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**INFLUENCE OF SELECTED SOIL SAPROPHYTIC FUNGI
ON THE POPULATION OF NEMATODES
Heterodera schachtii SCHMIDT**

**WPLYW WYBRANYCH GRZYBÓW GLEBOWYCH
NA POPULACJĘ NICIENI *Heterodera schachtii* SCHMIDT**

Abstract: Pot experiments were carried out in 2005–2006. In the first year of the experiment microorganisms were introduced into soil. In the following year the inoculum was not repeated. The goal of the present work was to determine the influence of saprophytic fungi of *Aspergillus versicolor* and *Trichocladium asperum* on the population of *Heterodera schachtii* in the second year of the research. The following parameters were taken into account in the interpretation of the experiment: the concentration of *H. schachtii* cysts in 100 g of soil, the concentration of eggs and larvae in 1 g of soil and the fertility of females. The research was carried out in accordance with the rules adopted in nematology. At the co-occurrence of *H. schachtii* and saprophytic fungi of *Aspergillus versicolor* and *Trichocladium asperum*, in comparison with the test combination (*H. schachtii* without microorganisms), a smaller number of cysts in 100 g of soil, considerably higher fertility of females (the number of eggs and larvae in a cyst) and significantly higher concentration of eggs and larvae in soil were noted.

Keywords: co-occurrence, *Heterodera schachtii*, *Aspergillus versicolor*, *Trichocladium asperum*

In ecological agriculture, works concerning possibilities to make use of soil microorganisms, and especially fungi accompanying parasitic nematodes in rhizosphere and having nematocidal properties, are very valuable. These organisms can constitute an important element of natural reduction of the *Heteroderidae* population: highly specialised nematodes forming cysts [1–4].

The aim of the present work was to determine the influence of saprophytic fungi of *Aspergillus versicolor* (Vuill.) Tiraboschi and *Trichocladium asperum* Harz on the population nematodes of *Heterodera schachtii* Schmidt in the second year of the research.

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Material and methods

The research (2005–2006) was carried out in pots (10 dm³ each) on red beet. In the first year of research the inoculum of microorganisms was added to the combination of respectively: 10 cysts of *H. schachtii*/100 g of soil and 21-day old one-spore cultures of *A. versicolor* or *T. asperum* on the AGZ soil (3 Petri dishes Ø 10 cm) or a pure culture medium of the same amount. Each combination was done in 3 repetitions. In the second year of the research the final concentration of microorganisms from the previous year constituted the initial value.

The following parameters were taken into account in the interpretation of the experimental data the concentration of *H. schachtii* cysts in 100 g of soil, the concentration of eggs and larvae in 1 g of soil and the fertility of females. Confidence semi-intervals were calculated with the use of Newman-Koul test at the significance level of 0.05.

Results and discussion

In earlier research concerning the reduction of harmful phytopathogenic nematodes, the inoculum of fungi was introduced each year [1–3]. The conducted experiment aimed at testing the behaviour of the population of *H. schachtii* in the second year of the research without renewing the inoculum of saprophytic fungi.

In the first year of the research at the presence of saprophytic fungi, a significantly smaller number of *H. schachtii* cysts was noted, as well as a significantly lower number of eggs and larvae in 1 g of soil in comparison with the test combination (a nematode without a fungus) [4].

In the second year of the observation a lower number of cysts in 100 g of soil was noted in the combinations of the co-occurrence of *H. schachtii* and the investigated saprophytic fungi in comparison with the test combination (only *H. schachtii*). On the other hand, in both combinations of the co-occurrence of the researched microorganisms considerably higher fertility of females and significantly higher concentrations of eggs and larvae in soil were determined in comparison with the test combination (*H. schachtii* without microorganisms) (Fig. 1).

Although in the research on the co-occurrence of *Heteroderidae* and saprophytic fungi hyphae were not observed inside cysts, high sensitivity of *H. schachtii* to the presence in soil of *A. versicolor* or *T. asperum* was shown, which manifested itself by lowered fertility and productivity of females. Similar results were obtained in the experiment with *Penicillium frequentans* and *Stachybotrys chartarum* conducted on *Globodera rostochiensis* [5]. Other laboratory research also confirmed a destructive influence of substance excretion by saprophytic fungi on developing larvae of soil nematodes [7, 8].

