

Commercial Crop Production

Field Crops – Sugarcane

Integrated Disease Management of Sugarcane

Sugarcane productivity and profitability rely on effective disease management. Most diseases are managed with varietal resistance and a healthy seedcane program. Since sugarcane is vegetatively propagated, regularly obtaining and planting healthy seedcane is essential for the control a group of systemic diseases that include ratoon stunt, leaf scald, smut, mosaic and yellow leaf. These diseases all can be spread and increased by planting infected stalks. An overview of diseases commonly found in Louisiana and management tactics is provided in Table 1.

Table 1. Symptoms, source of inoculum and management of sugarcane diseases.

Disease	
<p>Leaf Scald (<i>Xanthomonas albilineans</i>)</p>	<p>Symptoms: Leaves of young plants may show bleaching or yellowing. The characteristic symptom of leaf scald is the presence of one or more narrow, white “pencil lines” running longitudinally along a vein from the leaf margin down the blade into the sheath. Bands of dead tissue then develop along pencil lines starting at the leaf margin and may expand until the entire leaf is dead. Young shoots may be killed. Mature stalks may show leaf symptoms and develop side shoots with symptoms. Under severe disease conditions, entire plants may die. Drought stress can induce severe symptom expression.</p> <p>Source of Inoculum: The bacteria that cause leaf scald live from year to year in infected plants. It is spread by the harvester and possibly by other cultivation practices that cause plant wounding. The disease can be spread aerially in windblown rain.</p> <p>Management: Varietal resistance is the best means of control. The current varieties have adequate levels of resistance, particularly when produced with progeny from a tissue-culture based seedcane program. Avoid planting seedcane from fields with obvious disease. Regular planting of healthy seedcane produced through tissue-culture has kept the incidence of leaf scald low. The heat treatment used to control ratoon stunting disease is not effective against leaf scald.</p>
<p>Mosaic (Sorghum mosaic virus and Sugarcane mosaic virus)</p>	<p>Symptoms: The mosaic pattern of irregular, interspersed, pale green, yellowish and green areas on leaves varies with cane variety, stage of growth, temperature and the strain of the virus involved. The mosaic symptom is most evident in the youngest emerging leaves and is most easily seen in young plants.</p> <p>Source of Inoculum: The virus persists from year to year in infected plants. It is spread primarily by migrating aphids and also by planting infected seedcane.</p> <p>Management: Mosaic is controlled primarily with host plant resistance. Historically, mosaic was a major disease adversely affecting sugarcane production in Louisiana. However, basic breeding and development of sources of resistance have greatly reduced the impact of this disease. Currently grown varieties have adequate levels of resistance to mosaic with the exception of the two most recently released varieties, HoCP 09-804 and L 11-183. Planting seedcane produced through tissue culture can help keep disease incidence low in susceptible varieties.</p>
<p>Ratoon Stunt (<i>Leifsonia xyli</i> subsp. <i>xyli</i>)</p>	<p>Symptoms: Ratoon stunting disease (RSD) has no visible external symptoms. RSD-infected plants may be shorter with little or no decrease in diameter of the stalk. Stunting severity is associated with adverse environmental conditions, particularly drought stress, and it is more severe in ratoon crops. Affected plants, when split, may or may not show a pinkish color in the growing point of young shoots and orange-to-brownish discoloration of vascular bundles at the nodes in the lower portion of mature stalks.</p> <p>Source of Inoculum: The bacteria live from year to year in infected plants. It is spread mechanically by the cane harvester and by planting infected seedcane.</p> <p>Management: A healthy seedcane program is the primary method for RSD control. Seedcane produced from tissue culture free of RSD is commercially available. Heat treatment of seedcane in hot water at 50 C (122 F) for 2 hours can provide control of most RSD bacteria. A regular annual heat treatment program can provide good RSD control. Monitoring of RSD infection levels and the success of a healthy seedcane program can be provided by collecting stalk samples and having them tested at the LSU Ag Center’s Sugarcane Disease Detection Lab (http://www.lsu.edu/agriculture/plant/extension/sugarcane-lab.php). The level of RSD resistance varies among varieties. High levels of resistance are uncommon, so a healthy seedcane program is essential for successful RSD control.</p>

