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PESTS & DISEASES OF CASSAVA IN GUYANA

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**PESTS
&
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CASSAVA
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GUYANA**

cassava (Figure 14). The storage roots may become swollen and light brown discoloration may be evident. The roots may give out a bad smell as they rot if infections involve bacteria.



Figure: 14 Cassava root rot

Method of spread

Cassava root rot microorganisms are spread by water to new cassava roots. Infested plant debris remaining in fields may serve as a source for infecting new plants. The pathogens may also be transmitted through wounds caused by pests or farming tools.

Management Strategy

Cultural Control

- Collect plant debris and burn after harvesting.
- Do not plant in flooding or waterlogged areas.
- Plant in well drained soil.
- Practise good farm sanitation
- Practise crop rotation
- Use healthy disease free planting material that may be resistant or tolerant to root rot diseases.

Chemical control

- Farm equipment used in fields with a history of root rot should be cleaned after each use with a bleach solution.
- Chemical control may be used if required.

Cassava leaf blight disease - Light brown lesions are found on the upper leaf surface. Enlarged lesions may cover the leaf surface resulting in leaf blighting (Figure 13c). There is no water soaked areas on leaves, dark borders or “shot holes” on the leaf surface as is typical of other leaf diseases.



Figure: 13(c) Plant with enlarge lesion on the upper leaf surface.

Method of spread

Leaf spot diseases are spread from infected cassava leaves to new plants by wind or rain. Weeds also serve as alternative hosts for leaf spot fungi.

Management Strategy

Cultural Control

- Integrated Crop Management
- Field sanitation
- Crop rotation
- Use of disease free planting material

Chemical Control

- Spray a fungicide if necessary.
- Apply herbicide, e.g. Gramaxone, Roundup or Karmex for annual and perennial weed control.

5. Cassava Root Rot Disease

Symptoms

Cassava root rot diseases are caused by microorganisms both fungus and bacteria living on or in the soil. In poorly drained soils, where there is a prolonged wet period, the damage caused by these microorganisms may be greater.

The leaves on cassava plants affected by root rot disease turn brown, wilted, and the plant appears scorched. Root rot diseases kill both feeder and storage roots of

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Chemical Control

- Spray a fungal solution for fungus control.
- Farm tools should be cleaned using a bleach solution after they were used to cut infected cassava plants. This is to prevent fungi from spreading to other plants.

4. Leaf Spot Diseases

Symptoms

Cassava leaf spot diseases are caused by fungi. There are namely white leaf spot, brown leaf spot, and leaf blight.

Cassava white leaf spot (*Cercospora caribaea*) disease appears as circular chlorotic areas with white lesions on the underside of leaves (Figure 13a). The lesions when enlarge may have a purple border with a chlorotic halo.



Figure: 13(a) Plant with white leaf spot symptom

Cassava brown leaf spot (*Cercospora henningii*) disease appears as small brown spots with dark borders on the upper leaf surfaces (Figure 13b). On the lower leaf surface the lesions are brownish-grey in colour. Dead tissue may result in a “shot hole” effect on leaves. Infected leaves usually become yellow, dry, and die prematurely under severe attack.



Figure: 13(b) Plant with brown leaf spots

Chemical Control

- Farm tools should be cleaned using a bleach solution after they were used to cut infected cassava plants. This is to prevent bacteria from spreading to other plants.
- Fastac, Decis or Karate may be used for vector control.

3. Cassava Bud Necrosis**Symptoms**

Cassava bud necrosis is caused by a fungus which occurs on the surface of stems and leaves.

The disease appears as patches of a brownish-grey fungal mass that covers the stem (Figure 12). The fungus usually grows over the buds or eyes causing them to die. This reduces their sprouting ability.



Figure: 12 Brownish-grey discolorations on the plant stem

Method of spread

The main source of spread of the disease is by infected cassava stems and leaves if they remain in field after harvest. The fungus is spread by wind and infected stem cuttings.

Management Strategy**Cultural Control**

- Integrated Crop Management
- Field sanitation
- Crop rotation
- Use of disease free planting material

INTRODUCTION

Cassava is the main root crop grown in Guyana. The tubers are a popular domestic food and are the staple food for the hinterland communities. Cassava is classified as bitter or sweet. Cassava is widely adapted for cultivation on various ecological zones and it is known to be a drought tolerant, low input crop.

