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INFLUENCE OF INSECTICIDES TO *BEAUVERIA BASSIANA* (BALSAMO) VUILLEMIN

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Summary

Four insecticides, permethrin, deltamethrin, alfacypermethrin and cypermethrin, were tested for their influence to *B. bassiana*. When isolates of *Beauveria bassiana* (Balsamo) Vuillemin were placed into agars containing insecticides, they average daily growth of mycelium was significantly smaller than that of control variants. After mixing suspension of fungal spores with insecticides in the concentration recommended by producer against European corn borer, *Ostrinia nubilalis* Hbn., fungus did not create any colonies on artificial medium. Results show that during the application of chemical insecticides it is possible to use biopesticides containing the fungus *B. bassiana*, but they can not be mixed together with chemical insecticides.

***Key words*:** *Beauveria bassiana,* pesticides, pyrethroids, *Ostrinia nubilalis*, mycelial growth

Introduction

Combination of *Beauveria bassiana* (Balsamo) Vuillemin, or *Beauveria brongniartii* with insecticides should increase the efficiency of the fungi. Thus, there was an increase in incidence of *B. brongniartii* on *Melolontha melolontha* larvae in the presence of low doses of organochlorides or organophosphates (Ferron, 1971). Combinations of *B. bassiana* with insecticides abamectin, triflumuron, thuringiensin or carbaryl were consistently more toxic than *B. bassiana* alone (Anderson et al., 1989). When carbofuran was added to plants treated with *B. bassiana*, there was increased mortality of the European corn borer, *Ostrinia nubilalis* Hbn. (Lewis et al., 1996). Synergism only occurred at concentrations of chemical insecticide (Quintela, McCoy, 1997).
Growth inhibition of entomopathogenic fungi is an useful criterion for testing compatibility of fungi with pesticides used in plant protection systems (Loria et al., 1983).
Cadatal and Gabriel (1970) found that mycelial growth of *B. bassiana* was inhibited by carbaryl in vitro conditions. Permethrin did not inhibit *B. bassiana* at all, and its growth curve was very similar to that of the control (Clark et al., 1982).
The most efficient insecticides in the experiments with chemical control of *O. nubilalis* in Slovakia were pyrethroids (Cagáň, 1993). The aim of this work was to evaluate how pyrethroids influence biological properties of fungus *B. bassiana.*

Material and methods

Four isolates of *B. bassiana* (SK 67, SK 78, SK 99 and SK 100) isolated from *O. nubilalis* larvae and maintained on Sabouraud-dextrose agar (SDA) were used in the experiment. Four insecticides, permethrin (0.8 ml/1l SDA), deltamethrin (0.8 ml/1l SDA), alfacypermethrin (0.4 ml/1l SDA) and cypermethrin (0.8 ml/1l SDA), were tested for their influence to *B. bassiana*.
In the first experiment, application rates of insecticides were added to the cooled medium (SDA) and treated medium was infused into Petri dishes. *B. bassiana* isolates were placed on insecticide Petri plates and every 24 hours mycelial growth was evaluated during one week according to the formula $r = r_a - r_b$ where "r" was radial growth, "a" was actual time of measurement and "b" was time of measurement 24 hours ago.
In the second experiment, suspension of *B. bassiana* spores was mixed together with insecticide solution (concentration was as recommended for spaying of maize for control of *O. nubilalis*). Mixture was added on SDA and mycelial growth was evaluated during one week.
Each experiment was repeated four times.

