

Resistance and tolerance in different sugar beet genotypes against the beet cyst nematode *Heterodera schachtii*

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Integrated management of the beet cyst nematode *Heterodera schachtii* in sugar beet at the current state is mainly focusing on variety choice. Susceptible, resistant and tolerant (partial resistance) varieties are available to the farmers and used depending on the level of nematode infestation. Although increasingly cultivated, host-parasite interactions between *H. schachtii* and tolerant sugar beet genotypes have so far not been intensively investigated. Moreover the tolerance trait at the present stage is tested in field conditions but not in the greenhouse or in combination with a resistance test.

First part of the study focused to determine the penetration, development and reproduction of *H. schachtii* in a set of 12 sugar beet genotypes (4 susceptible, 3 resistant, 5 tolerant) and *Beta maritima* (*B. maritima* is the genetic source to partial resistance). Plants were cultivated in folded boxes in a climate chamber and harvested at 2, 5 and 7 weeks after inoculation with *H. schachtii* juveniles. Acid fuchsin staining followed by microscopic evaluation was used to determine the developmental stages of nematodes inside the roots. Results indicate that nematode penetration did only marginally differ between genotypes but female-male ratio was re-

duced in resistant and to lower extent in tolerant sugar beet genotypes and in *B. maritima*. Reproduction rate in tolerant genotypes and *B. maritima* was lower than in susceptible genotypes and almost zero in resistant genotypes.

Second part of the study was targeted to determine the degree of nematode resistance and tolerance at different inoculation levels under greenhouse conditions. Therefore, the same set of genotypes was cultivated in pots filled with 400 ml loess soil and exposed to five densities of nematode inoculum (0, 2,000, 8,000, 20,000, 35,000 juveniles/pot). Plant reaction to different inoculation levels was measured by repeated photographing of each plant followed by digital image analysis. Growth curves were derived on the basis of images taken at an interval of four days prior inoculation until the end of first nematode generation. Results indicate that plant growth was highly reduced in susceptible genotypes followed by tolerant and resistant with increased inoculum level. Plant growth in *B. maritima* was in between susceptible and tolerant genotypes. Shoot and root mass data support this observation. Reproduction rate was mainly determined by genotype but decreased with increasing inoculation level.