

Breeding for Resistance to Groundnut Virus Diseases at ICRISAT Center

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At ICRISAT Center in India germplasm screening and resistance breeding projects are being carried out to produce varieties with resistance to bud necrosis disease caused by tomato spotted wilt (TSWV), peanut mottle virus (PMV), peanut stripe virus (PSV), and peanut clump virus (PCV) diseases. Breeding for resistance to groundnut rosette virus (GRV) disease is being done at the SADCC/ICRISAT Center in Chitedzè, Malawi, in southern Africa.

TSWV has been reported in groundnut from many countries and is currently economically important in India and the USA. It is transmitted by *Thrips palmi* in India and by *Frankliniella occidentalis* and *F. fusca* in the USA. TSWV is not seed-transmitted. Utilizing a field-screening technique developed at ICRISAT, more than 7000 germplasm accessions of cultivated groundnut and 42 wild *Arachis*

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species have been tested for resistance to TSWV. Two cultivars recently released in India, ICGS 11 and ICGS 44, also showed field-resistance to TSWV. Many genotypes resistant to thrips attack additionally showed field-resistance to TSWV and were used in a conventional breeding program to combine the resistance with high yield. Two of the high yielding breeding lines, ICGV 86029 and ICGV 86031 also showed resistance to TSWV. Efforts are being made to produce high-yielding breeding lines with resistance to the thrips vector and to TSWV. Studies have also been initiated on the mechanism and inheritance of resistance to TSWV in groundnut.

PMV is widespread and can cause crop losses as high as 30%. It is transmitted by several aphid species, and through seed up to 8%. Using a field inoculation technique, over 3000 *A. hypogaea* genotypes have been screened for tolerance to PMV. ICG 5043 (NCAc 2240) was found to be tolerant. PMV was not seed-transmitted in the genotypes ICG 1697 (NCAc 17090), and ICG 7013 (NCAc 17133 [RI]). Interestingly, these genotypes are also resistant to rust and late leaf spot. Inheritance studies on tolerance and nonseed transmission to PMV are in progress. Initial data suggest high heritability for nonseed transmission. The breeding strategy is to develop high-yielding cultivars with PMV tolerance from ICG 5043, and with the nonseed transmission characteristic.

PStV is widely distributed in the USA and in many countries in Asia. It is economically important in the People's Republic of China and in Indonesia. PStV is transmitted by several aphids, and is seed-transmitted at a higher frequency than PMV. Over 9000 *A. hypogaea* genotypes were field-screened in Indonesia and none was found to be resistant to PStV. In tests conducted under containment in India, *A. carlenasii* (ICG 11558) was shown to be immune, and *A. chacoense* (ICG 11562, ICG 12168, ICG 4983), ICG 11560, ICG 8215, and *A. paraguariensis* (ICG 8973) resistant to PStV. Several interspecific hybrid derivatives and *A. chacoense* are currently being tested in Indonesia for resistance to PStV.

PCV has been reported from western Africa and India. When infection occurs early, the disease can cause up to 100% yield loss. The virus occurs as serologically distinct isolates. It is transmitted by a soil-borne fungus *Polymyxa graminis* and also through groundnut seed as high as 20%. Although nearly 8000 groundnut genotypes were screened in PCV-infested farmers' fields, none was found to be resistant.