Host Durable Resistance to Late Blight: Some Experiences under Long Days in Argentina

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Durable host resistance has been a concern for the Argentine potato-breeding program since 1985, and a strategy for achieving a sustainable level of resistance is applied. As a temperate country, many of the sources of resistance developed under short days have limited adaptation for direct use and, on the other hand, resistant varieties developed in the Northern Hemisphere do not have the required commercial attributes for the Argentine market. Therefore, if some success is to be expected from breeding commercial varieties, a good deal of effort has to be exerted on selecting adequate parental lines

Bearing in mind the complexities of tetrasomic inheritance, the polygenic nature of late blight resistance and the strong environmental effects on the disease expression, the first requirement for a successful breeding program is to work with no less than 20,000 seedlings per year produced from no less than 200 combinations of well known progenitors. These progenitors will necessarily possess a high combining ability for late blight resistance, bear no R genes, and have additional quality and resistance attributes.

Testing the populations in the laboratory, the greenhouse and the field with artificial inoculation, using both a race 0 and the most complex race available, is also a must. Use of complementary strategies such as chromosome manipulation and introgression of resistant genes from wild species natural to the country is also practiced. The Argentine progenitors used (such as Pampeana INTA and some advanced clones) have shown a good degree of durable resistance. Other varieties such as Serrana INTA, which bears no R genes, are also good contributors for virus resistance and adaptation. A major hurdle is the lack of correlation between years of evaluation and regions. Multilocation testing on a long-term basis is needed to overcome this problem. Argentine sites showed little correlation with sites in Colombia and Mexico when 12 segregating families from Population B were tested in those three places. Also, no correlation between rate of infection in the tubers and AUDPC was found in 43 clones from Population A.

An important effort in the evaluation of Argentine wild species has been made. The presence of incompatible reactions in three species, e.g. *Solanum commersonii* (cmm), *S. microdontum* (mcd) and *S. chacoense* (chc), has demonstrated the existence of R genes in species that have not evolved in a region of wide fungus variability such as the Toluca Valley. The use of these species for molecular marker development has been discussed, as RAPD's polymorhic bands were found. Field, greenhouse and laboratory evaluations of these species showed that chc and mcd have good potential for selecting resistant R gene free material.

Collaborative research between breeders, phytopathologists and biochemists has shed some light on the plant-fungus interaction. Quantitative resistance is expressed with the increase of phytoalexins compared to genotypes that bear no resistance of this type. The need for concerted and complementary action for multilocation testing, exchange of material and marker development is stressed. All efforts should be confluent towards the attainment of attractive, high-yielding and good-cooking varieties. Breakdown of the linkage between lateness and resistance is a requisite for selecting varieties of that type.

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