

## Wild species for crop improvement

The peanut crop has a very narrow genetic basis, and a limited number of alleles for crop improvement. The wild species of peanut are genetically diverse, and have been selected under diverse evolutionary pressures for millions of years. Accessions of all the 80 described *Arachis* species are available at the Brazilian Peanut Germplasm Collection, maintained at Embrapa Genetic Resources and Biotechnology – CENARGEN (Brasília-DF, Brazil). We have studied wild species with two questions in mind: which species can effectively donate genes to cultivated peanut, and what useful characteristics can the wild species donate?

Wild diploid species have diverse physiological responses to drought stress that may be useful if introduced to the peanut crop. However, we have also shown that the genetics of these physiological responses is complex: the wild species' drought physiology can fundamentally change when they are incorporated into a tetraploid form.

Microscopic characterization of the resistance response of wild peanut species has shown that some species block attack by nematodes, late leaf spot and rust before penetration. These responses can be classified as immunity, and would be highly valuable if introduced to peanut varieties.

Whilst wild species are a source of useful traits for the peanut crop, they are diploid and produce sterile hybrids with cultivated peanut. Furthermore, they are not suitable for agriculture. We have worked to overcome infertility barriers, by the incorporation of wild diploid genomes into a tetraploid form that can be crossed with peanut, and producing cultivated peanut lines with small introgressed fragments of the wild genomes. This is being done using molecular breeding, where crosses and line selections are carried out using information from molecular markers in combination with phenotypic selection. So far, lines which are agronomically adapted and have improved disease resistance against foliar diseases, the most important yield constraints in Brazil have been produced.

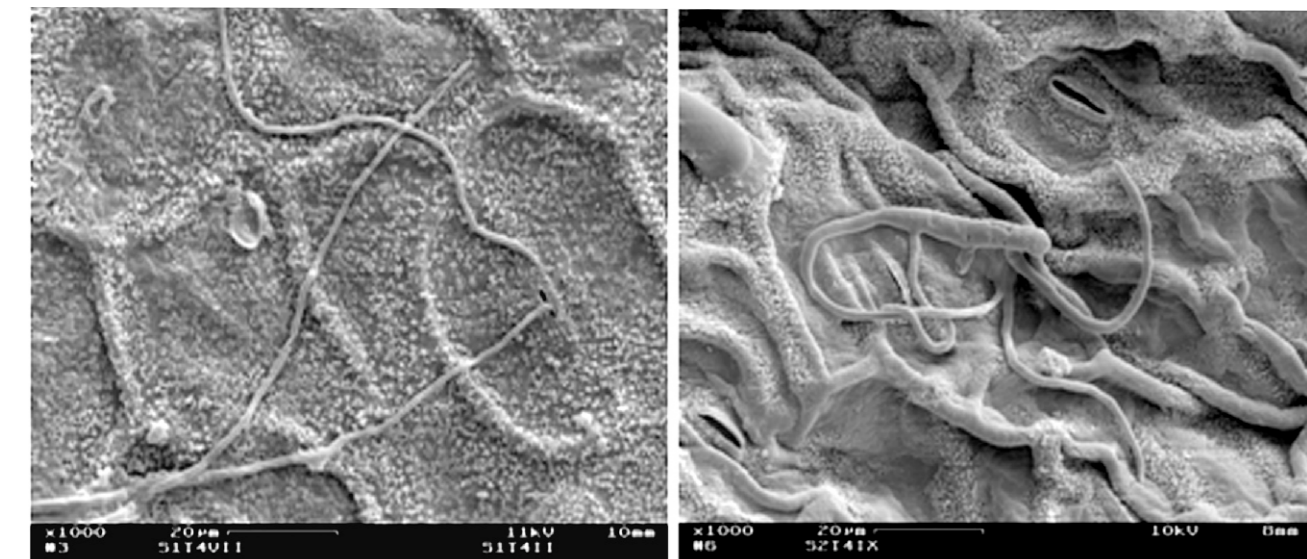


Fig. 4: *Cercosporidium personatum* hyphal penetration into stomatal openings 72 hours after inoculation observed only in *A. hypogaea* cv. IAC-Tatu (left) but not in *A. stenosperma* "V10309" (right).



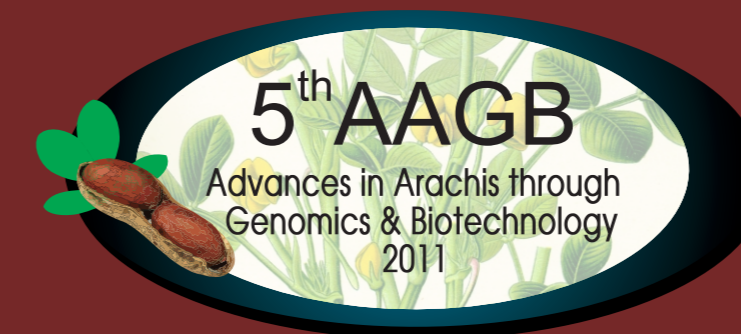
Fig. 5: Wild genes confer improved disease resistance to cultivated peanut. **Top left:** an elite variety at end of season under heavy disease pressure. **Bottom left:** a sample of seeds from the same elite variety. **Top right:** a breeding line with wild genes introgressed derived from the same elite variety at end of season. Much improved disease resistance. **Bottom right:** a sample of seeds from the same line. The quantity of pods are approximately proportional to average yields in 2010/2011 trials, a season with heavy disease pressure.

## 5th International Conference of the Peanut Research Community

After visiting all other continents, the 5th International Conference of the Peanut Research Community is being held in South America, the origin of cultivated peanut. The aim of this AAGB meeting is to bring together scientists involved in all aspects of peanut research and technology, both pure and applied. Whilst maintaining a broad focus, the meeting has a special emphasis on promoting exchange of ideas within, and at the interfaces of, modern genetics, genomics and biotechnology.

<http://www.cenargen.embrapa.br/aagb2011>

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