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Sustainable Sugarcane Production in India in Changing Disease Scenario

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During the last 100 years, the country has witnessed epidemics of various diseases like red rot, smut, wilt, rust, leaf scald and yellow leaf disease (YLD). Red rot epidemics were phenomenal in the past and during the past few decades many elite varieties like Co 1148, Co 6304, Co 7805, CoC 671, CoC 92061, CoJ 64etc were withdrawn from cultivation due to their break-down to red rot. However, sustained breeding efforts led to deploying red rot resistant varieties in both tropical and subtropical regions and the disease was contained in the recent years. New red rot pathotypes emerged during the recent epidemics were found to be more virulent. Although the disease severity has been reduced in the recent years, the ruling varieties CoS 8436, CoSe 92423, CoSe 95422, CoLk 8102 etc have shown moderate red rot in the field in the subtropics. Red rot severity has been reduced in different parts of Andhra Pradesh, however, smut assumed very serious epidemic proportion in the state. Similarly, moderate to severe smut incidences were observed in Karnataka, Gujarat and some part of the subtropics. Still wilt is found as serious disease in some parts of the country.

YLD was first recorded during 1999 in the country and now the disease occurs in serious form in all the states in the tropical region. In the subtropics also severe form of the disease is recorded. Complete genome of the causative agent *Sugarcane yellow leaf virus* (SCYLV) was sequenced and characterized it as a new genotype SCYLV-IND. Detailed studies on the impact of the disease in sugarcane revealed that the virus causes serious physiological changes like photosynthetic rate, stomatal conductance and SPAD meter value in the susceptible varieties. In addition to reduction in stalk weight, height and girth, YLD infection also reduced juice yield in the affected canes up to 34.15%. Recent studies clearly established the role of SCYLV in 'varietal degeneration' along with other viruses and ratoon stunting bacterium. In addition to these diseases, severity of *pokkahboeng*, rust and brown spot have been recorded in many parts of the country. Among them, rust and brown spot were restricted to few popular varieties however *pokkahboeng* affects most of the varieties under cultivation. These diseases were considered as minor diseases and their severe outbreaks also in the recent years suggest possible climate change effects that need to be studied in detail. Studies are also in progress to identify resistance in sugarcane progenies to *pokkahboeng* and rust through AICRP trials. Disease resistant varieties play a crucial role in managing many of the diseases in sugarcane. However, the new varieties may not possess adequate resistance to all the diseases, hence, alternate disease management strategies are being explored to manage the diseases under field conditions. To improve fungicide uptake in the setts, a new mechanized sett treatment device has been developed and this approach was found to be effective to protect young crop from primary sources of fungal inoculum. Further, delivery of fungicides through micro-irrigation is being evaluated to address disease development through secondary sources of inoculum. Planting of disease-free planting materials is recommended to tackle non-fungal diseases and tissue culture plays a crucial role in this regard. However, there is a need to diagnose pathogens in tissue culture seedlings for effective disease management practice. Molecular diagnosis is emphasized to index the seedlings or mother plants for sugarcane viruses and phytoplasma. Meristem culture combined with molecular diagnosis has become a proven technology to eliminate SCYLV and other viruses and grassy shootphytoplasma. For the successful diseases management in sugarcane, clean seed programme holds the future and sugar industry needs to adopt this approach to develop disease-free nurseries to sustain sugarcane productivity and maintain varietal vigour in the country.

