WAGENINGEN UR
For quality of life

# DuRPh: Sustainable Resistance against *Phytopthora* in potato through cisgenic marker-free modification

Haverkort A.J., Jacobsen E., Visser R.G.F., Boonekamp P.M., Vossen J.H., Kessel G.J.T., Hutten R.C.B., Franke A.C. & Lotz L.A.P.

## Project background

The DuRPh project aims to develop potato varieties with a sustainable resistance against late blight caused by *Phytopthora infestans*. For this challenge, Wageningen UR researchers jointly work on five themes in a 10 year project ending in 2016.

Farmers in the Netherlands generally need to spray their fields 10 to 16 times against late blight. A resistant potato will have great advantages:

- Reduced use of fungicides and less contamination of the environment.
- Lower production costs and a better competitive edge for the seed industry.
- Enhanced food security in resource poor countries where potato is a staple food.

## Cisgenic genetic modification

In DuRPh, well established cultivars are relatively quickly provided with several additional resistance genes (gene stacking) originating from wild relatives. In principle, these genes could be inserted into potato cultivars via crossing. However, during crossing many unwanted 'wild' properties come along with the desired property, such as small, malformed tubers, or a bitter flavour. As a result, it takes breeders decades of backcrossing with the cultivated potato to obtain a new cultivar suitable for commercial use. With genetic modification this problem does not occur. The incorporation of genes from related, crossable species is called *cisgenic* modification or *cisgenesis*. This is different from *transgenic* modification where the plant receives exogenous genes, e.g. from bacteria.

## Project overview

DuRPh consists of five themes:

1. Detection and cloning of natural R-genes.
2. Transforming cassettes of single or multiple R-genes into varieties.
3. Selection of resistant plants with exact appearance and quality as the original variety.
4. Spatial and temporal resistance management deploying different cassettes of R-genes to minimise the risk of *Phytophthora infestans* breaking the resistance and to reduce the build-up of epidemics.
5. Communicating en interacting transparently with relevant stakeholders in society.

*Seedlings from new crosses.*

*Flowering potato plants.*

*Field trials with genetically modified potato plants.*

*Wild relative with late blight resistance.*

**Plant Research International, B.V.**
P.O. Box 16, 6700 AA Wageningen, The Netherlands
Tel.: +31 317 48 09 06 - Fax: +31 317 42 31 10
E-mail: anton.haverkort@wur.nl
Internet: www.durph.nl