It is estimated that there are in excess of 30 varieties of cassava grown in Guyana. Some of these are Four Month, Brancha, Butterstick, Uncle Mack, M Mex 59, Mex 52 and Bad Woman. The two most common varieties used for cooking are Uncle Mack and Butterstick.

In order to enhance the production and productivity of pumpkins in Guyana, attention must be given to the management of pests and diseases. The purpose of this booklet therefore is to assist extension personnel and farmers to identify the various pests and diseases affecting cassava production and advise on the management strategies to employed to mitigate their effects.

CASSAVA PESTS

2. Cassava Bacterial Blight

(*Xanthomonas manihotis*)

Symptoms

Cassava bacterial blight is caused by a bacterium which is present inside cassava leaves and stems. Cassava bacterial blight disease is more severe in young plants. It appears as water-soaked lesions on cassava leaves (Figure 12). The lesions are usually present between leaf veins and are mostly evident on the lower surfaces of the leaves. Lesions are small, irregular in shape, with few angles at the edges. Lesions usually coalesce to form larger lesions resulting in death of the leaf.

Water soaked brown patches gave the leaves a blighted appearance. Severely blighted leaves wilt, die and fall causing defoliation and shoot tip die-back or complete death of the shoot. Brownish gum may occur on the leaves, petioles and stems of plants infected with cassava bacterial blight. The symptoms of cassava bacterial blight are more evident in the wet season.



Figure 11: Water soaked lesions on plant leaves

Method of spread

The main sources of the bacteria are infected cassava plants, dead stem and leaves which remain after root harvest. The bacterium enters the cassava plants through wounds on the stems and leaves. There it multiplies and occurs in large numbers. Insects can also transfer the pathogen to healthy plants.

Cassava bacterial blight is spread by planting infected stem cuttings.

Management Strategy

Cultural Control

- · Integrated Crop Management
- · Field sanitation
- · Crop rotation
- · Use of disease free planting material

Common Cassava Diseases in Guyana

1. Cassava Mosaic Disease

Symptoms

Cassava mosaic disease is caused by a virus which is usually present in the plant leaves and stems. Plant leaves infected by the virus usually appear discolored with mixes of light green, dark green, yellow (chlorotic) and white colour (Figure 10). In severe attack the leaves become small and stunted and are evident in younger plants.



Figure: 10 Mosaic patterns on cassava leaf

Method of spread

The cassava mosaic virus is spread by whitefly *Bemisia tabaci* from infected plants to healthy cassava plants. Infected stem cuttings are sources of contamination if used to plant clean fields.

Management Strategy

Cultural Control

- Integrated Crop Management
- Practise proper field sanitation
- Practise crop rotation
- Use disease free planting material
- Do not introduce stem cuttings from areas that are known to have this disease.

Chemical Control

- Spray for whiteflies using Admire, Vydate L, Abamectin, Vertimec at the recommended rates.

Insect Pests of Cassava in Guyana

In Guyana, cassava crops are grown mainly from stem cuttings. Planted cuttings start to root from the soil-covered nodes, at the base of the axillary buds and the stipule scars, some five days after planting. Two to four months after planting, storage roots start to develop by secondary thickening of a number of the adventitious roots.

Economical damage by diseases, pests and weeds of cassava is relatively moderate, although white flies can be a menace in some regions, if the problem is not identified early, and remedial action not implemented in a timely manner. Correct identification of the pest and an understanding of its behaviour, including its most vulnerable stages would provide insights into its management.

Care must be then taken if pesticide application is contemplated, since there is the likelihood of high residual levels remaining in the product after harvest if an inappropriate formulation is used.

The following provides a detailed description of the pests and the nature of the damage caused by the pests. Appropriate management strategies that may be employed are also provided.

1. Cassava Mealybug

(Phenacoccus manihoti)

(Homoptera:Pseudococcidae)

Symptoms

Mealy bug (Figure 1a) damages cassava plant during feeding by sucking the plant sap from the leaves, roots, petioles and fruit. This may result in whole plant dieback, dwarfing, seedling blight and plant deformation. Leaves may show symptoms of abnormal colours, forms, leaf fall, wilting, or may appear yellow or dead with honeydew or sooty mould covering the leaves. Plant stems and growing points may have witches' broom appearance, stunting, dieback and distortion (Figure 1b). Plant roots may have a reduced root system.



