



Opening Plenary 1

A systems approach to improve potato varieties for organic farming systems

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Potato late blight (*Phytophthora infestans*) is one of the largest problems in organic potato production due to a lack of late blight resistant varieties and of appropriate fungicides. As breeding varieties for the relatively small organic sector is economically a challenge for commercial breeding companies, a special (classical) breeding program ('Bioimpuls') was designed in a participatory manner according to the traditional way of potato breeding in the Netherlands (Almekinders et al., 2014). The team consists of breeding researchers from Wageningen University and Louis Bolk Institute, and six commercial breeding companies. By setting up yearly breeding courses over 10 farmer breeders are now linked to this programme and are actively involved in the yearly selection. To allow the new varieties to be adapted to organic farming systems, several variety characteristics need to be improved. These include, in addition to late blight resistance also resistance to other diseases such as Rhizoctonia, Alternaria, viruses and scab, as well as nitrogen use efficiency, good storability without chemical sprouting inhibitors, good flavour, and last but not least: good market performance, e.g. appropriate flesh colour and a smooth skin. The focus is not merely on varieties that are adapted to low-input and organic growing conditions, but also on variety characteristics that allow an resilient farming system to function as a whole. This includes long term durability of resistance and measures to avoid breakdown of the new resistances by combining genes from different wild potato relatives and by selecting for clones that are not too late maturing to reduce the time of exposure to late blight infestation. The results will lead to a diversity of varieties as not only the general requirements are taken into account but also the individual selection criteria of each participating farmer due to differences in soil type, rotation, specific disease pressure, nutrient requirements, etc. Active commitment of other chain actors such as wholesalers and retailers is essential which was developed during an additional EU project COFREE enhancing market acceptance of the current eight late blight resistant varieties. By embedding this breeding programme within the conventional breeding sector with commitment of the organic farmers and other chain actors, this systems approach does not only aim at ecological sustainability based on the values of organic agriculture but also on socio-economic continuity after the project ends.

Reference

Almekinders, C.J.M., L. Mertens, J.P. van Loon, E.T. Lammerts van Bueren, 2014. Potato breeding in the Netherlands: a successful participatory model with collaboration between farmers and commercial breeders. *Food Security* 6: 515-524.

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