

The Bioimpuls organic potato breeding program and the role of molecular markers

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Priority traits for organic potato varieties

The organic potato sector urgently needs better adapted, non GMO varieties to deal with the constraints of the low-input, organic farming system. Besides late blight resistance the program focuses on resistance against rhizoctonia, scab, alternaria and PVY. Special attention is also paid to early tuber bulking, long dormancy and high nutrient-efficiency. A joint breeding program "Bioimpuls" has been initiated comprising Louis Bolk Institute, Wageningen University, six breeding companies, and several farmer breeders.

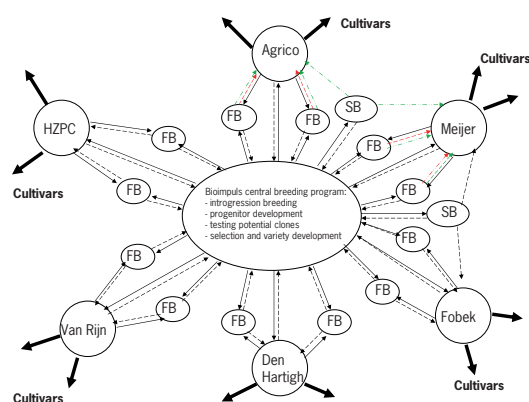


Figure 1. The organization structure of Bioimpuls. FB=farmer breeder, SB=small breeder

The approach is based on three parallel goals:

- to develop new progenitors through classical introgression breeding with new combined late blight resistance genes;
- to provide the breeding sector with plant material from crossings with new late blight resistances for selection;
- to stimulate farmer breeder participation in the selection process, by giving training courses on potato breeding and technical support.



Picture 1. Farmers are involved in Bioimpuls selection process.

Combining resistance genes

The breeding program aims at approximately 35.000 seedlings per year, including the whole range from wild species hybrid to commercial crosses. To manage new late blight resistance genes in a sustainable way one of the strategies will be to combine two to three resistance genes from different genetic sources in each variety and to develop a disease resistance management strategy in cooperation with other experts.



Picture 2. More than 300 different cross combinations made per year.

Molecular markers in organic breeding programs?

In 2009 the role of molecular markers (MAS) in organic breeding programs was evaluated by applying a 'SWOT' analysis [1]. One of the conclusions was that more interaction between the conventional and organic research communities would be fruitful and examples of good practices with respect to MAS in organic plant breeding would improve the better understanding of the potential contribution of MAS in organic breeding programs. Also 'cleaner' protocols e.g. by replacing harmful chemicals would contribute to better acceptance of MAS in the organic sector.

Molecular markers to support selection of genotypes with stacked late blight resistance genes was considered as an example of a useful application for organic breeding.

Reference

Lammerts van Bueren et al., 2010. Euphytica DOI 10.1007/s10681-010-0169-0

Table 1. Bioimpuls state of the art of late blight resistance introgression breeding, 2010.

[illegible]