*Figure 1: (a) Cassava mealybugs and
(b) Leaf distortion caused by cassava mealybugs*

Management Strategy

Cultural Control

- Integrated Pest Management
- Field sanitation
- Crop rotation

Biological Control

- Use natural enemies such as predators, parasitoids and parasites e.g. ladybirds.

2. White Flies

Bemisia tabaci

(Homoptera: Aleyrodidae)

Symptoms

All stages of whitefly can be found on the underside of leaves. Direct damages are caused when the whitefly nymphs and adults suck the plant sap and remove the plant nutrients resulting in a weakened plant. Honeydew produced by whiteflies

CASSAVA DISEASES



Figure: 9 Leaf cutting ant *A.cephalotes*

Management Strategy

Cultural Control

- Integrated pest Management – This may include digging and removing nests, flooding of nests, using metal, grease or painting white bands around trees.

Chemical Control

- Baiting is the recommended method for Acoushi ant control (Bait is formulated and packaged by NAREI).

also encourages the growth of sooty mould thus reducing the photosynthetic area of the plant (Figure 2). Plants heavily infested with whiteflies, wilt and become chlorotic and stunted before the plants die.

Indirect damages occur when whiteflies vector viruses which may result in total crop losses e.g. Cassava Mosaic Virus.

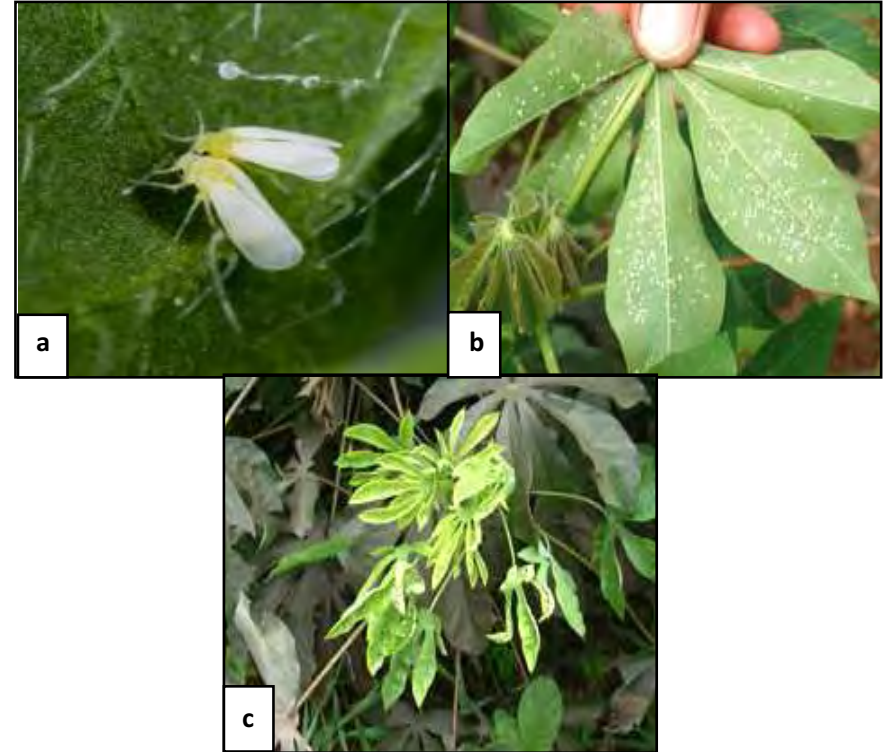


Figure 2: (a) Adult whiteflies, (b) Whiteflies feeding on the underside of cassava leaf and (c) Chlorosis and sooty mould on cassava leaves as a result of whiteflies feeding.

Management Strategy

Cultural Control

- Do not plant a new crop next to one which is mature: The common practice of having mature crops adjacent to newly planted ones makes management of the pest very difficult since the cycle of the pest is never broken.
- An integrated control strategy is necessary for the effective management of this pest.
- Good farm sanitation, including removal of weeds around the cultivation area is recommended since many weed species are hosts for white flies.

Chemical Control

- Several new generation insecticides are now available for the effective control of white flies. Nymphs and adults can be targeted using soap based products. Insecticides Admire, Pegasus and/or Basudin/ Vydate L may be applied at the recommended rates for effective control.

