COMMON SUGARCANE DISEASES AND PESTS IN KENYA

March 2015
Sugarcane diseases

Diseases on sugarcane are among the important factors affecting the productivity of cane. In Kenya, 30 diseases including major and minor diseases caused by fungi, bacteria, viruses, and phytoplasma were recorded on commercially cultivated sugarcane varieties. Among these the most important diseases are: Sugarcane smut; Ratoon Stunting Disease; Red rot; Pineapple disease; sugarcane rust and Sugarcane mosaic virus disease.

Most important sugarcane diseases are systemic. Planting infected seed cane can spread the diseases and increase in ratoons. This document shall highlight the common diseases in the Kenyan sugar industry.

Further references.

http://agritech.tnau.ac.in/govt_schemes_services/aas/sugarcane_ex.html(11 March 2013)
http://dsd dacnet nic in/PestManage.htm
Sugarcane smut

It is a highly infectious disease caused by the fungus *Sporisorium scitaminea* formerly *Ustilago scitaminea*. It affects both the PC and ratoon crops. It is ranked as number one disease of sugarcane in Kenya. Yield losses attributed to smut are estimated at 21 to 38% depending on variety and environmental conditions.

![Figure 1. Smut whip](image)

**Modes of Transmission and spread**

Transmitted through infected seed cane and inoculum spread/dispersed by wind. The fungus grows within the plants meristematic tissue and induces formation of flowering structures which it colonizes to produce teliospores. The flowering structures then transform into typical grass arrows (whips) (Figure 1). The whips serve as source of inoculum. Standing cane is latently infected in the buds and seed cane from the cane acts to spread the disease. Health seed cane planted in soil with viable spores also get infected. The disease is favored moisture and nutrient stressed plants.

**Symptoms**

- Emergence of smut whips (Figure 1).
- Erect spindle leaves
- Profuse tillering forming grass - like stalks

**Management**

- Growing of resistant and moderately resistant varieties for example D8484, KEN 83-737.
- Use of high quality seed cane from a certified Nursery
- Hot water treatment of setts at 50°C for 30 minutes for Nursery ‘A’ seed cane.
- Sett treatment with fungicides (Carbendazim)
- Roguing and burning or burying of smut whips before they open
- Discourage ratooning of fields with high incidences of smut
- Crop rotation
Ratoon Stunting Disease (RSD)
This is a serious disease that is not easily noticeable. It is caused by the bacterium *Leifsonia xyli* subsp. *xyli* formerly *Clavibacter xyli* subsp. *xyli*. Yield losses ranging from 5 to 30% have been reported depending on variety and environmental conditions.

**Modes of transmission and spread**
The disease is transmitted by contaminated knives and mechanical harvesting machines or through seed cane from diseased plants.

**Symptoms**
No external symptoms other than stunting of growth. The shortening of stalks is not uniform from stool to stool so there is an “up and down” growth appearance of the canopy. There is a slow decline in varietal performance with cane thinness and poor vigor. Reliable diagnostics is through laboratory tests.

**Management**
- Use of disease free seed cane is necessary for complete control of the disease
- Hot water treatment of Nursery “A” seed cane at 50°C for 2-3 hours.
- Disinfection of cane cutting implements with Lysol or Chlorine when preparing seed cane and when moving from field to field.

*Ratoon stunting disease showing shortening of internodes*
Red rot
This is a disease that leads to reduction in cane yields, juice quantity and quality. It is caused by the fungus *Glomerella tucumanensis* also called *Colletotrichum falcatum*.

**Modes of transmission and spread**
Primary transmission is through soil and diseased setts, while the secondary transmission is through wind, rain splash from crop residues or inoculums washed into the soil. Plant debris acts as source of inoculum. The disease is favored by excessive soil moisture and low temperatures.

