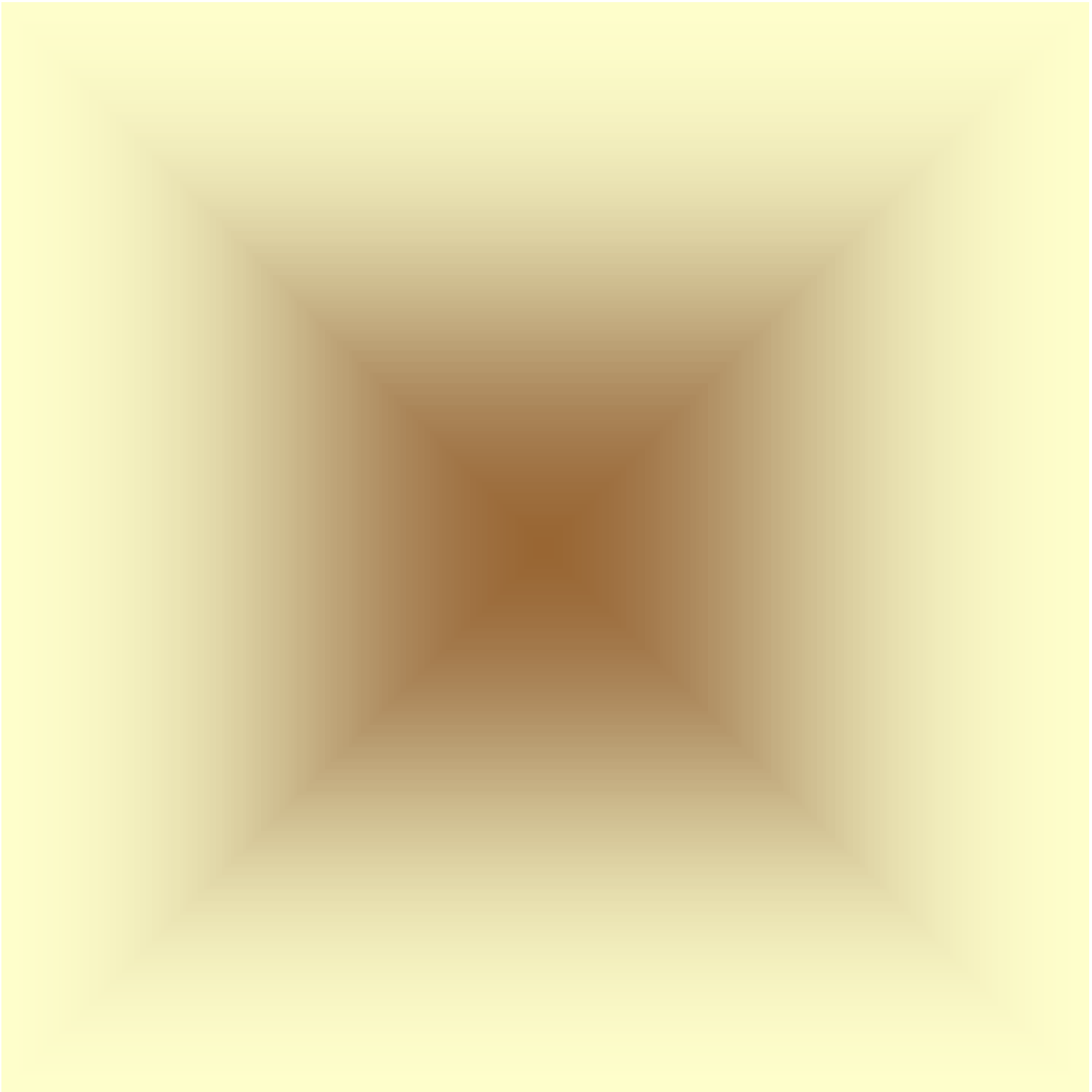
Ministry of Agriculture Land and Marine Resources

CASSAVA PRODUCTION

A Producer's Manual

EXTENSION TRAINING AND INFORMATION SERVICES DIVISION



MINISTRY OF AGRICULTURE LAND AND MARINE RESOURCES

Trinidad and Tobago

CASSAVA PRODUCTION

A Producer's Manual

Extension Training and Information Services Division

Produced in support of the Cassava Extension Programme of
the Ministry of Agriculture Land and Marine Resources
Extension Training and Information Services Division

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Follow these ten steps and you will produce a successful crop

How to Grow a Good Cassava Crop

Cassava (*Manihot esculenta*)

Successful cassava production depends on an understanding and application of good crop production practices. The tubers are highly susceptible to spoilage as early as 12 hours after harvesting. Good post harvest handling is crucial to maximise your profits.

10 Steps for good results

- Ensure good soil fertility.
- Prepare land properly.
- Use recommended varieties.
- Select and prepare stem cuttings.
- Plant stem cuttings properly.
- Apply timely weed control.
- Apply fertilizers based on soil test.
- Manage pests and diseases.
- Harvest at the correct time.
- Use proper post harvest practices.

