InnoPlant, a combined research program between Inra and French seed potato industry: promoting potato breeding for sustainable resistance to pathogens

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InnoPlant

http://www.umt-innoplant.fr

InnoPlant Joint Technological Unit was established in 2012 by the FN3PT / RD3PT (French Federation of seed potato growers) and INRA (French National Institute for Agricultural Research) as a tool to promote innovation and to increase the competitiveness of the French seed potato industry. GNIS (French Interprofessional body for seeds) and ACVNPT (French Association of potato breeders) are associated partners for some activities.

InnoPlant has a scientific program that combines research, development, dissemination and transfer on four major themes:

➢ Health of seed potatoes
➢ Integrated pathogens management
➢ Breeding for sustainable genetic resistance to different pathogens
➢ Innovative strategies to increase the competitiveness of the sector.
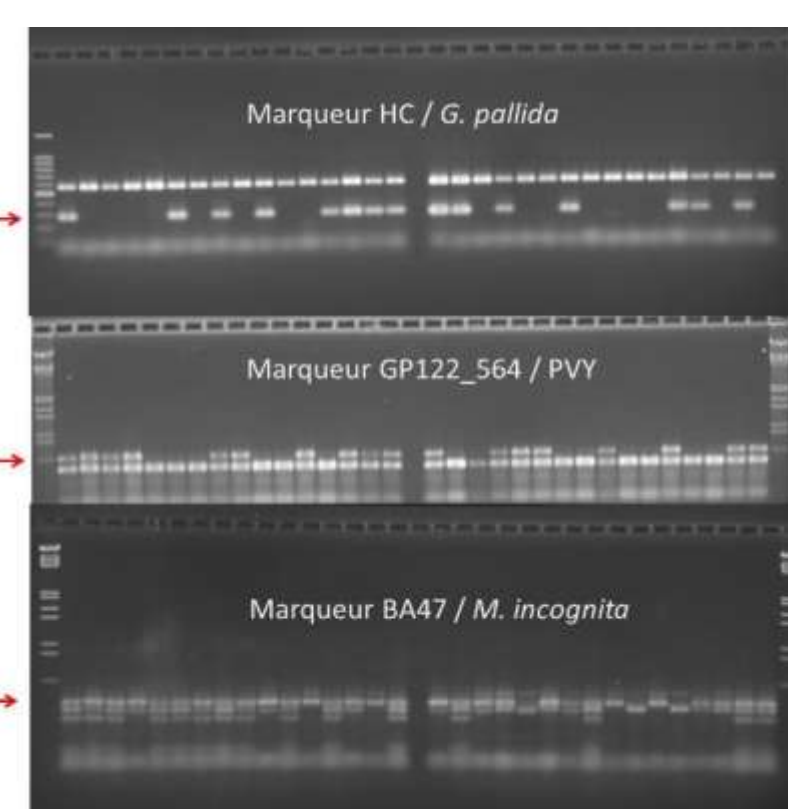
This poster focuses on the breeding component of the program.

Characterization of multi-resistant breeding lines

that combine resistance to different pathogens including PVY virus, foliage late blight, *Globodera pallida* and *Meloidogyne incognita.*
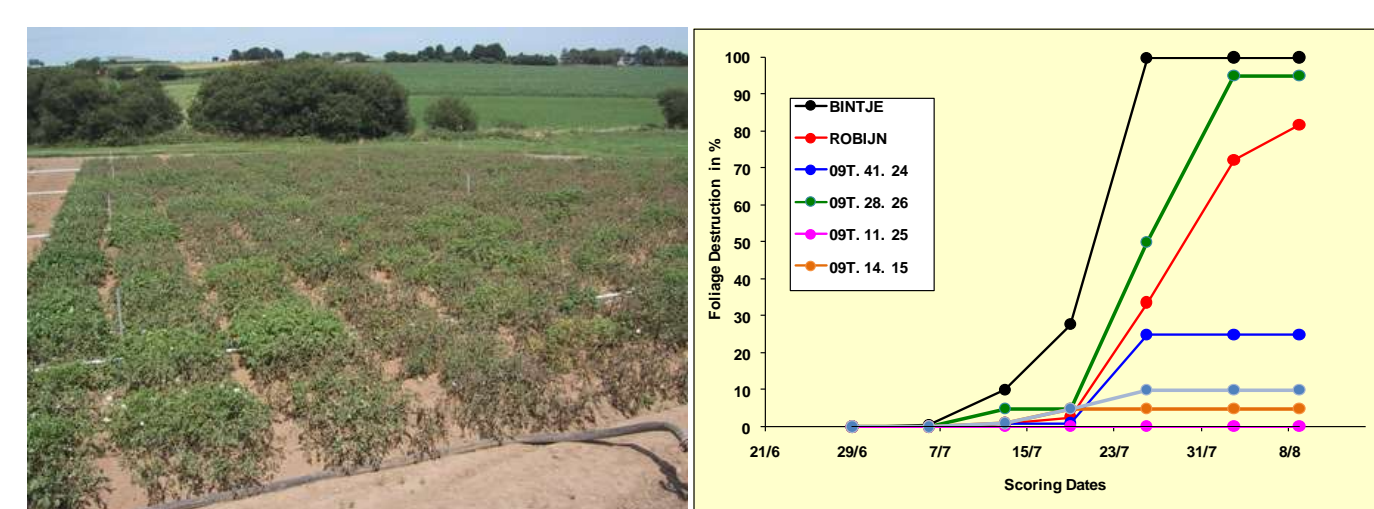
➢ Screening resistant materials using molecular markers or phenotypic data.

Diagnostic PCR markers (Kerlan M.C.)

Marqueur HC / *G. pallida*

Marqueur GP122_564 / PVY

Marqueur BA47 / *M. incognita*

Evaluation of resistance to late blight in natural field conditions (Pellé R.)