**Symptoms**

**On Stalks**
- Drying up of the 3rd and 4th leaf of the crown at the margins and later death of whole crown (Figure 2)
- Brown or reddish brown colored stripes appear externally at nodal region.
- Internal tissue has dull coloration with whitish transverse patches and emits alcoholic sour smell

**On leaves**
Tiny red colored lesion on the upper side of the lamina. Red spots on the upper side of the midrib turning brown with age (Figure 3)

**Management practices**
- Growing of improved sugarcane varieties
- Plant healthy certified seed cane.
- Adopt sett treatment with fungicides (Carbendazim) before planting.
- Removal of the affected clumps at an early stage and soil drenching with Carbendazim.
- Burn crop residue after harvest.
- Crop rotation preferably with a green manure crop
- Avoid ratooning of fields with high incidences of the disease
- Hot water treatment of seed cane.
Pineapple disease

Pineapple disease primarily affects sugarcane setts in the first weeks of planting. It is caused by the fungus *Ceratocystis paradoxa*. It is known to cause 85-90% germination failure.

**Modes of transmission and spread**

The fungus infects the setts mainly through the cut ends and from there spreads rapidly through the parenchyma. Infected tissue first becomes reddened; the parenchyma then breaks down and the interior of the setts become hollow and blackened. In the early stages of the rotting, the strong odour of overripe pineapples is often present and may help in diagnosing the disease. Standing cane is infected by windblown spores. In contrast to red rot (which is favored by excessive soil moisture), pineapple disease is most destructive when cane is planted in dry soil. Another major difference is that the red rot fungus is not soil-borne and infection occurs before planting, whereas pineapple disease fungus lives in the soil. Delayed germination either due to use of over age seed cane or unfavorable weather predisposes the material.

**Symptoms**

Internal tissue turns red and eventually black (Figure 4) with a characteristic pineapple odour

- Poor/patchy germination (Figure 5)
- Infected stools turns yellow and wither

**Management**

- Use of resistant varieties.
- Use of 3-5 eye budded setts
- Properly drain the fields
- Avoid injuring the setts when planting
- Treatment of setts with fungicides e.g. propiconazole.
- Plant in soils with adequate moisture.
- Crop rotation

---

**Nematodes**

These are microscopic round worms with an insidious damage on to crops. They are categorized into endo parasites, ecto-endo parasites and ectoparasites (sting nematodes- *Belonolaimus* spp). Endoparasites that may damage sugarcane are lesion nematodes (*Pratylenchus zeae*), lance nematodes (*Hoplolaimus* spp.), and root-knot (*Meloidogyne* spp.) nematodes. Most species of plant-parasitic nematodes favor sandy conditions and are rarely a problem on muck soils. However, sugarcane grown in sandy areas may suffer dramatic yield losses from nematodes.

**Symptoms**

- Galls formation on roots infested by *Meloidogyne* spp.
- Sugarcane roots that are damaged by ectoparasitic nematodes may appear stubby, coarse, discolored, and lack feeder roots.
- Sett roots damage causes poor germination and patchy fields (Figure 21)
- It should be noted that in the field it is common for multiple nematode genera to cause damage in the same field. Therefore, a mixture of root symptoms may occur together on the same plants.

**Management of Plant parasitic nematodes in Sugarcane.**

- Crop rotation with a legume e.g. soya beans or peanuts
- Maintain weed-free fallows
- Trash mulching or green manuring to promote establishment of beneficial organisms
- Minimum tillage to avoid destruction of beneficial organisms
White Grubs (various species)
These are polyphagous insects that damage the crops root system. Yield losses of upto 80% in cane yield and 5% reduction in Commercial Cane Sugar (CCS) have been reported. Common in areas with high usage of farm yard manure.

identification
- Larva is a fleshy ‘C’ shaped, translucent or whitish yellow grub, with a swollen dark last abdomen segment (Figure 18).
- The adults are beetles ranging from reddish brown to black (Figure 19)

Management
- Crop Rotation
- Deep ploughing during dry season
- Collection and destruction of adult beetles

Figure 18. White grub larva
Figure 19. White grub adult

Sugarcane Brown Rust
This is an important foliar disease in sugarcane caused by the fungus *Puccinia melanocephala*. Yield losses are difficult to quantify but losses of 20 to 40% have been recorded during severe infestations.

