarragon, and mint would be better dried in an oven or using a forced-heated air-dryer. Herbs may be sold fresh, or dired and packaged.

Spices and herbs can contribute much to a farmer's tribute much to a farmer's or gardener's income as well as giving a distinctive flavour to the food and life in Seychelles.



The Grand'Anse Research Station is currently doing work in two areas in an effort to control this disease : 1) finding adequate chemical control measures for the existing disease problem and 2) working with bringing in new varieties from outside sources which may be more tolerant of the disease.

The most important control measure at this time, though, is to use only healthy disease-free planting material. Rotate crops-don't plant ginger in the same area, and spray with fungicides every two weeks. Several insects may cause problems. Spraying with Thiodan or other suitable insecticides should control this problem.

Ginger is ready to harvest after about eight months when the leaves start to trun yellow. The rhizomes should be dug up carefully so as to not damage them. They may then be soil fresh or may be washed, peeled, and sun-dried for export.

HERBS

Herbs are very popular among households and small growers, as they can bring in extra income from small areas. Herbs are used as flavouring agents and as medicines. No Seychellois kitchen would be complete without access to many of these herbs.

There are many different herbs to grow. There are herbs which are very pungent or strong, including rosemary, sage, and pima.

There are those herbs which give a distinct flavour to cooking and salads such as sweet basil, dill, mint, marjoram, tarragon, chives, parsley, oregano, garlic, celery and lemon balm.

Most herbs require full sun for best growth (parsley being an exception). They can be grown in the borders of the garden, in between rocky areas, and in little-used areas.

They need a well-drained area with adequate sun. The planting beds should be filled with compost or rotted manure. Fertilisers may be added but caution should be made against using too much nitrogen as this could cause the plants produce too much foliage, which is not aromatic or flavourful. Watch your plants grow carefully, if they show a fast yellowing, nitrogen should be added, but not before then.

Most herbs can be grown from seed : thyme, parsley, sage, rosemary, sweet basil, sweet marjoram, celery and so on. Many may be propagated vegetatively by stem or root divisions or cuttings.

Cuttings or divisions have the advantage of quicker establishment. You can choose the healthiest plants and they will be ready to harvest much more quickly. Some herbs such as dill, anise; coriander and chervil should be planted directly be seed as they do not transplant well, but herbs such as thyme, oregano, marjoram, and mint will start much better as division or cuttings.

Mulches will help many herbs to keep stems and leaves off the soil.

HERBS AND SPICES CAN BOOST THE NATIONAL ECONOMY

ALTHOUGH the main emphasis of the Agricultural Department is on food crop production, there are other crops which are important sources of income to farmers a well as contributing to the nation's economy.

The month of September will be devoted to spices, which have historically played an important role in exports and in the local economy.

This week we will concentrate on those herbs and spices widely grown on most farms as well as by many households.

GINGER

One of the most popular spices that is grown is ginger. It is widely usesd in cooking in its "green" form but can also be dried for export or further processed into powdered form or an essential oil.

Ginger requires a lot of water for maximum production, therefore it must be watered on a regular basis. It will not do well on soils that are poorly drained as rotting of the rhizomes (roots) may occur.

Ginger can be planted on raised beds (preferably) or in trenches. Bed or trench size should be about one metre wide, should be dug deeply and worked to a fine tilth.

A lot of manure or compost should be added to the bed, or with a trench system the whole trench should be filled with these materials. Fertiliser should be applied at planting at a rate of about 25 grams per square metre of superphosphate and 4 grams per square metre of potassium chloride.

After 1 1/2 months, nitrogen should be added at 10 grams per square metre of a nitrogen fertiliser. After 3 months an additional 10 grams of nitrogen fertiliser and 4 grams of potassium chloride should be added.

For planting, only healthy rhizomes from healthy plants should be used for seed pieces. These should be cut so that one or two buds remain for each piece, each weighing about 15 grams.

These seed pieces should then be planted in rows 20 - 25 cm apart at a distance of 15 - 20 cm in the row. Plant deep enough to cover the seed piece well. Before planting, each seed piece should be treated with a suitable fungicide (Benlate for example).

The planting bed should be heavily mulched after planting with material such as rotted coconut husks or grass. There are several pests and diseases associated with ginger, the worst being a leaf-spotting disease which not only affects the leaves, but can also affect rhizome quality. At present,only partial control of this disease can be expected using Benlate, Dithane and copper fungicide.

Establishment of the rooted cuttings is much better than trying to root cuttings in the field.

The use of "dead" and treated supports is favoured as there is no competition between the pepper and its support. A live support such as glyricidia often provides too much shade and requires constant topping.

The pepper plant may, however, be allowed to creep on boulders but the yield is much reduced and harvesting made more difficult.

The best method to strike cuttings is the use of sand as a medium and application of Rootone hormone. Calcareous plateau sands are not suitable for pepper cultivation because of chlorosis induced by iron deficiency.

Rooted cuttings are best planted by applying farmyard manure in the planting hole. Snails can be a major hazard and must be constantly baited with snail pellets.

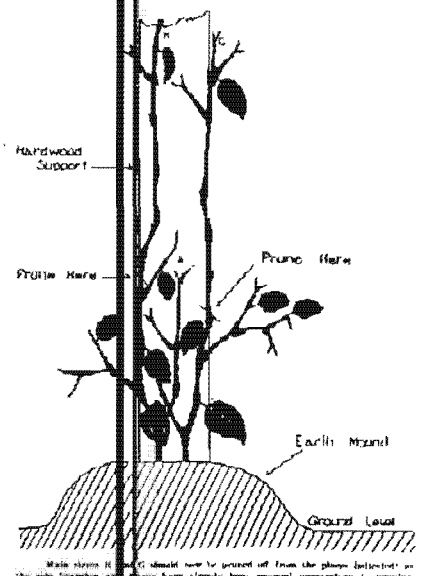
Pepper bushes grow more vigorously next to a stream or water source. They do best on rich, red soils with plenty of organic matter.

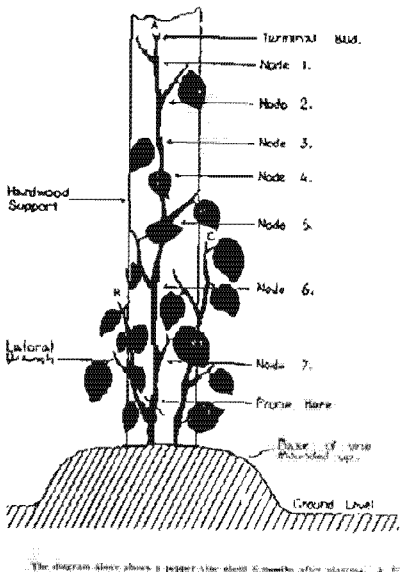
NUTMEG

Terraced land and the use of banana shade has been shown to give good crops at the Grand'Anse Experimental Station.

Nutmeg seedlings are germinated in coir fibre dust and then raised in a potting mixture in polythene pots. Marcotting of shoots from selected mother trees will be tried soon as these could give earlier crops.

More details about crop management and post-harvest activities in relation to cardamom, pepper and nutmeg can be obtained from the Grand Anse Experimental Station and Extension Service.





HOW FARMERS CAN ADD SPICE TO THEIR INCOME

CARDAMOM

THE chief use of cardamoms is as a spice. In the eastern countries cardamoms are used extensively for chewing and, particularly in India, as an aphrodisiac.

They are also used medicinally as an aromatic, stimulant and diuretic. In Europe the capsules are crushed and mixed with flour and baked into bread noted for its warmth-giving properties.

Two well-known cultivars are Mysore and Malabar. They grow best in Seychelles at elevation.

SOIL

Well-drained, fairly deep and moist such as found under forests or in undulating situations is the most suitable.

Cardamoms will thrive best on such soils under light, natural shade and when protected from strong winds.

AFTER-CULTIVATION

Very little after-cultivation is required. Weeding may be necessary at intervals for about two years after planting out. Dry leaves may be removed but placed round the clumps.

At lower elevations cardamoms come into bearing in two years and at higher elevations after the third year. At lower sites crops will begin to decline after about six years, but higher up, good crops can be obtained for about ten years.

From the fifth year, full crops of 300-400kg. of green cardamoms may be expected per hectar for some years.

HARVESTING

On reipening, cardamom fruits change their colour from green to a pale green. It is best to pick the fruits just before they fully ripe as over-ripe fruits are liable to split in curing. Sri-Lanka, India and Zanzibar are the main producers.

PEPPER

From trials laid out at Grand'Anse Experimental Station, the following conclusions were reached.

NUTMEGS

GROWING SPECIAL CROPS

D. SPICES, OTHERS

1. How Farmers Can Add Spice to Their Income.
2. Herbs and Spices Can Boost the National Economy
3. Vanilla Could Again Play Leading Export Role
4. Super Cinnamon!
5. Tobacco - The Flavor of Success

Method-put meat cut in pieces, salt and some chopped onion into saucepan, add water and boil gently for an hour until meat is tender. Meanwhile, peel and slice the onion, grind tomatoes, pepper, etc.

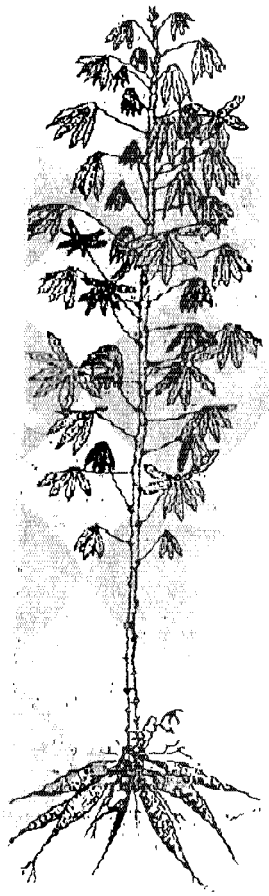
Pick tender cassava leaves and wash well. Dry and chop. When meat is tender, add dried fish (washed and cut into pieces) and condiments. Add the leaves and continue cooking until most of the liquid has evaporated. Add oil and simmer to desired thickness.

Add salt to taste. Serve with boiled yam, banana St. Jacque or sweet potato.

Cassava chips:

These can easily replace white potato chips. Cut cassava into small rectangular pieces, as for white potato. Parboil and drain. Drop the semi-cooked chips in hot oil and fry for two minutes.

Cassava is also an excellent rotation and break crop to be used by the intensive vegetable grower. It will not bring in as high a profit return as sweet potato, but being drought-resistant, it can tolerate adverse conditions and produce acceptable yields where sweet potato often fails to grow. The Department of Agriculture is doing its best to encourage growers to produce more cassava.



May 16, 1981

Local varieties are no longer recommended. If grown, the plants are permanently stunted after virus infection.

The recent planting material is made up of five families and a total of 1800 plants (derived from seeds). Within two years, we expect to obtain superior cultivars for distribution to farmers.

Varieties recommended:

Vert-excellent texture and sweet. Sey. 28, 32, 41, 52 :- high yield, white skinned, good texture and sweet.

Sey. 14-high yield, pink skinned, good texture and sweet.

N.B. Only sweet varieties are selected.

Cultural methods:

Prepare the land with hoe or rotovator. Apply farmyard manure at the foot of the ridge at the rate of 12 tons per hectare. If the planting site was previously planted with vegetables, the inputs of farmyard manure and fertiliser can be reduced considerably.

Build up the soil into ridges spaced 1.6 metres apart. Apply Nitrophoska fertiliser in a trench at the top of the ridge at the rate of 1 kg per 30 metres of ridge as a basal dressing.

Prepare 20 cm stem cuttings from a 7-10 months old crop. Dip in a mixture of Thiodan and Benlate for five minutes to control pests and diseases. Space cuttings at 0.6 metres and plant at an angle in a hole on top of the ridge, leaving two nodes above soil level. One month after planting weed manually and earth up the ridge.

Three months after planting, weed again and apply 1 kg of Nitrophoska per 30 metres of ridge. This fertiliser application is critical and essential for vigorous development of foliage and will also help to control virus incidence.

Economics:

A profit of approximately R. 500 per week is obtained at the Grand Anse Experimental Station from one hectare of cassava, harvested after a period of 9 months.

Recipes:

Cassava is used fried (crisps and chips), boiled, stewed with sugar and coconut milk (la daube), mashed, baked, made into galettes (local biscuits). The extracted starch is also used to make puddings and bread.

Cassava leaf sauce:

1 1/2 lb beef or mutton; 1 lb dried fish; 1 lb young cassava leaves. Use leaves of sweet cassava only; 4 cups water; 1 cup good quality oil; 2 large fresh tomatoes; 1 large onion; 1 1/2 tsp. freshly ground ginger; Salt and pepper to taste.

CASSAVA - ONE OF THE WORLD'S BEST-KNOWN FOODS

CASSAVA is a drought-resistant root crop eaten by some 300 million people around the world. Though most people in developed countries often use tapioca in puddings and as a thickener, they do not realise it comes from cassava.

It is generally recommended that in Seychelles lateritic/gravel mixed soils should be reserved for crops such as vegetables and sweet potatoes and that cassava should be preferably grown on the slopes where it does well. However, the best cassava yields have been recorded on laterite/gravel mixed soils.

Obviously, if the grower integrates cassava growing with vegetable production, with the aim of using cassava as a break crop, he can obtain maximum yields. Cassava should not be planted on sandy soils due to poor yields and chlorosis induced by iron and manganese deficiency. On better soils cassava matures earlier (9 months) while on the hillside it takes 10-12 months.

Production constraints:

On improved soils, cassava yields at the Grand'Anse Experimental Station are within the range of 30-40 tons per hectare, with the application of 600 kgs of Nitrophoska and 12 tons of farmyard manure per hectare. At the farmer's level, only 10-12 tons are being obtained. The major constraints are :-

1. Proper planting technique, preparation and treatment of planting material are not being followed.
2. Limited use of fertiliser and farmyard manure.
3. Insufficient weeding from planting.
4. Some farmers still use varieties susceptible to cassava mosaic virus.
5. No rogueing of diseased plants at the early stage.
6. The choice of poor marginal soils as planting sites.

Research activities:

The first improved cassava varieties were introduced in 1967 from the Kenya Coast Research Station. Although these had good resistance to mosaic virus and sweet texture, yields have been relatively low. The best of these is the well-known "manioc vert", with a production of approx. 15 tons per hectare, to produce more cassava.

In 1975, hybrid seeds were obtained from the IITA cassava research centre in Ibadan, Nigeria. Five selected clones of these were bulked up in 1977/1978 and then released to farmers. The best of these yielded 45 tons per hectare, an obvious improvement over the previous selections. Although not resistant, they show good tolerance to the virus.

RECIPES

The sweet potato is used fried, boiled, stewed with sugar and coconut milk (a popular dessert) and baked.

La Daube (local dish) :

Ingredients: Sweet potato; sugar to taste; pinch of salt; coconut milk; (vanilla flavouring optional).

Mix all ingredients in a pan and simmer over low heat, then increase heat until finally sauce thickens. Can be served hot or cold.

Mash :

Sugar to taste; pinch of salt; milk; egg (optional); sweet potato.

Boil sweet potato until soft. Mash to a fine paste adding butter, milk, salt and egg.

Sweet potato scones

1 cup mashed, cooked sweet potato; 2 1/2 cups S/R1 flour; 1 cup sugar; 1 tablespoon butter or margarine; 1 egg; 1 pinch salt ;

Cream together sugar and butter, beat in egg, blend in mashed sweet potato (still warm) then mix in flour and salt. Moisten with milk if necessary, Bake in hot oven for 8 to 10 minutes.

Roundup can prove very useful in weed control. Prepare ridges and then weeds, namely cyperus rotundus (onion grass) and panicum repens (couch), are allowed to grow to a height of 12 cm and then sprayed with Roundup.

One week after spraying, cuttings can be planted in the ridges. Roundup can save up to three weedings often required between planting time and close in of the vines.

