

OP 8/06

Development and evaluation of transgenic peanuts for induced resistance to the Indian peanut clump virus

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Peanut or groundnut (*Arachis hypogaea* L.) is an economically important oil and protein rich crop whose seeds contain about 48% oil and 25% protein that has significant impact in the semi-arid tropics (SAT). Several biotic and abiotic constraints affect the productivity of this crop that results in great economical losses annually. The Indian peanut clump virus (IPCV) is soil-borne and seed-borne and transmitted by the fungus *Polymyxa graminis* is very significant due to the non-availability of resistance sources in the available germplasm. We have developed efficient protocols for *Agrobacterium tumefaciens*-mediated genetic transformation of peanut by using cotyledon explants from mature seeds that can provide large numbers of independently transformed lines. Over 50 transgenic lines of peanut were developed by using either the coat protein (cp) or replicase (rep) genes of IPCV, and characterized for gene integration and expression. Replicated field evaluations against IPCV were carried out under controlled conditions during the rainy seasons of 2002 to 2005 by using 20 transgenic lines carrying single gene inserts (10 with *IPCVcp* and 10 with *IPCVrep*) in a sick plot. The preliminary results of this trial have provided very encouraging results where six lines (4 with *IPCVcp* and 2 with *IPCVrep*) showed complete resistance to IPCV. The resistant plants did not show any stunting or expression of any morphological symptoms on the leaves. The virus titer declined with maturity in the resistant plants. In the first ELISA test conducted three weeks after sowing, all the tested plants showed the presence of IPCV while the subsequent three tests at 15 day intervals did not reveal any virus in these six lines, thus suggesting the potential of capsid and replicase genes in the induction of resistance to IPCV. Detailed results on the controlled field evaluation for virus resistance in peanut and future strategies for their deployment in the developing countries of the semi-arid tropics are discussed.

INDIAN VIROLOGICAL SOCIETY
XVI Annual Convention and International Symposium on



Management of Vector-Borne Viruses

7-10 February 2006, ICRISAT Potancheru 502 324, Hyderabad
Andhra Pradesh, India

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Organised and Hosted by the International Crops Research
Institute for the semi-Arid Tropics. <http://www.icrisat.org>