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Integrated control of the sugar beet cyst nematode *Heterodera schachtii* - Catch crops, Sugar beet genotypes, Nematicide

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Hypotheses

1. Resistant catch crops and nematicides reduce sugar beet cyst nematode (SBN) infestation in the soil.
2. The effect of sugar beet cultivation on SBN infestation differs between genotypes:
   Susceptible genotype: strong increase of SBN
   Tolerant genotype: increase or no change
   Resistant genotype: reduction of SBN

Fig. 1: Experimental site at Jeinsen (21/06/2013).

Material and Methods

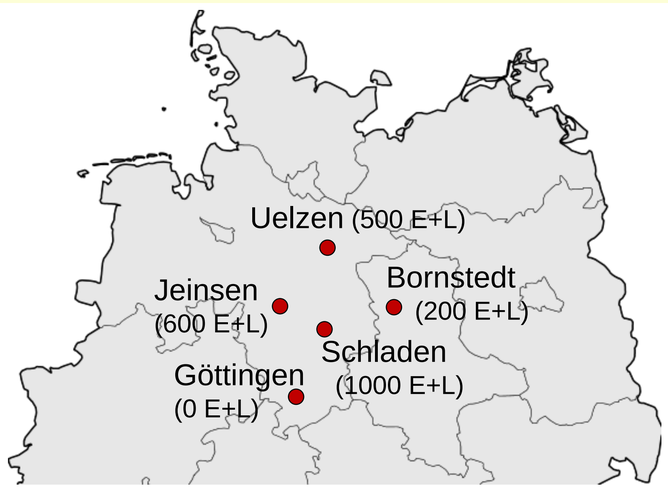

Fig. 2: Experimental sites in 2012/13 with different initial nematode infestation [Eggs + larvae (100 g soil)$^{-1}$]

- 5 sites in Northern Germany differing in initial nematode infestation (Fig. 2)
- Sandy to loamy (loess) soil; cereal pre-crop; straw left in the field
- <u>Catch crop treatments:</u>
  White mustard (resistance grade 2; sowing dates: 20th - 30th August 2012), Straw mulch as control
- <u>3 sugar beet genotypes (SB):</u>
  susceptible, tolerant, resistant against nematodes
- <u>Nematicide (under development):</u>
  with and without (soil applied, before SB sowing in 2013 at sites Bornstedt, Jeinsen and Uelzen)
- Soil sampling before catch crop sowing, before SB sowing and nematicide application and after SB harvest
- 30 cores per plot, 0-30 cm depth, mixed sample of 2.5 kg per plot
- Number of eggs and larvae in samples was determined in the PSA laboratory, Hanover

Results and Discussion

<u>Catch crops:</u>

- Straw mulch tended to reduce SBN infestation at Bornstedt and Jeinsen, but increased SBN at Uelzen and Schladen (Fig. 3, left)
- Mustard cultivation had a similar effect on SBN infestation as straw mulch (Fig. 3, right)
- Late sowing dates (end of August) and thus low dry matter yield (1.1 - 2.5 t/ha) might have been the reason for missing SBN reduction under mustard

