

The Dutch organic and participatory potato breeding program Bio-impuls

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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 'Bio-impuls' has been initiated comprising Louis Bolk Institute, Wageningen University, six breeding companies, and now 10 organic farmer breeders.

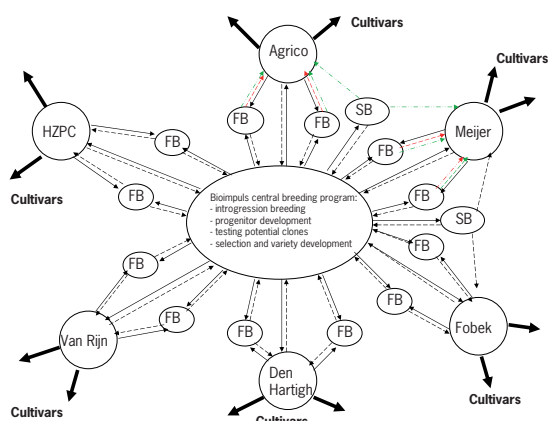


Figure 1. The organization structure of Bioimpuls. FB=farmer breeder, SB=small breeder

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 2. More than 300 different cross combinations made per year

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.

Year	Activity	Company breeder	Farmer breeder
0	Choice of parents	x	x
0	Crossing and harvesting seeds	x	
1	Delivery of seedlings	x	
1-3	Visual selection in the clones for basic agronomic characteristics		x
4 - 7	Trials for production, resistances, quality and adaptation	x	
8 - 12	Research for potential market, registration on national variety list, obtaining plant breeder's rights including the name of the farmer breeder	x	
13 - 15	Market introduction, maintenance	x	

Table 1. Sharing of activities in a collaborative model of potato breeding

The role of the farmer breeder

In the Dutch potato breeding sector we have a long tradition of a unique farmer breeder system in collaboration with the commercial breeders. Yearly farmer breeders receive a number of seedlings (300- or more) from preferred crossings from the Bio-impuls program. They evaluate and select the best ones during three seasons based on basic criteria: resistance, tuber size distribution, skin quality, not too long stolons etc. The best selections are handed over to a partner company for further testing and selection. If a variety enters the market the royalties are shared between Bio-impuls, company and farmer-breeder.

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