3. Aphids

Aphis gossypii
(Homoptera: Aphididae)

Symptoms

Aphids attack the cassava plants at all stages of growth and are usually found in dense clusters on the under surface of the young leaves thus causing leaf distortion (Figure 3). In severe cases, aphids cause the leaves to become chlorotic, followed by wilting. On young tender stems and growing point, sucking of plant sap from the tissues causes the plant to become weak. Seedlings are weakened and killed when infestation is high, and growth of older infested plants is retarded. Infested leaves curl, shrivel and may turn brown and die.

Aphids secrete a sweet substance known as “honey dew” while they feed. This substance attracts ants and serves as a substrate for sooty mould (black fungus) thus impairing photosynthesis. Aphids also serve as vector for viruses.

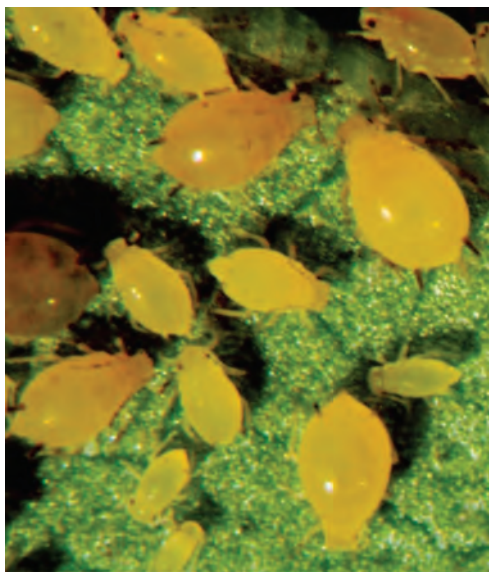


Figure 3: Aphid nymphs and adults

8. Cassava Hornworm

(*Erinnyis ello*)

Symptoms

Hornworm eggs when deposited on the upper or lower leaves hatch within seven days. The cassava hornworm larvae (Figure 8a) feed for three to four weeks until they mature on young leaves and growing shoot of the cassava plant by stripping away the foliage. In severe cases, the larva can defoliate the whole plant and the entire crop (Figure 8b).



Figure: 8 (a) Cassava Hornworms and (b) Stripping of cassava plant by cassava hornworm.

Management Strategy

Cultural Control

- Hand picking of hornworms then squashing them is very effective.

Biological Control

- Controlling breakout of larva can be achieved by spraying *Bacillus thuringiensis* (BT) on susceptible plants before they become a major problem.
- Braconid wasp parasitizes cassava hornworm and other insects thereby reducing the population.

9. Acoushi Ant (*Atta sp.*)

Symptoms

A. cephalotes (Figure 9) and *A. sexdens* are the two most important species of leaf-cutting ants in Guyana. These ants cut the leaves off of a variety of crops especially cassava and use the plant material as the substrate for a fungus on which they feed.

Crop losses are mainly due to defoliation which can result in total yield loss. Repeated attacks by acoushi can kill the entire plant.

7. Gall Midge

(*Latrophobia brasiliensis*)
Diptera:Cecidomyiidae

Symptoms

The gall midges are tiny flying insects (Figure. 7). They are known to incite gall formation on plants during feeding. They feed on flowers/flower buds, fruit, developing seed and decaying material. Galls are mostly found on leaves, buds and stems. A large number also feed on fungi (and is sometimes beneficial to agriculture).



Figure: 7 Adult gall midge

Management Strategy

Cultural Control

- It is advisable to plant in dry areas.
- Establish fields in open locations and space plants to allow adequate ventilation.
- Control weeds around plants.
- Remove all fallen leaves from fields and discard by burying or burning.
- Colour traps present a potential tactic for monitoring or mating disruption. Along with bio-control and other tactics, they form the basis of an IPM programme.

Chemical Control

- Insecticides: Sevin, Trigard, Diazinon, Admire, Malathion
- Fungicides: Manzeb, Maneb, Ridomil
- Herbicides: Fusillade, Roundup, Gramoxone, Nabu-S

Management Strategy

Cultural Control

- Good field sanitation- rid the field of weeds and plant residues from previous crops.
- Integrated Pest Management

Biological Control

- The natural predator, lady bird beetle frequently feeds on aphids. When aphid population is low and lady bird beetles are present, there is no need for chemical control.