Commercial Crop Production

Field Crops – Sugarcane

Disease	
<p>Red Rot (<i>Colletotrichum falcatum</i>)</p>	<p>Symptoms: Red rot adversely affects stand establishment by rotting planted seedcane. Splitting stalks dug up from portions of row without living plants reveals red discoloration of the internode tissue and rotted nodes. Within the red areas, white spots usually elongated at right angles to the long axis of the stalk, are diagnostic of red rot infection. Red rot is more severe when planted stalks are exposed to drought stress or waterlogging.</p> <p>Source of Inoculum: The fungal pathogen survives from season to season in infected cane tissues. Fungal inoculum is present on most planted stalks.</p> <p>Management: Plant multiple whole stalks and avoid planting heavily bored or physically damaged seedcane. Provide good drainage for planted seedcane. High levels of varietal resistance are uncommon, so cultural practices that minimize stress on planted seedcane are needed to minimize red rot damage.</p>
<p>Brown Rust (<i>Puccinia melanocephala</i>)</p>	<p>Symptoms: Small chlorotic areas appear on the leaves at first as flecks. Later, the flecks elongate and become reddish-brown. The spots continue to enlarge with a slight yellow halo surrounding the lesion on some varieties. The lesion takes on a pustular appearance on the lower surface of the leaf. The pustules erupt, releasing a reddish-brown mass of spores. On susceptible varieties, heavily infected leaves dry out and die prematurely.</p> <p>Source of Inoculum: Rust survives the winter in living green leaf tissue usually in southern areas of the industry. Spores are then produced and aerially dispersed to spread the disease over short and long distances.</p> <p>Management: Host plant resistance is the primary control method. However, the rust pathogen has the capability to adapt and overcome varietal resistance. Once a variety becomes susceptible, rust can be controlled with the application of fungicide. Detailed information on varietal resistance ratings, fungicide labels and use recommendations can be found through the LSU Ag Center website in “Best Management Practices for Minimizing the Impact of Brown Rust in Sugarcane” at http://www.lsuagcenter.com/topics/crops/sugarcane/pathology/best-management-practices-for-minimizing-the-impact-of-brown-rust-in-sugarcane.</p>
<p>Smut (<i>Sporisorium scitamineum</i>)</p>	<p>Symptoms: Smut is characterized by the production of a black, whip-like structure at the apex of stalks with smaller than normal diameter. The whip often elongates to a length of 2-3 feet and curls downward. The whip is covered by a layer of dark brown fungal spores. Prior to the emergence of whips, smut-infected plants can have a grassy appearance with many small-diameter shoots.</p> <p>Source of Inoculum: Tremendous numbers of smut spores are released over time from whips and dispersed in air currents to spread the disease over short and long distances.</p> <p>Management: To control smut, grow resistant varieties and plant healthy seedcane. Current varieties have adequate resistance to smut with the exception on L 01-299 that is moderately susceptible under field conditions. High rates of disease increase do not occur under Louisiana climatic conditions, so it is possible to grow varieties with moderate smut susceptibility, if a rigorous healthy seedcane program is followed. Tissue-culture produced seedcane will have little or no smut infection. On-farm roguing of smut-infected plants with glyphosate is only feasible in seedcane sources with low levels of infection. Avoid planting seedcane sources of smut susceptible varieties next to smut infected cane. Do not plant seedcane with more than 2 percent smut infection.</p>
<p>Yellow Leaf (Sugarcane yellow leaf virus)</p>	<p>Symptoms: The underside of the mid-vein on young leaves at the apex of mature plants turns bright yellow in SCYLV-infected plants. The yellowing can spread into the leaf blade, and mid-veins can turn pink in severely infected plants. Due to the short growing season in Louisiana, symptoms are not seen most years because of ripener applications and/or frosts. Despite the lack of visible symptoms, infected plants may exhibit reduced growth and juice quality.</p> <p>Source of inoculum: The sugarcane aphid acquires the virus during feeding on an infected plant. The aphid retains the virus for life and can transmit SCYLV during feeding to healthy plants within the same field or in other fields.</p> <p>Management: Certified seedcane produced through tissue culture is tested for SCYLV. Continuous planting of seedcane with little or no virus infection will keep the incidence of</p>