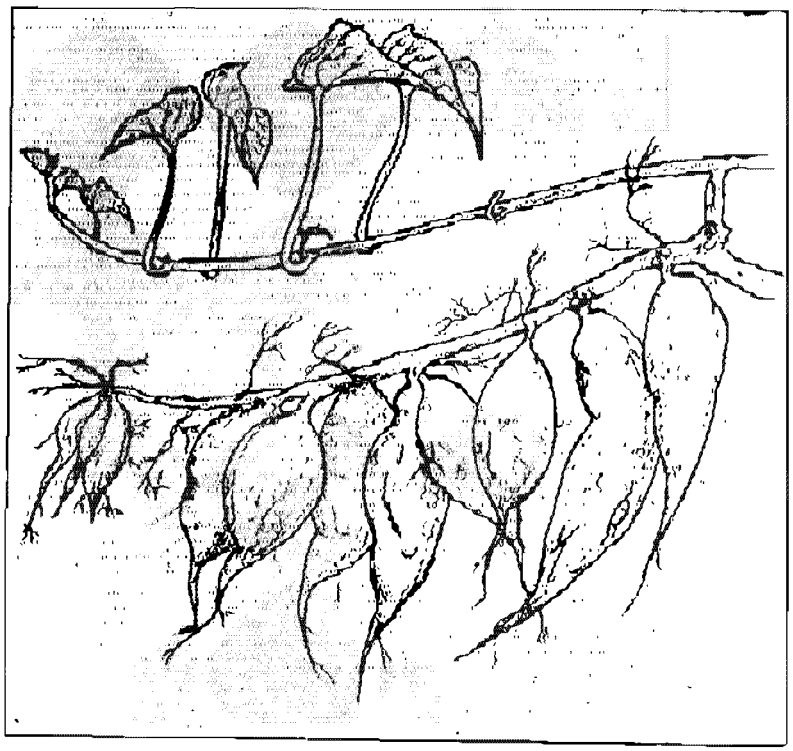
RAT CONTROL

Rats can consume from 20 to 30 per cent of tubers if not kept under control. They are particular fond of orange types. The best control measure is crop hygiene all round the plantation. The best method of using poison is to use pieces of bamboo with poison blocks pushed in the bamboo hole half-way and secured by pieces of bamboo with poison is also protected from the rains.

Sweet potato culls should be used for animal feeding and not thrown away.

ECONOMICS

A profit of approximately R.1,000 per week is obtained at the Grand' Anse Experimental Station from one hectare of sweet potato. If the profits of a sweet potato grower are low, he should examine his yield per hectare, selling price per kg and variable costs of production to try and find out the reason. This will help him to improve in the next crop.



2. Limited use of fertilizer.

3. Some farmers still believe that the use of artificial fertilizer has an adverse effect on the texture of sweet potato.

4. Insufficient weeding during the early growth period.

5. Incorrect application of fertilizer.

6. Lack of iron and manganese in sandy soils. This can be corrected by foliar feeding at 4 and 8 weeks after planting.

7. Yields would be greatly increased with the use of improved planting material and management practices combined.

RESEARCH ACTIVITIES

New sweet potato varieties were first introduced to Seychelles in 191[illegible] from Antigua and yielded more than double what the local cultivars pro[illegible]uced.

From 1970 to 1975 research activities were geared to varietal; cul[illegible]ural, and agronomic improvement of the sweet potato. Research in [illegible]he last five years was geared to the introduction of new varieties - scr[illegible]ening, evaluation, bulking and distribution to farmers.

The agronomic characteristics selected for are high yield, good tex[illegible]re, early maturity, red skin colour, minimal vine growth, car[illegible]tenoid and white flesh type. The local cultivars are no longer rec[illegible]mmended as they have been allowed to degenerate over the years thr[illegible]gh neglect and lack of selection.

VARIETIES RECOMMENDED

Sey. 3, 12, 23, 25. Pink skinned and white fleshed.

Sey. 30; FIS, Okinawa, yellow flesh.

Jewel, 551-3, 590, orange flesh.

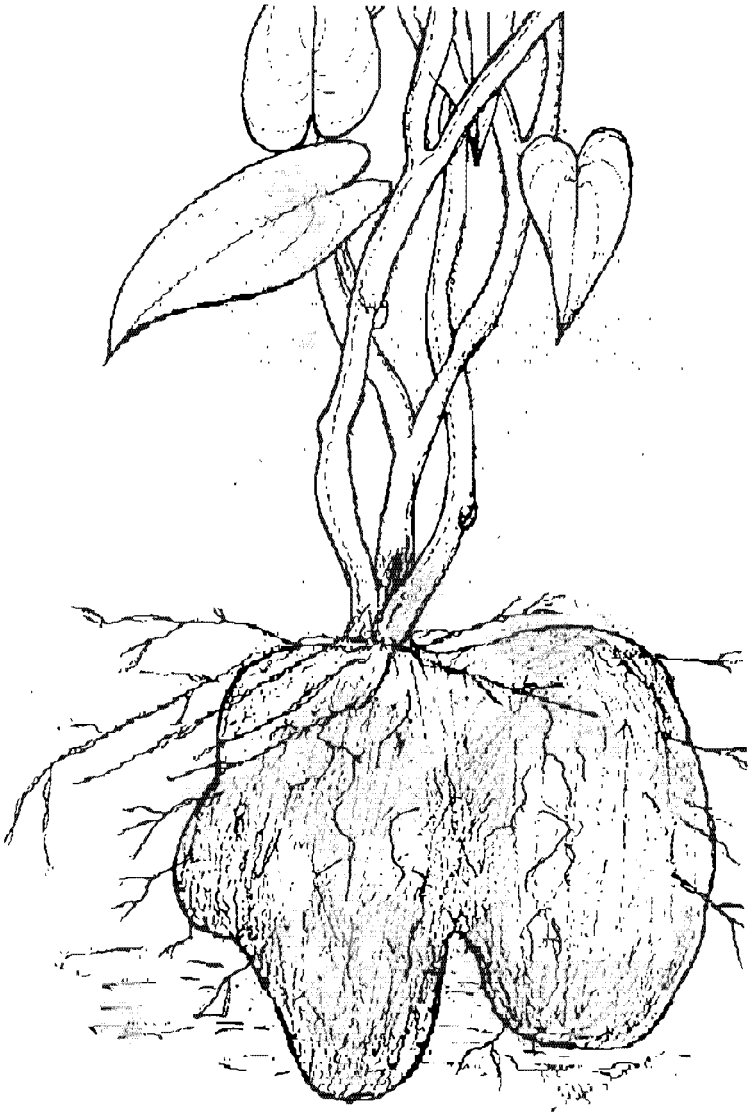
CULTURAL METHODS

Prepare the land, preferably with a rotovator. Apply farmyard man[illegible]re at the foot of the ridge at the rate of 15 tons per hectare. Bui[illegible]d up the soil into ridges spaced 1 metre apart. Apply Nitrophoska fer[illegible]ilizer in a trench at the top of the ridge at the rate of 1 kg per [illegible]0 metre of ridge as a basal dressing.

Remove eight node cuttings from a two-month old crop and dip in a mix[illegible]re of Thiodan and Benlate for five minutes. Plant the cuttings hor[illegible]zontally at the top of the ridge. One month after planting, weed man[illegible]lly and bring the ridge. Apply a second dose of fertilizer to one side of the ridge at the rate of 2 kg per 30 m of ridge.

Two months after planting, roll the vines over the ridge to prevent the side branches from feeding so that the food reserves are utilized mainly for tuber bulking. Apply the third dose of fertilizer to the other side of the ridge. Harvest approximately four months after planting.

Cliff S. Adam, Chief Research and Development Officer,
Grand' Anse Experimental and Food Production Centre.



May 23, 1981

MAKE THE MOST OF THAT OH-SO-SWEET POTATO

THE staple diet of the Seychellois is fish and rice, but without doubt he also likes his root crops. There is a big demand for sweet potato and other root crops like cassava, yams and cocoyam which is not being met. If available in sufficient quantity, these root crops could substitute a percentage of the rice being consumed.

One example - if the housewife were to buy 1 kg of rice for the family per day, she could probably buy 1/2 kg only and use the rest of the money to purchase 1 kg of sweet potato if it were available.

This would greatly contribute towards our goal of import substitution which would imply a saving in our foreign exchange and, more important, benefit the farming community who depend on agriculture for their livehood.

The sweet potato is a popular root crop with great economic potential which should be exploited to the full by growers.

It can be grown all year round in Seychelles on all three soil types, red earth, "plateau" and sandy soils (shioya).

Sweet potatoes are of three types - white, yellow and orange flesh. Tubers are usually marketed fresh for human consumption while the foliage can be used as a protein source for animal feed.

It is of great interest to growers for the following reasons :-

1. It is a short-season crop, harvested 3 1/2 to 4 months after planting, and can be grown all year round.

2. As well as a cash crop, it is also a good break crop in an intensive vegetable farming system.

3. Provided it receives adequate irrigation in the first month of establishment, it can tolerate drought periods.

4. It is relatively free of major diseases and insect pests.

5. It finds a ready market and does not need processing.

6. It is the most economic root crop to grow as regards land use; it is possible to obtain 2.5 crops per year on the same land.

PRODUCTION CONSTRAINTS

Sweet potato yields at the Grand'Anse Experimental Station are within the range of 15-20 tons per hectare with the application of 600 kgs of Nitraphoska and 15 tons of farmyard manure per hectare.

At the farmer's level, only 5-7 tons are being obtained, even with the recommended varieties. The major constraints are :

1. Growing practices have tended to a certain extent to remain traditional and there is much room for improvement.

Doli. (Sea 20) : Good size cluster, fair yield, tubers bigger than normal, white flesh. Cluster with normal tubers and one oversize tuber.

Average yields for the greater yam (D. alata) in tons per hectar are : Gumung,39.99 ; Florido, 31.37; Tanala, 38.04; Kinabayo, 46.34; Toki, 30.88; Kabusah, 29.76; Purmay, 29.48; Binugas, 31.68; Taniela Vula Leka, 32.85; Morasby, 35.13; Kinampay, 34.05; Smooth Statia, 28.69; Gemelos, 34.05.

CULTURAL METHODS :

Prepare the land with hoe and rotovator.

Apply farmyard manure at the foot of the ridge at the rate of 12 tons per hectare.

Build up the soil into ridges spaced 1.6m apart. Apply Nitrophoska fertiliser in a trench at the top of the ridge at the rate of 1 kg per 30 metres of ridge as a basal dressing.

Eight cut portions 'sets) can be obtained from an average size yam. Part of the flesh is removed from each portion and the rest dipped in lime and allowed to dry for 3 weeks. They are then planted in a manured bed, well mulched and watered. When the growing portion has reached approximately 10cm, it is carefully removed from the bed and planted.

Space yam setts at 0.6 metres and plant a few cms. below the soil surface. Apply snail pellets soon after. One month after planting, weed manually and earth up the ridge. Next to each plant put a stake 2 metres high and secure with a string tied loosely.

Three months after planting weed again and apply 1 kg of Nitrophoska per 30 m. of ridge. A mulch of coconut leaves is recommended. A stronger stake is inserted at every 5m along the ridge. Polypropylene string is recommended. Run string at two heights securing all along the stakes supporting each yam plant. Apply snail pellets to protect the growing shoots.

ECONOMICS:

Although the yields of cassava and yam are somewhat similar, yam fetches a better price than cassava. This is off-set by higher costs of yam cultivation due to the cost of planting material, staking, mulching, snail control.

Profit per week from one hectare of yam harvested after a period of nine months is approximately R. 270 per week.

RECIPES:

Yam is used fried, boiled, stewed with sugar and coconut milk (la daube) mashed, and made into puddings.

As a result of research work carried out during the last five years, it is obvous that the yam, which was almost forgotten, has been brought back from the doldrums and is now of great interest to farmers.

RESEARCH ACTIVITIES:

It was previously thought that yam growing, being so labour-intensive as a result of the need for hole digging, filling and staking, was a low return crop and hardly worth growing. This concept changed with progress made in the selection of yam varieties that could adapt to ridge planting.

The introduced collection of yam varieties originated from Puerto Rico, Fiji, Indonesia, Philippines, Samoa and Papua New Guinea. Their conformation, yield and marketability are very impressive. They are also easier to harvest.

The traditional yam spacing of 1.3m x 1.3m (hole planting) has been reduced to 1.6 x 0.45 (ridge planting). Yields have gone up from 15-20 to an average of 30-35 tons per hectare with the best yielding varieties.

VARIETIES RECOMMENDED:

D. alata : Gunung, Florido, Tanala, Kinabayo, Toki, Kabusah, Purmay, Binugas, Taniela Vula Leka, Moresby, Kinampay, Smooth Statia, Gemelos, On sandy soils, plant only Florido, Moresby, Gunung and Taniela Vula Leka. The growth and yield of other varieties is greatly affected by iron and manganese deficiency. Varieties worst affected are Purmay, Kinampay, Binugas and Tanala.

Chinese yam : Beti (Sea 20).

N.B. Planting material (setts) of D. alata is supplied every year to farmers in Sept/Oct. for planting with the first rains in November. Planting material of Chinese yam is available at any time during the year whenever a crop is harvested.

DESCRIPTION OF VARIETIES :

D. alata :

Gunung : very large tuber, early and good sprouting, fan shape, deformed white flesh.

Tanala : Good and early sprouting, yields high, Round, elongated tuber. White smooth skin and flesh. Susceptible to leaf spot.

Kinabayo : Early and good sprouting, bark light pink and smooth, white flesh, early maturity. Highest yielder. Susceptible to leaf spot.

Moresby : Good and early sprouting. Round elongated shape, skin smooth, flesh white. Yield average.

Chinese yam :

Bet (Sea 18): Good cluster, smooth, white. Tubers larger than normal, flesh white, good yield.

YAM - THE BEST-LIKED ROOT CROP OF THEM ALL

YAM is, by far, the best-liked root crop in Seychelles. The variety mostly grown is White Lisbon, originally introduced from the West Indies.

The greater yam (D. alata) is known locally as "cambare". Two races of the Lisbon variety of the greater yam, the "long" and the "round", introduced from the West Indies by the Department of Agriculture in 1940, are recommended for cultivation.

These produce large tubers of excellent quality. A tuber of the "long" can weigh up to 20 lbs and the "round" even more. The yam virus is seen more on the Lisbon round. These varieties are well adapted to the traditional "hole" method of planting but are very costly to grow.

The new recommended varieties are well adapted to "ridge" planting. In view of lower production costs and increased yields, yam is now a profitable crop to grow. Fifteen varieties were obtained from the Mayaguez Institute of Tropical Agriculture, Puerto Rico. Thirteen were selected, bulked up and distributed to farmers.

Another type of introduced yam, the Chinese yam, (D. esculenta), has also gained popularity among farmers. Some claim it is best tasting yam- two varieties have have been distributed. A third type of yam (D rotundata) is under test.

The yam is widely adapted as it will grow well on sandy, lateritic gravel and lateritic soils. The best yields are obtained on lateritic gravel soils.

PRODUCTION CONSTRAINTS :

On improved soils, yam yields at the Grand'Anse Experimental Station are within the range of 30 - 35 tons per hectare with the best varieties and application of 600 kgs of Nitrophoska and 12 tons of farmyard manure per hectare.

The major constraints to production at farmers' level are :

- Late planting.
- Proper planting techniques not followed.
- Limited use of fertiliser and farmyard manure.
- Insufficient weeding from planting to three months after planting.
- Snail problem.
- Poor staking.
- Lack of mulching.

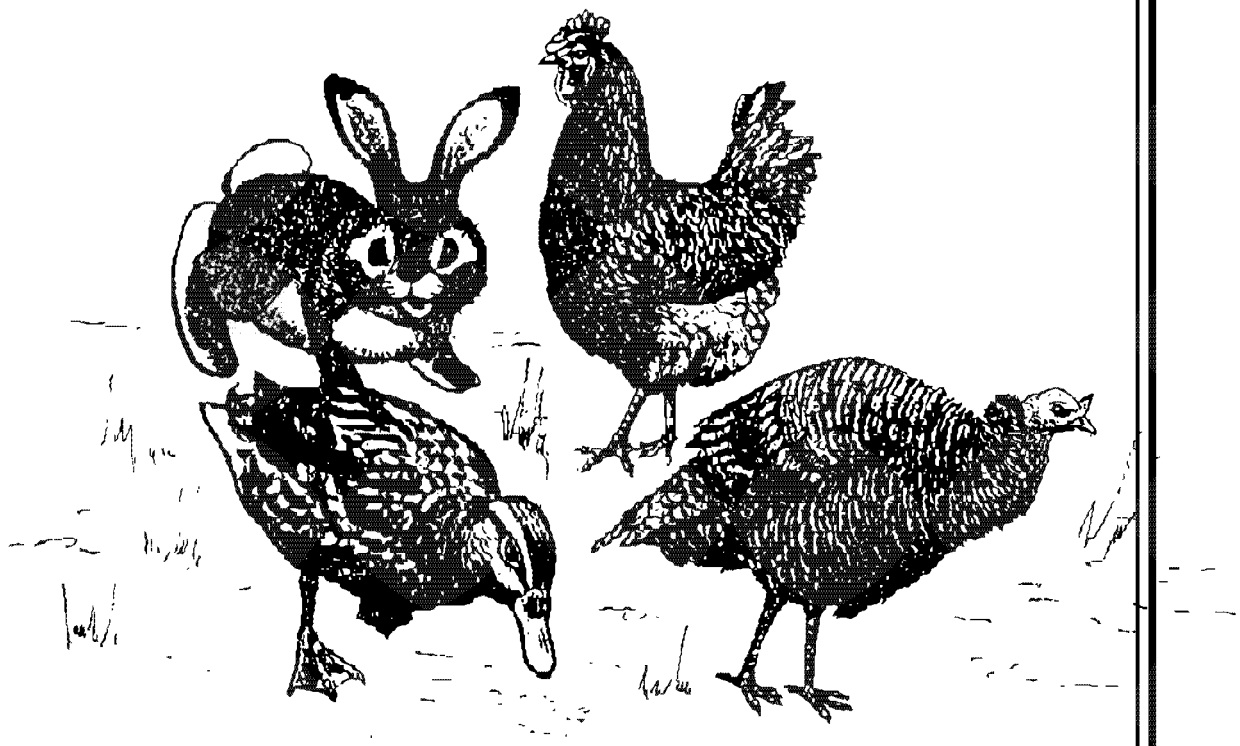
VI REARING ANIMALS

A. POULTRY and RABBITS

1. Home-Raised Pigeons

2. Getting the Best Out of Poultry

3. Rabbits Can Help Us Help Ourselves



HOME-RAISED PIGEONS ARE A USEFUL FOOD SUPPLY

LOCAL domestic pigeons, neglected so far as a national food resource, have now proved that they can be as productive as any that could be imported from countries in which they are a highly-developed farming activity.

