

HIP WP3.2: Screening wild potato accessions to nematodes
Report 2021
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The HIP project was initiated in 2019 for re-enforcing a sustainable and comprehensive solutions to potato diseases by finding novel resistant genotypes from wild potato species in smart rotation. One of the work packages (**WP3.2**) is screening for novel additional resistance against two quarantine nematodes; the Dutch virulent potato cyst nematode, (*G. pallida*, AMPOP1) and a root-knot nematode *Meloidogyne chitwoodi* (MC-31). The overall objective of this work package was to enrich the current collection of sources of resistance to both plant-parasitic nematodes by providing, additional breeding materials to potato breeders. In this work package we have used a rapid invitro bioassays in petri-dishes to downscale the large number of accessions to be tested followed by pot validation bioassays in the glasshouse.

Highlights: In 2021 the following major activities were carried out:

1. Screening of the remaining (319) accessions in experiment 3 against both nematode species. Data analysis in progress: Preliminary qualitative data (egg mass + galls and cysts counted) so far shows additional resistance will be found see (Fig. 1) compared to the susceptible genotype in Fig. 2 as an example for *M. chitwoodi*.



Fig.1. partially resistant wild potato genotype with relatively few galls and egg masses of *M. chitwoodi*.



Fig.2. A susceptible genotype full of galls and egg masses of the root-knot nematode *M. chitwoodi*.

2. A second confirmation invitro bioassay of those resistant genotypes found in 2020 (exp1 and 2) and additional genotypes which were in quarantine was done. These were 80 genotypes for *G. pallida* and 84 genotypes for *M. chitwoodi* in total. In majority of these genotypes the resistance was confirmed for a second time with few exceptions which were considered as escapes.
3. A selection of 55 genotypes of those confirmed for their resistance to *G. pallida* for pot validation experiment was done. (The pot validation bioassay for *G. pallida* will be carried out majorly by a breeding company, Averis to also have hands on by

the breeders. Only 15-20 of those genotypes will be tested at WUR for a comparison).

4. A selection of 15-20 of those genotypes whose resistance were confirmed against *M. chitwoodi* for second time is in progress for pot validation experiment to be carried out at WUR.
5. A draft standard operating procedure (SOP) for the pot bioassay was provided by Averis and was amended with comments from WUR.
6. Work plan was drafted, discussed and approved by partners for 2022/2023.

Planning: The following activities were planned for 2022:

1. A second confirmation of invitro bioassay of 60-100 resistant genotypes obtained from experiment -3 against both nematode species will be carried out at WUR.
2. Pot validation experiment will be carried out at Averis for a total of 55 selected genotypes against *G. pallida*. For a comparison of methodologies 15-20 of the 55 genotypes will also be tested at WUR. Genotype Sereno as negative control and cv. Desiree and genotype Edn51-01 as positive control will be included in the pot bioassay of *G. pallida*.
3. Averis will also confirm the presence of resistance to *G. pallida* on those selected wild genotypes by using their molecular markers if possible.
4. Pot validation experiment will be carried out at WUR for a total of 15-20 genotypes against *M. chitwoodi*. Genotypes karna as negative control and cv. Desiree as positive control will be included in the pot validation experiment.
5. A broad-spectrum resistance check of 6-10 genotypes will be carried out against *G. rostochiensis* and *M. fallax* at WUR. These genotypes will be selected based on the findings of literature with an indication of resistance to both *G. pallida* and *G. rostochiensis*; *M. chitwoodi* and *M. fallax*.
6. Crossing will be started among 7 genotypes each (2 and 4 EBN) for both *G. pallida* and *M. chitwoodi*.

Products:

- Several wild potato genotypes with resistance to both quarantine nematodes are found based on an invitro bioassay and qualitative data. Now pot validation experiment which is closer to the natural environment by estimating resistance using quantitative data (by counting final number of nematodes) will follow. After preliminary crossing the breeding materials will be recommended for Dutch potato breeders.
- A comprehensive movie was already made available to the public in Dutch and was presented in the "aardappeldemodag" along with the other work packages. Recently an English version has been made which is available in the HIP website.
- If corona regulation allows an abstract as an oral presentation will be presented at international symposium on crop protection (iscp), Ghent University Belgium, in May 2022.