Side Effect of Iodosulfuron-Methyl/Na + Mefenpyr-Diethyl and Isoproturon on Micromycetes on Winter Wheat

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Abstract

Side effect of two herbicides (iodosulfuron-methyl/Na + mefenpyr-diethyl = Husar and isoproturon = Tolkan) on micromycetes on winter wheat was study. Herbicide treatment reduced the whole number of fungi and number of genera in phyllosphere. It reduced number of the rhizosphere fungal genera, too. Population of *Chrysosporium* sp. markedly increased after Husar application, whereas population of *Trichoderma harzianum* was markedly reduced. Tested herbicides inhibited the development of *Fusarium avenaceum* on wheat leaves. Iodosulfuron-methyl/Na + mefenpyr-diethyl significantly reduced the growth of *F. avenaceum in vitro*.

Keywords: *Fusarium avenaceum*; phyllosphere; rhizosphere; iodosulfuron-methyl/Na + mefenpyr-diethyl; isoproturon

INTRODUCTION

Both stimulation and inhibition of micromycetes with various herbicides active compounds was observed. SA and MA (2001) found, that brominal and selecron significantly decreased the total number of cellulolytic fungi and most fungal species. CAL *et al*. (1993) in field trials observed that atrazine and alachlor decreased soil fungal populations in the first year of the study. On the oposite, POZO *et al*. (1994) found that presence of 2.0–10.2 kg/ha of alachlor increased the total number of bacteria and fungi. MACEK and LESNIK (1994) tested primisulfuron and triasulfuron + fluoroglycofen and they found these herbicides inhibited in field concentrations the mycelial growth of *Trichoderma longibrachiatum* and stimulated it with the middle and lowest concentration.

MATERIAL AND METHOD

We tested the influence of isoproturon (Tolkan Flo) and iodosulfuron-methyl/Na + mefenpyr-diethyl (Husar) on the micromycetes. We carried out glasshouse and field experiments and *in vitro* toxicity test. We sowed untreated winter wheat var. Šárka. Variants: control without any treatment (C), treatment with iodosulfuron-methyl/Na + mefenpyr-diethyl = Husar (H) and treatment with isoproturon = Tolkan Flo (T). Recommended doses of herbicides (Husar 0.2 kg/ha, Tolkan Flo 2 l/ha) and the term of application (BBCH 23) were used. To determine the phyllosphere fungi leaf pieces were removed and incubated on Sabouraud agar medium at 22°C for 7 days. Rhizosphere fungi were isolated using the dilution method, incubation for 10 days at 22°C, Martin agar medium.

RESULTS

Iodosulfuron–methyl/Na + mefenpyr-diethyl and isoproturon treatment both reduced the whole number of fungi and number of genera in winter wheat phyllosphere in glasshouse experiment (Figure 1). After two weeks there were not any differences among tested variants. Besides other *Fusarium avenaceum* (Fr.) Sacc.

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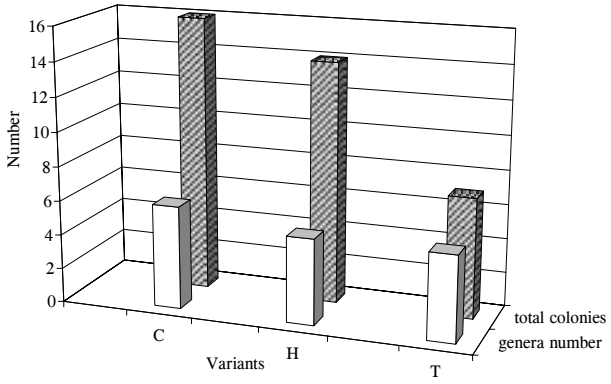

Figure 1. Glasshouse experiment, phyllosphere, 1 day after herbicides application

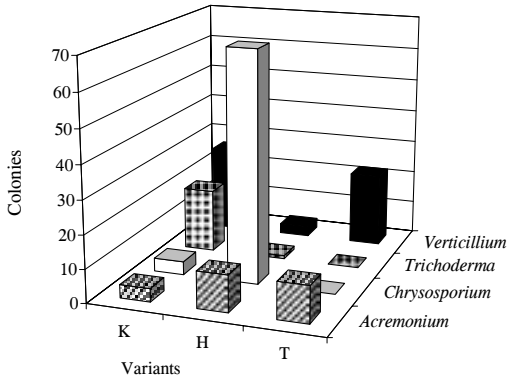

Figure 2. Glasshouse experiment, 3 days after herbicides application

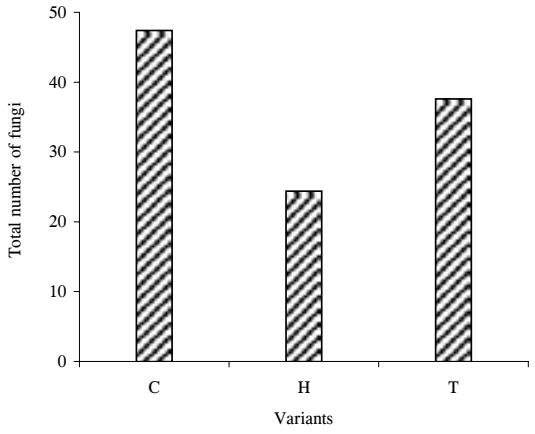

Figure 3. Glasshouse experiment, 30 days after herbicides application

was isolated at the first day after herbicides application from leaves from all three variants, whereas at the 6th day we isolated the fungus only from control.