Pigeon meat is both highly nutritious and valued as a gastronomic delicacy. Its production on a worthwhile scale - with the raising of "squabs" ready for the kitchen at 28 days from hatching - depends on a combination of inherited and management factors.

The required heredity exists in present Seychellois pigeons, although dispersed by random crossing, and can be segregated by selective breeding.

The necessary management factors, as detailed below, are essential if the improved results of selection are to be realised.

It must be appreciated that domestic pigeons can live at two totally different levels. If left to their own devices (as is usual in Seychelles) they remain apparently healthy, but nest and lay rarely and rear few of their young. If, however, they are given a suitable environment, food and management, a pair can produce two young every 28 days for ten months in succession, and maintain this rate of production for six years or more.

The essential conditions for high production are (1) suitable accommodation; (2) suitable nesting facilities; (3) suitable feeding; and (4) performance recording and selective breeding for improvement and replacement of production stock.

ACCOMMODATION:

A totally enclosed flight is indispensable in order to control nesting and rearing, to record performance and to ensure a balanced diet. The flight must be absolutely proof against rats, which will eat eggs and young.

The flight must also be proof against entry of wild birds, which can eat as much food as the pigeons housed in it. Sunlight is enjoyed and needed by pigeons, but they must have the opportunity of shade at all times. Shelter from rain is not needed in this climate (and even if provided most pigeons prefer to roost in the open when not on their nests).

The flight for a production flock of about thirty pairs should have about 300 square feet - preferably in a long rectangle (say 30 x 10 ft). Larger flocks than this are best housed in separate flights.

The height should not be more than seven feet, and perches should be provided at about five feet above ground. The floor must be well-drained and is best covered with a layer of coarse sand or gravel that can be renewed several times a year.

NESTING FACILITIES:

An adult flock requires at least two more nest boxes than there are pairs of birds in the flight. Each box must be large enough for two nests, since a productive pair of parents will lay a second clutch when their previous young are about ten days old.

If double boxes are not provided they may lay again elsewhere and neglect the previous nest, or wait until the first nest is vacated before laying again.

The dimensions should be about three feet wide by two feet from back to front, and about fifteen inches high. The width should be divided by a removable board at floor level about three inches high.

FEEDING:

Domestic pigeons at liberty to forage for themselves can keep fit on whatever they can find, but if they are expected to produce about 20 young per year they need a balanced grain diet that includes a high protein element, essentially provided by pulses.

Three grains that give good results in combination and that can be grown in Seychelles are maize, amberic, and sorghum. These can be provided separately and the birds will adjust their consumption to their varying needs.

The quantity given should be as much as is consumed twice a day - early morning and late afternoon. If the grains are home-grown they should be stored in a dry container until hard before being used.

Poultry pellets are unsuitable for pigeons confined in flights. Specially formulated pigeon pellets are made abroad, but there is no advantage in using them, and it doesn't make sense to increase home food production by importing more stock feed.

Pigeons need mineral grit, shell grit, coarse salt, and finely broken-up charcoal. Fresh drinking water must be always available to them in containers deep enough for them to immerse their whole heads, not just their beaks.

The drinkers should be covered with slats or wire grids to keep the birds from bathing in them. Bath water in open containers may be provided for an hour or so during the warmest part of the day, and taken away when soiled.

RECORDING AND SELECTION:

To maintain and improve high output in a squab production flock it is essential to record the performance of every pair and to eliminate progressively those falling below average. In this way average performance is raised by replacing the culled pairs by offspring of the better yielders.

It cannot be emphasised too strongly that young pigeons ready to leave the nest must never be left in the same flight with their parents or other adults. At around 28 days they must be removed, either for eating or to grow on to breeding age, about six months, in a separate flight with other growers.

If they are left with the adults they will upset the regular production routine and are liable to be bullied and injured. A separate flight for selected growers - without nest boxes - should contain at any one time not more than about 20 young birds. As soon as they pair up and show signs of nesting, they may safely be introduced into the adult flight.

Selected birds it is wished to pair should be temporarily housed together in a nest box with a detachable netting front, from which they may be released into the flight as they begin to build a nest.

Adult pairs may also be remated with selected partners in this way, but before they are returned to the flock their previous partners must be removed from it.

January 16, 1982

GETTING THE BEST OUT OF YOUR POULTRY

IT IS common to note nowadays that poultry have left the farm, and poultry enterprises are often referred to as "concrete" enterprises since they require only a very small area.

Poultry flocks have greatly increased in size and have developed into an independent industry with little direct contact with the land.

Practically all poultry are now housed in some form of intensive system, and there is a sharp commercial distinction between fowls used for egg production and destined for the table as meat.

Here and there a few fowls can be seen scratching around farmyards and there is a limited trade in "free range eggs" but these are not a commercially significant part of the market for eggs.

They do, however, remind us of the days when every farm had its flock of poultry providing colour and characteristic noise in the countryside.

The formation of larger units in the poultry field undoubtedly results from the impact of economic pressures which have left poultry enterprises with smaller and smaller profit margins. Poultry producers have therefore moved towards larger units in order to gain advantages of scale.

The poultry industry today has many facets, most of which are highly specialised, producing table meat or hatching eggs.

Since a high degree of specialisation is inevitably involved in the latter, it is likely that few general farmers will run poultry enterprises.

Nowadays it is generally agreed that the most profitable systems of egg production can be classified under three headings : deep litter, battery and wire or slatted floor system-all under controlled environment.

The amount of capital invested in laying houses and equipment will vary and depends largely on the following factors-size of unit, standards of ventilation, the amount of automatic equipment, stocking density and any extra equipment needed.

The factors which influence the profitability of egg production units:

NUMBER OF EGGS PRODUCED

Assuming a high standard of housing, feeding and general management, the following factors influence the levels of egg production.

Strain of bird

The effect of strain of bird is probably the greatest of all factors influencing production. Therefore probably the biggest decision the poultry farmer has to make is choosing the right strain of bird.

Since feed cost account for over 75 per cent of the costs of egg production, food consumed is the most important ratio.

This varies with strains of birds but, generally speaking, high-yielding birds usually show good returns for food consumed, and the high yielding bird generally truns out to be more profitable in the end.

The net effect of this is that the farmer must select the strain that will give him the best output under his particular circumstances.

In addition to strain of bird, light patterns may influence the number of eggs laid per bird. Also stress that may occur may depress the number of eggs produced.as well as a very high house temperature with poor ventilation and also a poor level of nutrition.

The number of eggs laid may also vary with the season of the year fewer eggs are laid in the second year, if birds are kept through a moult.

The size of eggs laid

Since there is a difference in price for the size of eggs its size will have an influence on gross output.

Heavy strains tend to produce larger but fewer eggs than do lighter strains and also the older the hen, the larger the egg that will be laid. Hens kept through a moult in the second year will generally produce larger eggs but unfortunately production in the second year will be lower.

Incidence of disease

Obviously incidence of disease will influence egg output and all precautions including medication of a preventative nature should be taken wherever possible.

FACTORS OF COSTS IN EGG PRODUCTION

Feed costs

Feed can account to over 75 per cent of the cost of egg production. The actual amount of food consumed will depend on the strain of bird, type of ration fed and the temperature of the environment.

Since food is a major cost item in egg production, poultry men should pay particular attention to wastage. Common causes of wastage are badly designed troughs, incorrect adjustments and over-filling of feeders, also wastage due to consumption by rats and other pests including birds.

Veterinary, medicines and other miscellaneous costs

These will not be very great per bird, but nevertheless are very important despite the fact that they are often applied as a preventive measure, since the consequence of disease outbreak in a poultry unit can be devastating.

Stockmanship is most important, especially where large number of birds are being looked after by one man. It may be very easy to lose birds and eggs if the poultry man forgets or neglects certain aspects of his work.

MANAGEMENT OF LAYING BIRDS

Clean, fresh water must be available at all times; even if the drinkers are dry for only half an hour a day, egg yield and egg size will be reduced.

Overeating can be as serious as under-feeding and may cause death of birds by degeneration. As food is fed ad-lib, you should feed mash instead of pellets if you suspect over-feeding.

Collect eggs frequently to avoid breakage, which results in egg eating becoming a habit among birds.

Keep the nest boxes clean. Soiled eggs, even when washed never keep as well as unsoiled eggs and if you sell bad eggs you lose your customers.

Always be quiet and move smoothly when attending to poultry, disturbance can cause reduction of egg production, or even death of chickens.

Always provide grit and shell, grit for good digestion of food, and shell for strong egg shells.

Try to provide some green food (deep litter) daily.

Possible causes of drop in egg production.

- Lack of water
- Lack of food
- Change of food
- Change of house
- Fright
- Damp or over-crowding

. Disease

. Moult - at the end of a cycle of egg production.

HEALTH AND HYGIENE

House, troughs and drinkers must be kept clean. Equipment should be scrubbed regularly and when the house is empty between batches it should be cleaned out-wood work scrubbed, scraped and painted with creosote.

Never over-crowd.

ALWAYS MAKE SURE THERE IS FRESH SUPPLY OF WATER

Provide plenty of sawdust and shavings, if on a deep litter system (at least 9") and try to limit spillage of water.

Make sure the poultry house is cool and shady.

Do not mix batches of birds and try to keep strange poultry and people away from your poultry houses.

Make sure you maintain a Newcastle disease vaccination programme.

Cull sick and unprofitable birds - isolate them and observe them for a few days, if they do not recover in a few days it is best to kill them.

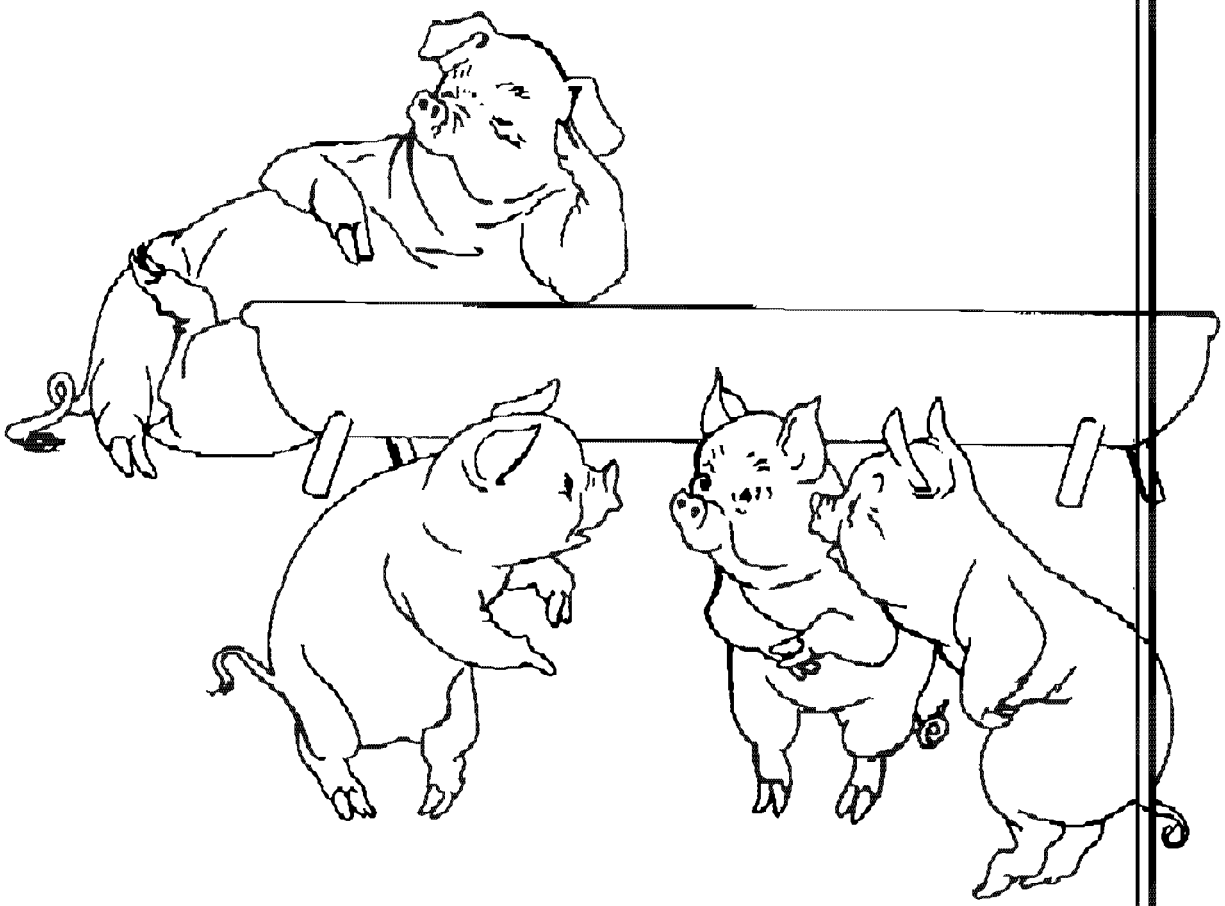
Guard against external parasites by general hygiene and spraying. You get a good opportunity to check at vaccination time every six months.

December 19, 1981

VI REARING ANIMALS, CONT'D

B. PORK

1. The Vital Role of Animal Production at N.Y.S
2. How to Achieve Pig Breeding Success
3. Make Yours a Supersow
4. How to Insure a Good Litter of Piglets
5. How to Keep Your Piglets Alive
6. How to Bring Good Pigs to Market



RABBITS CAN HELP US HELP OURSELVES

THE PROTEIN value of rabbit meat is higher than any meat used for human consumption. It contains more protein and minerals than beef or pork, less fat, a higher meat-to-bone ratio, and less waste.

One female rabbit can produce 20 times her own weight of meat in 12 months, and this in Seychelles too.

Rabbits manure is an exceptionally rich fertiliser with high levels of nitrogen, potash and phosphorous and more than three times the dry mater value of dairy cow manure.

Rabbits that are properly fed, housed and managed, thrive in Seychelles' climate and can contribute significantly to food self-sufficiently.

But despite its impressive advantages as a meat producer the rabbit is not yet taken seriously in Seychelles.

The many families that keep a few rabbits mostly regard them as "for the children" rather than as a source of home-produced food. That their rabbits are generally unproductive is due not to limitations of the local stock but to traditional methods and fallacies which need to be discarded before rabbits can fulfil their potential in the national economy.

Anybody genuinely interested in rabbit production and who would like further information should contact the Farmers' Training Centre at Anse Boileau.

May 30, 1981

THE VITAL ROLE OF ANIMAL PRODUCTION IN THE NYS

ANIMAL production, among many other activities in the National Youth Service, is an attempt towards self-reliance in which all students are really involved at particular times during the year.

General objectives of animal husbandry in the NYS curriculum are:

- To develop the spirit of self-reliance and to be self-sufficient in the village as far as food production is concerned.
- To change any negative attitude of the students (that animals are dirty) towards animal production by stressing its importance.
- Initiation of students to keep animals in the backyard later.
- To give the students some theoretical and practical knowledge of animal production so that the best scientific approach can be used to develop animal production in their backyards and in Seychelles as a whole.
- To give students a general and basic knowledge of animal husbandry on which further studies can be later founded.
- To stress the determination of the country to be self-sufficient.
- To make clear to the students that animal husbandry is not merely manual labour but is a scientific subject based on experiments, observation, recording economics, sociology and politics.

