



**MINISTRY OF AGRICULTURE AND LANDS**

# **BANANA TECH-PACK 2020**



**Table of Contents**

Site Selection .....1

Soil .....1

Lining and Spacing .....1

Planting Material .....2

Preparing the holes and Planting .....2

Irrigation .....3

Nematode Control .....4

Banana Borer Control .....4

Fertilizing .....5

Fertilizer Rates and Placement by Time .....6

Volunteer Removal / Pruning .....7

Follower Setting .....8

How to Set a Follower .....8

Weed Control .....9

Bunch Clearing .....9

Deflowering ..... 10

Bunch Sleevng ..... 11

Bunch Propping ..... 11

Leafspot Control ..... 12

Banana Harvesting ..... 13

Records of Activities ..... 14

References ..... 15

# Site Selection

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It is important to ensure that the site selected for the growing of bananas has not been affected by Moko disease in the last 18 - 24 months.

Select sites that are not too dry nor too wet as both conditions will affect the productivity of the crop.

It is advisable to conduct a soil test to ascertain the nutrients content of the soil before investing in banana production.

Depending on the condition of the soil one may have to apply some dolomitic lime during planting.

## Soil

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The soil should be free drainage and with appropriate well-constructed surface drains.

Where the soil is free drainage, the distance between the surface drains should be greater compared with soil that is waterlogged.

On hillsides, drains should be along the contour so that the water runs away at a gentle pace.

## Lining and Spacing

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These are the actions undertaken by the farmer to line the area to be planted and to determine the distance between plants in the lined area.

The number of plants per acre can affect the profitability of the crop.

Too few plants mean that there is unused space that encourages weed growth; whereas, plants that are too close create a local environment conducive to the development of diseases.

To maintain even spacing between plants, the designated area for planting the bananas must be properly lined by following these steps.

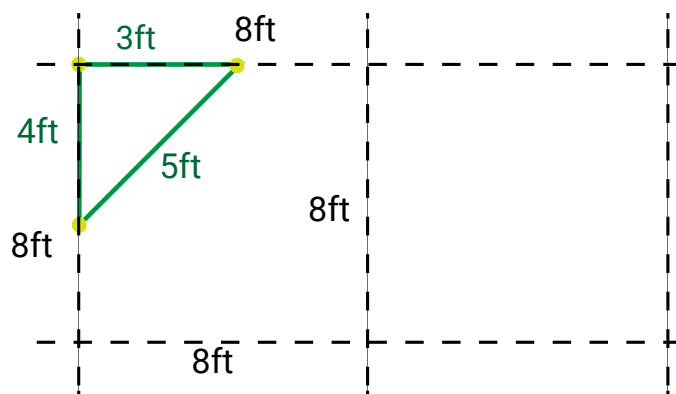
**Step 1:** You will need three sticks about 12-16 inches long, a measuring tape and one roll of twine.

**Step 2:** The next step is to square off the area. At one corner of the field that has been prepared for the banana plants, establish a right angle.

**Step 3:** Then pull the twine to the end of the field in one direction, then in the other direction, ensuring the twines touch each of the two sticks in each of the directions of the right angle established.

**Step 4:** At the required spacing intervals, place 2-3 ft length pickets to mark out where the holes are to be dug.

**Step 5:** A spacing of 8 ft X 8 ft is usually recommended but this could vary based on topography and other factors.



8ft X 8ft squared area for the banana plants

## Planting Material

There is a variety of planting material that can be used to establish a banana plot, but for this pilot project the recommended planting material is tissue culture of the Williams variety.

Tissue culture planting materials are disease-free, as such the plants will have a good start in their early life.



Banana tissue culture

## Preparing the holes and Planting

- Holes should not be prepared too long before planting.
- Dig holes at the intervals where the pickets are placed during lining.
- It is advisable that planting holes be freshly dug and not waterlogged.
- Planting out in the field should be done early in the morning or late in the afternoon to avoid too much heat to the plants on hot dry days.
- The size of the planting hole will depend on the size of the planting material. However, on average the planting hole should be 1.5 - 2ft X 1.5 - 2ft. Deeper holes about 2.5 - 3ft are required if farmers will be using manure and crop residue in the planting holes.
- For tissue culture plants, the holes should be able to accommodate the size of the bagged portion of the plants with just an extra 5 inches free from the circumference of the hole.
- The banana plants should be watered prior to planting. The bag surrounding the base of the tissue culture plant must be removed ensuring that the roots are intact.
- Place one plant per hole and use a fork to break the soil around the plant to fill the hole
- If additional soil is needed use top soil to fill the hole so that water does not settle close to the plant.

