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"STUDIES OF CHARACTERISTICS, IDENTIFICATION AND CONTROL OF SUGARCANE MOSAIC DISEASE: A REVIEW"

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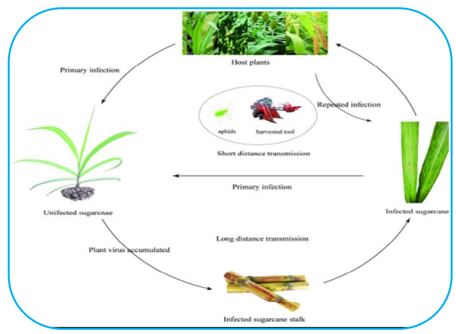
ABSTRACT:

Mosaic is one of the most important sugarcane diseases, caused by single or compound infection of Sugarcane Mosaic Virus (SCMV), Sorghum Mosaic Virus (SrMV), and/or Sugarcane Streak Mosaic Virus (SCSMV). The compound infection of mosaic has become increasingly serious in the last few years. The disease directly affects the photosynthesis and growth of sugarcane, leading to a significant decrease in cane yield and sucrose content, and thus serious economic losses. This review covers four aspects of sugarcane mosaic disease management: first, the current situation of sugarcane mosaic disease and its epidemic characteristics; second, the pathogenicity and genetic diversity of the three viruses; third, the identification methods of mosaic and its pathogen species; and fourth, the prevention and control measures for sugarcane mosaic disease and potential future research focus. The review is expected to provide scientific literature and guidance for the effective prevention and control of mosaic through resistance breeding in sugarcane.



KEYWORDS: *Characteristics, Identification, Control, Sugarcane and Disease.*

INTRODUCTION:

Studies have shown that a combination of cultural practices, such as crop rotation, and the use of resistant varieties, along with chemical controls, can be an effective strategy for reducing the impact of sugarcane mosaic disease. By implementing these strategies, it is possible to maintain the health and productivity of sugarcane crops and to ensure the sustainability of the sugarcane industry. In light of these findings, it is important to continue researching the disease and its causes, as well as to develop new and effective strategies for its control. This will ensure that sugarcane mosaic disease remains a manageable threat to the sugarcane industry, rather than a significant impediment to its growth and success.

Mosaic is one of the main viral sugarcane diseases. Systemic infection is caused by the virus after it invades sugarcane. The incubation period is generally about 10 d, but can be up to 20–30 d. The disease may even manifest in the second year of infection [Li Y.-R, 2010]. The disease was first described in 1893 by Musschenbroek in Java as "yellow stripe disease". Subsequently, it was found in Australia [Kelly N.L. 1927], Puerto Rico, the United States [Brandes E.W. 1919], and India [Dastur J.F. 1923]. In 1920, Brandes identified the disease as a transmissible viral disease that could be transmitted by aphis (*Rhopalosiphum maidis* Fitch) [Brandes E.W.1920]. Summers *et al.* 1948 speculated that the disease started in New Guinea and was introduced into Java from infected sugarcane, and then further spread to the Americas and other countries [Koike H. et al. 1989]. So far, mosaic has been widely discovered in most sugarcane planting regions around the world [Grisham M.P. et al., 2011, Wu L., et. al., 2012].

MATERIALS AND METHODS :

The materials and methods used to study the characteristics, identification, and control of sugarcane mosaic disease would typically involve the following steps:

Collection of plant samples: Sugarcane plants exhibiting symptoms of the disease can be collected and brought to a laboratory for analysis.

Observation of symptoms: The collected samples can be evaluated to determine the presence of characteristic symptoms, such as yellow or light green mosaic patterns on the leaves, stunted growth, and reduced cane yield.

Confirmatory testing: To accurately diagnose the disease, confirmatory tests, such as ELISA (Enzyme-Linked Immuno-Sorbent Assay) or RT-PCR (Reverse transcription polymerase chain reaction), can be performed on the plant samples.

