

# **Diseases of Selected Seed Crops**

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# Plant diseases

- Plant disease diagnosis (a) symptomatology: blights, leafspots, powdery mildews, rusts and smuts, anthracnose, cankers, galls and scabs wilts, damping off and seedling blights, yellows.
- (b) Isolation and study of cultural characteristics.
- (c) diagnosis of important diseases in the field. Disease incidence, severity and crop loss assessments, Collection, and preservation of diseased materials.

## Disease causal agents

- **Pathogens or Definition of phytopathogen:** It is an organism parasitic on a plant host or A causal agent of disease in a plant, the suspect.
- **Plant diseases are caused by living organisms (called pathogens), such as fungi, bacteria, viruses, nematodes, phytoplasmas, protozoa, and parasitic plants; infectious or transmissible disease**
- **and by nonliving agents, such as air pollutants, nutrient imbalances, and various environmental factors.**

## Wheat Diseases

- Stem rust:
- Wheat was wiped out by stem rust – *Puccinia graminis* f. sp. *tritici* in 1930s.
- Yellow rust
- It is caused by *Puccinia striiformis*
- Leaf Rust

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## Stem rust or black rust

**SCIENTIFIC NAME:** *Puccinia graminis* Pers.:Pers. f. sp. *tritici*  
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*Wheat stripe (yellow) rust* caused by *Puccinia striiformis* f. sp. *tritici*.



**Leaf rust** is caused by *Puccinia recondita* f. sp. *tritici* (now known as *Puccinia triticina*).



# *Ustilago tritici*- Loose smut of Wheat





# *Gaeumannomyces graminis* var. *tritici*-Take all



Take all of wheat caused by *Gaeumannomyces graminis* var *tritici*



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## *Others seed borne diseases*

- **Wheat:** *Pseudomonas syringae* pv. *syringae*,  
*Xanthomonas campestris* pv. *Translucens* (Seed borne)
- *Gaeumannomyces graminis* var. *tritici*-Take all
- *Septoria nodorum*,
- **Scab (Head Blight) caused by *Fusarium graminearum* and *Fusarium moniliform***
- , Ergot- *Claviceps purpurea*, *Ustilago tritici*

# Maize-Diseases

- **Maize**
- Northern leaf blight
- *Helminthosporium (Exserohilum) turcicum*
- Found throughout Kenya
- Attacks mainly leaves and their sheaths
- **Maize streak**
- Caused by maize streak virus
- It is currently a very important disease, widespread and destructive; Losses upto 75% on individual farms.
- MLND: The latest disease in Kenya and ECA

Northern leaf blight:  
*Helminthosporium (Exserohilum) turcicum*



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# Northern leaf blight: *Helminthosporium (Exserohilum) turcicum*

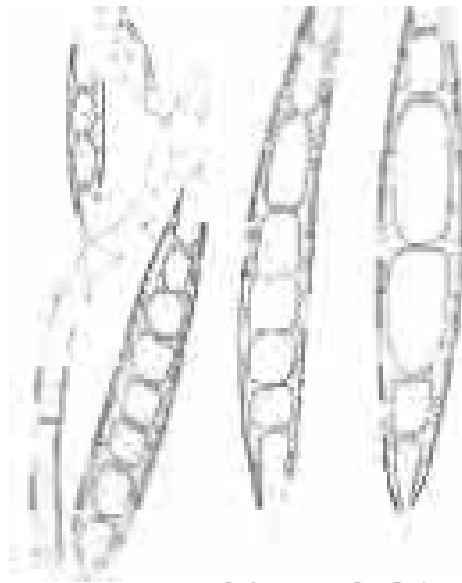
- Symptoms:
  - –Cigar-shaped gray lesions on lower leaves (1)
  - –Lesions spread to all leafy surfaces, eventually destroying the leaves in extreme cases
- Signs:
  - –Spores can be found within the lesions and observed with a hand lens



Northern leaf blight:  
*Helminthosporium (Exserohilum) turcicum*



*Exserohilum turcicum* (Pass.) Leonard & Suggs  
(*Helminthosporium turcicum* Pass)



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***Bipolaris maydis (Nisikado & Miyake) Shoem.***  
***(Heiminthosporium maydis Nisikado & Miyake)***



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# *Cercosporazeae-maydis, cause of Gray Leaf Spot on Corn:*

Early symptoms : Round, yellow/tan lesions with faint watery halo



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## *Gray Leaf Spot on Corn*

Late symptoms : Rectangular, brown lesions, bordered by leaf veins



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*Sphacelotheca reiliana*, cause of head smut of corn



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*Ustilago maydis*, cause of common smut of corn



# *Ustilago maydis*, cause of common smut of corn



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## **Maize Lethal Necrosis Disease (MLND):**

The **Maize Lethal Necrosis Disease (MLND)** is a result of a combination of two viruses, the Maize Chlorotic Mottle Virus (MCMoV) and any of the cereal viruses in the Potyviridae group, like the Sugarcane Mosaic Virus (SCMV), Wheat Streak Mosaic Virus (WSMV) or Maize Dwarf Mosaic Virus (MDMV).