Results and discussion

The effect of insecticide on mycelial growth of *B. bassiana* is shown in Fig. 1, 2, 3 and 4. The isolates grew when they were placed into agars containing insecticides. But average daily growth increase of any of tested isolates had not been higher than that of control variants (Fig. 1-4). The highest inhibiting effect to each of four isolates was found after application of Decis 2,5 EC. The fattest growth of isolates was observed on agars containing Vaztac 10 EC. There are many similar results from literature. From insecticides, carbaryl inhibited in vitro *B. bassiana* mycelial growth (Gardner et al., 1979), or was absolutely not dangerous to fungus *Verticillium lecanii* (Halla, 1981). Carbofuran showed moderate inhibition to *B. bassiana* (Clark et al., 1982). Permethrin did not inhibit the fungus (Halla, 1981; Clark et al., 1982; Samšiňáková, Kalalová, 1983), but another pyrethroid fenvalerate produced significant inhibition of *B. bassiana* germination and growth. As indicated by Landa (1983), cypermethrin showed only weak inhibition of *V. lecanii* similarly as permethrin, formothion, mevinfos, oxamyl, pirimicarb and pirimiphos-methyl.
In the second experiment, after mixing suspension of spores with insecticides in the concentration recommended by producer against corn borer, fungus did not create any colonies on artificial medium. Similarly, toxicity of many fungicides (including maneb, mancozeb, metiram, zineb) to entomogenous fungi was detected (Lorio et al., 1983; Landa, 1983; Samšiňáková, Kalalová, 1983).
From our results we can assume that during the application of chemical insecticides it is possible to use biopesticides containing the fungus *B. bassiana*, but they can not be mixed together with chemical insecticides.

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Fig. 1: The effect of insecticides on mycelial growth of Beauveria bassiana isolate SK 67.

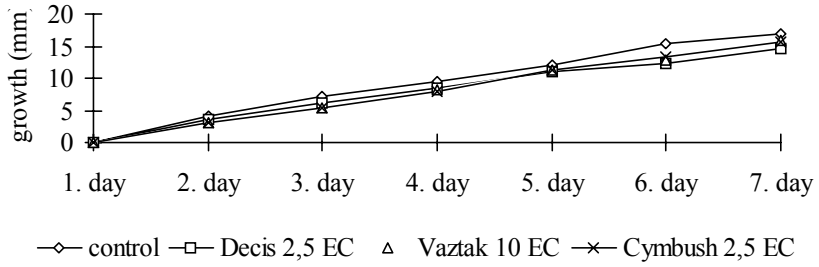

Fig. 2: The effect of insecticides on mycelial growth of *Beauveria bassiana* isolate SK 78.

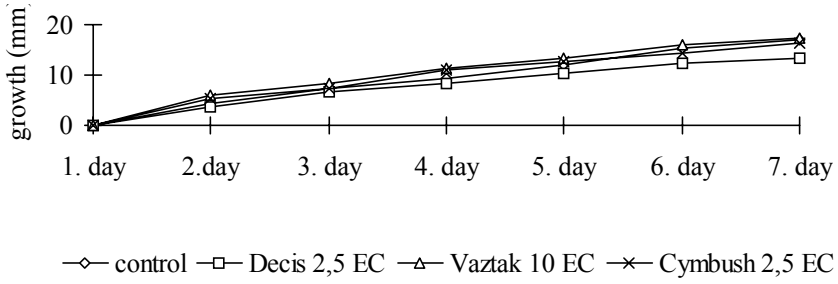

Fig. 3: The effect of insecticides on mycelial growth of *Beauveria bassiana* isolate SK 99.

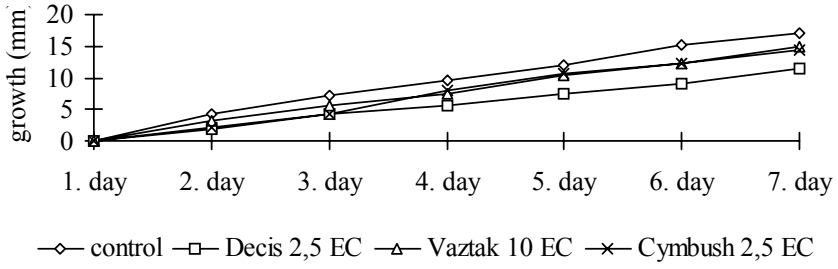

Fig. 4: The effect of insecticides on mycelial growth of *Beauveria bassiana* isolate SK 100.