Variety	CMD resistance	Yield (tonnes/ha)
Nase 1	Moderate	25-35
Nase 2	Moderate	30-35
Nase 3	High	35-40
Nase 4	High	35-50
Nase 10	High	35-40
Nase 11	Moderate	25-35
Nase 12	Very high	35-40

Resistant varieties are the most successful way of controlling CMD. Resistant varieties are not easily infected by the virus. Furthermore, the few plants of resistant varieties that get infected are only mildly diseased and often recover from CMD. Cuttings taken from such plants may even sprout without the disease. Local cassava varieties usually do not recover from CMD.

CMD-resistant varieties







(ii) Use of CMD-free planting material

Because the virus is present in all diseased parts of a cassava plant (especially local varieties), stem cutting staken from such a plant will carry the virus. To avoid this, always get cuttings for planting from healthy looking plants.

(iii) Roguing of infected plants

Plants that emerge/sprout showing CMD symptoms should be removed because they will allow further spread of viruses, especially in crops grown primarily for multiplication of planting material. Roguing may only be effective in areas with low disease spread.

(iv) Variety mixtures

Recent research has shown that spread of CMD in local cassava varieties can be limited by mixing the local varieties with improved, resistant varieties. Plants of the resistant variety will "protect" the susceptible ones when planted together in the same field. The most effective way of mixing is systematically (see below):

R S R S R S R
S R S R S R S
R S R S R S R
S R S R S R S
R S R S R S R

R = Resistant variety **S** = Susceptible variety

(v) Reducing CMD incidence in an area

It is useful if all farmers in an area use CMD controlmethods. As a result, the amount of virus in the area willdecrease. The amount of disease in a field depends on thelevel of disease in the nearby fields.

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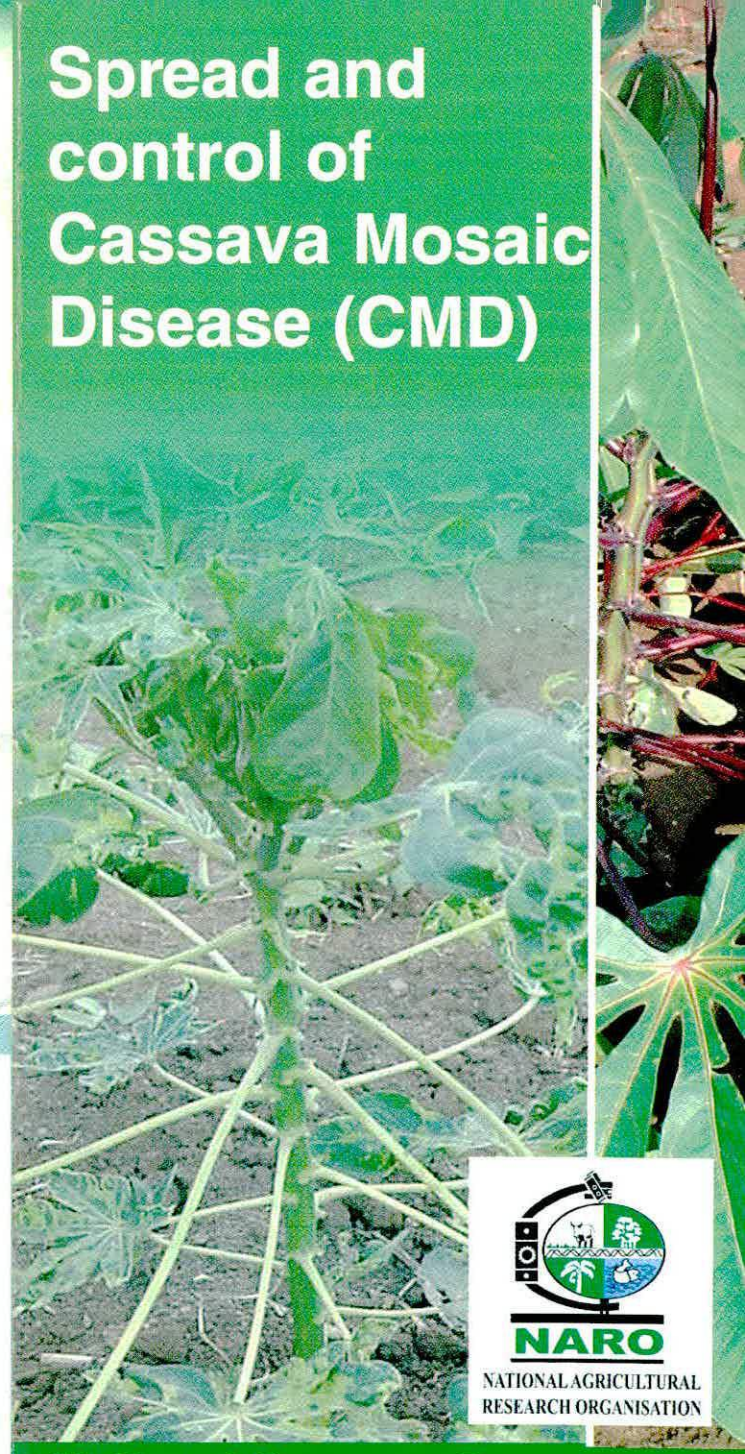
Spread and control of Cassava Mosaic Disease (CMD)



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National Cassava Programme (Uganda)

Introduction

Cassava mosaic disease (CMD) is caused by a virus, just like HIV/AIDS. The virus only survives inside a living organism. It damages the leaves resulting in low yield. This leaflet explains how to recognise a plant affected by CMD, how the virus infects a cassava plant and how the diseasecan be controlled.

Common symptoms of CMD

Cassava plants affected by CMD look different from healthy plants:

- The leaves become partly yellow, fail to expand and maycurl to one side.
- The growth of the plant is slower than that of a healthy plant. Diseased plants often remain stunted.
- Most importantly, the root yield of CMD-affected plants is low, especially if the plants are infected at an early stage (within the first three months).









A CMD affected plant will remain short and produce smalland few tubers.

Transmission and spread of CMD

(i) Whitefly infection.

The virus causing CMD is carried by small white insects called whiteflies, just like malaria is carried by mosquitoes. The whiteflies are usually found on the bottom side of cassava leaves. They feed on the sap in the leaves, just like mosquitoes feed on blood. The virus lives in the sap of the plant. So, when a whitefly feeds on an infected plant, the virus is carried along with the sap into its body.





Adult whiteflies feeding on the bottom surface of a cassava leaf

If the same whitefly feeds on a healthy plant, its saliva mixes with the plant sap and the virus is transmitted to the healthy plant. A plant infected through whiteflies will usually show symptoms after 3-4 weeks. In such a plant,only upper leaves initially show symptoms and the lower leaves do not have symptoms.

(ii) Cutting infection

CMD is also spread/perpetuated when cuttings are taken from a diseased plant. Cuttings then sprout with the disease.

Cuttings may also sprout with disease even if only a part of the parent plant was diseased or if the parent plant was only recently infected and not yet showing symptoms.





Whitefly infection: *Only upper leaves show CMD symptoms, lower leaves are symptomless*

Cutting infection: *Leaves formed soon afteremergence, as well as other leaves formed later have symptoms*

Methods of controlling CMD

(i) Planting resistant varieties

The National Cassava Programme of NARO has developed and released high yielding CMD resistant cassava varieties. They perform well even when the disease pressure is high. Some of the commonly grown varieties are listed below.