

EFFECTS OF WHEAT ALLELOCHEMICALS ON CARABID BEETLE LARVAE AS NON TARGET SOIL ORGANISM

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The wheat allelochemical DIMBOA (2,4-Dihydroxy-7-methoxy-2H-1,4-benzoxazin-3-one) and its three metabolites MBOA (6-methoxy-benzoxazolin-2(3H)-one), AMPO (2-amino-8-methoxyphenoxazin-3-one), AAMPO (2-acetamido-8-methoxyphenoxazin-3-one) as well as four metabolites of DIBOA (2,4-Dihydroxy-2H-1,4-benzoxazin-3-one), namely BOA (Benzoxazolin-3(3H)-one), APO (2-aminophenoxazin-2-one), AAPO (2-acetamidophenoxazin-2-one) and HPAA (2-acetamidophenol) were tested for their effects on carabid beetle larvae. *Poecilus cupreus* (Carabidae) was selected as one of the two representative soil test organisms within the EU-Project FATEALLCHEM QLK5-CT-2001-01967. As reference pesticides Perfekthion S (a.i. dimethoate) as toxic standard and Betanal plus (a.i. phenmedipham) were used to verify the validity of the trials. The tests were carried out in standard test substrate (LUFÄ, 2.1) according to method of HEIMBACH (1998). Lethal (mortality) and sublethal (developmental duration, hatching weight, sex ratio) effects were recorded as end points of the test (duration: 36 - 43 days). Neither DIMBOA nor its metabolite MBOA nor BOA resulted in significant lethal or sublethal effects at the maximum estimated field rate of 2 mg/kg substrate (DIMBOA: 10.7%*, MBOA: 13.8%*, BOA: 10.6%*) compared to the control group (treated with water). In dose-response tests with increasing MBOA and BOA concentrations up to 100 mg/kg, only BOA caused a significantly increased mortality at high test rates (42.1%* at 50 mg/kg and 54.0%* at 100 mg/kg substrate) compared to the control, whereas no significant difference concerning sublethal effects could be found. None of two MBOA degradation products AMPO and AAMPO led to a significantly higher mortality or sublethal effects compared to the control even at the highest test rate of 100 mg/kg substrate (mortality rate for both AMPO and AAMPO: 33.3%*).

In contrast, the BOA degradation products APO, AAPO and HPAA led to a significantly higher mortality compared to the control (APO: 56.7%*, AAPO: 43.3%*, HPAA: 55.6%*) already at the test rate of 2 mg/kg substrate. Increasing test rates up to 10 mg/kg (APO, AAPO) respectively 100 mg/kg substrate (HPAA) did not lead to significantly higher mortality rates compared with lower test rates. As for MBOA metabolites no significant sublethal effects of any BOA metabolite could be observed at any test rate.

The results of the present study, which was carried out with a standard laboratory method, suggest that wheat allelochemical degradation products deriving from DIBOA, such as BOA, APO, AAPO and HPAA cause stronger lethal effects on *Poecilus cupreus* larvae than DIMBOA and its metabolites MBOA, AMPO and AAMPO. However, none of the tested allelochemical compounds had any sublethal effect on the test organisms like developmental duration, sex ratio and hatching weight of the beetles. Nevertheless, there remain some questions which could not be traced within this study, such as the effects of the tested substances when accumulated or their efficacy in a complex natural soil system including other soil organisms, especially microorganisms. Additionally, other study endpoints like egg deposition rate or disturbances in behaviour after the treatments could be included in future observations

ACKNOWLEDGEMENTS

The research described in this abstract was performed as part of the project "FATEALLCHEM", "Fate and Toxicity of Allelochemicals (natural plant toxins) in Relation to Environment and Consumer". The project was carried out with financial support from the Commission of the European Communities under the Work programme Quality of Life, contract no. QLK5-CT-2001-01967 and from Austrian Agency for Health and Food Safety, Institute for Plant Health.

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