

HIP WP3.2: Screening wild potato accessions to nematodes

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Potato production in the Netherlands, like in the rest of the world is continuously threatened by 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 WP3.2 we produce high throughput assays and perform screenings of the *Solanum* germplasm to identify novel sources of resistance against nematodes.

Highlights: the in vitro bioassay for screening resistance to two quarantine plant parasitic-nematode species was started in February 2020. The starting material of wild potato accessions were obtained from in vitro collection of Plant breeding, WUR. In total around 250 accessions and a control cv. Desiree in 4-6 replications were screened for their resistance in 2020. A virulent potato cyst nematode (PCN), *Globodera pallida* (AMPOP) from Averis and a reference test population of the root-knot nematode (RKN), *Meloidogyne chitwoodi* (MC-31) from WUR were used in the screening. The in vitro-bioassay was carried out in a Petri dish using a B-5 media in temperature-controlled incubators. After 60 days the number of cysts developed in the wild accessions were counted and compared to that of the number of cysts developed in the cv. Desiree (Fig.1A). Similarly, for *M. chitwoodi* the number of egg masses and galls developed in the wild potato accessions were counted and compared to that of cv. Desiree (Fig1.B). Based on qualitative data a promising wild potato accessions with resistance to both nematode species were found. It should be noted that the estimated level of resistance based on qualitative data is so crude. The results need to be confirmed in a pot test were the actual numbers of final population densities (Pf) as number of eggs and juveniles counted per gram of soil and compared to that of control.



Figure.1. A. Cysts of *G. pallida* developed in the roots of wild potato accessions and counted for screening resistance.

Figure.1. B. egg masses of *M. chitwoodi* developed in the roots of wild potato accessions and counted for screening resistance.

Bottlenecks: Few accessions did not grow well and are removed from the experiments. These will be tested again with the remaining accession not tested in 2021. Fungal infection

is the main big problem in in vitro screening and was also a challenge though enough back-up were used.

Outcome: all planned activities for 2020 were accomplished.

Planning: The plan was to screen about 319 accessions in total, the remaining accessions will be tested in 2021. Besides, in 2021 a second confirmation experiment will be carried out in in vitro. Finally, the resistance confirmed in an in vitro bioassay need to be confirmed in a pot experiment (in vivo) in the greenhouse. A pilot is planned for 2021 and resistance will be estimated based on the actual number of nematodes multiplied.