

Broad spectrum late blight resistance in potato differential set plants MaR8 and MaR9 is conferred by multiple stacked R genes

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SUMMARY

Phytophthora infestans (Pi) is the causal agent of late blight in potato. The Mexican species *Solanum demissum* is well known as a good resistance source. Among the 11 R gene differentials, which were introgressed from *S. demissum*, especially R8 and R9 differentials showed broad spectrum resistance both under laboratory and under field conditions. In order to gather more information about the resistance of the R8 and R9 differentials, F1 and BC1 populations were made by crossing Mastenbroek (Ma) R8 and R9 clones to susceptible plants. Parents and offspring plants were examined for their pathogen recognition specificities using agroinfiltration with known Avr genes, detached leaf assays (DLA) with selected isolates, and gene-specific markers. An important observation was the discrepancy between DLA and field trial results for Pi isolate IPO-C in all F1 and BC1 populations, so therefore also field trial results were included in our characterization. It was shown that in MaR8 and MaR9, respectively, at least four (R3a, R3b, R4, and R8) and seven (R1, Rpi-abpt1, R3a, R3b, R4, R8, R9) R genes were present. Analysis of MaR8 and MaR9 offspring plants, that contained different combinations of multiple resistance genes, showed that R gene stacking contributed to the Pi recognition spectrum. Also, using a Pi virulence monitoring system in the field, it was shown that stacking of multiple R genes strongly delayed the onset of late blight symptoms. The contribution of R8 to this delay was remarkable since a plant that contained only the R8 resistance gene still conferred a delay similar to plants with multiple resistance genes, like, e.g., cv Sarpo Mira. Using this “de-stacking” approach, many R gene combinations can be made and tested in order to select broad spectrum R gene stacks that potentially provide enhanced durability for future application in new late blight resistant varieties.

Part of this work was presented in the Euroblight workshop under the title “Durability of resistance to late blight associated with stacking of R-genes” by Evenhuis, *et al.*. A full version of the manuscript can be viewed on www.springerlink.com/content/52x881847733m058/