Chemical Control

- This may be applied when the population is high. A contact or stomach insecticide may be used such as: Fastac, Decis or Karate at 6mls to 4500mls of water, Sevin 85% W.P. (Carbaryl) at 6 grams to 4500 mls water or Malathion 57% E.C. at 15 mls to 4500 mls water.

N.B. Sprays should be directed to underside/surfaces of leaves. When Sevin or Malathion is used, crops should not be harvested until 7 -10 days after application of the chemicals. In the case of Fastac, Decis or Karate, crops can be harvested within 3-5 days after chemical application.

4. Thrips

(*Frankliniella williamsi*)
(Thysanoptera: Thripidae)

Symptoms

Thrips are yellow, tiny, elongated insects that are found on the upper and lower surfaces of leaves (Figure 4). Infestations are more severe in the dry season. Both young and adult suck the sap from leaves and cause them to lose their colour. If attack occurs early, the young leaves become distorted. Older tissues become blotched and appear silvery or leathery in affected areas, thus hindering photosynthesis. Thrips are also vectors of major viral disease.



Figure 4: Immature nymph of thrips.

Management Strategy

Cultural Control

- Good field sanitation- rid the field of weeds and residues of all previous crops.
- Crop rotation- cultivation of crops (vegetables) which are not host to the pest.
- Overhead irrigation will help in reducing population of infestation during the dry season.
- An integrated approach is recommended for the management of thrips.

Chemical Control

- Insecticides such as Regent (Fipronil), Admire, Abamectin and Vydate L at 5 mls to 4500 mls of water may be applied to both upper and lower leaf surfaces for effective control.

5. Mites

(*Mononychellus tanajoa*)

(Acarina: Tetranychidae)

Symptoms

Immature and mature mites (Figure 5a) feed on the underside of leaves by sucking the plant sap thus giving rise to a speckled or mottled appearance (Figure 5b). Leaves may turn tan or yellow with a rough texture on the underside. Heavy infested leaves become chlorotic, dry and eventually drops. Webbing may also be evident on the leaves.

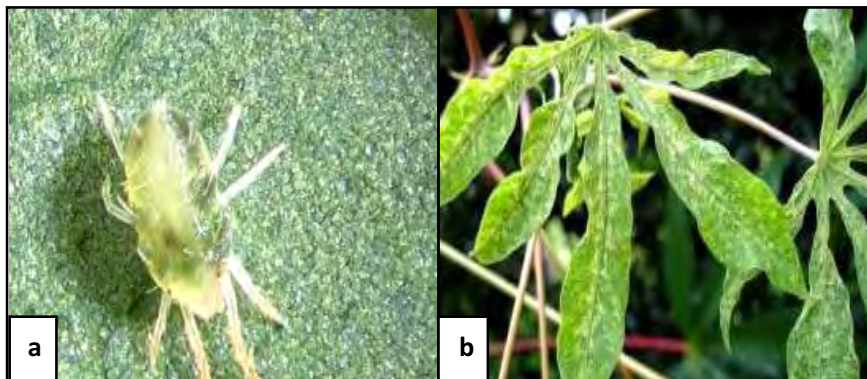


Figure 5: (a) Cassava green mite and (b) Speckled appearance on cassava leaves caused by cassava mites.

Management Strategy

Cultural Control

- Good field sanitation- rid the field of weeds and plants residues from previous crops.
- Integrated Pest Management

Chemical Control

- During severe infestations chemical control may become necessary. Miticides such as Abamectin, Newmectin or Vertimec may be used at 5mls to 4500mls of water for controlling the mites.

6. Lace wing bugs

Croythaica cyathicollis

(Hemiptera: Tingidae)

Symptoms

Lace wing bugs (Figure 6) are usually found in clusters on the under surface of leaves. Their sucking action results in leaf mottling. The mottled areas eventually become necrotic and this leads to premature abscission of leaves.



Figure: 6 Adult Lace wing bug

Management Strategy

Cultural Control

- Good field sanitation- rid the field of weeds and plant residues from previous crops.
- Integrated Pest Management

Chemical Control

- Decis, Karate or Fastac at 6 mls to 4500 mls water Sevin or Padan at 5grams to 4500 mls water are recommended for chemical control of Lace wing bugs.