

# Can *Metarhizium brunneum* F52 be considered a “low risk” substance in the EU?

## Effects of the microbial control agent on a non-target arthropod

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### Objectives

- ✓ Investigate whether *Metarhizium brunneum* strain F52 can be considered a “low-risk” active substance, according to the risk assessment proposal currently discussed within the EU Commission
- ✓ Examine exposure data: direct effects of *M. brunneum* on a pest insect (*Tenebrio molitor*) and a non-target beneficial insect (*Atheta coriaria*)
- ✓ Compare the virulence of *M. brunneum* strain F52 to a *Beauveria bassiana* isolate (B1)

### Materials and methods

Fungal isolates



*Metarhizium brunneum* F52  
*Beauveria bassiana* (B1)

Fungal suspensions containing  $1 \times 10^5$  and  $1 \times 10^7$  conidia/ml of 0.05% Triton X aqueous solution



*A. coriaria*



*T. molitor*

Four infection bioassays were performed with both species. For each treatment, 20 adults of *A. coriaria* and 30 larvae of *T. molitor* were used in each repetition.

### *M. brunneum* F52: a low risk active substance?

The currently discussed proposal for amending the criteria in Annex II.5 of the Regulation EC No 1107/2009 suggests that “low risk” substances should pass a **first tier risk assessment** (no mitigation measures) to be approved.

Characterization,  
 biological properties  
 and efficacy

Emission data

Fate and behavior in  
 the environment

Ecotoxicology

Safety evaluation

### Bioassay results

Figures 1 & 2: *T. molitor* survival probability at  $1 \times 10^7$  and  $1 \times 10^5$  conidia/ml with confidence intervals