Bananas need plenty of water within the first five months of the plant life, so it is better to plant during the wetter months for those who do not have irrigation systems.

# Irrigation

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This is very important for sustainable increase in production especially in dryer areas with flat and fertile soil.

Bananas will need approximately 1 - 1½ inches of water per week depending on the season. Too much water, especially in heavy rainfall areas with poor draining soil can cause the roots to rot.

There are different types of irrigation systems but the recommended type for bananas is the drip irrigation system .

The drip irrigation system places the water directly in the rooting zones of the plants hence there is more efficient water use compared to other systems.

**Note:** Contact your extension officer to obtain a quotation and technical assistance for setting up an irrigation system.



# Nematode Control

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Banana nematodes are tiny parasitic worms that damage the roots of banana plants by sucking out the nutrients.

Damaged root system weakens the stability of banana plants in the soil and affects their ability to uptake water and nutrients.

Damaged roots are susceptible to infection by fungal parasites causing rotting and subsequent toppling of the banana plants.

## Application of Nematicides

- Tissue culture plants are susceptible to nematodes infestation; therefore, if they are being planted on plots that had bananas or on plots that contained other plants that are hosts to the banana nematodes it is advisable to apply nematicide during planting.
- Apply nematicide at planting, two months after planting and every four months thereafter. However, this will depend on the type of nematicide and the type of planting material used.

**Note:** Contact your Extension Officer first before applying nematicides.

# Banana Borer Control

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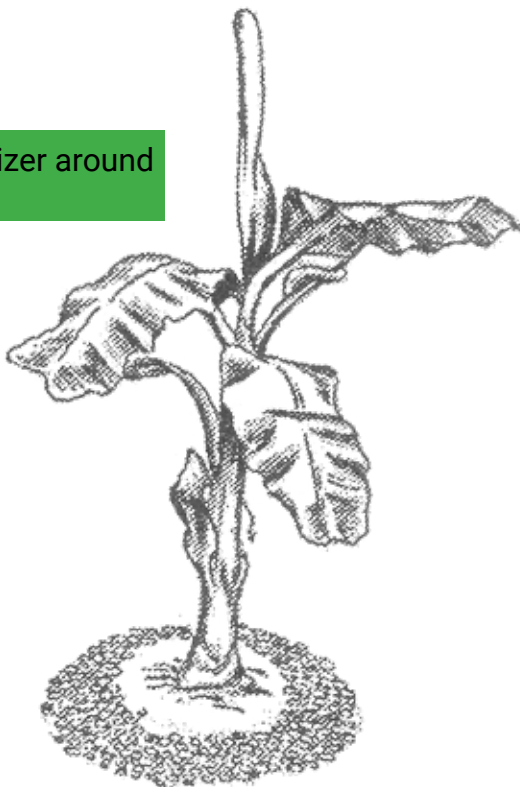
- The adult banana borer is a black weevil that hides in the banana corm and the banana trash in the day time but crawls about at nights.
- It lays its eggs at the base of the banana plant. The eggs hatch into larvae that feed on the base/corm of the banana plant thus damaging its tissue.
- Once the banana corm is being affected, the proliferation of roots decreases, and the plant may topple. Proper field sanitation will reduce on the incidence of this pest.
- The population of this borer can be kept in check by trapping and monitoring the number of weevils per traps before using any insecticides.

**Note:** Contact your Extension Officer or the Plant Protection Unit of the Ministry of Agriculture and Lands for more details.

# Fertilizing

- Bananas need large amounts of nitrogen and potassium fertilizers. For example, mixed fertilizers containing **Nitrogen, Phosphorus and Potassium (NPK)** should be used regularly in banana fields.
- At the end of the rainy season you may need to give your plants a boost of nitrogen fertilizer; e.g. calcium ammonium nitrate to assist them during the long dry period.
- Mixed (NPK) fertilizers such as 16-8-24 or 16-7-21 or any mixed fertilizers with a high percentage of Nitrogen and Potassium will be good for banana production.
- Straight fertilizers, e.g. calcium ammonium nitrate, are those that supply one primary plant nutrient in the NPK fertilizers.
- At the end of the rainy season it is advisable to apply a nitrogen-based fertilizer to help the plants cope better with the dry season. These nitrogenous fertilizers can be used for boosting slow growing plants as well.

