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Sugarcane Mosaic Virus Disease [1]

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The disease caused by sugarcane mosaic virus (SCMV) is commonly referred to as "mosaic." It has, at one time or another, occurred in virtually every important sugarcane-growing country. Estimated yield losses due to the disease vary greatly depending on the time period and sugarcane-growing area involved. Historically, it has been a serious disease problem in Louisiana. In fact, mosaic, superimposed on already established diseases in Louisiana, caused a near collapse of the industry in the mid-1920s. Until 1996, mosaic had not been a problem in Florida. In 1996, sugarcane mosaic was observed in grower fields on CP 72-2086, a major commercial cultivar. The epicenter of the disease was near where Hatton Highway intersects with US 98. Presently some fields of CP 72-2086 are infested with SCMV; the source of infection appears to be infected seedcane. Only traces of mosaic have been found in other cultivars. The western region of the south Florida sugarcane growing area still remains essentially free of mosaic.

SYMPTOMS

Mosaic is identified primarily by its leaf symptoms. As with most sugarcane diseases, the symptoms may vary in intensity with the cane variety, growing conditions, and the strain of the virus involved. 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 1). Generally, the chlorotic areas are diffuse, but they may be sharply defined in some clones infected with certain strains of the virus. The infection may be accompanied by varying degrees of leaf reddening or necrosis. 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. Young, rapidly growing plants are more susceptible to infection than more mature, slower growing plants.

CAUSAL AGENT

“Mosaic” is not a single disease but four different diseases each caused by distinct viral

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Figure 1. Sugarcane mosaic virus leaf chlorosis symptoms.

pathogens. The four distinct “mosaic” diseases of sugarcane are: sugarcane mosaic, sorghum mosaic, maize dwarf mosaic and Johnsongrass mosaic. Prior to the division of sugarcane mosaic into four distinct diseases, an identification system was used based on “mosaic strains”. In this system, the various strains differed with respect to their host range, ability to cause infection and in the degree of injury they caused. Strains were identified and designated by the letters "A" through "N."

In the United States sugarcane mosaic is found in Florida and was previously called strains A, B, D, and E. Sorghum mosaic is found in Louisiana and Texas and was previously identified as strains H, I and M. New strains are continually being identified in Louisiana. Natural infections of SCMV have been reported on a number of cultivated and wild grass species. Corn and sorghum, if planted next to sugarcane, may serve as an infection source. The importance of transmission of the disease from alternate hosts is not well understood. In Florida, certain weed species have been infected with strain E mosaic for over 20 years with no extensive build up of mosaic in a commercial sugarcane cultivar until 1996, when it became problematic on CP 72-2086.

SPREAD OF THE DISEASE

There are three principal modes of spread of SCMV: (1) by aphid vectors, (2) by infected seed cane and (3) by mechanical inoculation. Only aphid vectors and infected seed cane are important in the field. Mechanical transmission, for the most part, is important only in greenhouse and laboratory research.

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. Mosaic is primarily spread by planting infected seed cane in Florida. The relative importance of spread of mosaic by seed cane was indicated by the incidence of mosaic in adjacent fields of CP 72-2086 established from different sources. The incidence of SCMV in one field was 95% but only 22% in the adjacent field planted with seed cane from another source. The two seed cane sources of CP 72-2086 had been in proximity to each other for 15 to 20 years, clearly indicating that aphid transmission had not been extremely rapid.

PREVENTION AND CONTROL

The use of resistant varieties is the most effective method of mosaic control. Planting mosaic-free seed cane is essential. Presently there are only trace amounts of mosaic in growers fields in Florida.

Management practices targeting insect vectors and control methods aimed at eradication have not been very effective and are not necessary in Florida. For example, applications of insecticides have thus far failed to prevent the aphid vectors of SCMV from spreading the virus. Also, the practice of grouging (digging out and destroying diseased plants), is generally not considered feasible if the infection level

exceeds 5%. Control of mosaic through heat treatment of cuttings is partially effective but is only practical in quarantine situations.

It has been noted that some sugarcane plants recover from mosaic. A sugarcane plant which has recovered is not only symptomless, but the virus can no longer be detected in the plant. The recovered plant remains susceptible to reinfection by the same strain or from other strains.

There has not been any evidence of sufficient levels of mosaic to merit evaluating yield losses in recent years. Previously there was no evidence indicating that there is yield loss in CP 72-2086 due to sugarcane mosaic.