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Susceptibility of *Cameraria ohridella* to the entomopathogenic fungus *Lecanicillium muscarium* under outdoor conditions

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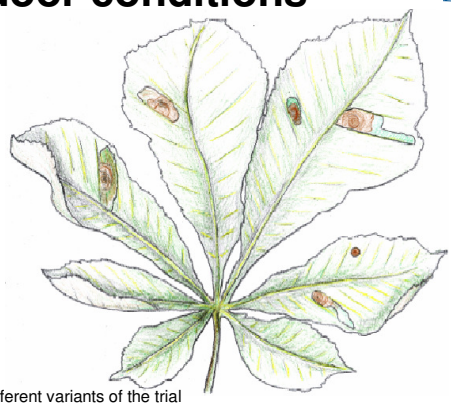
Introduction

To race the incentive for commercial production of a very promising strain of the fungus *Lecanicillium muscarium* ZARE & GAMS from our section Phytomedicine (strain V24), we tried to enlarge the area of application. The effectiveness of the strain against important pest insects was already proofed under glasshouse conditions. Now we conducted trials to examine the ability of strain V24 for use under outdoor conditions. The horse chestnut leafminer moth *Cameraria ohridella* DESCHKA & DIMIC was chosen as a model object because in laboratory trials the susceptibility of the host to our strain was shown.



Material and Methods

The trial took place on horse chestnut seedlings. The fungus *L. muscarium* was sprayed as spore suspension of Mycotal® or as strain V24, respectively in different variants (tab. 1). A water applied control was carried out to compare the results. Each variant contained 12 seedlings, settled with an initial population of *C. ohridella*. The first application of the fungus took place on the 7th of May with 500 ml suspension per variant and was repeated at intervals of 7 or 14 days up to the 15th of September. On the 28th of June bags of fleece were put over leaves on the tree, one leave per bag, 3 leaves per variant. Three weeks later emerged adults from the bags were counted, disinfected and incubated in wet chambers (20°C, 7 or 14 days). After this, the leaves from the bags were picked up, transferred to water filled Erlenmeyer flasks and put in cages in a climatic chamber (20°C, 60%RH, L:D 16:8h). Three weeks later all new emerged adults were counted and incubated in wet chambers, too. Then all closed mines were opened and alive, dead and moulding individuals of endophytic stages were determined. Living and dead juvenile forms without moulding were incubated in wet chambers (20°C, 14 days).

Tab. 1: Different variants of the trial

L. muscarium as:	'Addit'	Spore concentration per ml		Interval of application (d)		Name of the variant
		$1{,}5x10^7$	$1{,}5x10^8$	7	14	
Mycotal®		X			X	My14d
Mycotal®	X	X			X	MyA14d
Strain V24		X		X		L7 7d
Strain V24	X	X		X		LA7 7d
Strain V24		X			X	L7 14d
Strain V24	X	X			X	LA7 14d
Strain V24			X		X	L8 14d
Strain V24	X		X		X	LA8 14d

Results

28th of June — leaves in bags (field)

- moulding of the emerged adults showed the impact of the fungus to the population
- differences of the moulding rate between the variants are visible, significant only between LA7 7d and My14d
- higher rates of moulding at variants with 'Addit', plainest visible on the variants with Mycotal®

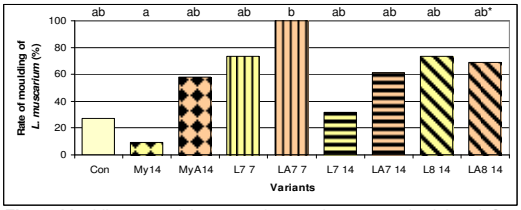


Fig. 2: Moulding rate of *L. muscarium* on the emerged adults of *C. ohridella* after incubation (*Significance between variants with different letters)

19th of July — incubation of emerged adults; leaves picked up, transferred to cages

Fig. 3: *L. muscarium* growing on cadavers of *C. ohridella*

- effectiveness of the fungus on the juvenile forms within the mines
- spontaneous moulding of *L. muscarium* in the field
- decreased number of living hosts, significant difference between the variant L7 14d and control

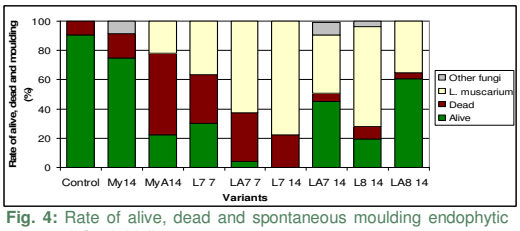


Fig. 4: Rate of alive, dead and spontaneous moulding endophytic stages of *C. ohridella*

09th August — opening of all closed mines, monitoring the juvenile forms in the mines; incubation of *endophytic stages*

- even after incubation, the juveniles of variant My14 didn't show any mycelia growth
- summarized moulding rate of the fungus (in mines and after incubation) ranged between 40 and 78%
- after incubation the mortality of all host stages in the mines was significant higher in the fungus variants compared to the control, except My14d

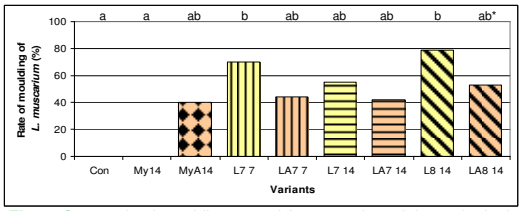


Fig. 5: Summarized moulding rate of *L. muscarium* of the endophytic stages of *C. ohridella* in the mines as well as after incubation

Conclusions

Usually the fungus *L. muscarium* is used in greenhouses, because it is adapted to moderate temperature and humidity over 80%. Additionally the spores are sensitive about UV-radiation. Therefore the increased mortality and the moulding of the host in the outdoor trial are important; the fungus appears less susceptible to the environmental conditions, than expected. Better or similar effectiveness of the unformulated strain V24 (L7 14d, LA7 14d) and the comparable variants of Mycotal® (My14d, MyA14d) are possibly attributed to the distribution of spores in the suspensions. The spores of strain V24 set up clusters in higher concentrated suspensions (≥ $1x10^8$ sp/ml). Maybe the effective inoculum will be decreased by clusters, like visible in the variants V24 with $1{,}5X10^8$. sp/ml. In the case of Mycotal® such clusters were already found at concentration of $1{,}5x10^7$ sp./ml. The results show the importance of the strain V24 as biological control agent..

Acknowledgements

The author wishes to thank Willem Ravensberg and Frans Weber from Koppert Biological Systems (NL), Kordes Jungpflanzen (Germany) and Heiko Lerche for the support.