The double infection of the two viruses gives rise to what is known as MLND, also referred to as Corn Lethal Necrosis (CLN).

# Maize Lethal Necrosis Disease (MLND):



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- Beans (*Phaseolus vulgaris*) including French beans
- **Anthracnose**
- Caused by *Colletotrichum lindemuthianum*
- It is a very important devastating disease in mid to high altitude areas.
- If the pathogen is seed born the crop can be totally destroyed 2-3 weeks after sowing.
- Attacks all parts above the ground

- **Angular leaf spot**
- Caused by *Phaeoisariopsis griseola*
- It is a very important disease in the Eastern province in Kenya but now it is spread throughout Kenya.
- Causes heavy defoliation.
- **Halo blight**
- Causal agent : *Pseudomonas savastanoi* e pv *phaseolicola*
- It is a very important disease in high altitude bean growing areas such as Kisii, upper Kiambu, Nyahururu, Embu.

- **Tomato and Potato (Irish)**

- It is a downy mildew caused by *P. infestans*
- Late blight destroys the two crops at mid and high altitude areas that the two crops cannot be grown without use of fungicides.
- Early blight: *A. solani*
- Bacterial wilt: *Ralstonia solanacearum*
- **Potato cyst: New disease**

- Maize
- Beans
- Cowpea
- Pigeonpea
- Lablab purpureus
  
- Simsim
- Sunflower
  
- Potato (irish)

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- ❖ *Pyricularia grisea* causes blast of finger millet and can survive upto 3 years as conidia & mycelia (Kato, 1977).
- ❖ The fungus is seedborne & can be found in the embryo, endosperm & glumes (Adipala, 1992; Pande *et.al.*, 1994).

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- Major Bean diseases in Kenya:
- Halo blight – *Pseudomonas savastanoi* (*syringae*)  
*pv. phaseolicola*

Common bacterial blight:

- *Xanthomonas axonopodis* *pv. phaseoli* (*syn.*  
*Xanthomonas campestris* *pv. Phaseoli*) & *var.*  
*fuscans*.



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# Halo blight of beans: *Halo blight of Beans-Pseudomonas savastanoi (syringae) pv. phaseolicola*

**On leaves**



**On mature pod and seeds**



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**Angular leaf spot:** *Phaeoisariopsis griseola* (syn. *Isariopsis griseola*)

- The grayish lesions on the leaves becoming light brown with age, are characteristically limited by the veins and premature defoliation occurs under severe attack.

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## ALS on leaves



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# Bean anthracnose-*Colletotrichum lindemuthianum*

- **Symptoms**

- Leaves, stems and pods of bean plants are susceptible to infection.
- Small reddish-brown, slightly-sunken spots form on the pods and rapidly develop into large, dark-sunken lesions.
- Infection of the leaves causes blackening along the veins, particularly on the undersurface.



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# Seed borne diseases of pulses

- Anthracnose:
- Beans: *Colletrichum lindemuthianum*
  
- *Sclerotinia sclerotiorum*-wide host range-White mold
- *Macrophomina phaseoli*-Ashy stem blight, Charcoal rot, Crown rot
- *Fusarium solani*-Fusarium root rot
- *Fusarium oxysporum* Schlecht. f. sp. *Phaseoli*-Fusarium yellows
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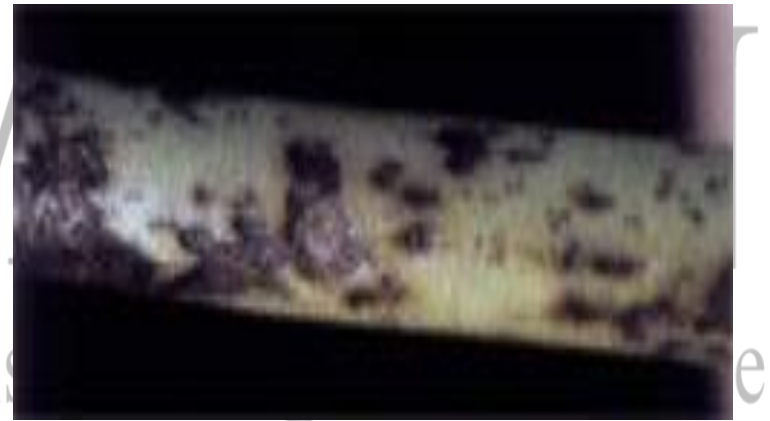
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# Bean anthracnose-*Colletotrichum lindemuthianum*

