

# The effect of crop rotation on infestation levels of *Heterodera schachtii* and the advice to use partially resistant sugar beet varieties in the Netherlands

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## Introduction

Beet cyst nematodes (BCN) *Heterodera schachtii* are known to decrease sugar beet yield (Fig. 1). To prevent yield loss due to BCN, farmers can grow a partially resistant variety (BCN-variety). Until 2021, Dutch farmers were advised to grow a BCN-variety when a host plant rotation frequency of up to 1:7 was used, based on previous monitoring studies. To further optimize variety choice, current *Heterodera schachtii* infestation levels of arable fields were studied.

## Results & discussion

In more than 89% of the fields BCN cysts were found, however, not all containing eggs and larvae (Tab. 1; Fig. 2). On arable fields with a narrow host plant rotation (1:5 and 1:4) infestation levels varied from none to moderate.

A wider host plant rotation (1:7 and 1:6) showed a reduction of BCN, thereby resulting in infestation levels from none to very low.

Nowadays, BCN-varieties have a high yield potential, even under non-infested conditions and can be cultivated as an insurance when the infestation levels of an arable field are unknown. Based on this study, it is not considered strictly necessary to grow these varieties at wider crop rotations.



Fig. 1 *Heterodera schachtii* infestation symptoms in sugar beet



Fig. 2 Cyst containing eggs and larvae



Fig. 3 Sampled fields

## Materials & methods

To monitor infestation levels of *Heterodera schachtii*, a total of 216 arable fields with a host rotation frequency ranging from 1:4 to 1:7 were sampled for BCN in the winter of 2020/2021. All selected field were in areas with known high abundance of BCN, mostly in the Southwest of the Netherlands<sup>1</sup> (Fig. 3). The soil samples were analysed for the number of cysts and the total number of eggs and larvae per 100 ml of soil.

Tab. 1 Percentage of fields containing *Heterodera schachtii* cysts (dead and alive) with different infestation levels for arable fields with a host plant rotation frequency from 1:7 to 1:4.

rotation	fields with cysts	number of eggs and larvae/100 ml soil*				
		0	1-150	151-300	301-600	>600
1:7	91%	79%	21%	0%	0%	0%
1:6	89%	78%	22%	0%	0%	0%
1:5	96%	41%	52%	0%	7%	0%
1:4	95%	38%	52%	5%	5%	0%

\*Infestation level: 0=none; 1-150=very low; 151-300=low; 301-600=moderate; >600 = high

## Conclusions

- For arable fields with a host plant rotation frequency of 1:7 and 1:6 it is not strictly recommended to grow a BCN-variety to prevent yield loss. This opens up possibilities for farmers to choose other variety characteristics, which may not be available in the BCN-variety segment.
- BCN-varieties are still advised for arable fields where host plants are grown in a frequency of 1:5 or narrower, since there is an increased chance of yield loss due to higher BCN-infestation levels.

## References

<sup>1</sup>Raaijmakers, E. (2012). *Verspreiding van witte bietencysteaaltjes (Heterodera schachtii) en gele bietencysteaaltjes (H. betae) in Nederland. Inventarisatie 2005 en 2006.* IRS-report. 12P01, pp: 31