

25. Somatic hybridization in potato breeding

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Somatic hybridization is an alternative method for creating new breeding materials. In our work, this method was applied in two directions, for both intraspecific and interspecific hybridization. To combine the ability of a good yield and capability for industrial processing, dihaploids of *Solanum tuberosum* were used. To enrich *Solanum tuberosum* by resistance genes, *Solanum pinnatisectum* and *S. bulbocastanum* were employed. Both wild species are tuber-bearing diploids with high level of resistance to *Phytophthora infestans*. Progeny was obtained from each combination. While the somatic hybrids of *S. pinnatisectum* + *S. tuberosum* and somatic hybrids of dihaploids *S. tuberosum* flowered sufficiently and their sexual offspring was obtained, the somatic hybrids of *S. bulbocastanum* + *S. tuberosum* bloomed rarely and sexual progeny has not been gained yet. Somatic hybrids *S. pinnatisectum* + *S. tuberosum* and some individuals of their progeny displayed moderate or high level of resistance to *P. infestans* in laboratory tests and also in the field experiment. This work demonstrated the possibility of somatic hybrids to be sexually crossed with *S. tuberosum* cultivars, and also proved the opportunity to pass resistance to *P. infestans* from wild species to somatic hybrids and also to cross generation.

26. Population structure of potato breeding germplasm from Embrapa-Brazil assessed with single nucleotide polymorphism (SNP) markers

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Embrapa, the Brazilian Agricultural Research Corporation, coordinates a national potato breeding program. Aiming to reveal the genetic structure intrinsic to the germplasm used by the Brazilian breeding program, a diversity panel, composed of 155 accessions, was genotyped with 8303 single nucleotide polymorphism (SNP) markers (Infinium 8303 Potato Array). The allelic dosage of each SNP for each genotype was estimated using the fitTetra package. Of the 8303 SNPs, 6086 (73%) presented good quality and were used to examine the population structure within the diversity panel. The population structure showed the division of the germplasm among three populations: I) diploid genotypes, from Phureja group; II) germplasm from Atlantic introduction within the chip processing market class; III) germplasm introduction from Europe, and the cultivars and advanced breeding clones from potato breeding program of Embrapa, including genotypes for fresh market class and French fry processing. Considering an adhesion coefficient $\geq 50\%$, of the 155 genotypes evaluated,