Before..... Trained at Farmers Training Centre

After..... Good results using recommended practices

Step 1: Ensure Good Soil Fertility

Contact your County Extension Office to get a soil test done.

A soil test will provide:

- the exact limestone requirement
- the types of fertilizers to be used
- the rate of application of fertilizers
- the timing of the fertilizer application

Reduce soil acidity

Cassava production can be improved if soil acidity is reduced. Soil acidity can be reduced by applying limestone. Sandy soils require more frequent liming because leaching is generally higher in these soils. The greater the amount of crops grown on the land, the more often the need to add limestone.

Understanding Soil Acidity

Soils may be acidic, neutral or alkaline. These determinations are made using a pH meter.

Soil	pH
Acidic	less than 7
Neutral	7
Alkaline	greater than 7

High soil acidity directly affects crop productivity in the following ways:

- most acid soils are generally low in calcium which is an essential nutrient element for plant growth.
- Acidic soils can have high concentrations of aluminium, iron and manganese which are toxic to plant growth.
- Bacteria are unable to rapidly decompose organic matter in acidic soils.
- Some herbicides are less effective.
- Soils are not well-aggregated, resulting in poor soil aeration and restricted permeability.

Step 2: Prepare Land Properly

Cassava requires a deep, well-tilled soil if the tubers are to grow freely. Proper land preparation includes:

- Land Clearing
- Ploughing and Rotavating
- Ridge Formation

Land Clearing

Remove all heavy vegetation using a tractor to brush cut the area or apply a systemic herbicide to remove all weeds.

Ploughing and Rotavating

Plough and rotavate heavy clay soils to give a good tilth.

Ridge Formation

The ridge and furrow system is best suited for cassava cultivation. Ridges are formed approximately 36 inches apart and 18 - 24 inches high.

Cassava planted on ridges

Step 3: Use Recommended Varieties

All of the varieties grown for the fresh market are sweet varieties. Select the variety that best suits your needs.

Varieties	Time of Maturity (Months)	Flesh Colour	Taste/ Texture
M.Mex	9-11	White	Good quality
Maracas Black Stick	9-11	White	Excellent
Blue Stick	9-11	White	Good
White Stick	9-11	White	Sweet
Butter Stick	9-10	Yellow	Exceptional

Step 4: Select and Prepare Stem Cuttings

Cassava is grown from stem cuttings.

Select cuttings from the middle of the stem. Cuttings taken close to the roots are too hard and cuttings taken near the top are too soft.

Choose cuttings from plants that have good vigour and are disease -free.

Cut stem cuttings about 9 - 12 inches long. Dip the cuttings in an approved fungicide solution for 5 - 10 minutes. This prevents decay of the planting material.

Step 5: Plant Stem Cuttings Properly

Plant single stem cuttings at a distance 36 inches apart along the ridges at an angle of 45^{o}.

Do not place more than 3 nodes (eyes) above the ground. These nodes will produce enough shoots with sufficient leaves needed for high yields.

Tip: *The common practice of placing the entire stem cutting along the ridges and covering is not recommended.*

Stem Cuttings

Plant cutting leaving only 3 nodes above the soil

Only 2-3 shoots required to produce good tubers

Step 6: Apply Timely Weed Control

Heavy weed infestation competes with the cassava crop for nutrients and water and will reduce yields.

Apply a contact herbicide 2 - 4 weeks after planting. Prevent herbicide spray drift from coming into contact with the young plants. Within 3 months the crop will develop sufficient canopy to limit weed growth.

Step 7: Apply Fertilizer Based on Soil Test

Use NPK fertilizer with micronutrients as recommended by the soil test.

However, in the absence of a soil test, the general fertilizer requirements are as follows:

- 2 - 3 weeks after planting, apply a compound fertilizer high in phosphorus, for example, 12:24:12 at a rate of 2 - 3 ounces per plant. Place fertilizer 2 - 3 inches from stem cuttings.
- At 3½ - 4 months old, apply a compound fertilizer high in potassium, for example, 16:8:24 at a rate of 4 ounces per plant.

Weed free furrows

Step 8: Manage Pests and Diseases

Pests

The major pests of cassava in Trinidad and Tobago are:

- **Thrips**....they suck the sap of the plant resulting in the loss of vigour and leaf mottling causing reduced yields.

  Thrips can be controlled with Insect Growth Regulators.

Thrips Damage

- **Chinch Bug**

  This pest lives in the soil and punctures the young tubers making them unmarketable.

  A common farmer-practice is to plant Crotalaria to prevent damage from Chinch bugs.

Cassava Shoot Fly Damage

- **Cassava Shoot Fly**

  It damages the tips of the young plant causing growth to be stunted for a while.