Contents of course:

Students always have theoretical courses during or after practical work. The second year's work at Port Launay is stressing backyard production with such animals as rabbits, cattle, pigs, poultry and other fowl.

The NYS is offering such courses so as to ensure that students will later start backyard production at their homes, which will help their families financially and finally contribute to an increase in food production in Seychelles.

Cap Ternay students are also following an intensive course in animal production (mainly cattle and poultry), in fish-farming.

Besides the main content of the course the NYS also offers what is called a supplementary programme covering matters of general interest in animal husbandry to those students who may express a special desire to learn more.

This supplementary programme does not include lectures but resource materials that the students can use under guidance to enrich their experience at any time whether they are in the block or not.

Organisation of the courses:

Presently a group of 200 students at Port Launay are working in the animal husbandry block. A group will come for animal husbandry once a week for four hours for both theoretical and practical work.

Practical work involves daily routine farm work, like cleaning the production sites, feeding the animals, collecting eggs, keeping records, giving special care to sick animals and many other interesting activities.

In a year a student has the chance to stay for eight half-days on the farm.

Many students would have liked more time to study this challenging subject but they have to learn other things too. Cap Ternay students have much more time for theoretical work (four hours a week).

As regards methodology, the NYS constantly tries to link theory and has led Port Launay students to build an open class in the farm itself.

Students enjoy this type of accommodation with no walls and with mobile blackboard, far from being a traditional classroom.

Production staff are also called upon to play a vital role in the education of students by taking part in the organisation of students on the farm and by constantly having to answer their questions.

NYS animal production

Daily egg production has reached the 1,000 mark. June alone produced 29,895 eggs, while May production was 24,320 eggs and in April 21,227 eggs.

Eggs produced are suppled to the three villages on a weekly basis. Before the start of the Cap Ternay and Ste. Anne villages, eggs were sold to Seycom, Skychef, Barbarons Hotel and N.Y.S staff as well.

Poultry:

Chickens produced at the Port Launay village are of two types - layers and broilers. In March a total of 1,784 broiler chickens were produced which fetched a total of R56,195.50.

These chickens are also supplied to the three villages and some sold to Seycom. In March we fetched a total of/R.69,296. Pork is supplied to Seycom.

Pork:

In the last six months since January, a total of 4,331 kilos of pork meat has been produced, fetching an income of R.69,296. Pork is supplied to the three villages of Port Launay, Cap Ternay and St. Anne.

Conclusion:

Students have always liked the animal husbandry block-many long to come to the block while others who have already passed through have happy memories. Many students have expressed the desire to further their studies in animal husbandry.

It has been interesting to have students producing their own meat and eggs and enjoying at the same time the fruits of their labour.

We have much to do to improve this field and we hope with time to set up a good management based on appropriate scientific methods that will contribute further to a better agricultural education.

We are also expecting to double our production as our demands are increasing with the new NYS villages. We are also struggling to reduce animal mortality in our farm with improvement in management practices.

Feeding the hens at the National Youth Service

July 24, 1982

HOW TO ACHIEVE PIG BREEDING SUCCESS

REALISTIC reproductive performance goals for today's producers are:

- 90 per cent conception rate.
- 42-day interval between farrowing and weaning.
- weaning to remating interval of seven days.
- Eight piglets weaned per sow.

This order of efficiency will produce 18 piglets per sow per year.

MANAGEMENT OF BREEDING BOAR:

Rearing period: It is essential thay young boars have physical contact with either boars or gilt in order to develop high levels of serving performance.

Serving frequency: Producers should aim to work boars as frequently as is compatible with full fertility, so as to intensively use superior sires and reduce boar numbers.

Boars can generally commence mating at 6 1/2 to 7 months of age and should be mated to a quiet, sexually receptive gilt for the first few services.

The potential serving frequency and fertility of the boar is still poorly understood but it appears that one service every two or three days should not reduce the present or subsequent fertility of the young boar. Boars of 10 months or older should be capable of serving daily for long periods.

Housing: Isolating working boars form gilts or sows dramatically reduces their serving performance. Prolonged high temperatures in the order of 35° - 40°C within the piggery can cause serious infertility in boars, gilts and sows.

Physical condition: Problems of leg weakness leading to difficulty in mounting the sow are a common cause of poor serving performance. The amount of movement that the pen allows the boar will affect his physical condition.

Minimum pen size should be 9 square metres (100 square feet). Dry, non-slip floors in the pen may also assist in preventing leg problems.

Overfatness results in serving problems. Ideally 2.0 to 2.5 kg of feed daily, depending on the working circumstances, of a well-balanced breeding sow ration (16 per cent protein) should be adequate.

MANAGEMENT OF THE GILT/SOW:

The aim of management of the female is to get her in pig as soon as possible and as often as possible with the maximum number of piglets weaned.

Rearing the replacement gilt: Rearing gilst in isolation from boars until 5 1/2 to 6 months of age and then housing them adjacent to sexually active boars appears to be the most efficient technique in attaining puberty at a young age.

Transport, change of buildings, mixing gilts and other forms of stress also stimulate puberty in gilts. The normal nutritional system for the grower pigs will ususlly provide adequate nutrition for the replacement gilt (i.e. 2.2 to 2.5 kg/day).

Age of the gilt at first mating: Mate gilst at about 90 to 100 kg liveweight at the second to third heat. Mating at first heat generally results in poor litter-size.

Increasing feed intake by 25 per cent (i.e. to at least 3 kg/day) for 7 to 14 days prior to mating may increase ovulation rate and possibly litter-size. However, litter size in the pig depends less on the number of eggs released and far more on the number of foetuses that survive in the uterus. Therefore, cut back feed intake to pregnancy level from mating on, or else embryo mortality will increase.

Weaning to re-mating: This period for first litter gilts is the most critical period as far as rebreeding is concerned. Do not allow gilts and sows to lose excessive weight before weaning. High levels of feeding during this period may be beneficial in some situations. There is no advantage in "single-day flushing".

Grouping gilts or sows at weaning appears to prepare them better socially for exposure to the boar at the time of mating. This type of housing may also stimulate the onset of oestrus. However, be sure that space is not limiting and avoid mixing animals with large variation in size and age.

MANAGEMENT OF MATING:

Putting a boar and gilt or sow together does not necessarily ensure that they will breed satisfactorily. Any in-efficiencies at this stage of production will cause economic loss. Each gilt or sow that returns after mating represents 21 breeding days loss in a year. Therefore this aspect of production in the pig enterprise cannot be over-emphasised.

Oestrus detection : The characteristic signs of oestrus or heat are:

Swelling and reddening of the vulva.

The prickling of the ears in breeds with erect ears.

A characteristic grunt or "roar" associated with oestrus.

The gilt showing interest in the boar and the standing reflex (adopting an immobile posture when pressure is applied to her back).

Time and number of matings: The duration of oestrus in the gilt or sow is 1 to 4 days, with an average of 2 to 3 days.

Ovulation usually occurs between 24 to 42 hours, or an average of 36 hours, after the onset of standing heat. Research has shown

that optimum time for mating is 12 hours before ovulation. Therefore it is generally recommended that gilts be mated late on the first or early on the second day of standing heat and sows be mated late on the second day.

A second mating within 12 hours of the first mating for both gilts and sows should ensure that the optimum time of mating is covered.

Supervision of mating: Assisting the mating enables the herdsmen to identify and in some instances overcome mating problems of boars, gilts or sows as they arise. For example, with mating problems such as rectal intromissions or penetrations, size disparity between boar and gilt or sow, slippery floors and sows or gilts that are weak on their legs, assistance by the herdsman generally ensures that mating occurs. When the boar has completed ejaculation, remove gilt or sow to avoid injury or stress to her.

Stressing the gilt/sow: Stressing gilts or sows around the time of mating may reduce their fertility. For example, near the time of mating, high temperatures, rough handling by the herdsman or boar or persistent attempts to mate a female when she will not stand for the boar may reduce litter size or even cause the gilt or sow to return on heat.

MAKE YOURS A SUPERSOW!

THE sow has one commercial prupose in life, which is to produce weaners and the more efficiently she does this, the higher will be the profit margin on any pig enterprise. This means higher farrowing index, bigger litter size and greater number of pigs weaned per litter. All these will help you to get more out of your sow.

Some management guidelines to help you get more out of your sow:

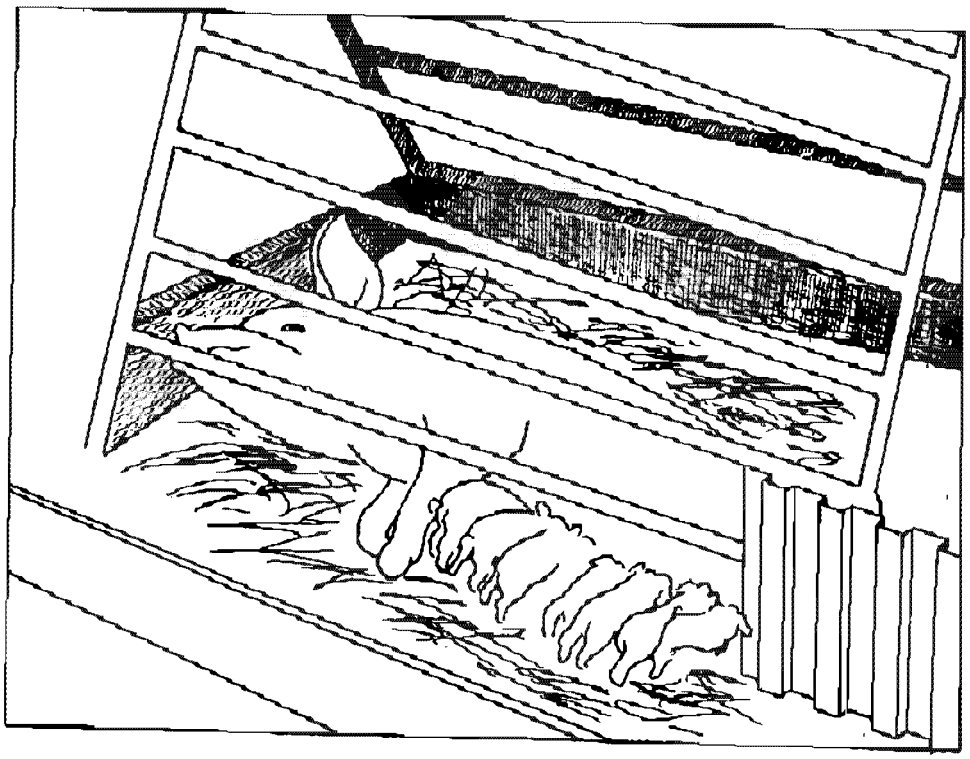
1. Age at which gilts reach puberty or FIRST heat averages about 180 days. Delayed puberty will result if gilts are not brought into conatct with the smell and sight of boars for some time after they have been selected as replacement or also if gilts and boars are reared together.

2. First mating should take place at the THIRD heat because the number of ova released is higher at the third than at the first or second.

3. Best conception rates are obtained when mating takes place on the first and second day after the sow first shows willingness to stand for the boar, because this is when ovulation occurs.

4. The herd target for weaning to conception interval should be 12 days, and this should include those sows which are culled for infertility after two or more matings.

5. Sows should be fed higher levels from weaning to five days after service. If, however, these high levels of feeding are maintained, both for gilts and sows, subsequent litter size may be reduced.



March 21, 1981

HOW TO ENSURE A GOOD LITTER OF PIGLETS

FROM four weeks before farrowing, the sow needs a much higher level of nutrition. Her ration should be increased and special attention given to her.

At this stage good feeding will ensure:

. Satisfactory birth weights.

. Maximum secretion of milk.

. An active and healthy mother.

Two weeks before she is due to farrow, the show should be cleaned and sprayed if there are any external parasites, and it is also advisable to deworm her.

She should then be placed in a clean, dry and disinfected farrowing pen. She is placed in her farrowing pen two weeks before so that she gets accustomed to her new surrounding. By the time she is due to farrow she will be settled quietly.

FARROWING PENS

There are two common types of farrowing pens used that are cheap to construct.

The rail system: A pen of 12 feet x 9 feet with rail approximately 9 inches above floor and 9 inches from the wall. The sow has plenty of room in the central area but rails prevent her from crushing the litter against the wall when she lies down.

Race or crate: A pen of 12 feet x 9 feet with a crush or crate fitted in the centre. The crate is 2 feet 4 inches wide and has a door at the rear. Bottom rail is 9 inches above the floor, so piglets can go in and out without being crushed.

With this system the sow can only stand and lie down but is unable to turn around. So she must be given some exercise daily to prevent constipation. With both types of pens mentioned the floor must be hard, kept dried and easily cleaned.

SIGNS OF FARROWING

Again the farm record will let you know when the sow is due to farrow. Gestation period is 116 days. During the last 24 hours the following signs will be noticed:

1 - Restlessness and off her food.

2 - Vulva enlarged.

3 - Udders swollen.

4 - Makes a "bed".

So watch her and if the first piglets appear without any difficulty or any deformity she should be all right. With good management it is rare that the sows have difficulty during farrowing.

If there are from 10-12 hours of unsuccessful labour, seek help from someone who knows. If the sow is nervous and tries to attack her piglets, remove them as soon as they are born and place them in something warm.

When the sow has finished farrowing and is settled and calm, return the piglets to her. Normally she will then accept them without any difficulty.

ROUTINE AFTER FARROWING

- Count the number of piglets, sex and weigh them.
- Identify each piglet e.g. by earnotching.
- Destroy any obvious runt. A runt is the smallest piglet born in a litter.
- Remove needle teeth. There are eight in all, which are very sharp and can cause pain to the sow's teats and udder.
- Give iron injection if they are on concrete floor.

The sow should not be fed for the first 24 hours after farrowing, but she should be given warm water ad lib. The first feed given is usually of a laxative type.

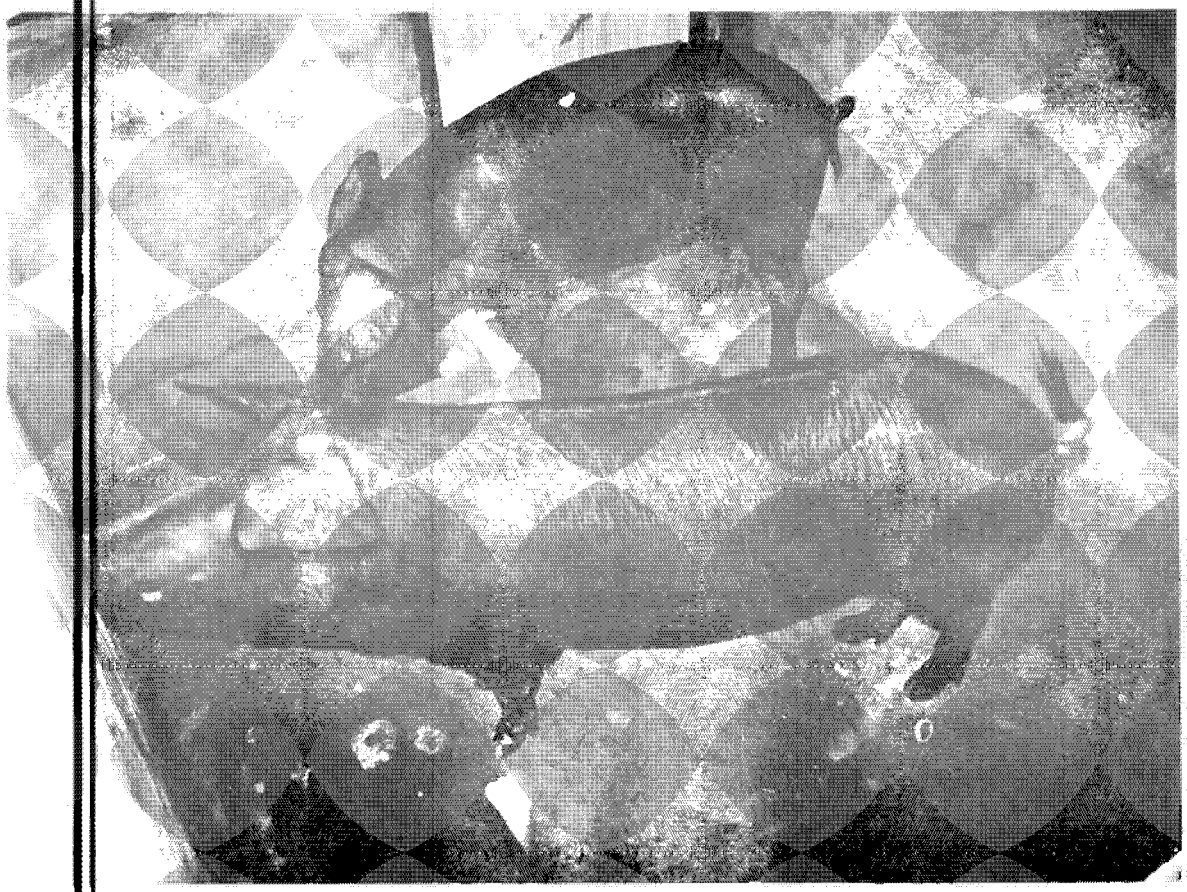
From the third day start to feed her to increase to normal at approximately 10 days after farrowing. It must be remembered that overfeeding a sow can lead to scouring in piglets. Exercise is needed, even if she is kept in farrowing crates.