**Blackening along the veins of french bean caused by anthracnose**



**Black-sunken spots on stem caused by anthracnose**



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# White mold-*Sclerotinia sclerotiorum*





## Lab lab purpureous

- Lab lab purpureous
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- Fuscans blight: caused by *Xanthomonas axonopodis* pv. *phaseoli* (syn. *Xanthomonas campestris* pv. *phaseoli* var. *fuscans*.) var. *fuscans*.
- **lentil and chickpea**-*Colletotrichum truncatum*
- **field pea** is caused by *C. pisi*

## Pigeon pea diseases

- Pigeon pea diseases
- 
- Fusarium wilt. – Fusarium oxyporum f. sp. Udm, widespread in East Africa.
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- Mycovellosiella leaf spot/cercospora leaf spot:
- 
- **Caused by the fungus Mycovellosiella cajani**

# Fusarium wilt. – *Fusarium oxysporum* f. sp. Udim



*Mycovellosiella cajani*  
= *Cercospora cajani*-*Cercospora* leafspot



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Powdery mildew: *Leveillula taurica*(*Oidiopsis taurica*  
[anamorph]), *Ovulariopsis ellipsospora*



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# Cowpea diseases



Collar rot in cowpea

- Collar rot (Pythium aphanidermatum  
Rhizoctonia sp,  
Sclerotium rolfsii  
,Fusarium)

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# Cowpea Web blight

- Web blight - *Rhizoctonia solani*
- Symptoms: Small circular reddish brown spots on leaves
- Mycelia of *Rhizoctonia solani* are visible on the under surface of leaves young stems Control 1. Use disease free seed



web blight

# Cowpea yellow mosaic

- Cowpea yellow mosaic virus
- Symptoms Leaf symptoms vary from green mottle to severe mosaic Leaf distortion blistering and plant death
- Control 1. Use resistant cultivars 2. Plant disease free seeds 3. Control vectors with insecticides



Cowpea yellow mosaic virus





# Cercospora leaf spot



Cercospora leaf spot.  
Courtesy of George Philley, TAES - 1995.

- ***Cercospora canscens***  
***Pseudocercospora***  
***cruenta***
- Chlorotic spots on upper surfaces of leaves; necrotic spots on leaves; masses of spores on lesions which resemble black mats on lower leaf surface; defoliation of plants; yellowing of leaves; circular, red lesions on leaves

# Cowpea Powdery mildew

- **Powdery mildew: *Erysiphe polygani* (*Sphaerotheca fuliginea*).**
- White powdery fungal growth on upper surfaces of leaves; chlorotic or brown patches on leaves; leaves dropping from plant

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# Cowpea bacterial blight (CoBB), caused by *Xanthomonas axonopodis* pv. *vignicola*



- Leaves: pin point water soaked spots on the leaves.
- Spots coalesce to form orange lesions surrounded by yellow halo.
- The bacteria infects also the stems, causing cracking, canker and the pods causing water soaked spots.

Results: Plates showing the pathogen (A) and seed borne *P. grisea* (B)

