

# Current Research on Breeding for Resistance to Groundnut Viruses at ICRISAT Asia Center

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Diseases of groundnut (*Arachis hypogaea* L.) caused by peanut bud necrosis virus (PBNV), peanut mottle virus (PMV), peanut stripe virus (PStV), and Indian peanut clump virus (IPCV) are economically important in the Asia-Pacific region. At ICRISAT Asia Center (IAC), groundnut breeding activity has focussed on germplasm screening and development of improved germplasm with resistance to peanut bud necrosis disease (PBND). Over 8000 accessions of cultivated groundnut (*A. hypogaea*) and 19 accessions of wild *Arachis* species were screened for resistance to PBND under field conditions. Of these, ICGs 848, 851, 852, 862, 869, 885, 2271, 2306, 2307, 2323, 2741, 3042, 3806, 3873, 5024, 5030, 5043, 5044, 6135, 6317, 6323, 7676, and 7892 showed consistently low PBND incidence compared with the susceptible control JL 24. They all belong to the subspecies *hypogaea*. Five accessions of the wild species *A. duranensis* (30064, 30065, 36002, 36002-2, and 36005), and one accession each of *A. valida* (30011), *A. correntina* (9530), and *A. monticola* (30063) showed resistance to PBND.

PBNV is transmitted by *Thrips palmi*. Resistance to PBND could be due to resistance to the vector and/or the virus. Therefore, the strategy adopted for breeding for resistance involves the incorporation of resistance to both vector and virus into improved genetic backgrounds. Several high-yielding lines with resistance to PBND have been developed at IAC. In the majority of these lines, resistance to PBND is due to nonpreference by the vector. All the improved lines tested so far, including interspecific derivatives, are susceptible to PBNV when mechanically inoculated at a relatively high virus concentration ( $10^{-1}$  dilution of extract). However, ICGV 86031 and ICGV 86388 showed resistance when inoculated at a low virus concentration ( $10^{-2}$  or lower dilution of extract). High-yielding cultivars (ICGVs 87123, 87128, 87189, and 876141) with field resistance to PBND are now being grown in India.

PMV is seedborne and is transmitted by many aphids. None of the 3000 cultivated groundnut germplasm lines screened so far have shown resistance to it under field conditions. However, NC Ac 2240 and NC Ac 2243 consistently showed significantly lower yield losses than the susceptible controls. Therefore they are regarded as tolerant to PMV. NC Ac 17090 and NC Ac 17133 (RF), the two rust- and late leaf spot-resistant sources, did not transmit the virus through seeds when more than 20 000 were tested. A limited breeding program was initiated to combine the tolerance and non-seed-transmission traits with improved genetic backgrounds. Several advanced breeding lines are now available for further screening.

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Our efforts in the past to locate resistance to IPCV and PStV in cultivated groundnut germplasm have failed. Resistance to PStV in some accessions of wild *Arachis* species has been reported by other workers. However, attempts have not been made to transfer this resistance to cultivated groundnut. The development of transgenic plants containing virus genes offers exciting prospects for inducing resistance to IPCV and PStV.