10th International Plant Virus Epidemiology Symposium

Controlling Epidemics of Emerging and Established Plant Virus Diseases - The Way Forward

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Patancheru 502324, AP, India

Program and Abstracts

Organized and Hosted by the International Crops Research Institute for the Semi-Arid Tropics

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OP-30: Development and evaluation of transgenic groundnut for resistance to *Tobacco streak virus* (TSV)

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Stem necrosis disease first recognized in the year 2000 caused by *Tobacco streak virus* (TSV; *Ilarvirus*) has wiped out almost all the groundnut harvest in 225,000 ha in Anantapur and Kurnool districts of Andhra Pradesh, India. Since then the virus has emerged as a major problem on groundnut and several other annual crops in Peninsular India. Due to the lack of TSV resistance in cultivated germplasm, a transgenic approach was undertaken to develop resistance against the virus in groundnut. The coat protein gene of TSV (*TSVcp*) cloned under the CaMV35S promoter in pCAMBIA2300 was introduced into the de-embryonated cotyledons of three popular groundnut varieties (JL 24, TMV 2 and ICGV 91114) by *Agrobacterium*-mediated transformation. Eighty percent of the resultant primary transgenic events (T_0) contained the *TSVcp* gene. Analysis of genomic DNA of 10 independent transgenic plants (T_0) demonstrated the integration of the *TSVcp* gene at one (in three events) to three (in seven events) loci within the genome. In Western-immuno assays using anti-TSV serum a polypeptide of ~50 kDa (presumed to be a dimer of *TSVcp*) was detected in 29% of the 92 primary transgenic events tested. Virus resistance assays with T_1 transgenic plants and non-transgenic controls (groundnut cv. JL 24) were done by mechanical sap inoculation at the three-leaf seedling stage (10 to 12 days after emergence). The inoculated leaves of the transgenic and non-transgenic controls showed necrotic lesions within 5 to 10 days post inoculation and they tested positive to TSV. However, three types of systemic reactions were observed in the transgenic events: (i) events with total lack of systemic symptoms and no virus accumulation; (ii) events that showed delayed systemic symptoms compared with the non-transgenic controls; and (iii) susceptible phenotype similar to that of non-transgenic controls within 15 to 20 days of inoculation. Through this procedure all the susceptible transgenic lines (including those showing delayed symptom expression) were eliminated from further resistance testing. These preliminary results suggest that the *TSVcp* mediates resistance against the systemic spread of TSV in certain events. The detailed phenotypic evaluation and molecular characterization of the resistant transgenic events and their advancement to further generations are in progress.