Modes of Transmission and spread
Spread by air currents even between continents. Disease development is favored by leaf wetness and favorable temperatures (15°C to 30°C)

Symptoms
- Small elongated yellowish spots on both sides of the Leaves. The spots increase in length, turn brown to orange-brown or red-brown in color (Figure 6) and develop a slight, but definite, chlorotic halo. The spots are more numerous around the leaf tip.
- Pustules, which produce spores usually, develop on the lower surface of the leaf (Figure7)

Management
- Diversify varietal composition
- Plant resistant varieties
- Avoid planting sugarcane in soil with low pH (acidic) and/or high levels of Phosphorous and Potassium.

Figure 6. Sugarcane rust symptoms
Figure 7. Rust pustules
Sugarcane Mosaic Disease
The disease is caused by the Sugarcane Mosaic Virus (SCMV). Yield losses vary greatly depending on the variety and environmental factors favoring the aphid vectors. Young, rapidly growing plants are more susceptible to infection than more mature, slower growing plants. Yields losses ranging from 20 to 30% have been reported in susceptible varieties. It has been noted that some sugarcane plants recover from mosaic. However, in Kenya it is not a disease of major economic importance.

Modes of transmission and Spread
The disease is spread by (1) by aphid vectors and (2) by infected seed cane. There are several aphid species that can transmit SCMV from diseased sugarcane to healthy sugarcane. The spread of mosaic is most rapid when vector populations are high, susceptible sugarcane varieties are grown, and SCMV-infected plants are plentiful.

Symptoms
The most distinctive symptom is a pattern of contrasting shades of green, often islands of normal green on a background of paler green or yellowish chlorotic areas on the leaf blade (Figure 8). Chlorotic areas are most evident at the base of the leaf. Chlorotic areas may also be present on the leaf sheath, but rarely on the stalk.

Management
- The use of resistant varieties is the most effective method of mosaic control.
- Planting mosaic-free seed cane is essential.
- Rogue and burn infected stools to prevent further spread
- Control weeds which serve as alternate hosts to the vector

Termites (several species)
This is a Polyphagus pest and more serious under prolonged drought conditions and in light textured soils (sandy and sandy loam soils). The termites attack setts causing poor germination of up to 60%. Termites may also attack shoots and cane stalks. Yield losses of up to 33% in cane yield and 4.5% reduction in Commercial Cane Sugar (CCS) have been reported.

Symptoms of damage
- Poor germination of setts
- Setts are hollow inside and may be filled with soil
- Characteristic semi-circular feeding marks on standing crop
- Stalk filled with mud and collapses when disturbed
- Entire shoot dries up and can be pulled out easily

Identification
Cream colored tiny insects resembling ants with dark colored head (Figure 16)

Management
- Killing the queen (Figure 17) by manual removal or by use of termiticides (imidacloprid or chlorpyriphos)
- Soil drenching of the fields using termiticides
- Sett treatment with termiticides
Pokkah Boeng
The disease is caused by the fungus *Fusarium moniliforme*. Yield losses vary greatly depending on the variety. It has for long been thought to be a minor disease in Kenya but recently it has been reported in several sugarcane growing areas. Pokkah boeng appears to be favored by dry climatic conditions being followed by a wet season. Cane that is three to seven months old and growing vigorously appears to be most susceptible.

**Modes of transmission and Spread**
The disease is spread mainly by airborne spores and to a lesser extent through infected seed cane.

**Symptoms**
- Chlorotic condition towards the base of the young leaves (Figure 9)
- Wrinkling, twisting and shortening of the leaves
- Malformation or distortion of the young leaves.
- The base of the affected leaves is seen often narrower than that of the normal leaves.
- In affected mature leaves, irregular reddish stripes and specks are observed within a chlorotic part.

