Effects of Fusarium Oxysporum (Schlecht) on the Nematode Globodera Rostochiensis (Wall.) Population

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Fusarium oxysporum is a common plant-pathogenic soil fungus. Recent studies have indicated a possibility of its being parasitic on oyst-forming nematodes, including Globodera rostochiensis /CLOVIS and NOLAN, 1983; GOSWAMI and RUMPENHORST, 1978; MORGAN-JONES et al., 1986; WRONKOWSKA and JANOWICZ, 1986, 1988/.

The present study was aimed at determining the effects of F. oxysporum on the G. rostochiensis population and the health of this nematode's eggs and larvae.

Materials and methods

The tests were run in pots filled with thermally sterilized light clayey sand as a substrate. The substrate was infected with F. oxysporum isolated from G. rostochiensis cysts. The inoculum was a 2-week-old mycelium grown on PDA medium. Once the substrate was interlaced with the mycelium, Sowa variety potatoes were planted and nematode cysts, previously rinsed 3 times with distilled water, emplaced in it. The initial nematode population density /P_f/ was determined immediately after the potato harvest.

In order to determine in vitro the effects of F. oxysporum on the health of nematode eggs and larvae, G. rostochiensis cysts were placed on the mycelium growing on PDA. Health analyses of eggs and larvae were made after 12 weeks of their contact with the mycelium. Cysts placed on the medium without the mycelium served as controls.

Results and discussion

The nematode population density analysis showed an inhibitory effect of F. oxysporum on the development of G. rostochiensis. In the fungus-infected substrate population density was significantly lower than in the fungus-free substrate /Fig. 1/.

Immediately after potato harvest, an increased number /23%/ of dead eggs was observed. Most /60% on the average/ of the dead eggs found in the cysts taken from the fungus-infected substrate had non-typical shapes,

mostly spherical, frequently joined together with their poles in groups of 2 or 4. From 8 to 20.5% of the eggs in a sample were penetrated by the mycelium.

The increased number of misshaped dead eggs in the fungus infected substrate is a sign that F. oxysporum affects female G. rostochiensis

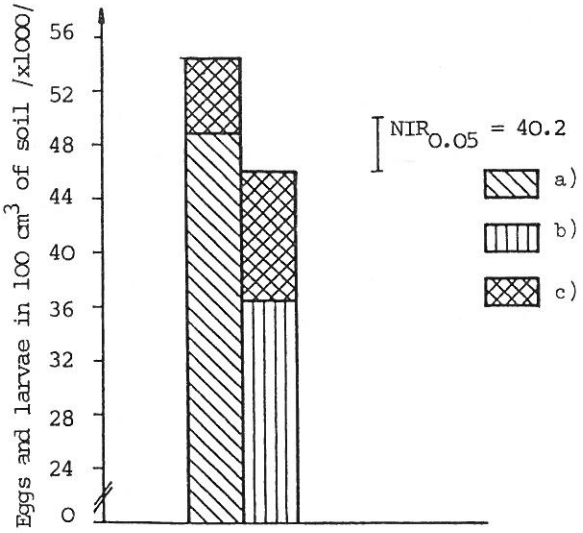

Fig. 1
Influence of Fusarium oxysporum on the Globodera rostochiensis population. a/ Globodera rostochiensis; b/ Globodera rostochiensis + Fusarium oxysporum; c/ Dead eggs, %

physiology during oogenesis. The Fusarium fungi are known for their chemical activity involving the production of a number of toxins /BULNHEIM et al., 1978; GROSSMANN, 1962; ROEB et al., 1977/.

The in vitro tests confirmed the destructive effect of F. oxysporum exudates on G. rotochiensis L_2 larvae. After 12 weeks of direct cyst contact with the mycelium, deformation and mortality of larvae was observed, with mortality rate amounting to 60-90% per sample. These results agree with MORGAN-JONES et al. /1986/ who state that fungal metabolites are potentially important in controlling nematode populations.

Pot and in vitro tests demonstrated an inhibitory effect of F. oxysporum on G. rostochiensis population and on the health of eggs and larvae of the nematode.

The key role in nematode population control is played by fungal metabolites as the dead larvae showed no trace of the fungus hyphae.

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