Population growth coefficients, in combinations with saprophytic fungi were considerably lower in the first year of research. In the second year of the experiment growth coefficients were twice higher in comparison with the combination with only *H. schachtii* (Fig. 2). The number of cysts was still lower when compared with the control test. According to Brzeski [9] each species aims at attaining the level of population saturation and in the course of growth of the initial population it decreases. Hence, it

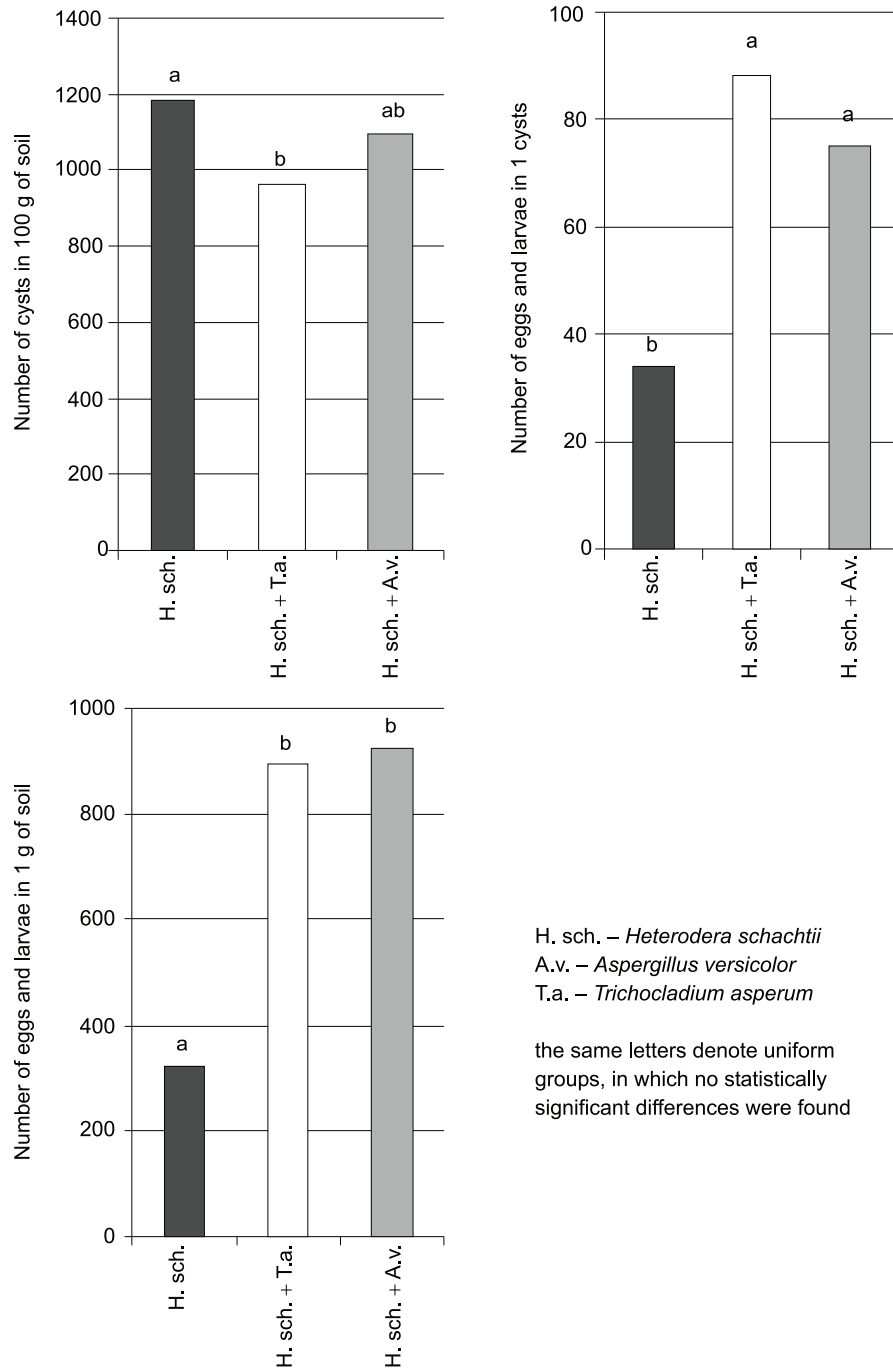


Fig. 1. Effect of of *Aspergillus versicolor* (Vuill.) Tiraboschi and *Trichocladium asperum* Harz on the population nematodes of *Heterodera schachtii* Schmidt