Distribution of fertilizer around a young plant



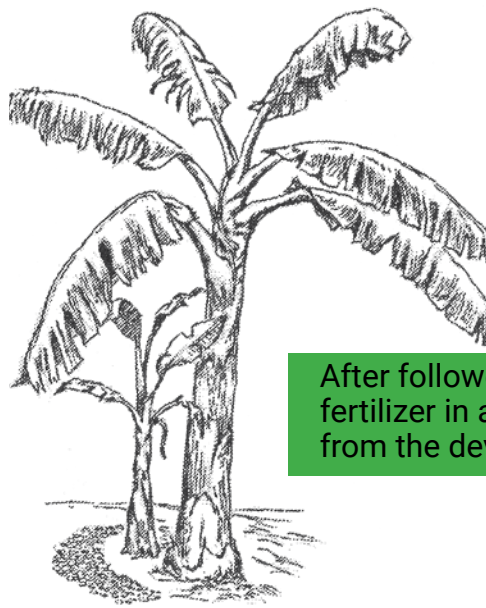
# Fertilizer Rates and Placement by Time

If the tissue culture plants show vigour, fertilize after the first month of planting. However, if the plant is lacking vigour, give it a boost of fertilizer after the first two weeks.

Fertilizer	Time after planting	Amount per plant in a circle on flat lands	Placement directly on soil	After Follower Setting	On Slopes apply
NPK	1 month	¼ lb	Drip edge	Apply Around the Follower	In a semi-circle on top side of plant
NPK	2 months	½ lb	Drip edge		In a semi-circle on top side of plant
NPK	3 months	½ lb	Drip edge		In a semi-circle on top side of plant
NPK	Every three months thereafter	¾ lb		1½ft from the developing follower	In a semi-circle on top side of plant
Straight fertilizer					At the end of the rainy season to boost plants



Apply fertilizer in semicircle uphill so that it does not wash away



After follower setting, apply fertilizer in a semicircle 1½ feet from the developing follower



## Volunteer Removal / Pruning

If there were bananas planted on the plot before being cleared for the planting of the tissue culture plants, it is possible that some bits of corm would have remained in the soil.

These pieces of plants will grow among your tissue culture plants and therefore must be removed voluntarily from the field. Any unwanted banana plants in the field must be removed as well.

This tool once used properly will remove the growing point of the banana plant.



This pruning tool once used properly will remove the growing point of the banana plant



Prune all unwanted suckers and leave the strongest sucker as the follower

# Follower Setting

It is important to maintain the original planting density of the field by pruning unwanted suckers, leaving a single strong sucker on each mat to produce the next crop (1st Ratoon).

About 4-5 months after planting the plants would have produced a few young plants from their bases. If allowed to continue growing the field will become over-crowded with these plants and bunch size will decrease.

Therefore, it is advisable to select a single follower to replace the parent plant when it is harvested. Prune off all unwanted suckers leaving the strongest sucker as the follower. The parent plant will continue to produce new suckers which should be pruned off every six weeks.

## How to Set a Follower

**Step 1:** Select the strongest well anchored follower furthest away from the parent plant. The first follower will produce the next crop of bananas.

**Step 2:** Use a pruning tools to remove the growing points of the suckers that are not wanted around the parent plant.

**Step 3:** On hillsides, set the follower on the uphill side of the parent plant. This will prevent the follower from encountering the bunch from the parent plant.

For each banana mat, there should be three generations consisting of the parent, the follower and a peeper as seen in the illustration.



Set followers on the uphill side of the parent plant

# Weed Control

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Weeds require the same nutrients for growth and reproduction as the banana; therefore, they tend to compete with the bananas for nutrients, water and sunlight.

This level of competition will result in bunches taking longer to mature, increased pest infestation and changes in the microenvironment that can increase the incidence of leafspot disease.

Farmers should always try to control weeds before they produce seeds, as weeds tend to reduce yield and the overall condition of the bananas.

## There are several methods to control weeds in banana fields as follows:

- **Growing a cover crop** – this is important in the early stage of the development of the plant but should not compete with the bananas for nutrients.
- **Mulching** – when being used ensure that there are no seeds from weeds that can become invasive.
- **Cutlassing** – this is more effective once the weeds have not yet seeded.
- **Weed whacking** – this is not very suitable in areas with watergrass as this grass will easily be spread throughout the field.
- **Chemical weedicides**(contact and systemic) – there is a range of weedicides available but only those recommended for banana production must be used.

**Note:** Contact your Extension Officer on recommendations for chemical weed control

# Bunch Clearing

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After the flag leaf has heralded the coming of the bunch, the bunch begins to bend towards the ground.