Perspectives : To continue with the characterization of clones combining different biotic stresses

Using protocols developed by Sattarzadeh *et al* (2006) Mol Breeding 18: 3. Viteck *et al* (2006) Mol. Breeding 18:273.

Development of knowledge on the genetic structure and the phenotypic value of genetic resources

that are maintained in the INRA BrACySol Biological Resource Center (BRC) or by French breeding companies.

Improved breeding lines originating from different INRA research programs (Esnault F.)

Improved material from French breeding companies (Marhadour S.)
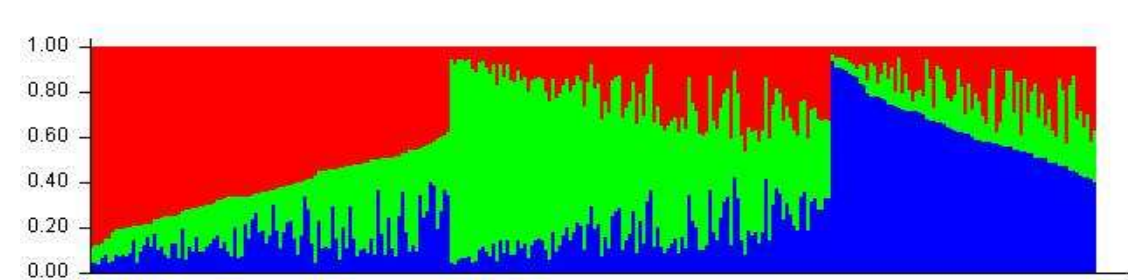
Population structure analysis using the Bayesian model-based clustering method of Pritchard *et al* (*Genetics* 2000. 155: 945-9) implemented in STRUCTURE software and a set of 120 SNP selected from the SolCAP 8303 SNP Potato Array (Felcher *et al*, 2012 *Plos One* 7). Bar plot of individual genotypes with **3 subpopulations**.
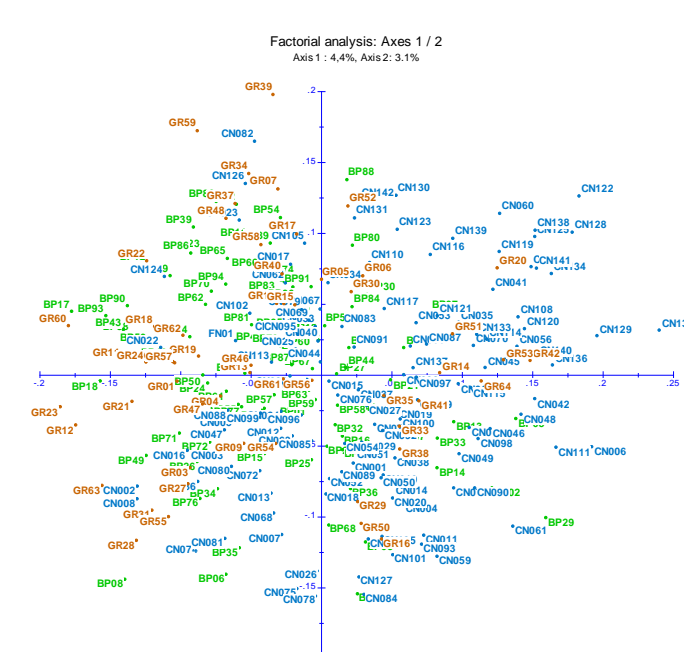
Molecular diversity showed no evident structuration Results from factorial analysis on dissimilarity matrix (231 alleles from 32 SSR markers) showed no evident groups into the collection. Axis 1 explained 4.4% and Axis 2 3.1% of the total inertia.

Perspectives : To compare the diversity between the different collections, to evaluate their late blight resistance level

Assessment of resistance to emerging or newly identified pathogens

like to pectinolytic species belonging to *Pectobacterium wasabiae* and *Dickeya solani* associated to potato blackleg and soft rot.

➢ *Pectobacterium atrosepticum* resistant clones (Pasco *et al* 2006 Potato Res 49 : 91), originating from *S. andigena*, *S. etuberosum* or *S. brevidens*, show very low soft rot severity to two or three bacteria species.

Evaluation of *P. atrosepticum* resistant clones against *Dickeya solani* (Hélias V., Quêtu-Laurent A.)

Impact on tuber
Index of susceptibility

Controls   *S. andigena*   *S. brevidens*   *S. etuberosum*

Perspectives : To evaluate the resistance to blackleg, and to other species /subspecies (*D. dianthicola*, *P.c. brasiliense*)

Implementation of a long term cryopreservation method

➢ Development of a routine cryopreservation technique by using a droplet vitrification method.
➢ Cryopreservation of 5500 meristems from tetraploid potato and wild species maintained at the INRA BrACySol Biological Resource Center.

(Souchet C.)

Perspectives : To continue cryopreservation of different accessions from the INRA collections, and to go on the assays to ensure the conformity of this material.

REFERENCES
Esnault *et al* 2015. 12th Solanaceae conference, Bordeaux.
Kerlan et al 2013. Innovations agronomiques, 27, 111-122.
Marhadour *et al* 2015. 19th triennial conference, EAPR 2014, Brussels.
Hélias et al 2014. 19th triennial conference, EAPR 2014, Brussels.

INRA SCIENCE & IMPACT

FN3PT FÉDÉRATION NATIONALE DES PRODUCTEURS DE PLANTS DE POMME DE TERRE

EAPR Plant Breeding Section
November 15 – 18, 2015, Sorrento (Italy)

RD3PT RECHERCHE, DEVELOPPEMENT, PROMOTION DU PLANT DE POMME DE TERRE

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