Commercial Crop Production

Field Crops – Sugarcane

Disease	
	yellow leaf low. Information is lacking on the disease resistance levels of commercial varieties.
Red Stripe and Top Rot (<i>Acidovorax avenae</i> subsp. <i>avenae</i>)	<p>Symptoms: Narrow, dark red stripes of variable length run longitudinally along veins. Symptoms are often seen in 4- to 6-month-old cane. The leaf spindle at the shoot apex can become infected in susceptible varieties, particularly under wet conditions. The infection can spread into the shoot apex and cause a top rot. Reddish brown discoloration and cavities may form in stalk internodes. An unpleasant odor is associated with the rotting spindle that may be detected outside the field.</p> <p>Source of inoculum: Bacterial exudates form that are readily spread from plant to plant by wind-blown rain. The bacteria infect through wounds and stomates.</p> <p>Management: Red stripe is usually a minor disease. Most commercial varieties are resistant and never exhibit top rot. HoCP 00-950 is a current variety that may develop top rot during wet growing seasons.</p>
Brown Stripe (<i>Bipolaris stenospila</i>)	<p>Symptoms: In leaves, elongate, reddish-brown lesions with an obvious yellow “halo” develop parallel to veins. During severe infection, lesions may coalesce and entire leaves may be killed. Disease is more severe when plants are under nutritional stress or injured by herbicides. Brown stripe may be severe in fields cut the previous season for seed cane.</p> <p>Source of inoculum: Spores produced by the fungus are spread by the wind to cause new infections.</p> <p>Management: Brown stripe is usually a minor disease. Obvious disease symptoms have been observed in L 01-299, L 03-371, HoCP 04-838, and HoCP 09-804. Disease development is minimal when conditions are favorable for growth. Symptoms usually diminish after fertilization.</p>
Pokkah Boeng (<i>Gibberella fujikuroi</i>)	<p>Symptoms: Malformed or twisted leaves occur near the shoot apex. Young leaves may exhibit pronounced wrinkling, twisting and shortening. Chlorosis (yellowing) is often evident at the leaf base, and necrosis may develop. Spindle infection can spread into the stalk. In severe cases, dark red streaks and ladder-like lesions form inside the stalk and the rind. A “knife-cut” lesion may form in the rind.</p> <p>Source of inoculum: Spores of the fungus are spread by wind and rain.</p> <p>Management: Grow resistant varieties. All the current varieties have adequate resistance. Pokkah boeng may become evident during wet periods when rapid plant growth is occurring. However, plants recover, and the effect on yield is minimal.</p>
Orange Rust (<i>Puccinia kuehnii</i>)	<p>Symptoms: Leaf lesions are very similar to brown rust except that young lesions and the spores produced in pustular lesions on the underside of the leaf are orange. Symptoms will persist into the summer months, whereas few brown rust symptoms are evident in young leaves during summer.</p> <p>Source of inoculum: Same as for brown rust. The fungus overwinters in green leaf tissue, and spores produced during late spring spread the disease over short and long distances.</p> <p>Management: Orange rust was first observed in 2012. Varietal resistance has provided good control. One variety, Ho 05-961, has shown moderate susceptibility to orange rust.</p>
White Stripe (Physiological disorder)	<p>Symptoms: Characterized by variable amounts of longitudinal, white striping on leaves of some plants, usually occurring during spring. The white stripes extend the full length of the leaf. Striping is not considered infectious but rather a growth response to environmental conditions.</p> <p>Management: None. Plants will usually recover after fertilizer uptake in the presence of adequate rainfall.</p>

The sugarcane section was revised September 2019 by Dr. Jeff Hoy.