Once the bunch has emerged, the flag leaf must be pulled away from the bunch to avoid scarring the tender bananas.

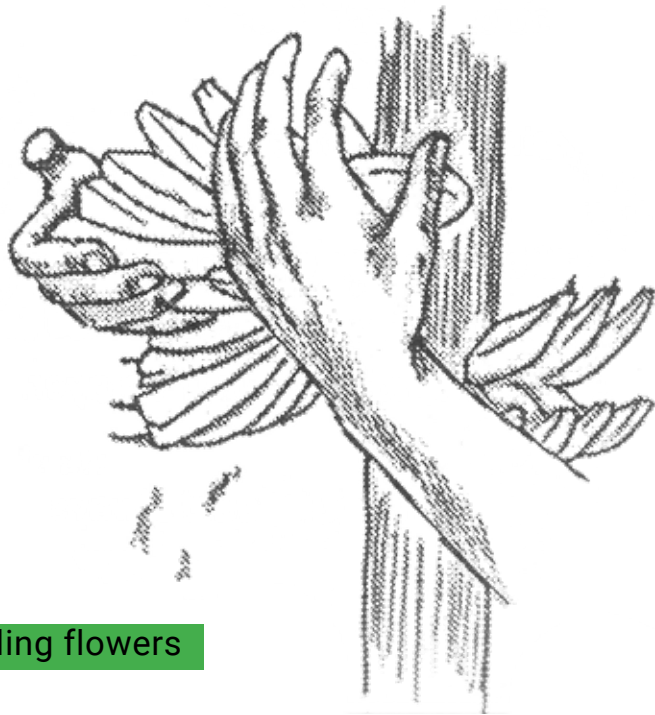
At this time any dried and dying leaves must be removed from the plant to avoid scarring the bananas.

Continue removing dried leaves and any other leaves that are in direct contact with the developing bunch.

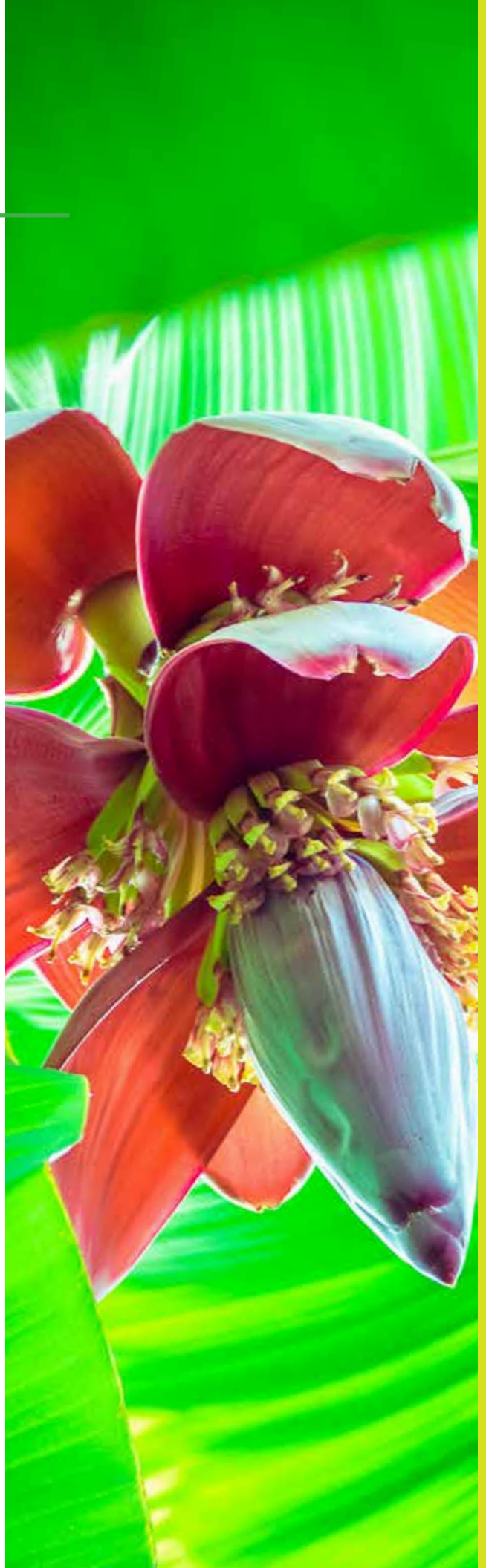


# Deflowering

- This is the process whereby the flower ends are removed from the fingertips of the bananas.
- This is practiced when the fingers are horizontal. It is achieved by supporting the banana fingers with one hand and using the other hand to lightly brush off the flower ends.
- Deflowering deters birds and insects from feeding on the flower ends. In the process of feeding the fingers on the bunch become damaged/scarred.
- Deflowering must be done when the fingers are horizontal because the flower ends are easier to remove at that stage and the latex that oozes from the deflowered fingers will not come into direct contact with fingers lower down the bunch.
- Avoid deflowering during heavy rains as latex can stain the bananas.