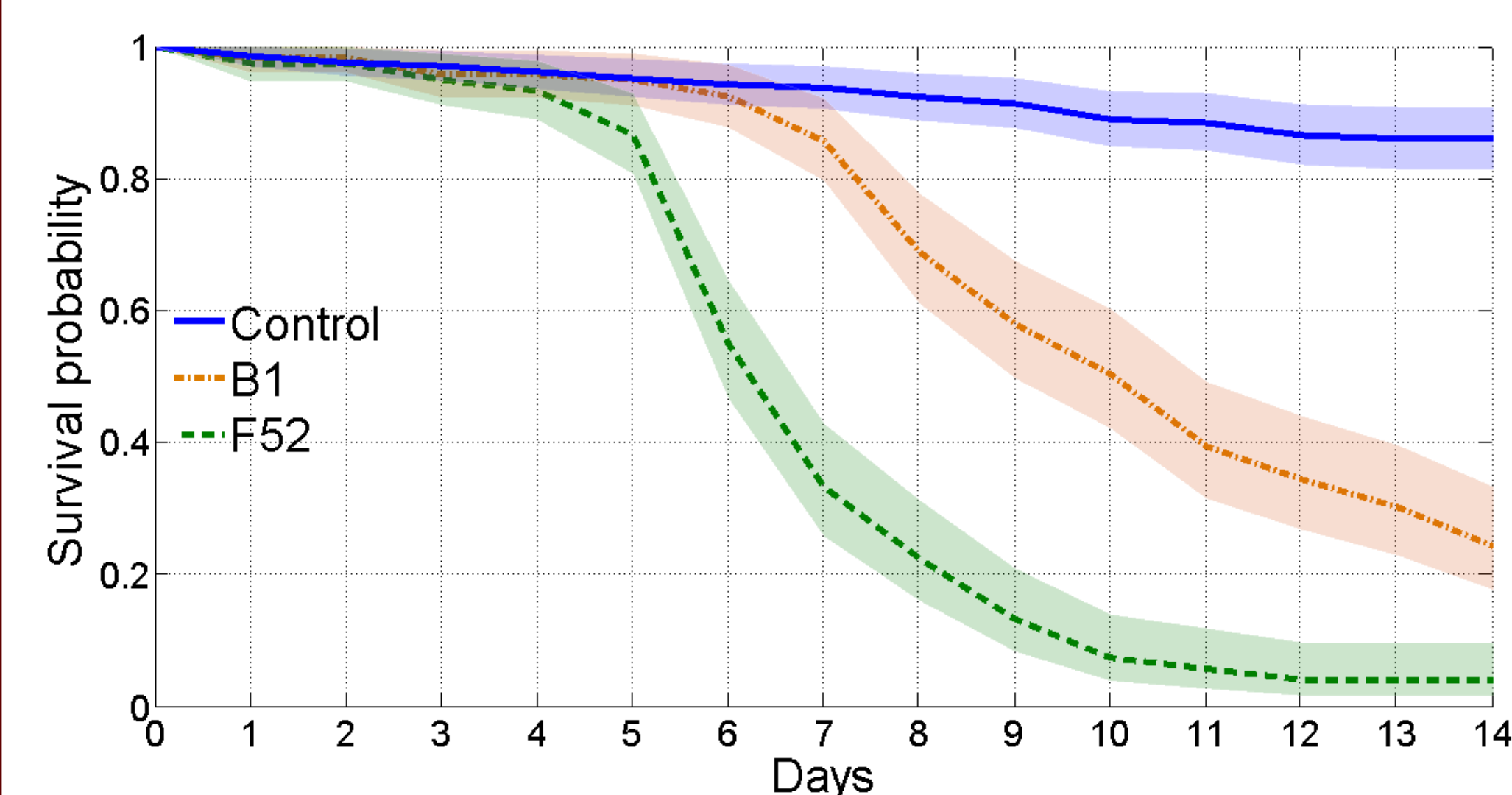
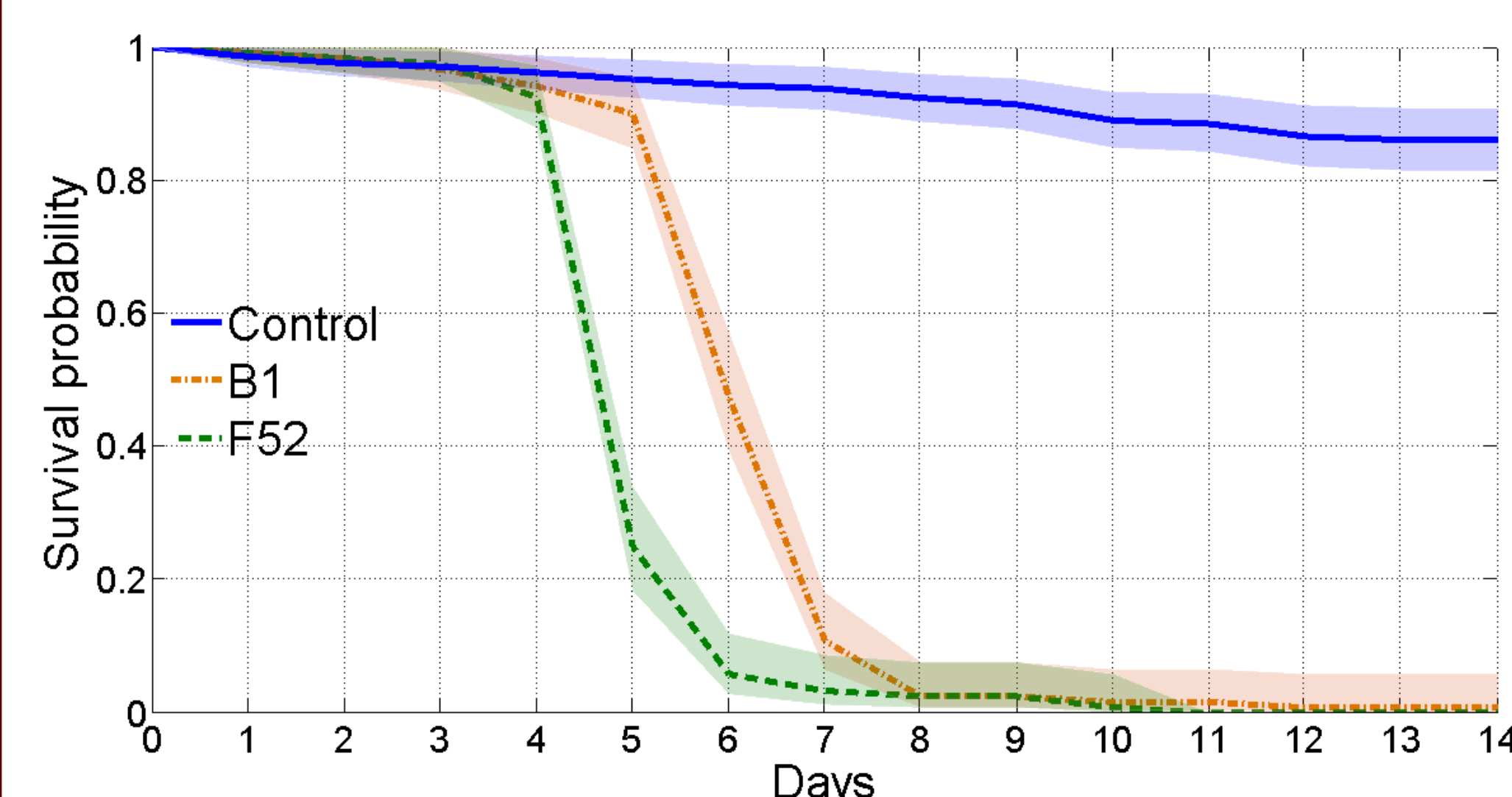