When the sow is suckling her piglets, she should be given her normal maintenance ratio plus 1/2 lb meal per piglet per day with an ad lib supply of water. One week before weaning reduce her ratio by two-thirds to allow her drying off, otherwise she may have difficulty at drying off and laxative may be recommended.

WEANING

This is the separation of the piglets from the sow's milk. The normal weaning age is 8 weeks but 6 weeks weaning has been found to be most practicable here.

However, the best method for weaning is to remove the sow from her pen and leave the litter at home, thereby causing as little set-back as possible. The sow, if possible, should be taken to a pen close to the boar's pen, flushed and meted as soon as possible. Normally the sow should come on heat 4-6 days after weaning.



A healthy litter of piglets should not be difficult to achieve with proper care before hand.

November 21 1982

HOW TO KEEP YOUR PIGLETS ALIVE

REPORTS from Extension and Veterinary Officers show that many piglets in Seychelles die during the first week of life, mainly due to poor design of farrowing pens. Newly-born piglets are very vulnerable. They are very small in relation to the size of the sow and are therefore very prone to death from overlying by her. The sow can be very restless and awkward during the process of farrowing and this further endangers the newly-born piglets.

FACTORS TO CONSIDER WHEN PLANNING FARROWING

Accommodation:

The major factors to be considered in planning farrowing accommodation are as follows:

a. welfare of the sow and piglets, including cleanliness.

b. ease of observation and supervision.

c. labour economy.

d. capital investment.

It is impossible in a single arrangement within a pen to fully cater for all objectives so that a compromise in design is necessary. No two people will put the same emphasis on the same factor. Some will place most emphasis on low capital investment, possibly at the expense of piglet welfare, some may go for maximum labour economy, while others will put maximum weighting on sow and piglet welfare at the expense of higher capital investment and labour costs.

The outcome is an infinite variety of systems in practice, all having their strong and weak points.

Objectives:

The original objectives in providing specialist farrowing facilities are:

1. to reduce incidence of crushing by:

a. controlling the movements of the sow within the pen.

b. attracting piglets to a comfortable safety zone or piglet creep.

2. to ensure adequate nursing and suckling, and therefore piglet nutrition by:

a. ensuring that the bottom bars of the farrowing crate (if in use) are high enough to ensure that they do not stop piglets suckling.

b. providing a comfortable floor surface to encourage the sow to rotate her body at nursing so as to expose fully

all teats on the down row to her piglets.

arranging an adequate micro-environment for piglets in the creep area.

chieving objectives:

n designing a farrowing facility, how do we set bout meeting the requirements of the farrowing sow and her piglets in their first critical few days of life in such a way as to minimise risk of crushing and minimise opportunities for adequate and regular nutrition on the part of every viable piglet born?

he farrowing pen components which must be considered to provide the necessary conditions for the sow and her newly - born piglets are as follows:

the farrowing crate.
the floor surface
the piglets area.
watering arrangements.
pen size.

he farrowing crate:

his should help to control the movements of the sow in such a way that she is forced to lie down on her belly before rolling over on to either side. Most crushing of piglets stems from sows flopping directly on either side from the standing position, trapping unsuspecting piglets.

he floor surface:

he floor surface in a farrowing pen should:

cater for good mobility of piglets.

eliminate risk of injury to piglets and the udder.

be comfortable for the sow and provide her with a good foot-hold.
provide an acceptable level of cleanliness and be easy to clean.

be durable.

be of low cost.

he piglets area:

his area should provide a temperature of 29 to 30°C. It should by dry, dust-free and easy to clean. It is also important that the area be adjacent to the udder of the sow since piglets have a strong instinct to lie as near the udder of the sow as possible in the early hours of life.

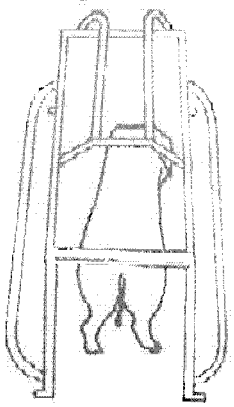
atering arrangements:

f nipple drinkers are used, they should not be mounted too high on the crate as otherwise, in drinking, the jowl and neck of the sow will act as a drainpipe as the sow drinks and the area in the front of

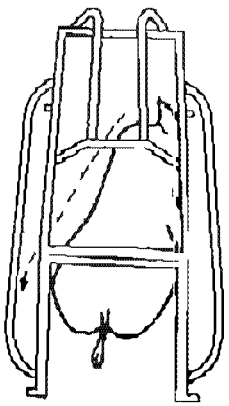
the crate will become wet. Water bowls can also be used. They are less liable to drip, they can be adjusted and water cut off if necessary. They can also be used by young piglets, thus decreasing the need for a special nipple or bowl drinker for piglets.

Pen size:

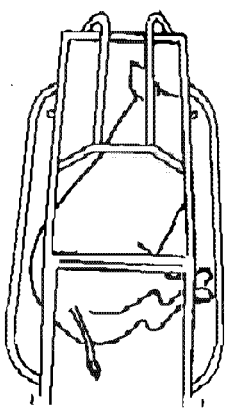
The optimum pen size is dependent on the age piglets are transferred from the farrowing pen. In Seychelles most piglets are weaned at 8 weeks at a weight of between 8 - 13 kg each. The minimum desireable width of a farrowing pen is 1.8 metres. For eight week weaning, we recommend a pen of size 2.1 by 4 metres.



1.

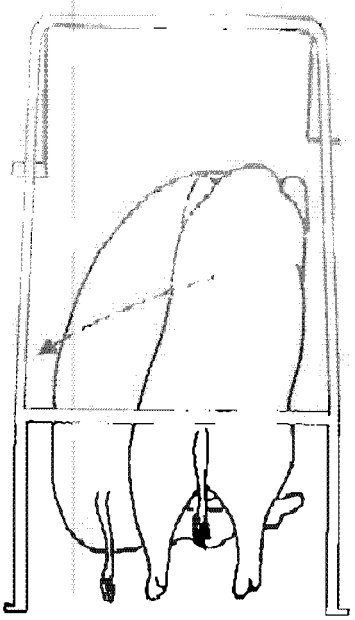


2.

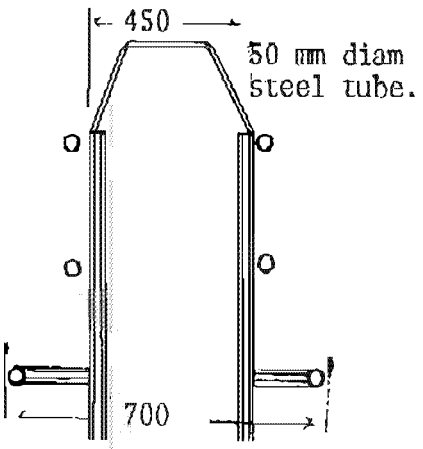


3.

A properly designed crate forces the sow to lie down on her belly first before rolling over on to either side.



This design allows the sow to flop directly on to her side, thus increasing the risk of crushing the piglets.



The arrangement of the horizontal bars of the crate.

HOW TO BRING GOOD PIGS TO MARKET

In managing your pigs from weaning to slaughter, the task is comparatively simple.

It is better to remove the sow and leave the piglets in the same pen for another one to two weeks. By this means they are not subjected to a new environment where they could be stressed and become liable to catch an infection or other diseases.

There are great advantages in filling the pens of fattening houses with equal numbers of evenly matched pigs. This means there is more equal competition for food and each pig gets its proper share. All pigs reach market weight at the same time, when the pen can be emptied completely.

Pigs from weaning to about 50kg should be fed ad libitum i.e. they should normally have access to food at any time they want it.

If the feed is comparatively cheap and carcass quality of little importance, this practice should be maintained up market weight.

Market weight is normally over 100kg liveweight but where a premium is being collected for superior quality meat carcasses, the market weight could be about 70-80 kg.

An experienced pigman can judge to 5 kg the weight of a pig and therefore market date can be decided accordingly.

DESPATCH AND TRANSPORTATION:

Here it is found that the losses during transportation to market can be considered. Deaths up to 2 percent are common and even more have been recorded.

In addition there is considerable loss due to "shrinkage", the pigs commonly arriving at the slaughterhouse 3-4 kg lighter than when they left the farm.

To avoid these losses requires care in transportation.

Trucks should have shades and should be divided up with open-weave divisions which let air through but which keep pigs separated into small groups.

The pigs should be sufficiently tightly packed to prevent their moving violently on a rough journey but not so tight as to deprive them of clear space around their heads. The best time to move them is during the cool early morning, from 3-6 a.m.

MEAT PRODUCTION AND CARCASS QUALITY:

Pig meat is not a uniform commodity; it may be produced by pigs of different breeds and different ages; it may vary according to the ration fed and the way that meat is handled and processed.

Some of the factors causing the characteristics of pig meat to vary are as follows:

As pigs grow there is a change in their body proportions and also in the amounts of the different tissues-lean meat, fat and bones.

It is changes in the proportion of these different tissues that have the major effect on the quality and hence the value of the carcass.

KILLING OUT PERCENTAGE

During slaughter the pig carcass is usually bled, de-haired and eviscerated. The head and feet may or may not be removed. The carcass may then be sold intact or divided into halves or joints.

Killing out percentage is the weight of the dressed carcass as a percentage of the liveweight before slaughter. It is therefore a measure of the yield of saleable meat from a pig of given liveweight.

Typical values (head and feet off) are:

70 per cent for pigs of 65 kg.

75 per cent for pigs of 90kg.

77 per cent for heavy pigs of 120kg.

CARCASS QUALITY:

The term carcass quality usually refers to two aspects of the carcass:

The relative proportions of lean, fat and bone.

The conformation or "shape" of the carcass.

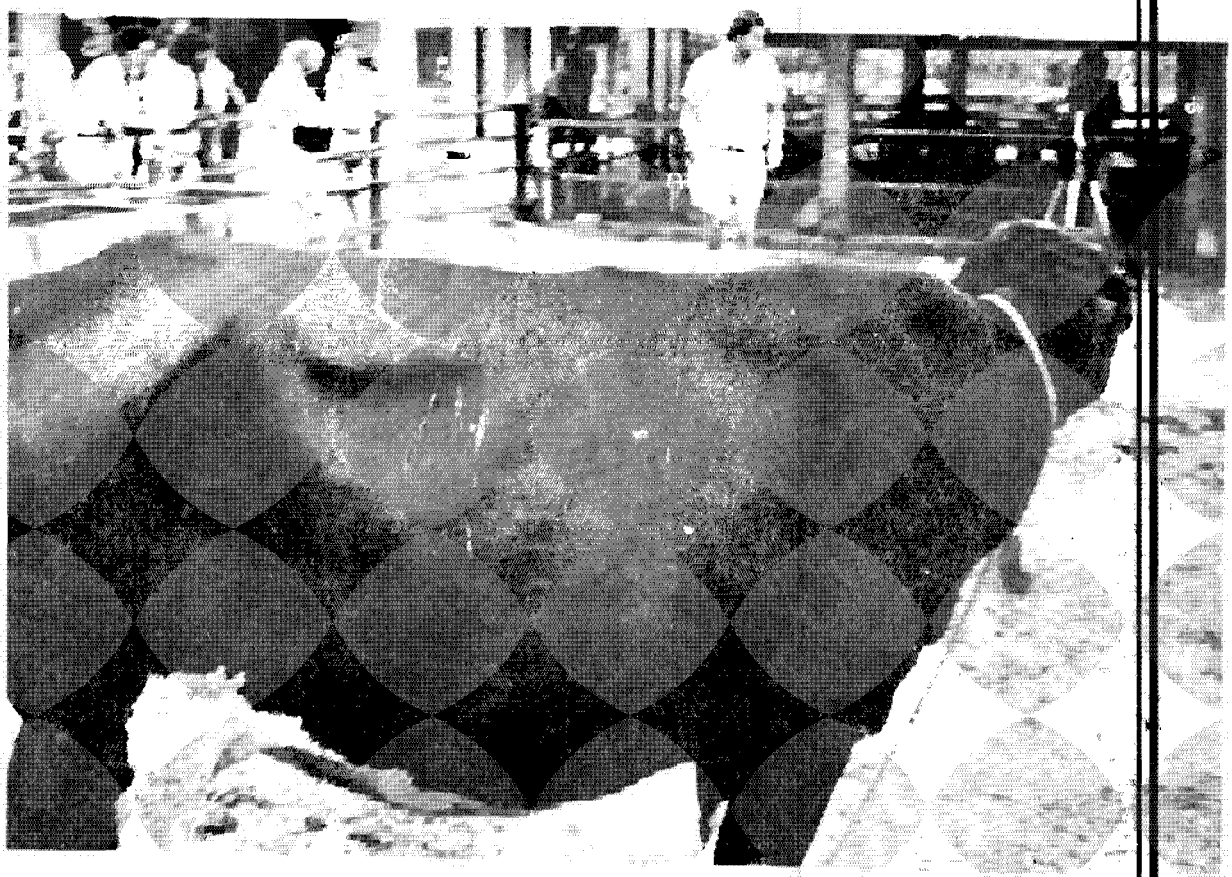
Meat quality in contrast, refers to characteristics of the tissues once prepared for eating.

A carcass of high quality is in most places regarded as one with a large amount of muscles with small amounts of bone and fat, with the muscles being particularly well-developed in the back and hams.

It is best to fill pens with evenly matched pigs.

VI REARING ANIMALS, CONT'D

0. CATTLE
1. Proper Sheds Are Very Important in Cattle-Raising
2. Keeping Your Cattle Healthy
3. Make Sure Your Cattle Get the Right Food
4. How to Rear Strong and Healthy Calves



PROPER SHEDS ARE VERY IMPORTANT IN CATTLE-RAISING

THE proper planning of sheds is a very important factor in cattle raising. Proper sheds are important for both adult cattle and calves especially under an intensive raising system.

CALF SHEDS

Good quality replacement heifers are an asset to any cattle raising operation. Heifers are needed to replace cows culled due to low production, poor health and other reasons. Since those young stocks are important for replacement they must be properly housed.

The first four months of a calf's life are quite critical. It is at this stage that mortality rate can be high. The environment of the calves affects their death rate. To lower that death rate, farmers should plan young-stock housing carefully. Any successful housing unit must be able to keep labour and costs to a minimum and still provide good care, thus raising healthy calves. The following are some characteristics of good calf housing.

1. The facility should be easy to clean
2. It must have proper equipment for feeding
3. It should be built to last
4. Pens must be of proper size
5. Above all they must be low in cost.

The basic housing facility is a pen. This can be constructed either with wood or bricks. An ideal pen must have:

1. a cemented floor
2. good openings for ventilation
3. central water supply and feed trough

The pens are designed to maintain an inside temperature and must have adequate openings for ventilation which is very important to provide fresh air and removing humidity. In group pens, animals should be separeted by size or age. A common way of grouping animals is from:

1. birth to weaning
2. weaning to six months
3. 6 months to 9 months
4. 9 months to breading (marking)
5. marking to calving

GROUP PENS

Group pens (with bedding) can be used for both small calves and older animals. One important factor is spacing. Below are some spacing requirements for cattle.

Young calves - 25 sq. ft. of floor space per head (there should be no more than 7 calves per pen)

10 months old calves - 30 sq. ft. of floor space

Older hiefers - average of 40 sq.ft./hd.

Do not over stock; this can lead to shy-feeding and agressiveness amongst both calves of older cattle groups.

MANURE DISPOSAL

Small calves don't produce much solid manure and its removal poses no problem regardless of the type of housing used. Removal of liquid manure is more of a problem. A small gutter that can easily be flushed can be helpful to keep bedding dry. As cattle grow older, manure removal becomes more of a problem. At this stage an option can be established: the use of a manure pit or a gutter. No matter which system is used, the level of ammonia (in the manure) must be kept low.