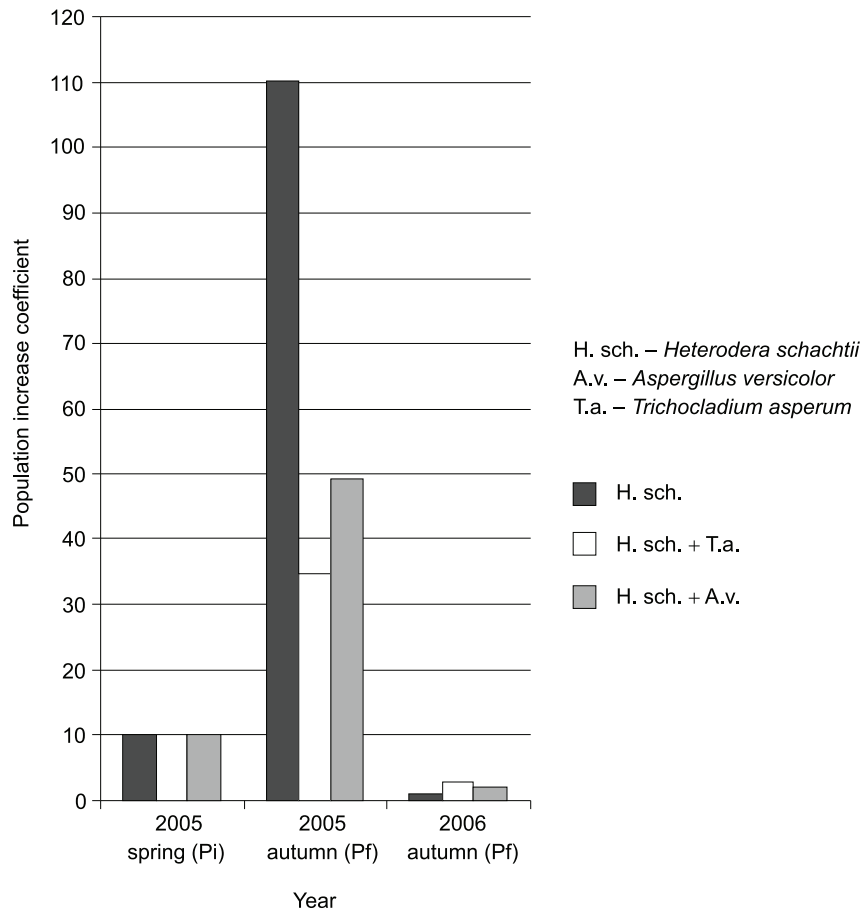


Fig. 2. Effect of *Aspergillus versicolor* (Vuill.) Tiraboschi and *Trichocladium asperum* Harz on the population nematodes of *Heterodera schachtii* Schmidt

could be assumed that the population of *H. schachtii* in the test combination achieved its maximum growth in the first year of the research (Fig. 2). Furthermore, the decreasing number of eggs and larvae in the consecutive year of the observation corroborates the thesis of the population saturation (Fig. 1).

Conclusions

At the co-occurrence of *H. schachtii* and saprophytic fungi of *Aspergillus versicolor* and *Trichocladium asperum*, in comparison with the test combination (*H. schachtii* without microorganisms) was shown:

1. a smaller number of cysts in 100 g of soil,
2. considerably higher fertility of females (the number of eggs and larvae in a cyst),
3. significantly higher concentration of eggs and larvae in soil were found.

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WPLYW WYBRANYCH GRZYBÓW GLEBOWYCH NA POPULACJĘ *Heterodera schachtii* SCHMIDT

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W latach 2005–2006 przeprowadzono badania wazonowe. W pierwszym roku doświadczenia wprowadzono do podłoża badane mikroorganizmy, w roku kolejnym nie ponawiano inokulum. Celem pracy było określenie wpływu grzybów saprofitycznych *Aspergillus versicolor* oraz *Trichocladium asperum* na populację *Heterodera schachtii* w drugim roku badań. W interpretacji doświadczenia uwzględniono następujące parametry: zagęszczenie cyst *H. schachtii* w glebie, zagęszczenie jaj i larw w 1 g gleby oraz płodność samic. Przy współwystępowaniu *H. schachtii* z grzybami saprofitycznymi *Aspergillus versicolor* oraz *Trichocladium asperum* w porównaniu do kombinacji kontrolnej (*H. schachtii* bez mikroorganizmów) znaleziono mniejszą liczbę cyst w 100 g gleby, znacznie większą płodność samic (liczba jaj i larw w cyście) oraz większe zagęszczenie jaj i larw w glebie.

Słowa kluczowe: współwystępowanie nicieni i grzybów saprofitycznych, *Heterodera schachtii*, *Aspergillus versicolor*, *Trichocladium asperum*