Diseases

Cassava bacterial blight can cause rapid wilting of the crop. The bacteria are transmitted by contaminated soil and diseased planting material. Choose disease-free planting material as there is no chemical control.

Here are some guidelines to follow for the safe handling of pesticides:-

- ***Only purchase pesticides in labelled containers.***
- ***Choose the right pesticides for the job.***
- ***Buy and use the least toxic pesticide.***

When Using Pesticides:

- *Carefully follow all instructions on the container.*
- *Wear protective clothing, mask, and eye protection when spraying.*
- *Choose a calm, wind-free time of the day to spray.*
- *Do not spray near children and pets. Keep them away from sprayed areas.*
- *Follow the restricted time for re-entering an area after a pesticide has been applied.*

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After Using Pesticides:

- *Wash hands and face thoroughly. Wash all clothing used.*
- *Keep **all** pesticides locked up, out of sight and reach of children and pets.*
- *Keep the pesticide stored in its original container - do not transfer a pesticide to a food or drink container.*
- *Store pesticides away from food, including pet food and livestock feed.*
- *Dispose of empty pesticide containers and unused pesticides properly.*

In Case of Poisoning:

- *Contact your Doctor or nearest health centre immediately if a pesticide comes in contact with your skin, is inhaled or swallowed.*
- *Carry the pesticide container with you if you have to visit a doctor or health facility.*

Use Extreme Care Always!

Step 9: Harvest at the Correct Time

Yellow leaves on cassava ready for harvest

Harvest when there is a marked yellowing of leaves. This usually occurs when the plant is about 9 - 10 months old.

Cut the stem 12 - 18 inches above the ground when the yellowing of the leaves is observed.

Leave the tubers in the ground for about 2 weeks before digging them out. This will fill out the tubers with starch, resulting in a superior product.

A Note on Maturity Indices

Knowing when the tubers are ready for harvesting is the first step in ensuring tubers with good eating quality. If harvesting is delayed the tubers will become "brittle" when cooked. This condition is described by housewives as "past". It is believed that after maturity the starch in the tubers is converted to sugars to facilitate new shoot growth and the tubers lose their 'mealiness' when cooked. One variety which does not succumb to this condition is the M MEX, which goes from one season to the next without brittleness. Two varieties CMC 40 and M. Col 22 which are regarded as sweet varieties, will develop high levels of toxins increasing the chance of poisoning if left on the field for more than 11 months and 7 months respectively.

Step 10: Use Proper Post Harvest Practices

Tubers should be treated and ready for market within 3 - 4 hours of harvesting. Failure to do so will result in greater post harvest losses.

Harvesting Technique - carefully remove tubers from the ground and shake off excess soil. Ridges facilitate the easy harvesting of tubers. Tubers are generally confined to the edges of the ridges which are easily loosened with a garden fork, thereby greatly reducing the damage to the tubers.

Place harvested tubers in harvesting crates and keep in a cool part of the field.

Sort the tubers in the field and place the damaged tubers in separate crates or plastic buckets.

Soak tubers in water and then wash under running water. A soft bristle brush will help in removing soil debris.

Sanitize tubers by immersing in a solution made from household bleach mixed at the rate of 2 teaspoons of bleach to one gallon of water. Dip for 10 minutes. Do not use a fungicidal dip.

Whole Tuber

Damaged tubers

Cleaned, sanitized and undamaged tuber held in a sealed low density polythene bag for two weeks without spoilage

Whole tubers can be sorted as 1 - 2 pound units in sealed low density polythene bags and offered for retail sale.

Frozen Cassava

Damaged tubers can be made into frozen cassava chunks. Wash, peel, cut into chunks and sanitize. Place in low density polythene bags, seal and freeze.

Damaged tubers can also be grated and placed into low density polythene bags and frozen.

These products can be sold to supermarkets allowing for greater income from the enterprise.

Tip: *Wash and treat damaged tubers first since these will be subjected to the most rapid spoilage.*

Cassava Spoilage

Cassava spoilage is caused by damage done to the tubers during harvest. Once spoilage starts it is accelerated by drying out of the tuber. The damaged tubers are easily invaded by pathogens, which result in rotting.

Precautions

Given the nature of the spoilage of the tubers the following precautions must be taken when handling cassava tubers.

- Harvest at the correct time.
- Ensure that tubers are not damaged during post harvest operations.
- Ensure a moist environment around the tubers.
- Prevent exposure of the tubers to air for long periods.
- Clean and sanitize the tubers soon after harvesting to remove surface pathogens.

Vascular Streaking

The first symptom of spoilage is vascular streaking. This occurs when freshly damaged tubers are exposed to air causing a discolouration to the flesh.

Secondary Infection

Damaged tubers become infected by microorganisms. The entry of bacterial organisms lead to the onset of soft rots.

Freshly Damaged Tuber

Vascular Streaking

Soft Rot

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