SHEDS FOR ADULT CATTLE

Adult cattle need very little housing protection. The stalls must have roofs for shade and the cows must be able to move freely to the feeding area and have ample space to lie down. It is of advantage if the floor is paved to facilitate cleaning up. With this system of housing, manure removal must be done twice a week to prevent the accumulation of ammonia in the dung.

For ventilation, the upper sides of the pen should be open to allow fresh air to move in (the wind will affect air movement).

The following is a suggested list of procedures for planting housing facilities for cattle.

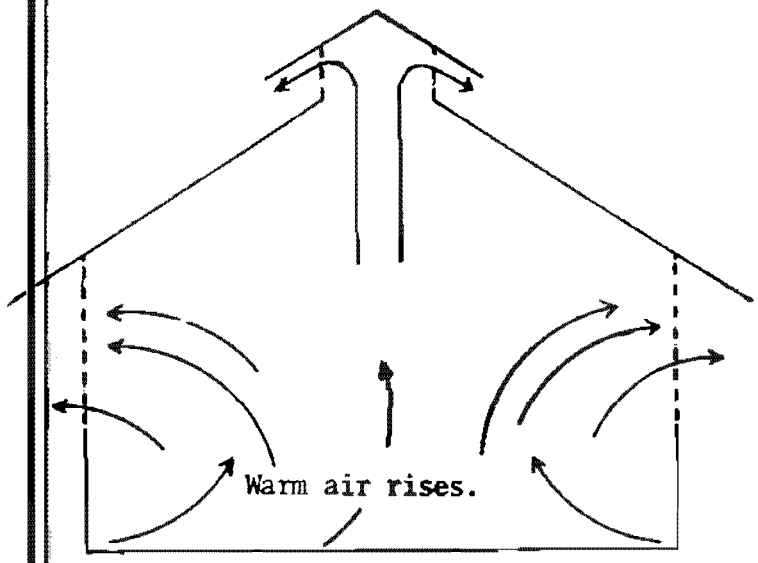
1. Decide how many animals are to be housed in the facility (allow extra room for expansion).

2. Examine the existing facilities if they are to be renovated and determine how they can best be improved.

3. Visit farms, eg. Animal Improvement Centre, and take home literature on cattle housing.

4. Make an estimate of how the can best be cessary for new contruction or remodelling.

5. Allow personal preference to play a role in the choice of housing.



Good ventilation is important in cattle sheds.

An ideal pen must have a feed trough.

March 20, 1982

KEEPING YOUR CATTLE HEALTHY

THERE are many causes of ill-health, as are the degrees of its severity - and the standard of health regarded as satisfactory by some farmers will not be the same as by others.

Cattle in any state of ill-health are not fit to give maximum performance, whether as meat or milk producers or as breeding stock.

Early signs of trouble

A farmer should be continually alert for signs of ill-health in the very early stages. Cattle in poor health frequently move away from their mates if grazing. Loss of appetite is a very early sign of ill-health. Another is an abnormal posture-standing with a dejected appearance-ears and head held low and back arched; or when lying down, the head is either stretched out or turned towards the back end of the body.

The coats of cattle in good health are bright and glossy in appearance, and the tails and hind quarters should be free of heavy faecal contamination or discharges from the genital organs.

Watch out for these symptoms

Cattle in good health should always be alert. If dull and listless or slow to move, should be watched carefully for any sign of lameness, or (in milking cows) for acute mastitis, or in (recently calved cows) genital infection after calving. Another possibility could be a foreign body in the stomach wall.

Pain should not be experienced when the body and limbs are handled. The horns and ears should not feel cold, the eyes should be bright and not sunken, and the mucous membrane within the lower eye lid should be pale pink and not anaemic in appearance. Cattle should be observed to see if the dung and urine are normal. Very loose or very firm dung both indicate some malfunctioning of the digestive system due to unsuitable food or the presence of disease.

Strong-smelling dung or urine, or blood-stained faeces or urine are abnormalities that should be noted. So are abnormalities in milk either in appearance as will be shown by using a mastitis-strip cup or in smell as the smell of acetone which indicates acetonemia.

Three health checks

There are three preliminary checks on health which can be made on the farm.

1. The pulse:- Which measures the rate at which the heart is beating. The heartbeats can best be felt by gentle pressure on the artery underneath the tail, using the tips of the three fingers. Count the number of pulsation in one minute, the normal pulse rate is from 40-60, a pulse rate over 80 is dangerous.

2. Respiration :- Count the number of chest movements per minute. The normal breathing rate in cattle is 25-30 per minute.

3. Temperature:- Can be done with the help of a thermometer Normal temperature in cattle is 38-39°C. Temperature above normal is a sign of fever.

Tackling troubles on the farm

Bleeding

To stop bleeding make a pad out of a part of a clean linen sheet, moisten in warm water and hold it firmly over the wound until a bandage can be applied to keep the pad in position and assist clotting of the blood. Call the vet immediately, if the blood tends to spurt out, indicating that an artery has been damaged. Keep the animal as quiet as possible.

Wounds

Clip the hair around the wound and then bathe it with salt solution (2 teaspoonfuls of salt to a litre of boiled water) to assist in cleaning up the wound. Damaged teats should be well treated and vet assistance is required where wounds are deep seated or contaminated with dirt.

Bruises

Bruises including swollen joints should be bathed with cold water on the first day and then with warm water on following days.

Choking

The best aid treatment is to try and locate the obstruction in the gullet by feeling along the whole length of the underside of the neck. If an obstruction can be found, massage towards the throat will in most cases dislodge the obstruction. Difficult cases require vet aid.

Scouring

In its simplest form scour may be due to a stomach chill or change of diet. Persistent scouring may be due to diseases or worm infestation. Deworming routine is the key to control worm infestation.

Failure to thrive

Some cattle even on good feeding may fail to thrive, the chief causes being

1. Parasitic worms: dose with dewormer as instructed by vet.

2. Lack of some essential minerals-shortage of copper or cobalt causes unthriftiness an can be combated by allowing free access to a complete mineral mixture available at all Agriculture Extension stores. A depraved appetite (eating soil or debarking trees) is often held to be a sign of mineral deficiency.

MAKE SURE YOUR CATTLE GET THE RIGHT FOOD

IT IS necessary to provide enough feed and the proper type of feed for your cattle. With proper nutrition your animals will have a better chance to grow quickly, become strong, breed and produce healthy calves, produce meat and milk and stay in good health.

What are the things an animal needs to live, to stay healthy, and to produce?

It needs a source of energy, protein, minerals, vitamins, and water. All of these must be provided in any feeding programme-in adequate amounts and proper proportions.

A cow needs a good source of energy in its food. It uses this energy to maintain its body and above this for milk production and to put on extra weight.

If there is not enough energy in the food given, the first things to go are the production of milk and weight gain as the cow will put all its energy into trying to stay alive.

Energy is the thing most required, then, in the feed given.

What types of feed give a lot of energy to cattle?

In Seychelles, forages such as chopped elephant grass and sugar cane stems, along with chopped banana stems and waste bananas, provide much energy.

Dairy meal, which is composed mostly of cereal grains, is a highly concentrated source of energy. A small amount given to animals can supplement the diet providing adequate energy if not enough is present in the other feeds given.

Cattle also need a good source of protein in their feed. Protein is needed for growth and to repair and keep the animal's body strong. With too little protein, calves do not grow well.

Cows will lower their production of milk and quality will be poorer. The health of animals can also be affected if there is not enough protein in their feed.

Several feeds in Seychelles can be used to provide adequate protein. Leucaena is the most successful forage grown because it is high in protein. If enough leucaena (chopped) is given, it can supply the protein needs of most animals.

There are other forage legumes that can be seen growing wild or that can be planted as good sources of protein such as pueraria, centrosema, and so on. Protein also can be supplemented through the use of dairy meal or calf meal or through the use of local waste products such as meat meal and brewer's grains.

Minerals are needed by cattle in small amounts. Although not much is needed, they are very important in keeping your animals healthy. There are at least 15 minerals that cattle need and some are needed in larger amounts than others.

The coats of cattle in good health are bright and glossy in appearance.

March 27 1982

The 3 most important minerals are phosphorous - important for animals to use the energy in their foods and also a major mineral in bone, calcium, also important for strong bones, and salt (sodium).

There are other trace minerals that may have to be provided if not found in the food given. To supplement these minerals, salt-mineral blocks or powder should be given to the animals.

Another requirement that cattle have is vitamins. Vitamins are needed in very small amounts but are important in maintaining the health of the animals. Usually enough vitamins can be produced by the animals or can be obtained through the forage that they consume so that supplementation is not needed.

An adequate water supply is very important for cattle to live and produce. Water should be available at all times to the animals or should be given as many times as possible throughout the day.

If not enough water is given, the animal will suffer stress and may die. Also a constant source of clean, fresh water is very important to maintain milk production in dairy animals.

What kind of feeding programme should you use then to provide all these things your cattle should have-one that provides adequate energy, and protein along with minerals and vitamins?

First you must know what foods are available and what they contain. In Seychelles the most commonly available food sources are local grasses, banana stem, sugar cane tops, sweet potato tops and other plant wastes, elephant grass, leucaena, brewer's grains, and dairy or calf meal.

Other materials may be available such as other forage legumes, sugar cane stems, waste bananas, powdered milk and meat or fish meal.

When choosing a feeding programme you must find out what you have available and then feed it in the proper amounts.

Again you need to mix your forages to provide energy and protein. High energy foods include banana stems, elephant grass, sugar cane stems, sweet potato tops, waste bananas, and concentrated foods (dairy meal).

Moderate energy foods are such things as local grass and sugar cane tops.

High protein foods include leucaena, other forage legumes, brewer's grains, powdered milk and meat and fish meal.

A feeding programme that has been very successful in Seychelles uses chopped elephant grass for two-thirds to three-quarters of the ration and chopped leucaena for the rest along with feeding local grass by free choice.

This is supplemented by small amounts of dairy meal or brewer's grains for milking cows and calf pellets for those growing calves that have been weaned.

Other successful programmes have used sugar cane for the majority of the forage energy requirements. These are very suitable for moderate or large cattle operations where milk and meat production is aimed for.

For smaller animal units or for the household that keeps one or two animals, local grass will provide most of the forage for the cattle and this can be supplemented with small amounts of elephant grass and leucaena grown in waste areas or around borders.

Bananas can be chopped and fed when available. Sweet potato tops and other waste can be fed also when available. If there is not enough forage available then small amounts of dairy meal should be given to help maintain the animals.

In all cases mineral-salt blocks should be used - made available for the animals to lick free choice at all times and fresh water should be available most of the time.

It is important to provide enough food at all times. A cow will easily consume 80lbs of fresh food material per day if given.

If enough food is not given and the energy and protein requirements are not met you are putting the health of your animals at risk.

Cattle must have energy foods, protein, minerals, vitamins and water.

HOW TO REAR STRONG AND HEALTHY CALVES

IT is important to be well prepared for the calf-rearing period. Service records kept for each cow and heifer will give the farmer the expected time the cow or heifer is due to deliver her calf.

It is best to have the cow in a clean place away from other cows. The place should be close so that the cow may be watched closely in the last few days before calving. It is always advisable at this time to check all quarters of the udder for mastitis.

Look out for these signs:

The swelling of the udder, slowly developing in the heifer, more suddenly occurring in the mature cow, the presence of colustrum (first milk) and during the last 24 hours before calving the falling of the tendors on each side of the tail head, enlargement of the vulva with jelly-like mucus, the cow becoming uneasy and lazy, bellowing and trying to find a quiet place to calve.

The calving:

The most critical time for the cow's as well as the calf's life is the actual calving, which starts with the dilation of the cervix.

Keep constant observation on the cow, but from a distance. The water bag will open the cervix, become noticeable in the vulva and burst.

The cow has now moved into the last stage of the delivery, the expulsion of the foetus stage with visible labour, abdominal pressure, bellowing and pain. The vagina and vulva become extended to the utmost and the foetus is finally expelled.

If more than 1-1 1/2 hours elapse after the breaking of the water bag and nothing more happens, it is advisable to clean up and make an examination to feel if the foetus is coming along all right.

If help has to be given at delivery, it requires knowledge and patience. Incorrect pulling may cause severe damage to the cow.

After calving comes the expulsion of the foetal membranes.

Care of the new-born calf:

After the calf is born it is important to observe if the breathing is normal, and any obstruction of the breathing should be removed.

Normally the cow will rise, thereby breaking the naval cord. It is however advisable to paint the navel cord with tincture of iodine or any other antiseptic chemical.

As a motherly instinct, the cow will start to lick its calf. It is better to allow the cow to dry her calf on her own, because while she is doing it she breathes on her calf which warms it and has a massaging effect which helps the calf's breathing etc. It is not advisable to remove the calf from the dam and wipe her dry.

A vigorous calf will attempt to rise and suckle within half an hour. However, if the calf is weak or the cow's teats are too large, the calf should be helped to stand and the teat guided to the calf's mouth.

It is extremely important that the new-born calf receives colustrum as early as possible, because colustrum (or first milk) has the following properties;-

It is a laxative.

It is high in vitamin A.

It has antibodies which are essential for disease resistance in the new born calf.

It is easily digested.

Methods of milk feeding calves:

. Calf left with dam.

. Bucket or hand feeding.

. Restricted suckling.

All these systems of feeding mentioned above have their advantage as well as their disadvantages.

Calf left with dam (i.e. natural suckling):

The calf will take the milk at the required temperature i.e. temperature of the udder.

The calf will itself maintain sucklings, which means small meals but often, and the correct amount is consumed and there will be no overfilling of the calf's stomach; no contamination from dirty feeding buckets; little labour is involved.

Bucket or hand feeding for calf:

With this system the calf has to be removed from the dam. It is best to remove the calf soon after it has been licked dry by the cow just before attempting to start to suckle, because this will lessen the mothering effect. Also, the earlier the separation the less noise both from the dam and the calf.

However, it is important that the calf receives her colustrum. Bucket or nipple feeding is easily taught to the calf that has never suckled. Milk recording is more accurately kept.

The calf is penned so that there is less risk of internal parasites.

The cow without the calf at foot is more easily mixed with other cows. With this system of feeding there are some general rules that must be observed.

1. Colustrum must be fed for the first three days at least.

2. Milk must be fed at the cow's body temperature i.e. not too hot nor too cold.

3. Feeding time should be regular.

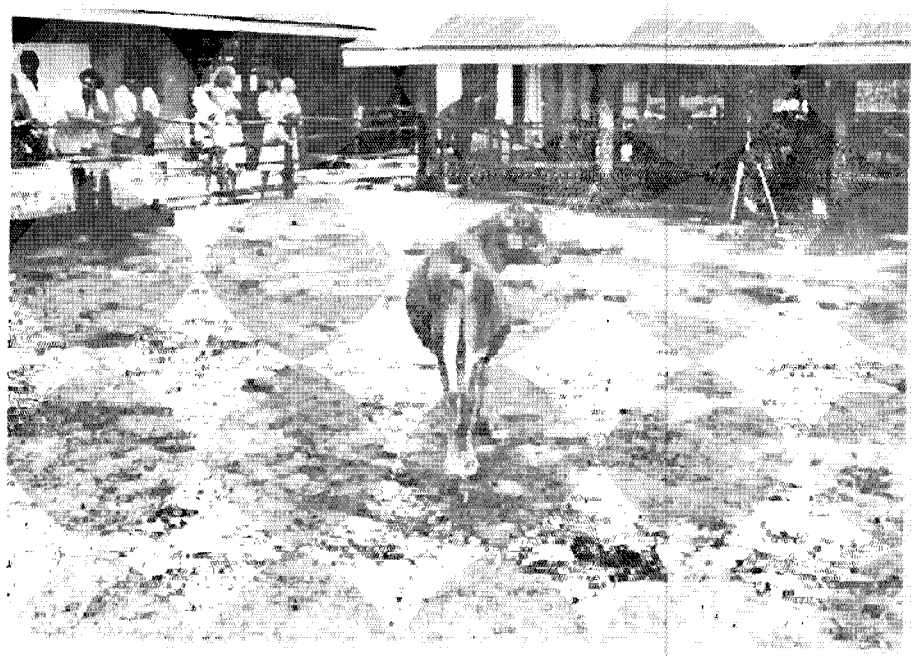
4. Feed approximately the same amount each time.

5. Do not over-feed a calf - a calf should get milk at 10 per cent of her body weight per day.

6. Any change in the feeding should be made gradually.

7. Drinking water should be clean and always available.

8. Tny utensil used for calf feeding should always be kept clean and sterile.



An increase in beef production will help to reduce Seychelles' import bill.

