INTROGRESSION BREEDING IN EGGPLANT (*Solanum melongena* L.) BY COMBINING BIOTECHNOLOGICAL AND CONVENTIONAL APPROACHES


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Breeding programs, aimed at the introgression of innovative traits into the eggplant (*Solanum melongena* L.) gene pool through both sexual and somatic hybridization, have been set up in the middle of 1990’s in the frame of international (EC) and national (MiPAAF) research projects. A sexual interspecific hybrid was obtained with the wild species *S. sodomaeum* (syn. *S. linneanum*) carrying tolerance to verticillium wilt, drought and salt. Tetraploid somatic hybrids were obtained by electrofusion of eggplant and *S. aethiopicum* gr gilo or *S. integrifolium* protoplasts, both allied species being a source of resistance to wilts caused by *Fusarium oxysporum* and *Ralstonia solanacearum*, and dihaploids were obtained through anther culture. Molecular, biochemical and phenotypic analyses demonstrated that partial genetic recombination occurred between the genome of eggplant and those of the allied species. Advanced introgression lines, phenotypically indistinguishable from the recurrent genotypes were obtained through 6-8 backcross cycles and selection, followed by selfing and/or anther culture to obtain pure lines. Some seed companies joined the last steps of the breeding program in view to exploit these genetic materials to release commercial F1 hybrids suited for both open field or greenhouse cultivations. Crosses among introgression lines from different allied species have been carried out to cumulate useful traits such as *Fusarium* resistance and *Verticillium* tolerance, and molecular analyses confirmed that COS and SSR of allied species were still present in the advanced introgression lines. The introgressed *Fusarium* resistance trait is controlled by the dominant resistance *Rfo-sa1*, of which alleles are present in *S. aethiopicum* and *S. integrifolium*. BSA analysis enabled to develop codominant CAPS markers tightly linked to the *Rfo-sa1*. Our best selected lines, phenotypically similar to the most common Italian typologies, are resistant to *Fusarium*, highly tolerant to *Verticillium*, fertile and productive, the fruits display good colorations of skin and flesh, and firmness. Biochemical analyses revealed high differences between eggplant and its allied species in chlorogenic acid, total polyphenol, glycoalkaloids, anthocyanins and lipid fatty acids contents as well as PPO activity and antioxidant potential. Total amount of glycoalkaloids in allied species is close to or exceeds the recommended safety value in plant, however we recovered introgressed lines with glycoalkaloid content analogous to that of the recurrent eggplant genotypes.

Functional studies enabled to identify a number of genes putatively involved in the resistance to the wilting fungi. The development of a dense genetic map, based on SSR, AFLP, COS and SNPs is in progress to fine mapping the *Rfo-sa1* locus and to find markers associated with agronomically important traits.