Falling flowers



## Bunch Sleeving

- This is the process of placing a diothene sleeve/tube over the maturing bunch to prevent damage caused by Rust Thrips, Flower Thrips and peel scarring insects.
- To prevent Rust Thrips damage to the bananas, the sleeves must be placed at least two days after deflowering. In the case of Flower Thrips damage, early sleeving should be practiced 4-6 days after the bunch has shot.



Early sleeving

## Bunch Propping



Double wooden prop

- Propping is the physical support given to banana plants using a string or wooden poles.
- It is advisable to prop all bearing plants soon after sleeving the bunch.
- The emphasis here is to prop the plant to protect the bunch.
- Any material used to prop must take into consideration the weight of the plant, the weight of the bunch, and wind speed and direction.

Double picket method of pseudostem support

# Leafspot Control

- The two main types of fungal leafspot diseases that affect the banana leaves are the yellow leafspot and the black leafspot.
- The black leafspot is much more difficult to control compared with the yellow leafspot.
- The leafspot fungi affect the plant by killing the leaf tissues thus reducing the plant's ability to produce food needed for good growth of the plant and the developing bunch.
- In severe cases, the productivity of the banana plant is affected, and the quality of the fruit is reduced.
- Leafspot disease is more serious in the rainy season because the fungi need water both for producing and the spreading of spores onto uninfected leaf surfaces.

**Factors that favour the development of the leafspot diseases in the fields are as follows:**

- Poor field sanitation as a result of old disease leaves left in the field
- Overcrowding of fields with too many plants
- Poor drainage in the field
- Heavy weed infestation

	Yellow Leafspot	Black Leafspot
Types of Bananas Affected	Cavendish bananas are susceptible whereas plantains are relatively resistant	Most bananas including plantains are susceptible
Symptoms	Early streaks on the leaves are pale yellow	Early streaks on the leaves are dark brown
How it's spread	By the wind and by water	Mainly by the wind, sometimes water

Source: Bennett and Arneson 2003

Yellow Leafspot



Black Leafspot



**Note:** For chemical control of leafspot in your fields contact your Extension Officer or the Pest Management Unit of the Ministry of Agriculture and Lands

## Banana Harvesting

- The banana plant bears a bunch between 7-9 months and the bunch takes approximately 75 to 80 days to mature.
- The stage of maturity depends on the use to which the bananas are put and the distance from production to market. The more mature the bananas the shorter time it takes to ripen.
- Farmers may use a caliper to determine the grade to harvest or alternatively they can use the ribbon system to determine the age for harvesting their bananas.



# Records of Activities

Practices	At Planting		One Month After		Two Months After		Three Months After		Four Months After		Five Months After	
	Due	Done	Due	Done	Due	Done	Due	Done	Due	Done	Due	Done
No of plants planted												
Nematicide app	✓*				✓							
Fertilizing (NPK)			✓ ¼ lb		✓ ½ lb		✓ ½ lb					
Dolomitic lime/ Tipple Cal	✓ 2-lbs in hole											
Pruning					✓				✓			
Follower Setting									✓		✓	
Weed control					✓				✓			
Borer control												
Leafspot control			✓		✓		✓		✓		✓	
Deflowering												
Sleeving												
Propping												

## Comments

If other bananas were on your plot before, apply nematicide at planting\*. Then at 2 months, then at every four months interval.

Then every three months thereafter apply ¾ lb per mat

Do not apply any other fertilizer within one month of the first application

Ensure that weeds are kept at a minimum. For chemical weed control, contact your extension officer

Set borer traps, if the average number of borers found per mat is two or greater

Regular field sanitation

Once the fingers are horizontal or begin to curve upwards

Two days after deflowering

Once the bunch is sleeved



# References

Illustrations referenced from:

Paul, N. C. A., Windward Islands Banana Growers Association. Research & Development Division, John, K., & Alwyn St Omar & Angelina Husbands Publication Design. (1993). Banana Growers' Manual (4th ed.). Windward Islands Banana Growers' Association, Research and Development Division.