In variants with herbicides the amount of fungi was insignificantly lower than in control three days after herbicide treatment. We observed changes of the amount of fungal genera (Figure 2). In both treated variants we observed less total amount of micromycetes 4 weeks after herbicides application (Figure 3). The first rhizosphere analysis of the field experiment was done three days after herbicide treatment. We found less amount of fungi at treated variants to compare the control. Number of genera was lower, too. The second rhizosphere analysis was done 25 days after herbicides treatment. Total number of fungi was significantly smaller at Husar variant. Genera number did not differ among variants (Figure 4). Attack of leaves segments by *Fusarium avenaceum* was the strongest at the control and the development of the fungus was quicker than at herbicides treated variants (Figure 5). Iodosulfuron-methyl/Na + mefenpyr-diethyl at concentration 0.1% and 0.2% inhibited the growth of *F. avenaceum* on agar medium (Figure 6).

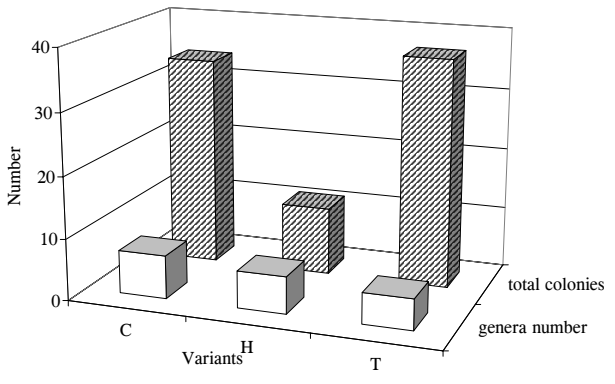

Figure 4. Field experiment, rhizosphere, 25 days after herbicides application

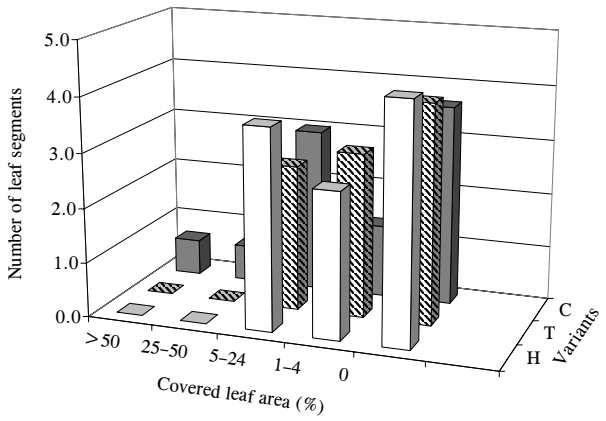

Figure 5. *Fusarium avenaceum* growth on wheat leaves

Control Husar 0.1% Husar 0.2%

Figure 6. Effect of iodosulfuron methyl/Na + mefenpyr-diethyl on *F. avenaceum*

DISCUSSION

The phyllosphere fungi was partly reduced by Husar and Tolkan Flo. In the rhizosphere we observed the changes of total number of fungal populations and the significant changes of the proportion of a few genera after herbicides treatment of the wheat. In the glasshouse experiment the total number of fungi decreased after herbicide treatment. In the field condition Husar increased the amount of isolated micromycetes in the short period after treatment.Three weeks after the application of herbicides were the results of glasshouse and field experiments almost the same; Husar decreased the total number of fungi in the rhizosphere. Also treatment with another herbicide active compounds decreased the number of soil fungi (CAL *et al*. 1993; SA & MA 2001). Both tested herbicides decreased the attack of leaves and retarded the development of *Fusarium avenaceum*.

Conclusion

Iodosulfuron-methyl/Na + mefenpyr-diethyl inhibited the growth of fungal populations and the development of *Fusarium avenaceum*, too. Isoproturon inhibited the growth of *F. avenaceum* on leaves segments too, but the more precise *in vitro* experiments must be done.

References

CAL A., DE TADERO J.L., OBRADOR A., MELGREJO P., PASCUAL S. (1993): Effects of atrazine and alachlor herbicides on the soil micro ora of a maize monoculture. Investigacion Agraria, Production, Protection, Vegetales, **8**: 97–108.

MACEK J., LESNIK M. (1994): The influence of primisulfuron and triasulfuron herbicides on mycelial growth and sporulation of some parasitic soil fungi. J. Plant Dis. Protect., **101**: 492–497.

POZO C., SALMERON V., RODELAS B., MARTINEZTOLEDO M.V., GONZALEZLOPEZ J. (1994): Herbicide effects of the alachlor on soil microbial activities. Ecotoxicology, **3**: 4–10.

SA O., MA A.-S. (2001): Microbial populations and enzyme activities in soil treated with pesticides. Water, Air, Soil Poll., **127**: 49–63.