

Metarhizium anisopliae and Verticillium lecanii* — safe bioinsecticides



Skrobek, A.¹, Ravensberg, W.J.², Brueckner, S.³, Shah, F.A.¹, Ben El Hadj, N.⁴, Wang, C.S.¹, Vey, A.⁴ & Butt, T.M.¹
¹UWS Swansea, UK; ²Koppert, Berkel en Rodenrijs, NL; ³Prophyta GmbH, D, ⁴INRA St. Christol, F

INTRODUCTION

- *M. anisopliae* and *V. lecanii* are well-known fungal biological control agents (BCAs) for a range of foliar and soil pests.
- *V. lecanii* is the active ingredient of the commercial products Mycotal and Vertalec (both Koppert, NL).
- The secondary metabolites of BCAs are of increasing interest for the registration of biocontrol products.
- Destruxins (dtxs) have been described as predominant metabolites for both *M. anisopliae* and *V. lecanii* [1,2].
- The dtx A, B and E contents of different *M. anisopliae* cultures and of the commercial products Mycotal and Vertalec assessed.
- Food and horticultural crops were treated with the BCAs, the plant material was harvested and analysed for dtxs A and B.

MATERIALS AND METHODS

- Greenhouse trials for residue analyses on tomato and cucumber were set up acc. to EC Working Document 7029/VI/95 rev. 5. Crops were treated with Mycotal and Vertalec at 10 fold above the recommended dose in a foliar application.
- Cucumber was also treated with a soil application of *M. anisopliae* V275 at 2×10^9 conidia per litre soil
- Cyclamen and polyanthus as examples for ornamentals were treated with a soil application of *M. anisopliae* V275 (10^{10} conidia per litre compost)
- Extraction protocols with organic solvents and HPLC analyses were developed for fungal cultures and different crops [3,4]

RESULTS

Table 1. Dtx content of *M. anisopliae* V245 and V275 cultures – lab scale, large scale fermenter and conidia grown on rice.

<i>M. anisopliae</i> V245/V275			
	Dtx A	Dtx B	Dtx E
Culture filtrate lab-scale	74/199 mg/l	24/100 mg/l	55/41 mg/l
Mycelium lab-scale	traces	traces	traces
Culture filtrate and mycelium large-scale	-	-	-
Conidia (per 10^{10} spores)	0.6/0.02 mg	2.4/0.004 mg	0.3/0.001 mg



V. lecanii

No dtxs were detected in Mycotal and Vertalec unformulated spores and formulated product from a large-scale fermenter

Analyses of plant samples



- **No dtxs** were detected in cucumber fruit treated with *M. anisopliae* V275 (soil application)
- **No dtxs** were detected in cyclamen and polyanthus leaves or roots treated with *M. anisopliae* V275 (soil application)
- **No dtxs** were detected in cucumber or tomato fruit treated with a 10 fold dose of Mycotal and Vertalec (foliar application)



CONCLUSION

Studies at different stages of the production process showed that dtxs were not produced under large-scale conditions and were only detected in small amounts in conidia of *M. anisopliae* (when extracted destructively with organic solvents). It can therefore be assumed that the BCAs do not pose a risk to the workers in the production facilities or the growers. Dtxs were not detected in food and horticultural crops treated with foliar and soil applications of the BCAs, thus indicating that the metabolites do not enter the food chain.

* The Mycotal strain of *V. lecanii* has now been classified as *Lecanicillium muscarium*, the Vertalec strain as *L. longisporum* [Zare and Gams, 2001. Nova Hedwigia 73, 1-50.]

Literature:

- [1] Ben El Hadj *et al.*, 2004. in preparation
- [2] Roberts, 1966. J. Invertebr. Pathol. 8 (1), 222-227
- [3] Skrobek *et al.*, 2004. J. Biochem. Biophys. Methods, submitted
- [4] Wang *et al.*, 2004. J. Invertebr. Pathol. 85 (3), 168-174

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