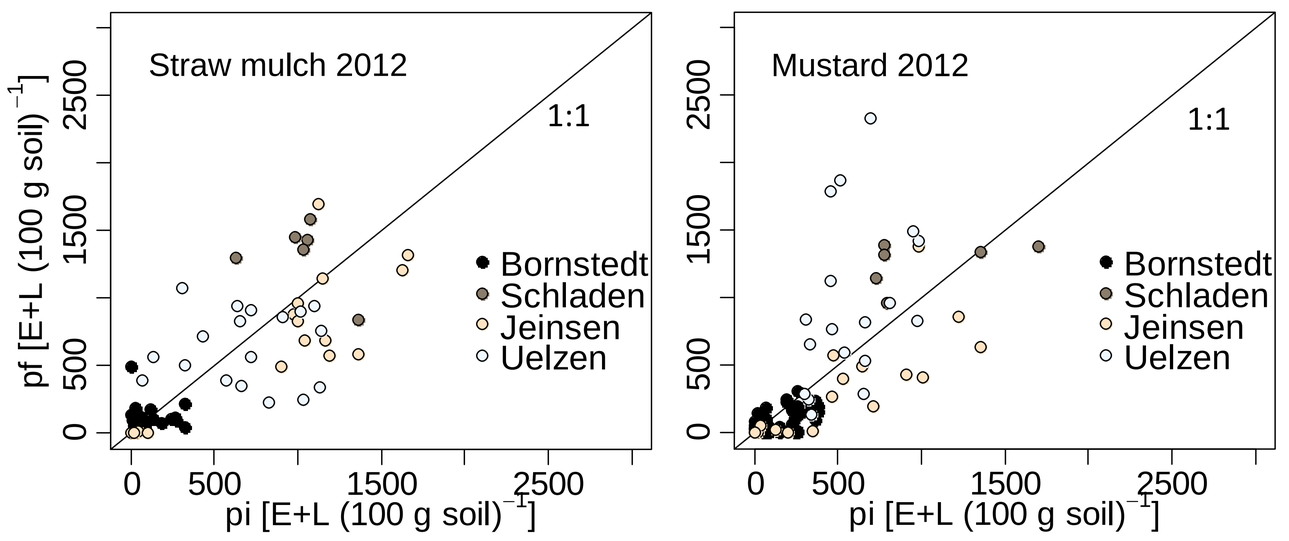

Fig. 3: Nematode infestation [Eggs and Larvae (100 g soil)$^{-1}$] before (pi) and after (pf) straw mulch (left) and resistant mustard (right).

<u>Sugar beet genotypes:</u>

Without nematicide (Fig. 4)

- Resistant SB: reduction of SBN or no change
- Tolerant SB: increase at Jeinsen, reduction at Uelzen
- Susceptible SB: strong increase of SBN at all sites

With nematicide (Fig. 4)

- Jeinsen:
  Resistant SB: strong reduction due to additive effect of nematicide and genotype
  Tolerant and susceptible SB: reduced increase of SBN (compared to without nematicide)
- Uelzen:
  No effect of the nematicide possibly due to adverse soil conditions
- Bornstedt:
  No effect of the nematicide, presumably due to low nematode infestation (data not shown)

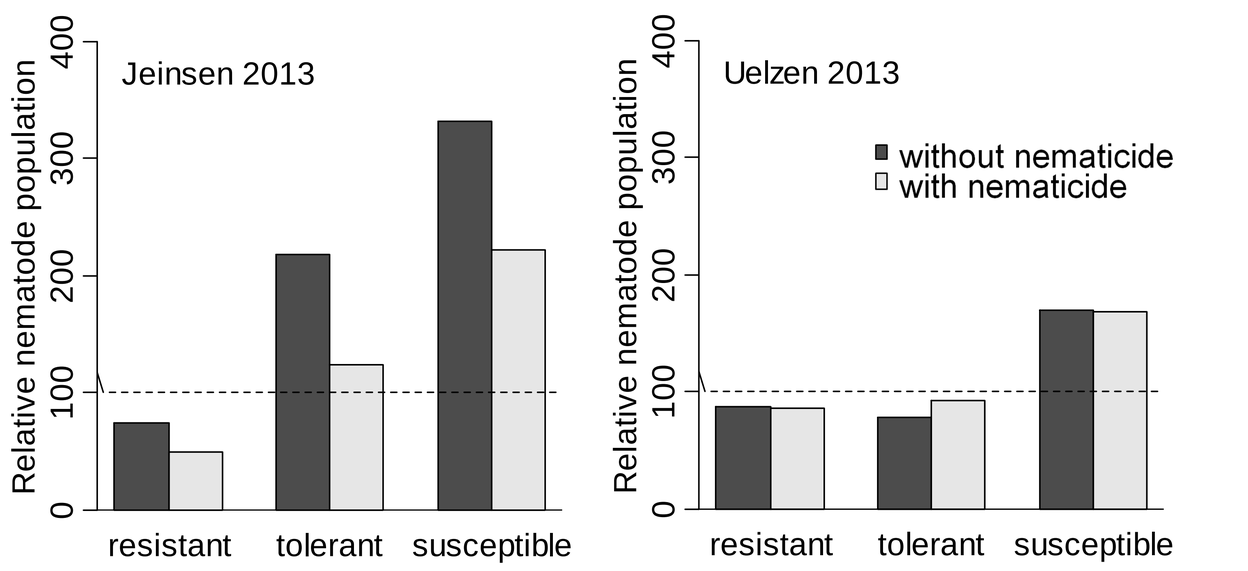

Fig. 4: Relative nematode population after resistant, tolerant and susceptible sugar beet genotypes with and without nematicide application at Jeinsen (left) and Uelzen (right) 2013 (n=9) .

Conclusions

- Early catch crop sowing is a prerequisite for nematode reduction by means of catch crop cultivation.
- Genotype effects are highly variable: Tolerant SB can increase the number of SBN, resistant SB can reduce it; however, both can leave SBN infestation unchanged.
- Nematicide application decreased SBN reproduction and can amplify the genotype effect on SBN infestation.