10th International Plant Virus Epidemiology Symposium

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

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Program and Abstracts

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PP-2_70: Frequency of mixed infection of *Tobacco streak virus* and *Peanut bud necrosis virus* in groundnut

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Bud necrosis disease (BND) first recognized in 1968, caused by the *Peanut bud necrosis virus* (PBNV; *Tospovirus*) is an important constraint to groundnut (*Arachis hypogaea* L.) production in Southeast Asia, including India. BND symptoms on groundnut include mosaic mottling symptoms on leaves, drooping of petioles followed by terminal bud necrosis. Early infection causes stunting and proliferation of axillary shoots. In 2000, a sever epidemic of BND-like disease was observed in groundnut crop grown in over 250,000 ha in Anantapur district of Andhra Pradesh, India. Symptoms of affected plants were similar to that of BND except that necrosis on petioles and stems were very pronounced and plants infected at early stage died prematurely. Initially it was assumed that the PBNV or a new strain of it as a cause for this severe epidemic. Subsequent studies confirmed that *Tobacco streak virus* (TSV; *Ilarvirus*) was responsible for the new disease outbreak on groundnut and it was named as stem necrosis disease (SND). Surveys were conducted in groundnut fields during 2001-04 in Anantapur district by randomly collecting leaf samples from diseased plants from several different farmer fields and tested them for PBNV and TSV by enzyme-linked immunosorbent assay (ELISA). This has demonstrated occurrence of both PBNV and TSV in different proportions. Surprisingly, the incidence of mixed infection of PBNV and TSV was very low. Symptoms in plants infected singly with TSV or PBNV or with both the viruses were almost similar and difficult to distinguish. Of 175 symptomatic plants from rainy season crop (Jun-Nov) tested during 2000, 57.1% were positive to PBNV and 42.8% were positive to TSV. In the same year most of the parthenium (*Parthenium hysterophorus)* plants grown adjacent to groundnut fields tested positive to TSV, but not to PBNV and symptomatic sunflower plants intercropped in groundnut fields were positive to TSV but not to PBNV. In 2001, of 113 symptomatic samples tested 41.5% were positive to TSV, 30.9% were positive to PBNV and 6.2% were positive to both TSV and PBNV. Of 104 symptomatic samples tested in 2002, 43.2% were positive to TSV, 57.7% were positive to PBNV and 3.8% were positive to both the TSV and PBNV. Of 900 symptomatic samples tested in 2004, 53.9% were positive to TSV, 45% were positive to PBNV and 3.5% samples were positive to both TSV and PBNV. The incidence of these two viruses varied from field to field. In some fields PBNV incidence was high and in some other fields TSV incidence was high, but co-infection of plants with both the viruses was very low (3.5 to 6.8%) even in fields where near equal incidence of TSV and PBNV were observed. Thrips are involved in transmission of these two viruses, but transmission mechanisms are different. Several species of thrips aid in the TSV transmission apparently by mechanical inoculation in the presence of TSV-infected pollen rather than as direct vectors, while PBNV is transmitted in a persistent manner only by *Thrips palmi*. At field level abundance of inoculum sources (viruliferous thrips in case of PBNV and thrips+TSV-infected pollen for TSV) and preference of thrips species might influence the incidence of PBNV and TSV. In a scenario of abundant sources of TSV and PBNV and thrips in the same region, it is unlike that thrips selectively infect plants with PBNV or TSV. We suspect suppressor role (antagonism) of one virus on other depending on the time of infection. For example, plants infected first with PBNV may suppress multiplication of TSV inoculated subsequently, and vice-versa. We are conducting experiments to determine any synergistic or antagonistic effects of these two viruses in virus titer and symptom phenotype in groundnut. Nonetheless, from field survey data it was clear that infection with PBNV and TSV or by both results in severe symptom phenotype in groundnut and requires different management tactics to control these virus diseases in endemic locations. It is worthy to investigate this situation in other crop species which are susceptible to both TSV and PBNV in India.