Bioinsecticides
a risk for humans, animals and the environment?

A study on metabolite extracts from Mycotal and Vertalec

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INTRODUCTION

Risk assessment of metabolites produced by fungal biocontrol agents has recently come into focus of the registration authorities and toxicology data for a whole range of individual metabolites is demanded [1,2]. These studies are time- and cost-intensive and prove a big obstacle for registration. Testing of the crude extract from fungal cultures, extracted with solvents with different polarities, where all metabolites produced by the respective fungus are amplified offers a cheaper alternative. In this study polar and non polar extracts from the commercial bioinsecticides Mycotal and Vertalec (Koppert, NL) were tested for their toxicity against different organisms. Values for the most sensitive organisms were extrapolated to a greenhouse application on tomatoes to assess the possible risk posed by these Biological Control Agents.

MATERIALS AND METHODS

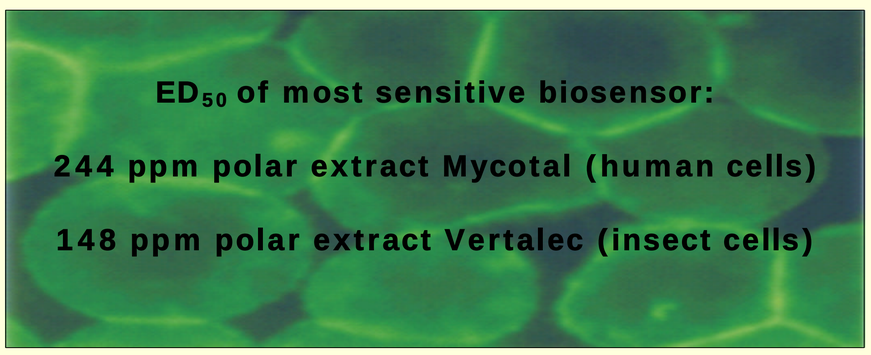
The commercial bioinsecticides Mycotal and Vertalec (Koppert, NL) were extracted with the organic solvents ethyl acetate (polar) or dichloromethane (non polar) according to protocols developed by the RAFBCA team [3]. Toxicity was determined for salt– and sweetwater animals (*brine shrimp — Artemia salina*, waterflea — *Daphnia magna*), a single cell organism (*Tetrahymena pyriformis*), human leukemic (HL60) and insect (SF9) cells and the ED_{50} (=effective dose for 50 % mortality) was calculated according to PriProbit 1.63 (Masayuki Sakuma).

RESULTS

Table 1. Toxicity of polar and non polar extract from Mycotal and Vertalec to different organisms.

	ED_{50} values in ppm (lower and upper confidence limit)				
	HL60 cells (4 hrs)	SF9 cells (4 hrs)	*A. salina* (24/48 hrs)	*D. magna* (24/48 hrs)	*T. pyriformis* (4 hrs)
Mycotal polar extract	244 ppm (195; 314)	340 ppm (230; 640)	nd (MCT 50 ppm)	nd (MCT 50 ppm)	nd (MCT 500 ppm)
Mycotal non-polar extract	912 ppm (nc)	nd (MCT 500 ppm)	nd (MCT 50 ppm)	nd (MCT 50 ppm)	300 ppm (nc)
Vertalec polar extract	1480 ppm (972; 2300)	148 ppm (126; 175)	nd (MCT 50 ppm)	nd (MCT 50 ppm)	2 % dead at 500 ppm
Vertalec non-polar extract	709 ppm (579; 1310)	nd (MCT 500 ppm)	nd (MCT 50 ppm)	nd (MCT 50 ppm)	18 % dead at 500 ppm

nd: no effect detected; nc: confidence limits not reliable, MCT: max. conc. tested.



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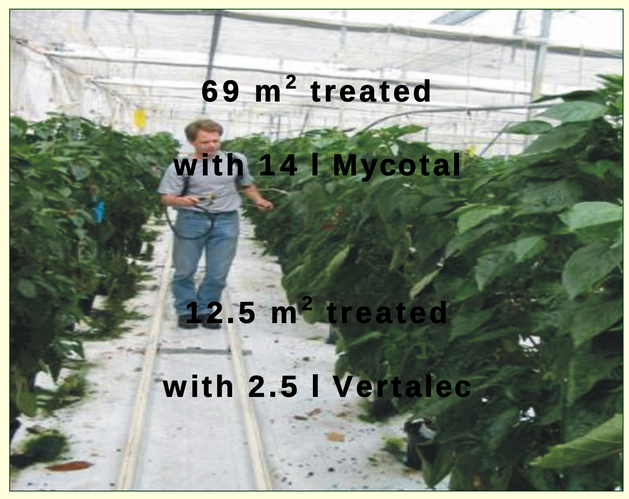

CONCLUSION

In order to have enough extract from one portion (1 kg) of tomatoes resulting in the death of 50 % of the most sensitive biosensor, Mycotal would need to be applied 69 x higher than the recommended dose and Vertalec 12.5 x higher: a highly unlikely scenario. The results suggest that Mycotal and Vertalec do not pose a risk when applied at the recommended dose.

Literature:
[1] Blum, B. *et al.* 2003. BioControl 48 (1), 474-487.
[2] Zimmermann *et al.* 2004. Nachrichtenbl. Deut. Pflanzenschutzd. 56 (6), 131-136.
[3] Skrobek *et al*., 2004. in preparation

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