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Molecular characterization and management of Tomato leaf curl virus and its vector, *B. tabaci*, using cultural methods like guard crops and mulches in Tomato

Rajasri Mandali, K Vijaya Lakshmi and M Sujatha
Acharya N. G. Ranga Agricultural University, India

Tomato leaf curl virus is a gemini virus transmitted by the whitefly, *Bemisia tabaci*. It is considered to be the most invasive and economically damaging insect pest to agriculture with an ability to colonize in more than 500 plant species. It is a known vector for more than 100 emergent plant viruses. Very little information is available on the biotype status of *B. tabaci* in Andhra Pradesh and the strainal variation in the existing Tomato leaf curl virus attacking Tomato in Telangana regions. Present investigations were carried out to know the biotype status of *B. tabaci* strainal identification of ToLCV and their management using cultural practices. Molecular characterization studies were conducted using RAPD-PCR analysis of *B. tabaci* samples collected from different locations of Andhra Pradesh and Telangana and compared with B-biotype collected from Kolar district of Karnataka using OPB 11 primer. It revealed the existence of B biotype of B.tabaci in Rangareddy, Medak districts of Telangana and Chittoor district of Andhra Pradesh. The ToLCV sample from Hyderabad was isolated and sequenced. ToLCV sample of Hyderabad, Andhra Pradesh shared a maximum homology of 93% with three Indian ToLCV strains Viz., TOLCNDV-AVT1 from New Delhi (AY428769), ToLCNDV-Svr (U15015) and ToLCNDV-Chilli (EU309045). The complete nucleotide sequence of Hyderabad sample was identified and found to be identical Tomato leaf curl New Delhi virus (ToLCNDV) strain when it was compared with other ToLCV known sequences in the NCBI genbank through BLAST analysis.

Whiteflies and the viruses they transmit result in extensive losses which resulted in a worldwide search for cost effective management strategies where cultural practices can play a significant role in integrated pest management system targeting whiteflies, because of their preventive nature.

The effect of six guard crops around the main crop on the whitefly vector and ToLCV incidence indicated that tomato-maize combination followed by tomato - brinjal has resulted in reduced whitefly population and less incidence of ToLCV in the main field compared to bajra guard crop which recorded maximum number of whiteflies and high ToLCV incidence on par with control. The present findings brought out the practical utility of guard crops especially maize to manage the virus and vector incidence in tomato. Different inorganic and organic mulches were evaluated against whiteflies and subsequent ToLCV incidence .Among the mulches, UV reflective mulch and paddy husk mulch recorded significantly low population of whitefly and ToLCV incidence throughout the crop growth period and recorded higher yield, while highest incidence of ToLCV was observed in black polythene mulch on par with the control. The UV reflective mulch was effective in controlling the disease as well as the vector. Field studies revealed that the ToLCV incidence was well managed through vector control by the manipulation of agro-ecosystem using cultural practices like growing guard crops around the main crop and use of mulches. These cultural methods can be followed as an integral part of IPM practices along with suitable safer insecticides to safe guard the Tomato crop from viral diseases spread by whiteflies.

nihariraj@yahoo.co.in