Collection of data: Data can be collected on the prevalence of the disease, its impact on the sugarcane crop, and the effectiveness of control measures.

Evaluation of control measures: Different cultural and chemical control measures can be evaluated to determine their effectiveness in reducing the impact of the disease. This may include the use of resistant varieties, crop rotation, and the application of herbicides or insecticides to control the green sugarcane aphid, the primary vector of the disease.

Statistical analysis: Statistical analysis can be performed on the collected data to determine the significance of the results and to identify trends and patterns.

Documentation: The results of the study can be documented in a report or scientific paper, including a discussion of the findings, conclusions, and recommendations for future research.

These methods can be used to gain a better understanding of sugarcane mosaic disease and to develop effective strategies for its control, which are crucial for the sustainability of the sugarcane industry.

RESULTS AND DISCUSSION:

Sugarcane mosaic disease is a widespread and destructive disease of sugarcane plants. It is caused by a virus, which reduces the plant's ability to produce sugar and can lead to significant economic losses. The identification and control of this disease is crucial for the sustainability of the sugarcane industry.

Characteristics of the disease include yellow or light green mosaic patterns on the leaves, stunted growth, and reduced cane yield. The symptoms may appear on only a portion of the plant or spread throughout the entire plant, depending on the strain of the virus and the plant's resistance level.

Identification of sugarcane mosaic disease can be challenging due to the presence of other diseases that cause similar symptoms. Confirmatory tests, such as ELISA or RT-PCR, can be performed to accurately diagnose the disease.

Control of sugarcane mosaic disease involves a combination of cultural practices, such as crop rotation, and the use of resistant varieties. In some cases, chemical controls, such as herbicides or insecticides, may be used to reduce the spread of the disease by its vector, the green sugarcane aphid.

Effective management of sugarcane mosaic disease requires a thorough understanding of the disease and its causes, as well as the implementation of integrated pest management strategies. By implementing these strategies, it is possible to reduce the impact of the disease and maintain the health and productivity of sugarcane crops.

Sugarcane is an asexually propagated crop. If infected stalks are ratooned or used as propagating material, the virus can accumulate in large quantities. Although viruses transfer slowly between plant cells, they move quickly in vascular bundles, along with the flow of plant nutrients [Putra L.K. et al. 2014, Wang W. et al. 2009, Chaves-Bedoya G. et al. 2011]. As a result, the virus can spread to almost every tissue, even the whole stool [Pokorny R. et al. 2006]. In infected sugarcane plants, chlorophyll is destroyed, photosynthesis is weakened, and growth is significantly inhibited [Bagyalakshmi K.,2019, Irvine J.E. 1971], resulting in shorter internodes, fewer mill-able stems, shorter roots, and a significantly lower sprouting rate and lower yield of cane stems [Pan D.R., et al. 2001, Singh V. et al. 2003, Singh S.P., et al. 1997]. Moreover, the disease also reduces juice content, sucrose content, and the crystallization rate [He Y.S., Li R.M. 2006], which can ultimately reduce sugarcane yield by 10–50% [Viswanathan R., Balamuralikrishnan M. 2005]. The disease has become a pandemic in many countries or regions, including the United States, China, Cuba, Puerto Rico, Argentina, Brazil, and Australia, causing huge economic losses and even bankruptcies to the sugarcane industries [Grisham 2011, Wu L. et al. 2012, Jones C. 1987].

CONCLUSION:

In conclusion, sugarcane mosaic disease is a widespread and economically important disease of sugarcane that requires careful study and management. The characteristic symptoms of the disease, including yellow or light green mosaic patterns on the leaves, stunted growth, and reduced cane yield, make it a significant threat to the sugarcane industry. Through the use of confirmatory tests, such as ELISA or RT-PCR, and by evaluating different cultural and chemical control measures, it is possible to accurately diagnose and effectively manage the disease.

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