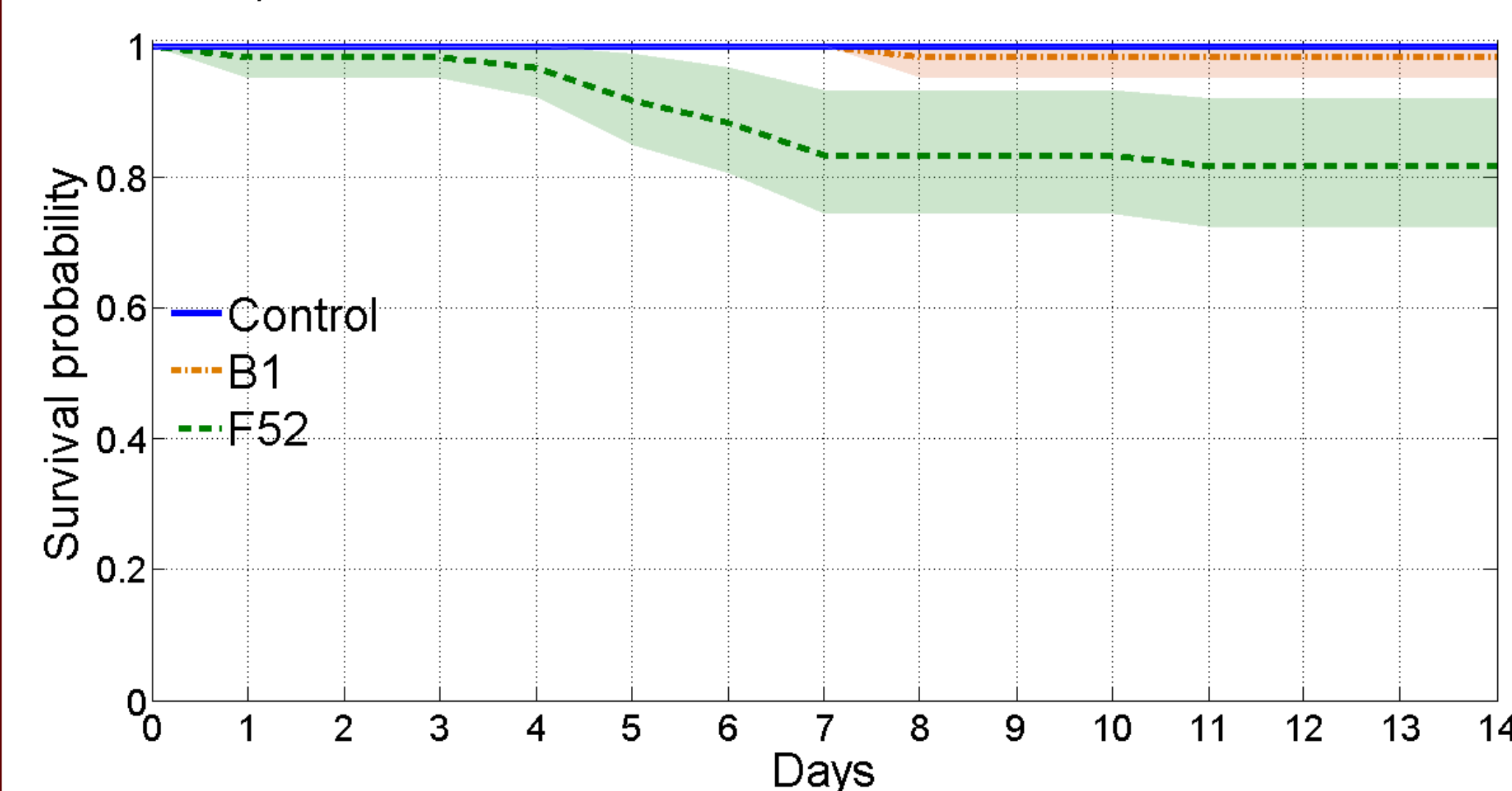


