

The bush has exhibited good initial growth and heavy fruiting pattern indicative of its suitability for semi arid regions and has been recommended for large-scale cultivation.

As evidenced the potential for greater utilization of exotic shrubs and trees is high. A multiple use management policy for desert rangelands should provide an incentive for including selected exotics in seeding mixtures for improvement of livestock forage, wildlife habitat, biomass, fuel wood, oil and reclamation of disturbed areas. The proportion and extent of use of exotics however needs to be ascertained before introductions to ensure economic and ecologic benefit to the existing system.

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Pests Intercepted in Imported Transgenic Planting Material during 2002-2004

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The National Bureau of Plant Genetic Resources (NBPGR) is the nodal agency to issue import permit and undertake quarantine for imported transgenic planting material meant for research purposes as per the Plant Quarantine (Regulation of Import into India) Order 2003. The import permit is issued only after the import clearance from Review Committee on Genetic Manipulation, Department of Biotechnology is obtained.

Plant quarantine ensures introduction of valuable germplasm meant for use in the crop improvement programmes in a pest-free state (Khetarpal *et al.*, 2001). A containment facility of the level-4 has been built at NBPGR to ensure that during quarantine processing of transgenics, no viable biological material/ pollen/ pathogen may enter or leave the facility keeping in view the biosafety requirements.

During 2002-2004, 6746 samples of transgenic crops comprising *Gossypium* spp. (11), *Nicotiana tabacum* (2), *Oryza sativa* (6721), *Triticum aestivum* (11) and *Zea mays* (1) imported from Belgium, Canada, China, Germany, Philippines, Singapore, South Africa, Vietnam and USA were processed from quarantine point of view. Most of the material was imported by private sector

viz., De Nocil Crop (3), Hybrid Rice International (75), Mahyco (38), Metahelix Life Sciences (6598), Monsanto (1), Nath Seeds (7), Syngenta (1), whereas 23 samples were meant for public sector i.e. Directorate of Rice Research and University of Hyderabad.

Quarantine processing involved detection of pests in imported material and salvaging of infested material by using suitable detection and disinfestation procedures/ techniques. All the samples were processed through visual and/ stereo-binocular microscopic examination to detect and remove abnormal/ infected/ infested seeds, dead insects/ stages thereof, fungal fructifications, nematode galls, plant debris, soil clods, weed seeds etc. These were then subjected to various techniques for detection of specific pests.

Seed samples of all the crops were subjected to incubation and/ or washing test for detection of fungi and bacteria. Seeds of *Gossypium* spp. were screened through X-rays generated at 22kV 3mA for 10 seconds at a distance of 30cm from the source to detect likely presence of hidden infestation caused by insects. Seeds of *O. sativa* were subjected to soaking, washing and staining test to detect seed-borne nematodes. The post-

entry quarantine inspection of *Gossypium* spp., *O. sativa*, *T. aestivum* and *Z. mays* grown in containment facility (greenhouse) by the indenter was undertaken and leaf samples suspected to be infected were tested in the laboratory.

Two thousand two hundred and fifty samples of various crops imported from different countries were found infected/ infested with pathogens and insect pests. The important pathogens/ pests intercepted in different crops are listed in Table 1.

Interception of large number of insects in 1548 samples of *O. sativa* imported from Singapore indicated the poor health status of the material. Among these, *Cryptolestes ferrugineus* is not known to occur in India (CAB International, 2003).

All the infected/infested samples were salvaged by using various suitable disinfection/disinfestation procedures/techniques and released to the indenters. *O. sativa* samples found infested with insects were salvaged by fumigation with ethylene dichloride-carbon tetrachloride mixture @ of 320 mg/l for 48 hrs at 30°C and normal atmospheric pressure while fumigating the entire consignment (6598 samples) as an additional safeguard. *O. sativa* and *N. tabacum* found infected with fungi were salvaged by giving hot water treatment at 52° C for 30 minutes. Apart from this all the *O. sativa* samples (123) were given mandatory prophylactic hot water treatment against seed-borne fungi, bacteria and the white tip nematode *Aphelenchoides besseyi* before releasing the material to the indenters. Several other pathogens including *Soybean mosaic virus* (SMV), the downy mildew fungus, *Peronospora manshurica* etc. have been intercepted in transgenic material earlier also. *P. manshurica* is of utmost quarantine importance to India as it is yet not known to occur in the country and there are reports of world wide distribution of several physiological races (Lim *et al.*, 1984; Marcinkowska 1991; Singh *et al.*, 2003) and also several

Table 1. Pests Intercepted in Imported Transgenic Planting Material during 2002-2004

Interceptions	Crop	Source of Import
Fungi		
<i>Alternaria longipes</i>	<i>Nicotiana tabacum</i>	Canada
<i>Drechslera oryzae</i>	<i>Oryza sativa</i>	Singapore, Vietnam
<i>Fusarium dimerum</i>	<i>O. sativa</i>	Philippines
<i>F. moniliforme</i>	<i>O. sativa</i>	Singapore
	<i>Zea mays</i>	South Africa
<i>Phoma glumarum</i>	<i>O. sativa</i>	Singapore
<i>Tricochonis padwicii</i>	<i>O. sativa</i>	Phillippines
Insects		
<i>Cryptolestes ferrugineus</i> ,	<i>O. sativa</i>	Singapore
<i>C. pusillus</i> , <i>Rhizopertha dominica</i> , <i>Sitophilus oryzae</i> , <i>Sitotroga cerealella</i> , <i>Tribolium castaneum</i> , Psocids		

strains of SMV are known world wide (CAB International, 2003).

The interception of insect pests/pathogens, thus highlights the importance of plant quarantine in minimizing/eliminating the risk of introducing destructive exotic pests and their strains, along with germplasm of transgenic planting material.

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