September 18, 1982

VII A SUMMARY ON SEYCHELLES AGRICULTURE AND RESEARCH

1. Research The Key to Greater Crops Production
2. Boosting Agriculture in our Schools
3. How the NYS co-ops Unite Life and Work
4. Why Agriculture Offers A Good Career
5. A Bridge Between Research and Farmers
6. Now Crops Research Is Starting to Pay Dividends

RESEARCH - THE KEY TO GREATER CROP PRODUCTION

DURING the past ten years efforts to improve vegetable, fruit and root crop production, have been geared in particular to the selection and testing of different varieties from seed firms, nurseries and institutes.

As varieties proved to be adaptable to our conditions, research proceeded on selection criteria, screening superior cultivars, propagation methods, cultural requirements, disease and pest control, harvesting and storage.

Previous years had already produced a list of interesting varieties but unfortunately these lacked tolerance and adaptability to Seychelles conditions.

With improvement in breeding techniques and research by plant breeders, we have been able to obtain a good selection of varieties for our agro-climatic conditions and in particular hybrids, which imply increased yields, and varieties with resistance to pests, diseases, viruses and bacteria.

During the past few years, as a result of intensification of vegetable, fruit and root crop production to meet the demand of the hotel trade, experience has shown that while it is possible to draw up a list of varieties, it is often seen that one variety in a particular area does not perform as well as in another area.

This can be due either to altitude or different soil conditions. Each area has its own particular environmental conditions. It is, therefore, of the utmost importance to familiarise farmers with recognised qualities of the different varieties grown in each area and with the various farming methods practised.

The results which are published pertain to varieties and also include technical information on farming methods and plant protection

Naturally, these results are neither complete nor final. Allowance must be made for special difficulties encountered, particularly those connected with weather conditions, seasonal cycle, possible pest damage and, lastly, availability of staff.

Choice of varieties, improvement of soil and farming methods, pest disease and weed control, and the best methods for harvesting, packging, storing and canning are all among topics which will be pursued in due course.

So far, judging from good results obtained from farmers, pilot and commercial farms, crop research in Seychelles can already be deemed a success.

However, our action will not stop at this point, for we consider it of the utmost importance to continue trials in various areas on Mahé, Praslin, La Digue and outlying islands. It will be necessary to have a closer look at fruit varieties that bear off-season and new vegetable varieties released that can be grown out of season, i.e. during the hot and rainy months.

The use of improved or adapted varieties cannot by itself bring about an improvement in crop production. Rational use of organic and mineral fertilisers, irrigation and crop protection are crucial factors that must not be forgotten.

The introduction of certain vegetables, fruits and root crops which can be cultivated simply and at family level using small scale methods, will certainly improve the diet of many people in Seychelles.

The role of the research set up is that it must report all its findings, it must also be co-ordinated and intensified. The Extension Service is also of great importance in providing the feedback of information.

Better farming methods will be sought to produce good "economic yields", the obvious goal of all farmers.

May 30, 1981

BOOSTING AGRICULTURE IN OUR SCHOOLS

AGRICULTURE has been introduced in schools with the following aims:-

. To encourage pupils to adopt positive attitudes to cultivating crops and rearing animals and to appreciate the importance of the government's drive towards national self-sufficiency, by means of practical work and farm visits.

. To introduce pupils to working with soil, simple agriculture tools, crop plants and animals.

. To help pupils acquire a sense of responsibility, team spirit and co-operation through activities on the school farm.

. To help students adopt a scientific approach to crop and animal production by teaching them simple agricultural techniques.

. To foster in pupils a positive attitude to new agricultural ideas and techniques.

. Ultimately, to provide as much food as possible for school meals.

Role of Science Section

In order to achieve these goals, the Science Section has certain responsibilities.

To provide further training to agriculture technicians working in schools. In turn, these technicians will manage school farms and impart their skills to pupils more efficiently.

To set up projects in schools and supervise their management.

To provide materials, tools and equipment.

To give advice and technical help.

To ensure that agriculture is being taught properly to students and that they adopt positive attitudes.

State and evolution of agriculture in schools

At present many schools are producing both animals and crops. However, a few schools are only reducing crops either because they have only recently been introduced to agriculture or because of a lack of facilities for animal production.

Animals are introduced in a particular school only if it has shown a certain level of responsibility. This is because animals need constant care.

Since the introduction of agriculture in schools in 1980, many difficulties have had to be solved. Some of them are :

To convince everyone that agriculture could be successfully introduced and established in schools.

Organisation and planning.

Co-ordination of activities and providing materials quickly and efficiently.

Changing negative or neutral attitudes of some students towards agriculture.

After agricultural projects were introduced in some schools, agriculture technicians, who are graduates of the Farmers' Training Centre, were employed to instruct students.

Employing technicians as well as using readily available materials and advice from the Ministry have all helped to establish agriculture firmly in schools.

Another factor which has helped a good deal is the positive attitude of many students. They have started producing more and more, using their newly acquired skills.

Management of school farms

The Ministry has taken proper measures to ensure sound management of schools farms. During weekends and school holidays supervision is done by the agriculture technician and students on a roster basis.

The school farm works using a scientific approach. Each pig has its own board showing its history and performance.

Broiler chickens are constantly weighed and various data collected and entered on charts. This helps students to detect immediately cases of mismanagement or abnormality.

Pig pens and poultry houses are kept under good sanitary conditions. Steps are being taken to ensure sanitation in all schools.

Each crop bears an information board displaying its variety, date of planting, spraying programmes and expected date of harvest.

At present there are 15schools spread all over Seychelles which have agriculture projects contributing a good deal to school funds.

Materials are used wisely and maximum use is made of freely available materials. For example, pigs are fed on left-overs from school meals, slurry from pigs and cattle is used as manure for vegetable plots and fodder in the school compound is used to feed cattle.

Marketing and projections

Production of crops and animals in large quantities is not possible because there is not enough space in schools. However, most of the products are bought by students and teachers. If larger quantities are produced, these are then marketed through Seycom or sold to the School Meals Centre. Later a better marketing system is expected.

Presently, these are around 40 pigs in all schools. Gradually with a proper distribution of left-overs from the School Meals Centre, the pig population will be greatly increased.

Three schools are together producing more than 1,000 broiler chickens monthly.

One school is producing an average of 550 eggs monthly. In the weeks to come, production will reach 2,000 eggs monthly, when layers at Cascade start production.

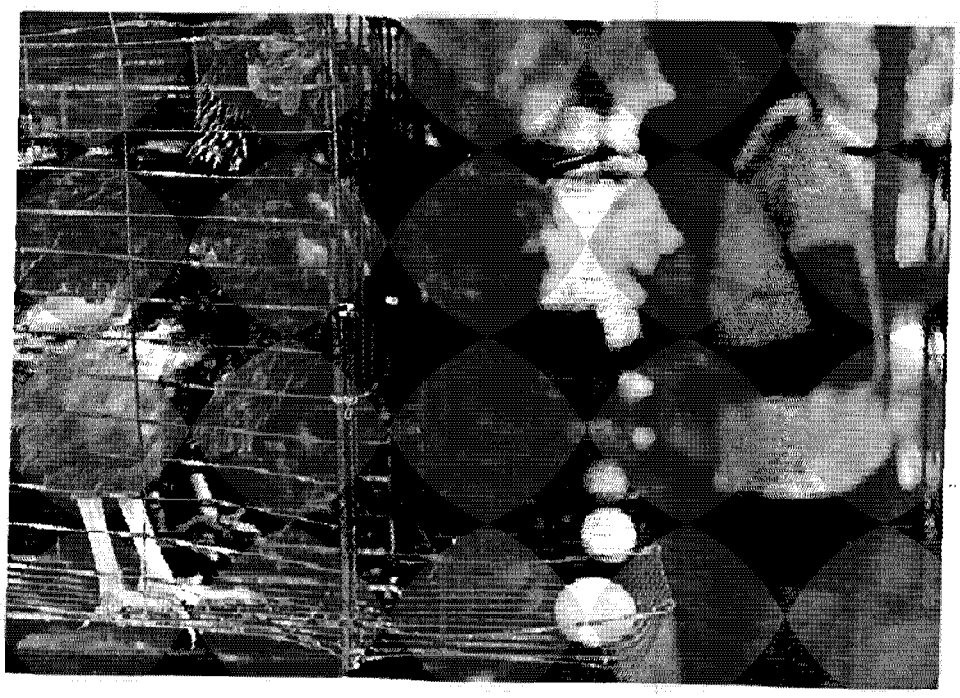
By next year, monthly production of eggs will reach 6,500-7,000 eggs - an increase of 14 times.

After one or two years of running agricultural projects in schools most students will have acquired proper skills in crop production and there will be a substantial increase in harvests.

Students are the ones who are going to lead our country in the years to come. They are being given a tool - agriculture. With this tool, they will fight a winning battle for self-sufficiency in food and eventually greater prosperity.

ESTIMATED INCREASES

	1982	1983	Percentage increase
Broilers	1,000	1,200	20%
Pigs	40	100	150%
Egg production (monthly)	500	7,000	1,400%
Crops	1.5 tonnes	4.5 tonnes	300%
Cattle	4	8	100%



July 31, 1982

HOW THE NYS CO-OPS UNITE LIFE AND WORK

IN THE booklet introducing the National Youth Service of Seychelles, entitled 'The NYS: What it aims to do and how it will be run" it is stated that:

"The NYS will re-unite work, daily life and education. A key part of the students' education will be organised around their participation in the daily organisation of the Youth Village economy... production of much of their own food..."

All activities in the Village aim to develop education work. The main purpose of the NYS co-operatives is to put this principle into practice.

What are the NYS co-operatives?

The specific objectives of the cooperatives may be summarised as follows:

. To develop a form of organisation which allows all people (students and adults) in the Village to work together as equals without exploitation or hierarchy.

. To fully use the different human skills and natural resources in the NYS.

. To foster the spirit of belonging to a small community which is part of a larger one -the Village.

. To involve all the producers in the planning of crop production.

. To create an awareness of the need for production and self-reliance.

There are nine co-operatives, each having boy and girl students and some adults. Each co-op elects a management committee of four boys, four girls and one adult.

The co-operatives also choose delegates - one boy, one girl and one adult from each - to join the NYS Union of Co-operatives. The union is also made up of field assistants, teachers of agriculture, animateurs and co-ordinators.

Functions of each co-operative:

To elect by general meetings new management committees.

To develop, plan and manage their co-operative plot.

To take part actively in crop production in the plot in relation to Village needs.

Role of management committees:

To consider problems suggested by the holders of each plot.

To keep record books.

To inform all members about any decision taken at the union.

To plan the work in the plot.

Union of co-operatives:

Objectives:

To plan and manage production at Village level.

To solve problems arising.

To develop the student to think in terms of the Village.

Co-ordination and mutual help among the co-operatives.

How education is achieved in crop production through co-operatives:

The study centre activity - crop and soil science - unites what is being done in the fields with theory. The topic dealt with during that activity is directly linked to what is done in the plots.

Some topics that are dealt with are soil management, fertilisers, pests and control, plant propagation and also social and economic aspects of agriculture.

Topics such as the importance of crop production in Seychelles, its history and development, government plans to promote agriculture, are discussed.

All the actions of co-operatives are educational.

For example, students learn how to plan, how to make constructive criticism, how to keep records, how to lead a meeting, how to solve problems, how to take decisions, how to pass on information.

The future:

As a result of co-operatives in the N.Y.S., students get the necessary education and this will surely lead well motivated groups of students to form real co-operatives not only in crop production but also in all production fields - fishing, shopping, crafts etc.

Co-operatives, if properly managed by well-educated members, become a real socialist way of production, where people having equal rights do not produce just for their own benefits but for the welfare of all members.

July 10, 1982

WHY AGRICULTURE OFFERS A GOOD CAREER

WE ARE already halfway through the year and before we realise it December will be upon us. Hundreds of young people will be leaving school and naturally seeking jobs or trying to enrol in one of the many technical institutions. Some have probably made up their minds but others are probably still undecided.

For those wanting to pursue a career there are several to choose from - among them mechanical and electrical engineering, ceramics, hotel catering and of course AGRICULTURE.

But why agriculture?

Agriculture has always been a very important industry in Seychelles. Some of the other sectors are beginning to catch up, but it is hoped that farming will keep its place as the most important.

And what is agriculture?

People must have food to live and most of the food people eat comes from the land. But we sometimes forget that this food has to be produced somewhere.

There are more and more people to feed each year and while at the moment it may be possible to import all the food we need to feed the rapidly growing population, we must not forget that other countries also are suffering from fast population growth and will need to save more and more food for their own use.

It makes good sense for a country to grow most (if not all) of its own food. For example, what is the point of having tourists in Seychelles if we immediately give all the money away again to other countries to buy food to feed the tourists?

We have already imported building materials to house them, furniture for them to sit on, staff to manage them, air lines to carry them and built airports and paid staff to look after them.

It is quite clear therefore that Seychelles will benefit only if we can produce what we require from local resources. Food is the obvious starting point.

But what about the farmer's life? Doesn't he have to work very hard for very little income?

Perhaps we tend to look at farming only as a way of life. The dedicated farmer likes to dig the soil, put plants in and watch these plants grow and bear fruit. He enjoys being with his cows, pigs and chickens. This is very true. But why does he work so hard and put in so much time and effort doing these things?

Because he too wants to make money to be able to live comfortably. Farming is a business. Like the shopkeeper who buys goods and resells at a profit, the farmer buys seeds, fertiliser, manure, pig, cattle, and chicken feed and when he sells his vegetables, pigs, milk and eggs, he must bring in more money than he spent.

Like the shopkeeper, we must sell at a profit. Obviously to make a lot of money in business one has to be a good businessmen. So to make money in farming one has to be a good farmer.

Too often young people are lured to jobs they dislike doing just because the money is good. They are unhappy in their work. They yearn for the day and week to end and never look forward to a new day. These people are usually very dissatisfied, irritable and mentally depressed.

On the other hand, the person who enjoys his work is always happy no matter how hard he works even if money is not so good. This is known as job satisfaction. And what job can equal farming in giving this satisfaction?

Be it the full-time or part-time farmer, the backyard gardener, the nurseryman or the flower and pot plant enthusiast, they all enjoy every second spent among their beloved plants or animals. Their day is never long enough no matter how hard they work.

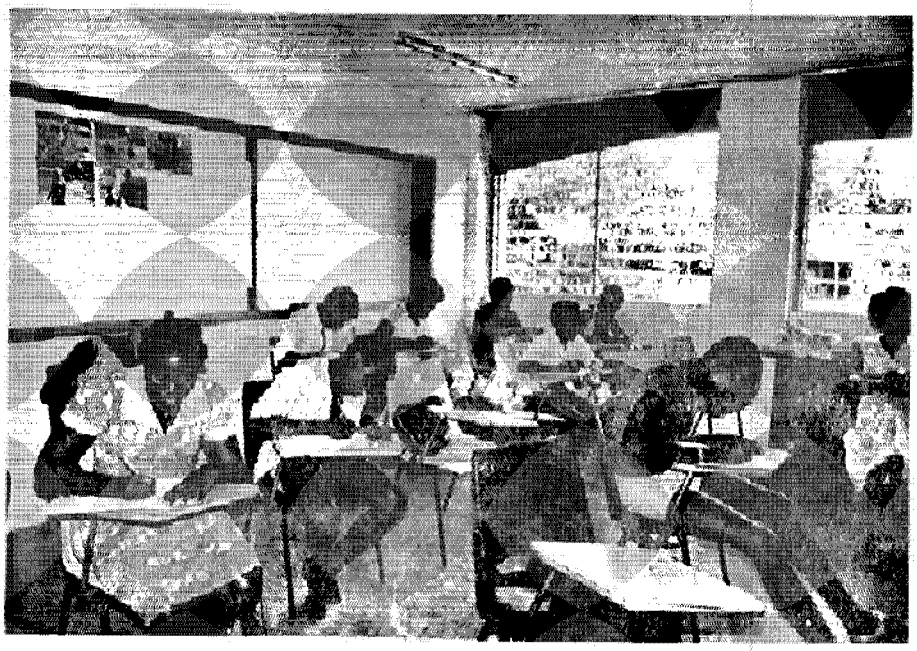
Is there any greater excitement and enjoyment than to have plants of one's own loaded with fruits or blossoms of many different colours and shapes? Or to feel the warm milk on one's finger while milking that beautiful cow which gives 15 pints of mulk and watching that bucket fill up? And looking after the sow that has just given birth to 12 lovely piglets, the sound of their squeals being like sweet music to one's ears?