Figure 3: *A. coriaria* survival probability at  $1 \times 10^7$  conidia/ml and confidence intervals



- B1 and F52 had negligible effects against *A. coriaria* - more than 80% of the insects survived the treatment with *M. brunneum*
- Higher virulence was reported for *M. brunneum* F52 as compared to *B. bassiana* isolate B1

### Regulation criteria for microbial control agent usage in the EU

Persistence	Host range
<p><b>Current Regulation:</b></p> <ul style="list-style-type: none"> <li>• <math>DT_{50}</math> lower than 60 days</li> </ul> <p><b>Proposed changes:</b></p> <ul style="list-style-type: none"> <li>• Concept of persistence not applicable to microorganisms, which can reproduce and are naturally occurring</li> <li>• Related risks are to be covered in the ecotoxicology data requirements</li> </ul>	<p><b>Current Regulation:</b></p> <ul style="list-style-type: none"> <li>• Risk assessment performed for adverse effects on non-target organisms</li> </ul> <p><b>Proposed changes:</b></p> <ul style="list-style-type: none"> <li>• The wide range of <i>M. brunneum</i> F52 host species is an area of concern and there should be space for a case by case approach</li> <li>• Define application methods to reduce exposure to non-target organisms (e.g. soil inoculation)</li> </ul>

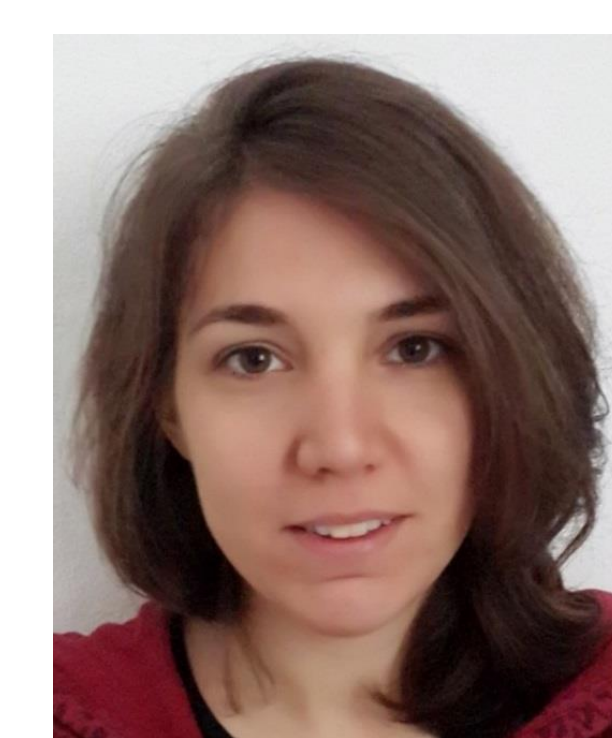
### Conclusions

According to the proposed changes to the EU regulation *M. brunneum* F52 can be placed in the “low risk” category, based on its persistence and host range.

The results of this study suggest that its use is environmentally safe from an ecotoxicological perspective. Furthermore, the formulations proposed by the INBIOSOIL team, focusing on an effective maintenance of the fungus in the soil, minimize the exposure of arthropods living on the vegetation.

### Perspectives

- Improved safety-evaluation test protocols for microorganisms, taking into account biological properties and ecological aspects of the organism
- Assess direct and indirect adverse effects on non-target organisms
- Field trials with formulated products



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