

## Sugarcane Smut Disease <sup>1</sup>

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Sugarcane smut was first noted in South Africa in 1877. It is caused by the fungus *Ustilago scitaminea*. The disease is sometimes referred to as "culmicolous" smut of sugarcane because it affects the stalk of the cane. At one time or another, sugarcane smut has been important in nearly every sugarcane growing country in the world. Australia is a major exception since the disease is present only in western Australia, a minor production area.

Sugarcane smut does not always pose a serious problem where it occurs. However, smut may remain unnoticed for years, then quickly devastate large areas of susceptible varieties. Hence, the disease has been called the "dread disease of sugarcane" by some and a "trivial disease with exaggerated yield losses" by others. Smut can cause significant tonnage losses as well as juice quality losses. Disease development is dependent on the environmental conditions and the resistance of the sugarcane varieties grown.

Sugarcane smut disease was first documented in Florida in 1978. However, commercial yield losses have been minimal even when moderate smut levels

occurred. Since smut development is favored by hot dry weather the wet Florida summers do not favor the disease.

### SYMPTOMS

The most recognizable diagnostic feature of a smut infected plant is the emergence of a "smut whip." A "smut whip" is a curved, pencil-thick growth, gray to black in color, that emerges from the top of the affected cane plant (Figure 1). These "whips" arise from the terminal bud or from lateral shoots on infected stalks. They can vary in length from a few inches to several feet long. The whip is composed partly of host plant tissue and partly of fungus tissue. Whips begin emerging from infected cane by 2-4 months of age with peak whip growth occurring at the 6th or 7th month.

Other smut symptoms may be evident before the characteristic whip is seen. Spindle leaves are erect before the whip emerges. Affected sugarcane plants may tiller profusely with the shoots being more spindly and erect with small narrow leaves (i.e., the

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**Figure 1.** Sugarcane smut whip.

cane appears "grass-like"). Less common symptoms are leaf and stem galls, and bud proliferation.

Plants grown under stress conditions are more prone to develop smut. In 1997, smut was observed on CP 70-1133, a resistant cultivar, grown on sandland under stressed conditions. Low incidences (less than 5%) of smut have been observed in a few sandland fields of CP 78-1628 and CP 73-1547 under stressed conditions. Dry and hot spring weather favors the disease.

### CAUSAL AGENT

Although several races of the sugarcane smut fungus (*Ustilago scitaminea*) are known to exist, the race picture is poorly defined at this time. Part of the problem is due to sugarcane variety-environment interactions causing test-to-test variability regarding pathogenicity. Using modern analytical methods, as well as pathogenicity studies with different sugarcane cultivars, researchers have suggested at least six races exist worldwide.

### SPREAD OF THE DISEASE

Sugarcane smut is spread by microscopic spores. The spores are particularly adapted to aerial dispersal and can be spread over great distances by wind currents. The whip serves as a source of spores. It has been shown that approximately one billion spores per whip per day can be released into the air. Standing cane becomes infected in the buds. Since many infected buds remain dormant until the cane is cut for seed and planted, the use of infected seed cane is another important way the disease is spread. Strict quarantine measures are necessary in affected areas.

Windborne spores may settle on the soil of cropped or newly prepared fields. Disease-free seed pieces may become infected if planted in soil containing viable spores. The spores, however, only survive for a short time in the soil under normal soil moisture regimes.

Several species of insects have been consistently associated with smut whips and spores have been found on their bodies. These observations suggest insects could play a role in spore dissemination.

Although sugarcane smut has been reported on a few other members of the grass family, there are probably no important naturally occurring alternative hosts outside the *Saccharum* species.

### PREVENTION AND CONTROL

The use of resistant varieties is the best approach to smut control and has been used successfully in Florida. There is a strong genetic basis for resistance and resistant varieties have been readily available and used to control outbreaks of smut in several countries.

Using disease-free seed cane is also very important for disease control. Care should be taken because this disease can be latent and show up only after planting.

Disease-free planting material can usually be obtained by subjecting seed to hot water treatment. Hot water treatment, however, may not be practical on a large scale and its effectiveness may be subject to varietal differences.

Roguing diseased stools has been successful in some instances usually in foreign countries where the lower wages allow repeated roguing. However, it is not practical for severe outbreaks involving commercial acreage. Roguing may be effective in seed nurseries where smut incidence is generally low. The use of alternate disease-free seedfields is advised.