

HIP WP3.1: Resistance to microbes and viruses, report 2020

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Potato production in the Netherlands, like in the rest of the world is continuously threatened a large number of pests and diseases. Without crop protection programs potato production at the current scale would not be possible. In the past, the Ministry of Agriculture from the Netherlands has invested in research programs to understand and provide solution for potato late blight. Other disease, that produce similar environmental pressure, have so far been underexposed but deserve similar research efforts. In buildingblock 3, three workpackages have been defined. In WP3.1 we produce high throughput assays and perform screenings of the Solanum germplasm to identify novel sources of resistance against microbial pathogens and viruses.

Highlights: The work is divided in different modules. In 2020 the screenings for modules soft rot and dry rot were finished.

- **Module soft rot:** In 2019 we screened >300 genotypes from the PBR Solanum collection for foliar resistance to *Pectobacterium brasiliensis* and *Dickeya solani*. Around 100 genotypes for each bacterial species were found that responded differently than susceptible potato varieties. In 2020 the genotypes that responded differently to bacterial inoculation were tested for bacterial accumulation using Q-PCR. 18 genotypes were left that did not allow amplification of both *P. brasiliensis* and *D. solani*.
- **Module dry rot:** In 2019 we designed a stem inoculation method for *Fusarium solani* and *Fusarium sambucinum* (Figure 1). For the detection and quantification of both species in plant tissue we set up a Q-PCR assay. In 2020 we screened >300 accessions for reduced symptoms and reduced fungal accumulation and spread. More than 10 accessions showed strong resistance to both *Fusarium* isolates.



Figure 1. Phenotypes obtained in the *Fusarium* stem inoculation assays. Longitudinal stem sections are shown of a susceptible genotype where the central part of the stem has rotten (left panel), and from a resistant genotype that contained the *Fusarium* infection (right panel).

Knelpunten: No bottlenecks were encountered

Planning: In 2021 we will proceed according to the multiyear project description.

- **Modules soft rot and dry rot:** We will proceed with inventory research of the positive accessions. Crosses will be made between genotypes with contrasting phenotypes.
- **Module agroinfiltration:** Germplasm screens will be performed in which effectors from fungal bacterial and a virus are expressed in the leaves. Visual symptoms will be recorded.

Products:

- Solanum plants have been identified that resistant to diverse isolates of *Fusarium* and *Erwinia* species. It remains to be proven how the resistance in these assays correlates with behaviour in a more practical setting

- As a public outreach movie clips were made about this project. A Dutch version was presented at the online "aardappeldemodag". Also an English version has been made which will be available through the HIP website.