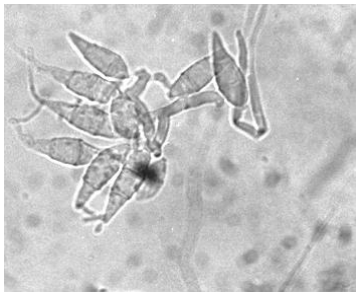


Plate A

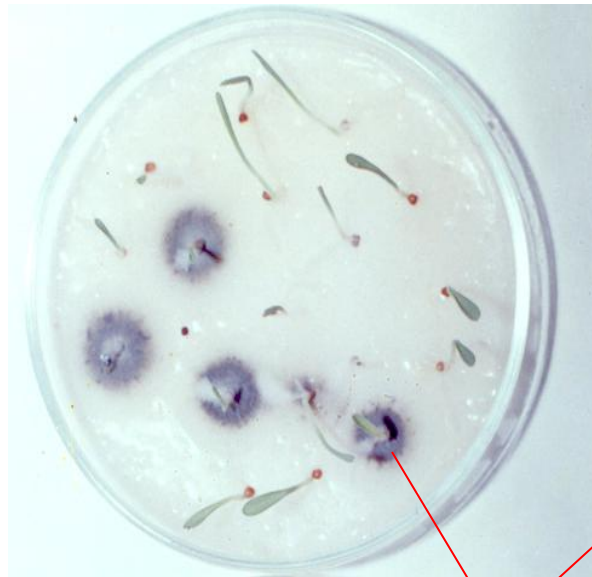


Plate B: Infected seed



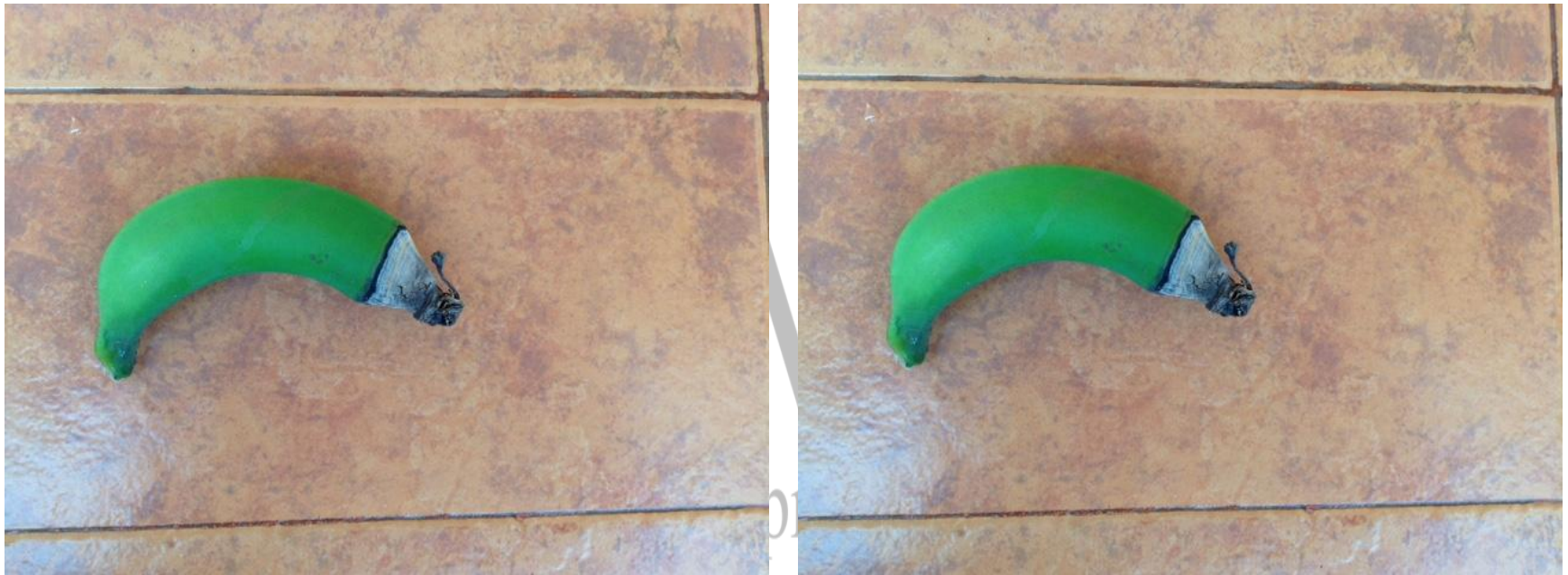
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Banana: Cigar end rot-*Verticillium theobromae*, and  
*Trachysphaera fructigena*

- Necrotic tissue on fruit tips covered with fungal mycelia that resembles the greyish ash cigar end.
- Advanced damage showing greyish ash cigar end on banana fingers.

