APPLICATION OF MOLECULAR MARKERS IN THE HUNGARIAN CONVENTIONAL POTATO BREEDING PROGRAM

István Cernák[1], Zsolt Vaszily[1], István Wolf[1], János Taller[2], Edit Korom[3], Zsófai Bánfalvi[3], Zsolt Polgár[1]

[1] University of Pannonia, Centre of Agricultural Science, Potato Research Centre, Deák F. u. 16. H-8360, Keszthely
[2] University of Pannonia, Georgikon Faculty, Department of Plant Sciences and Biotechnology, Deák F. u. 16. H-8360, Keszthely,
[3] Agricultural Biotechnology Center, Szent-Györgyi Albert u. 4. H-2100, Gödöllő

In potato production significant loss is caused by the potato virus Y (PVY) and nematodes (*Globodera rostochiensis*).
Modern environmental friendly plant protection is undoubtedly based on resistance breeding. However, the production of multi-resistant new potato varieties is a complex and time-consuming process. Traditional breeding methods must be combined with modern molecular methods to succeed.
The resistance breeding program operated by Potato Research Centre, has resulted cultivars having extreme resistance against PVY and resistance to nematode *G. rostochiensis* 1-4 races. The PVY extreme resistance gene (Ry_{sto}) originates from wild potato species *Solanum stoloniferum*, while the source of *H1* nematode resistance gene is *S. tuberosum* ssp. *andigena*.
Currently our Institute successfully applies the results of molecular genetic studies during the practical resistance breeding process.
In the case of Ry_{sto} gene a tightly linked marker was developed in co-operation with the Biotechnology Research Center, Gödöllő. A rapid procedure was developed using direct-PCR assay for mass selection during seedling stage of crossing families. Although the marker is closely linked to the gene due to recombination events misgenotyping may occur in low frequencies. However in later steps genotypes are tested under natural virus infection pressure too.
To select the H1 gene, a known gene specific marker (TG689) was applied. Since the marker is part of the H1 gene, recombination events cannot take place, the reliability of selection is 100%, and further traditional resistance test is not required.
In later steps multiplex PCR assay was developed for simultaneous selection of the two resistance gene. Applying this method the efficiency of potato breeding process can be further increased.

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