As farming is a business, a lot of money must be involved. Money, however, will be wasted unless it is closely tied to agricultural knowledge and experience.

Knowledge is obtained by studying books, attending schools and listening to other people. Experience of growing crops, tending live stock and marketing agricultural produce is something quited ifferent.

It is far more valuable and only obtained in one way - actually doing the job. But experience can be obtained at far less cost if the farmer also has a good basis of knowledge. There is no easier way of losing money than by trying to farm without qeither knowledge or experience.

But where can one acquire this knowledge and experience in Seychelles. This can be done at the Farmers ' Training Centre at Anse Boileau? For further details contact the Principal at the Centre.



Class work at the Anse Boileau Farmers Training Centre

Learning how to prepare beds.

A BRIDGE BETWEEN RESEARCH AND FARMERS

THE Agricultural Extension is the service which links research to farmers with a two-sided and continuous means of communications.

But extention alone does not enable farmers to maximise their incomes. Inputs of seeds, fertilizers, pesticides, effective credits and other investments, are needed. In addition, agricultural development requires a general policy framework which provides farmers with incentives to produce.

That is why it is essential to put first priority on the development of an effective Extension Service. Production gains can be achieved by using available resources more efficiently, and once these gains have been realised, effective extension is needed to ensure a higher standard of agricultural with increased use of inputs and high technology.

The Extension Service has developed various programmes designed to establish and maintain direct contact and information exchange with research and the farmers.

Fields visits and advices

During the visits, the extension agents and officers work with the farmers one-to-one, exchanging informations and ideas. Disease pest problems, nutrient deficiencies, animal health and management, crop cultural practices and the use of new varieties and improved plants are few of the topics discussed during the visits.

It is important to note that at the initial stage, it is very important to achieve an immediate impact which will give the farmers confidence in the agents and officers and the officers confidence in themselves.

Once this starts, the process is self-reinforcing. Farmers will expect and demand more from these officiers who will be motivated to work hard to achieve other successes.

Use of available resources

A fundamental concept underlying the approach to extensive reform is to teach farmers to make the best use of available resources. This concept influences the message the extension service extends to the farmer.

Exactly what this involves needs to be checked thoroughly in the field in each area where the system is being adopted. Nothing should be recommended which will not increase farmers' incomes.

The initial concentration should be on improving agricultural management practices. These include better land preparation, use of improved good seeds, weeding, timely operations, proper spacing of plants etc.

Farmers cannot get full benefit from purchased inputs or costly investments until their practices have improved.

For example, if farmers apply fertilizer to a field that is not properly weeded and the stand of the plant is poor, they fertilize the weeds which then can compete more successfully with the crop for available soil moisture and light. The result is a lower crop yield.

Fields trials and demonstrations

To remain effective, extension service must be linked to a vigorous research programme, well tuned to the needs of the farmers. Without a network of field trials upon which new recommendations can be based and without continous feedback to research from the fields, the extension service will have nothing to offer to farmers, and research will lose touch with the real problems farmers face.

The emphasis is on showing farmers the use of different spacings, fertilizer rates, fertilizer application and times. Demonstration plots show the use of various new and different varieties, to compare well as to demonstrate many other cultural practices on vegetables and root crops.

The Service provides information in the form of slides and pictures. This method of information collecting is valuable as aids in educational programmes, for use in written materials and as well as valuable informations for future references. Emphasis is placed on pictures of diseases deficiencies, pest damage and cultural practices as well as on areas where very good practices as well as on areas where very good practices are being performed.

Another area of importance is monthly field days, audio-visual programmes and farmers discussions. These are forms of educational programmes done on monthly basis where the extension officers group farmers at regional levels for group discussions and general comments on field activities.

Agricultural loans and grants

As in all other businesses, problems and to assist them in farmers encounter financial problems and to assist them in these difficulties, the Development Bank of Seychelles provides loans recommended by the Extension Service.

And any other improvements done on the farms, farmers can be compensated with a grant system which provides money refunable on different percentage level depending on the sort of development done.

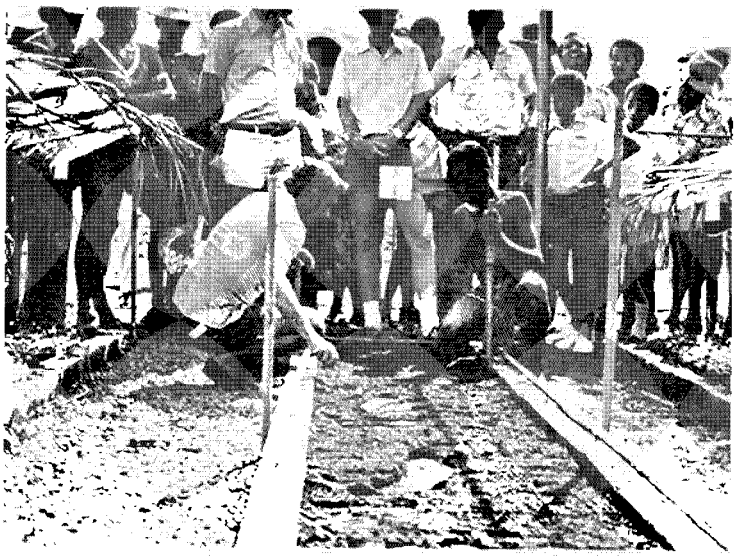
Links with research

As noted earlier, an extension service cannot function for long unless there is effective research programme. One step taken last year to strengthen this link was the establishment of a Research and Extension Committee.

This Committee has the responsibility for developing recommendations for the Extension Service to transmit to farmers, evaluating experimental data, and designing programmes of field activities. It also states the main problems faced by farmers that should be solve by research.

It is evident that the capability of the extension service is the key to the success of any agricultural programming, as the investment absorbing capacity of the agricultural sector depends on extensions input and available resources.

Even without physical investment, extension can bring about increased income and productivity for the farmers, particularly for the small farmers who are usually keener to put their land to more intensive use.



One of the extension officers giving a demonstration during one of the field visits.

Farmers gather at one of the extension divisions to watch field trials and demonstrations.

May 8, 1982

NOW CROP RESEARCH IS STARTING TO PAY DIVIDENDS

SEYCHELLES, like many developing nations in the tropical world faces several constraints in the continued development of its vegetable industry, root crop and fruit production.

Some of these constraints result from climatic factors, selection of varieties, incidence of diseases and pests, on farm crop husbandry and the marketing structure of the crops.

During the dry and cool season, conventional production of vegetables is practised. On the other hand, during the rainy season rainfalls are heavy and frequent. Pest and weed control are difficult. Normal fungicides and insecticides are washed away almost as soon as they are applied.

Thus the potential for crop production appears to be less in the rainy than in the dry season. But man continues to live and work during the rainy season and needs to feed himself.

Improving the present system of vegetable farming through better technology is one of the most effective courses to generate greater farm productivity.

In Seychelles, research on vegetables is concentrated on selection of varieties, fertiliser recommendations, plant spacings and the evaluation of cultural practices.

Most of the experimental work is conducted at the Grand'Anse Experimental and Food Production Centre on both lateritic and calcareous soils. Recently improvement in availability of staff has made it possible to conduct regional trials for priority vegetables.

Research over the last 10 years has shown that the five main factors which can lead to increased production on the farms are:

- Use of a recommended variety or selection.
- Use of fertilisers, especially nitrogenous ones.
- Use of closer plant spacings, especially within the rows.
- Phased sowings to enable supply over a long period.
- Effective control of diseases and pests by regular chemical sprayings.

A major problem encountered on the red soils is the incidence of bacterial wilt which severely restricts yields of egg plant, tomato and sweet pepper. Selection of wilt-resistant varieties is, therefore a priority area for research.

Another important factor limiting vegetable production is the effect of nematodes. Presently a survey of nematodes is being carried out to measure the extent of crop losses. As a result of continous testing, the Ministry of Agriculture can recommend and supply many new vegetable varieties and hybrids which are now being extensively grown by farmers.

Consistent attempts are made to use varieties recommended for their resistance or at least their tolerance to certain diseases and to nematodes. One major weed problem is the widespread occurence of nutsedge (onion grass) and panicum (calume). Good results are obtained with the use of Roundup herbicide.

The time has now come to make an evaluation of the research programme and to select from the findings everything of immediate relevance to the needs of farmers. This necessary and gratifying task is to be done in 1982.

Furthermore, the Grand'Anse Experimental and Food Production Centre is seeking funds to publish extension handbooks on vegetable, fruit and root crop production which will provide the means of updating existing knowledge to agricultural producers.

A major constraint to research and development in Seychelles in the past was a lack of recognition of the importance of research in national development plans with consequent lack of investment in research development, insufficient long-term financial support and no laboratory facilities.

In this respect, it is hoped that a fully equipped plant and soil diagnostic laboratory will be operational by end of 1982. Serious gaps between research, extension and the farming community existed for many years.

Another major constraint was the shortage of well-trained and experienced research workers. From 1972-1980, the Research Centre had one technician only working in the fruit, root crop and vegetable programme.

STRATEGIES FOR THE FUTURE

Considering the current status of crop production, the strategy for future research and development activities will need to encompass the following programmes:

Crop improvement

Evaluation of elite cultivars and selection of suitable vegetable varieties must continue. The introduction and evaluation of heat-tolerant cabbage varieties resulted in the recommendation of K.K. Cross for the cool and Spring Light for both cool and hot season.

The cultivation of cabbage is now expanding greatly. The heavy crop of passion fruit (a newly introduced fruit) which follws soon after the end of the lime harvest is of tremendous importance in maintaining a continuous supply of fruit on the market.

Notable achievements have been made with tomato lines selected for tolerance to bacterial wilt-breeding lines from the Asian Vegetable Research and Development Centre-for cultivation on red soils throughout the year.

Crop management

Rapid progress is needed in crop protection studies and top priority should be given to incroporating biological and chemical control measures. A wide range of pesticides and chemicals are readily available in the stores.

Many are quite specific while others may be toxic or disrupt the ecology. The priority of crop protection studies should include screening of up-to-date pesticides and developing safe, efficient and economic control programmes.

Mechanisation

Mechanisation for vegetable production is inevitable. However, the smallness of the farm in the case of a "blocker" is a major constraint to effective use of farm machinery and equipment.

The strategy for the future should be geared towards identification of small agricultural machines, and equipment suited to the farming systems as practised by vegetable farmers with the view to improving the efficiency of farm operations and reducing farm labour.

Research and development programmes can only be considered successful if improved technology is translated into action at the farm level. The cases of the heat-tolerant cabbages and passion fruit provide classic examples of co-ordinated information between research extension and producer fostering the application of a technology at the farm level.

The Grand'Anse Centre is aware that in other parts of the world competent vegetable research is in progress and technology in terms of new varieties, new cultural practices and new crop production measures are likely to emerge rapidly.

Our research centre with limited manpower has opted to collaborate with various competent international agencies to accelerate and strengthen the research programme. Close and fruitful contacts have been established with AVRDC, IITA and MITA since 1974 to isolate cultivars suited to Seychelles conditions.

Greater efforts should be made to foster such co-operation in order that farmers may realise rapidly the full potential of new technology. Thus a crop producer with sound knowledge resulting from an efficient research and extension programme, access to materials and a block of land has great resources at his disposal. If motivated, he can feed himself and raise a healthy family.

Isn't this really what agriculture is all about!

Great strides in vegetable and fruit production have already been taken.

May 1, 1982

EPILOGUE

We are pleased that these articles, originally written for readers of the Nation, have found another use and readership, in the training of students of Agriculture in schools, National Youth Services and the Polytechnic Institute.

We at the Grand'Anse Experimental and Food Production Centre of the Ministry of National Development having researched and assayed the husbandry of diverse food crops and livestock in Seychelles over the past twelve years, are encouraged by the emphasis on scientifically based agriculture and its inclusion in the schools' curriculum. We must, however, remind our readers, particularly those concerned with increasing production, that research findings are of little value unless they are applied for production purposes.

Some of the information included in this publication is likely to be updated at a later stage, and more publications are anticipated. This is to be expected as any active research program progresses. For example, methods of pest control or prevention, and selections of vegetable varieties are subject to change as new information becomes available.

Many persons have made valuable contributions to the preparation of these articles. However, special acknowledgement must be given to the Research and Development Crop and Livestock personnel of the Agricultural Promotion Division A. Young, P. St. Ange, G. Johnson, G. Chetty, M. Leon, F. Frichot and P. Denousse. I speak for all the contributors, I am sure, in expressing the hope that this publication will in its small way, make some direct and immediate contribution to the competence of those who are concerned with improving the quantity, quality and efficiency of agricultural production in Seychelles.

We are pleased to see that our research results in the form of these REPRINTS are being used in the training of a younger generation of farmers on whom the country will be relying for food production in the next and subsequent decades.

It is fitting to mention here that our broad objectives, as set out in the Agricultural Plan, better known as An Agricultural Strategy for Food Security, are to produce more and better food for the Seychelles and a higher income for those engaged in this production. However, let us not forget the true value of agriculture. Its real purpose is frequently misunderstood. It is often thought of as a way of raising incomes, satisfying one's stomach or of reducing food imports.

Agriculture arose as a response to a basic but fundamental human need - the need to eat in order to survive. 'FOOD' however, a component of MAN'S diet, must be varied and consumed in sufficient quantity to guarantee a healthy diet.

As important as productive farming is for feeding our population, it is hoped that some among our young farmers in training will also be inspired to pursue the Research and Development aspects of Agriculture which are so vital to boosting agricultural production, thus benefiting our agro-economy and achieving our goal of FOOD FOR ALL.

I take great pleasure in being associated with the publication of these REPRINTS and congratulate the MINISTRY OF EDUCATION on its successful effort to produce this documentation, and in particular, Professor Alberta Seaton who initiated the idea, to whom we are all grateful.

Compliments

Clifford S. ADAM
Ag. DIRECTOR of Agricultural
Promotion and Chief Research
Officer
Agricultural Promotion Division
Agricultural Department
MINISTRY OF NATIONAL DEVELOPMENT

LITERATURE CITED

1. ADAM,C.S.

1972 Vegetables, Research Report, Grand' Anse Exp. Station, Dept. of Agriculture.

1974 Research Report, Grand' Anse Exp. Station, Dept. of Agriculture.

1976 Research Report, Grand' Anse Exp. and Food Production Centre, Ministry of Agriculture.

1977 a. Vegetable Production in the Republic of Seychelles 1976-1977 and Cultivars Recommended, in Vegetables for the Hot Humid Tropics, Newsletter and Annual Communication among Research Workers, No. 2, F.W. Martin and R.M. Ruberte, Editors, published by the Mayaguez Institute of Tropical Agriculture.

1977 b. Yam, Sweet Potatoes and Cassava from the Republic of Seychelles, in Vegetables for the Hot Humid Tropics, Newsletter. Ibid.

1979 Sweet Potato Improvement in Seychelles, Research Report, Ministry of Agriculture.

1981 a. Know Your Fruits, Research Report, Ministry of Agriculture.

1981 b. Know Your Root Crops - Cassava, Sweet Potato and Yam, Research Report, Ministry of Agriculture.

2. BORGET,M.

1980 Le Manuel du Potager Familial dans les Isles de L'Ocean Indien, A.C.C.T., Institut des Amengements Regionaux et de L'Environement, Montpelier (France).

3. BRANDT,K.R. 1979 Rearing of Dairy Cows and Heifers. F.A.O. Regional Dairy Development and Training Centre for Africa.

4. FROHLICH,G. and W.RODEWALD 1970 Pests and Diseases of Tropical Crops and Their Control, Pergamon Press, London.

5. HUTCHINS, R. 1980 a. Rabbit Meat Production in Seychelles, Ararat paper No. 1.

1980 b. Pigeon Meat Production in Seychelles, Ararat paper No. 4.

6. KRONZ,J.H. SCHMUTTERER and W.KOCH, Editors 1977 Diseases, PESTS and Weeds in Tropical Crops, John Wiley Publ ., New York.

7. MARTIN, F.W. and R.RUBERTE 1979 Principles of Insect Control in the Small Vegetable Garden, in Newsletter of the Mayaguez Institute of Tropical Agriculture.

8. SCOPES,N. and M. LEDIEU 1979 Pests and Disease Control Handbook. British Crop Protection Council, CROYDON (U.K.)

9. WARDLAW,C.W. 1972 Banana Diseases, Including Plantaines and Abaca, Longman Press, London.

10. YOUNG,A.R. 1981 a. Farmer Guide to Pest Control, Ministry of Agriculture.

1981 b. Crop Pest Problems in Seychelles, a Research Report, Grand'Anse Exp and Food Production Centre.

INDEX