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# Banana: Cigar end rot-*Verticillium theobromae*, and *Trachysphaera fructigena*

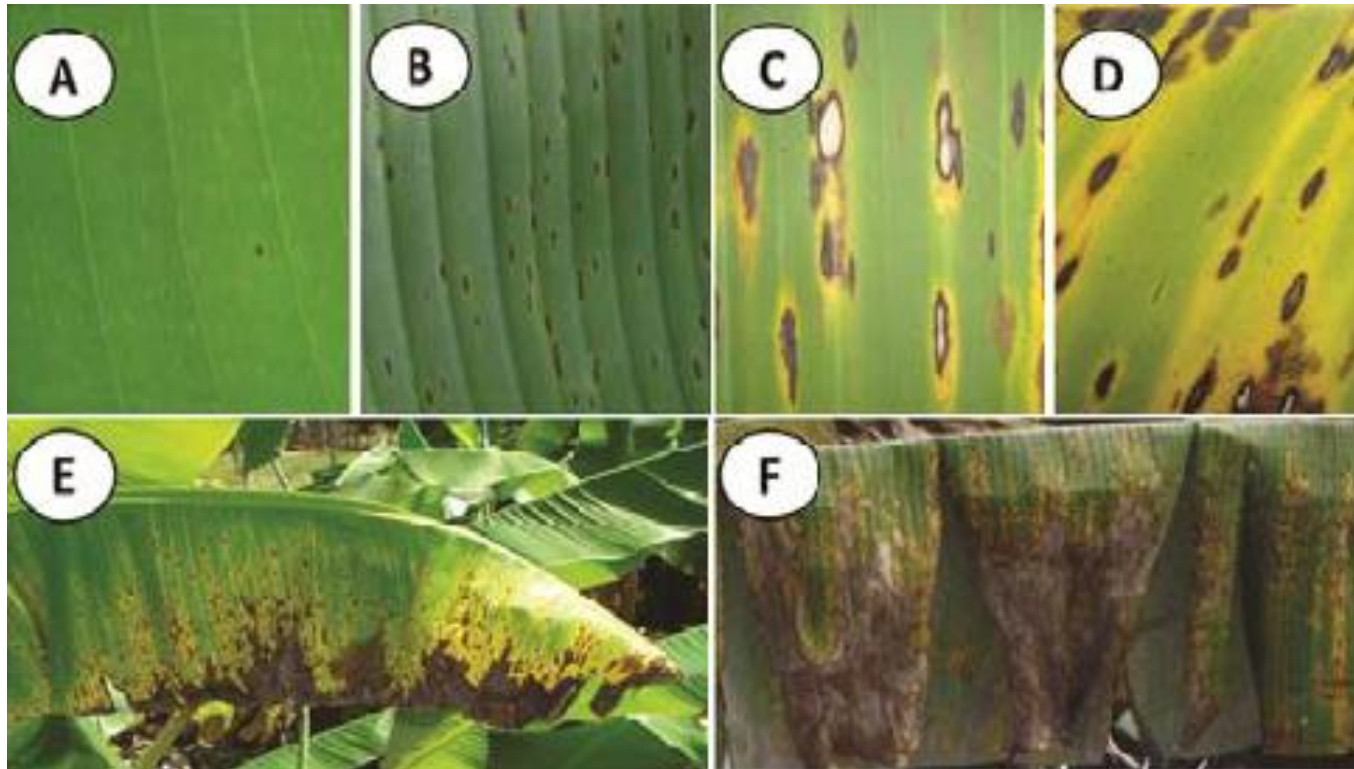


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Banana: Cigar end rot-*Verticillium theobromae*, and  
*Trachysphaera fructigena*



Sigatoka leaf spot (popularly known as Yellow Sigatoka) is a fungal disease caused by *Mycosphaerella musicola*





**Black Sigatoka** caused by the organism *Mycosphaerella fijiensis*- not reported in some countries



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**banana bacterial wilt (*Xanthomonas campestris* pv. *musacearum*) in Uganda and Rwanda, DRC**

- **Banana bacterial wilt (*Xanthomonas campestris* pv. *Musacearum*)**
- Symptoms included progressive yellowing and wilting of leaves, shrivelling of male buds, premature ripening and internal discoloration of fruits plus a characteristic yellow ooze from the vascular tissue of cut pseudostems

# Banana bacterial wilt (*Xanthomonas campestris* pv. *musacearum*) in Uganda and Rwanda, DRC



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# Cassava

- Africa cassava mosaic disease(ACMD)
- Cassava mosaic disease is caused by a virus.

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- The disease is caused by a bacterium
- *Xanthomonas campestris* pv. *manihotis*

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## Seed borne Nematodes

- Wheat: *Anguina Tritici*
- Potato cyst nematode: ***Globodera rostochiensis in Kenya.***

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Potato cyst nematode: *Globodera rostochiensis* in Kenya.



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