



Proceedings of the 3rd Fungal Genomics, 4th Fumonisin, and 16th Aflatoxin Elimination Workshops



October 13 – 15, 2003
Savannah, Georgia USA

Aflatoxin Contamination of Groundnut: Conventional Breeding for Resistance

H. D. Upadhyaya, S. N. Nigam, and F. Waliyar

Crop Improvement, Management and Utilization for Food Security and Health International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru, Andhra Pradesh 502 324, India

Aflatoxin contamination of groundnut or peanut (*Arachis hypogaea* L.) is a widespread serious problem in most groundnut-producing countries where the crop is grown under rainfed conditions. The semi-arid tropical environment is conducive to preharvest contamination when the crop experiences drought before harvest, whereas in the wet and humid areas, postharvest contamination is more prevalent. Breeding for resistant cultivars is one of the possible means of reducing aflatoxin contamination. These cultivars will be of great value as no cost input to the farmers in both developed and developing countries. At ICRISAT research on breeding for resistance to aflatoxin contamination started in 1976. In the beginning, resistance to *in vitro* seed colonization by *Aspergillus flavus* (IVSCAF) received maximum attention. The importance of resistance to natural seed infection and aflatoxin production later was recognized and received increasing attention. Sources for resistance to seed infection and aflatoxin production were identified. We have developed and tested several hundred breeding lines for resistance to IVSCAF and seed infection and yield. Some of the breeding lines have seed infection and colonization equal to or less than the best resistant control cultivar J 11, and high-yield potential across seasons/years, and locations. Of these ICGV 88145 and ICGV 89104, and ICGV 91278, ICGV 91283 and ICGV 91284 have been released as improved germplasm. ICGVs 91278, 91283, and 91284 have performed well in evaluations in Thailand and Vietnam. ICGV 87084, ICGV 87094, and ICGV 87110, bred at ICRISAT Center for resistance to seed infection, were also found to be resistant in Senegal, Niger, and Burkina Faso in West Africa. ICGV 91278 and ICGV 91284 are also doing well in West Africa. We are attempting to enhance levels of resistance to aflatoxin contamination and combine it with the rust and late leaf spots resistance and good agronomic background. One way to achieve greater success in conventional breeding efforts is to modify screening techniques to suit screening of segregating generations and select resistant plants/progenies. The genetics of resistance mechanisms has not been clearly established. The information on allelic relationship among various sources for each resistance trait is crucial and will enable breeders to pyramid the non-allelic genes for each resistance mechanism. There is an urgent need to locate germplasm sources in the core and mini-core collections with stable, high levels of resistance to different mechanisms. Unfortunately, the progress made so far in conventional breeding has not been able to produce cultivars that are free from aflatoxin contamination. The recourse to biotechnology to provide transgenic protection to groundnut against infection by aflatoxin-producing fungi may help in obtaining groundnuts free from aflatoxin.