

Soil suppression against the cereal cyst nematode *Heterodera avenae*

Caroline Eberlein¹, Jan Moos², Hans Marten Paulsen² and Andreas Westphal¹

¹Julius Kühn-Institut, Institute for Plant Protection in Field Crops and Grassland, Braunschweig

²Thünen-Institute of Organic Farming, Westerau

Email of corresponding author: caroline.eberlein@jki.bund.de

Cereal cyst nematodes (CCN), especially *Heterodera avenae*, can constrain the yield of cereal crops, affecting important annual losses. In addition to rotation with non-host crops, management relies on the use of resistant cultivars. Their use can be jeopardized by the existence of different pathotypes of CCN. In the UK, examples of nematode suppressive soils have been reported where population densities of *H. avenae* declined under a cereal monoculture. Two endoparasitic fungi frequently infected females, and were primarily responsible for this nematode population density decline.

Objectives of this study were (a) to monitor the population dynamics of the CCN *H. avenae* or *H. filipjevi* under a cereal monoculture, and (b) to test how female populations of *H. avenae* develop in soil of different origin (location and crop history). Microplots infested with *H. avenae* and *H. filipjevi* were cropped to a cereal monoculture from 2009 to 2012. Yields and nematode population densities were determined at each planting and harvest. Cysts were extracted, the eggs counted and categorized into healthy and diseased. Population densities of the two nematodes tended to decline, while the proportion of diseased eggs increased throughout these years.

In winter 2012/13, soil samples originating from three cereal fields were placed in root boxes of 1-L capacity, with the respective transparent side

leaned in 45 degree downwards. Soil was either left untreated or heat-treated (134°C, 10 min) before placing in the boxes to test if biotic causes impacted the number of females. Root boxes with soil from a field with a history of limited cereal cropping served as control. Susceptible *Hordeum vulgare* 'Hanka' was planted to the boxes at 6 plants per box. Roots boxes were inoculated with 10,000 J2 of *H. avenae* per box. Beginning at first appearance, nematode females visible on the root surface were counted weekly. Maximal female numbers were observed at the second week of observation. Thereafter, the numbers remained on a similar level. At all monitoring times, the numbers of females in the untreated soil were less than those in heated soil. During the first two weeks of observation, female numbers in the three soils were significantly lower than the one control soil. In soil from a wheat field, female numbers remained about one third lower than those in the control during the entire monitoring period. The results of this study suggested that a biotic component negatively affected the development of *H. avenae* females on the roots of a susceptible cultivar. Further investigations will focus on what microbial agents may be involved in this suppressive effect. Such microorganisms could play a vital role in the life history of CCN, and may be helpful to mitigate infestations of this nematode pest.