**Management**
- Plant clean seed setts
- Pre-Soak setts in malathion solution
- De-trash or plant self de-trashng varieties e.g D8484
- Spray white oils after dethrashing
- Rogue and burn infested sugarcane plants
- Crop rotation with legumes

---

**Scale insects (Melanaspis glomerata)**
These are scale like insects that establish on stalks covered by leaf sheaths. They are sap sucking insects spread through seed material and dispersed by rain water, wind or man and animals passing through infested fields. Yield losses of up to 33% in cane yield and 2% reduction in Commercial Cane Sugar (CCS) have been reported.

**Symptoms of damage**
- Occurrence of circular, smoky-brown or greyish-black covers on stems and leaf mid-ribs
- Leaves of infested crops show unhealthy pale green color.
- De-sapping leads to non opening of leaves which also turn yellow.
- Infested crop losses vigour, growth is stunted and intermodal length is reduced.

**Management**
- Plant clean seed setts
- Pre-Soak setts in malathion solution
- De-trash or plant self de-trashing varieties e.g D8484
- Spray white oils after dethrashing
- Rogue and burn infested sugarcane plants
- Crop rotation with legumes

---

**Eyespot (Bipolaris sacchari)**
Sugar cane wilt (*Cephalosporium sacchari*)

---

**Adult female cover of Duplachionaspis divergens (sugarcane scales)**
B. Insects Pests and Nematodes

The pests of economic importance in sugarcane production are: termites; Borers (shoot and internode borers); moles; white grubs; primates; scale insects and nematodes.

Early shoot borers (*Chilo infuscatus*)

Attacks crop during early part of growth before internode formation. Significant damage results from the sugarcane borer tunneling within the stalk. This can cause a loss of stalk weight (tonnage/acre) and sucrose yield. The borer’s tunneling into the stalk allows points of entry for secondary invaders including fungal, bacterial, and viral disease organisms. Yield losses of up to 33% in cane yield and 2% reduction in Commercial Cane Sugar (CCS) have been reported.

Symptoms of damage

Larvae enter through one or more holes on the stalk and bores downwards as well as upwards killing the growing point. If the tunneling is extensive, death of the terminal growing point of the plant (“dead-heart”) (Figure 10) may result. Weakened stalks are more subject to breaking and lodging. The dead hearts are easily pulled out and emit a foul smell.

Identification

Larva: 5 dark violet stripes and a dark brown head (Figure 11)
Adult: Pale greyish brown moth with white hind wings (Figure 12)

Management

- Early planting to avoid hot months when infestation is high
- Earthing up during early stages of crop growth
- Trash mulching
- Pulling out dead hearts and killing the larvae with a spoke
- Intercropping sugarcane with legumes like cowpea or repellent plant such as silver leaf desmodium (*Desmodium uncinatum*) and a trap plant, such as Napier grass (*Pennisetum purpureum*), as a border crop around this intercrop to protect maize from stemborers. The trap plant draws the adult female away from the crop. More eggs are laid on the trap plant than on the crop but the larvae develop poorly or not at all on the trap plant. This practice is known as “push-pull”

Internode borer (*C. saccharifugus*)

Is a serious pest of sugarcane with yield losses of up to 35% in cane yield and 3% reduction in Commercial Cane Sugar (CCS) reported. It is also a pest on maize, sorghum and rice. The pest attack after internode formation till harvest. Favoring by lodging, high Nitrogen dosage and water logging.

Symptoms of damage

Caterpillars bore into softer elongating internodes, enter the stem and tunnel upwards in a characteristic spiral fashion causing reduced growth, constriction of the stem, shortening of internodes and death of the top. The entry holes are covered with frass (Figure 13).

Identification

Larva: 4 violet or pink stripes and a light brown head (Figure 14)
Adult: Pale brown with white hind wings (Figure 15)

Management

- Detrashing the canes during fifth, seventh and ninth month
- Plant self dethrashing varieties e.g. D8484
- Avoid use of excessive nitrogen fertilizers.