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Souvenir de Presentation

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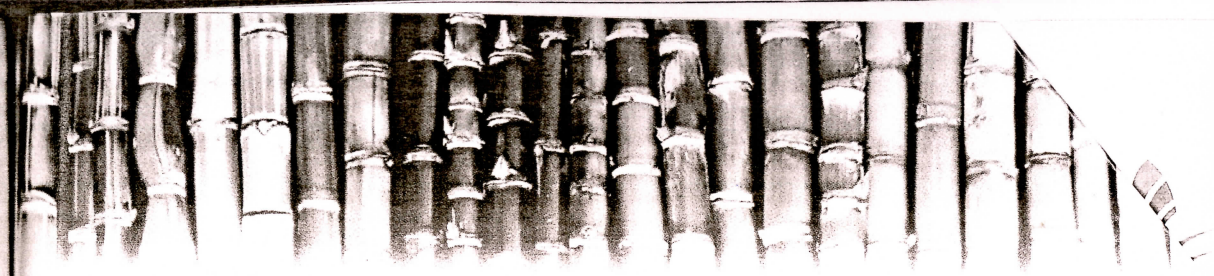

CONCURRENT SESSION B-IV

NEW APPROACHES TO PROTECT SUGAR CROPS FROM PEST AND DISEASES AND POLICY FRAMES

LEAD PAPERS

B-IV-L-1

Developments in diagnosis of sugarcane pathogens: Taking diagnosis to the field through lateral flow assay (LFA) kits

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Vegetative propagation favours the accumulation of different pathogens inside sugarcane stalks which serve as planting material. Further, sugarcane is affected by all kinds of pathogens viz. fungi, bacteria, virus and phytoplasma and this requires different disease management strategies for each pathogen group. In integrated disease management approach, healthy seed plays a vital role in preventing pathogen spread through planting materials, thereby arrest epidemic development in sugarcane. However, the planting materials either setts or seedlings do not exhibit disease symptoms and we have to rely on advanced diagnostic tools to detect the pathogens which are in very low titre. Earlier, serological techniques were developed at ICAR-SBI to detect fungal pathogens causing red rot and smut, sugarcane grassy shoot (SCGS) phytoplasma, bacteria causing ratoon stunting and leaf scald and viruses *Sugarcane mosaic virus* (SCMV) and *Sugarcane streak mosaic virus* (SCSMV) causing mosaic disease, *Sugarcane yellow leaf virus* (SCYLV) causing yellow leaf (YL) and *Sugarcane bacilliform virus* (SCBV) causing leaf fleck. Subsequently, for more sensitivity and precision,molecular assays either PCR or RT-PCR were developed depending on genome of pathogen. These molecular assays are routinely used to detect all the three RNA viruses and SCGS-phytoplasma in our virus indexing programme to ascertain freedom of these pathogenson tissue culture derived sugarcane seedlings for the past 10 years. Currently there is a need to take these diagnostics to the field to index planting materials of sugarcane for the adoption of healthy planting materials in larger areas.

For such diagnostics, we need to develop in-field portable diagnostic devices and lateral flow assays (LFAs) are the technology behind simple, rapid and portable detection devices which are popular in biomedicine, food, environment, and agriculture. Recently, gold nanoparticles (AuNPs) antibody conjugates based sensors achieved high detection sensitivity compared to conventional methods. Hence, nano-based sensors are expected to offer the possibility of monitoring pathogens in the crops under field conditions.In this direction, we are standardizing LFAs for three RNA viruses SCMV, SCSMV and SCYLV. Initially we synthesized citrate-stabilized gold nanoparticles with ~10– 30nm spherical particles and characterized them through transmission electron microscopy and uv - visspectroscopy. The AuNPs optimized for uniformity were subjected to chemical modification with EDC/NHS for covalent linking with the antibodies specific to sugarcane infecting viruses. The nanogold-labeled conjugates were further confirmed by UV-Vis spectroscopy and gel retardation assay. We found that the conjugates are stable in the buffer media and in a salt solution with high ionic strengths and they exhibited specificity in antibody reactions by localizing target antigens (SCSMV) on nitrocellulose membranes (dot-blot immunoassay). The nanogold labelled probe was found to have higher sensitivity than ELISA and in addition, the detection efficiency can be enhanced ten-fold by following silver enhancement method. Further studies are in progress to develop LFA kit for SCSMV. Further, the nanogold immunoassay format will be standardized for multiplex LFA for the detection of sugarcane viruses viz. SCYLV, SCMV, SCSMV, and SCBV under field conditions. This development will lead to the adoption of simple field diagnostic kits for sugarcane pathogens and managing them in a sustainable way.

B-IV-L-2

Kairomonal effect of extracts of different life stages of top shoot borer, *Scirpophaga excerptalis* Walker of sugarcane on foraging behavior of naturally occurring parasitoids

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Sugarcane is a second most important commercial crop cultivated in about five million hectare cultivable land in tropical and subtropical India. Being a long duration crop (12-18 months) provides a most congenial environment for the development of a large number of insect pests and their parasitoids.