Biological Control: Fighting below ground insect pests with insecticidal ***Pseudomonas*** **bacteria, nematodes & fungi**

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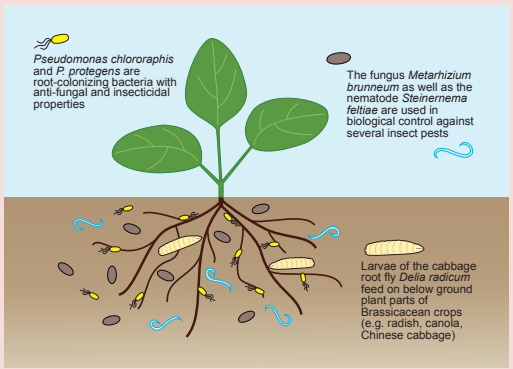
Introduction

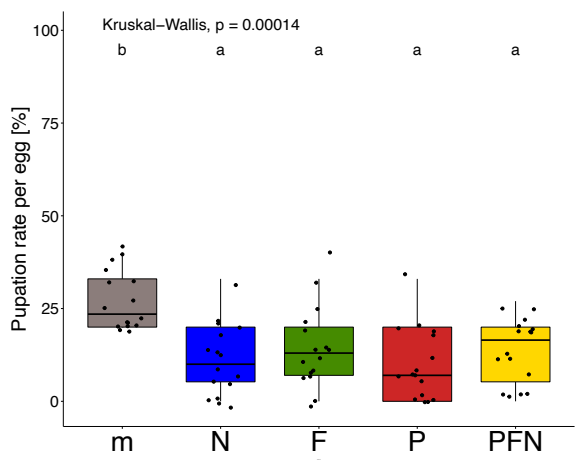
- The cabbage root fly *Delia radicum* causes increasing losses in the production of Brassicacean crops and so far, no satisfactory control measures exist
- Plant-beneficial fluorescent ***Pseudomonas chlororaphis*** **bacteria with insecticidal activity (P)** were combined with **entomopathogenic nematodes (N)** and **entomopathogenic fungi (F)** to control the cabbage root fly *Delia radicum* under screening, greenhouse, semi-field and field conditions



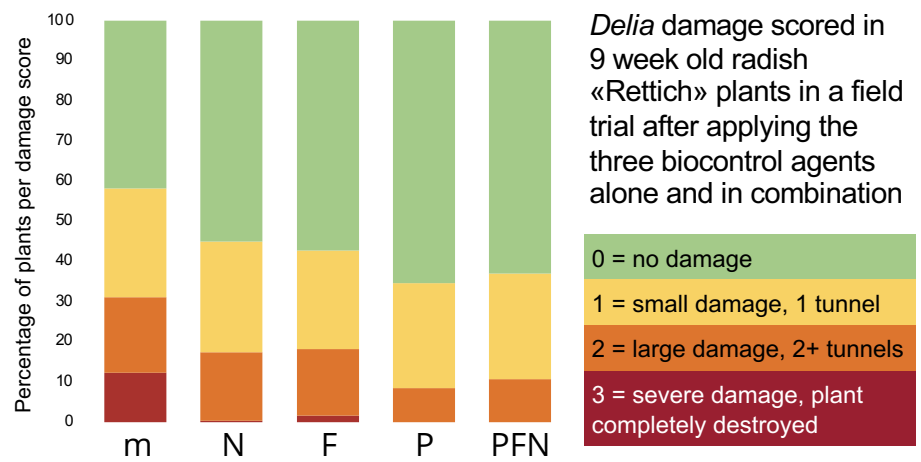
Conclusion

- All three chosen biocontrol agents are able to reduce *Delia radicum* survival and damage alone and in combination under different conditions
- The combination of biocontrol agents can lead to more stable effects

Results



Delia development from egg to pupa displayed as pupation rate in a radish greenhouse experiment with no (m = mock), single (N = *S. feltiae* RS5, F = *M. brunneum* Bip5, P = *P. chlororaphis* PCLRT03) and combined (PFN = PCLRT03 + Bip5 + RS5) biocontrol agent application



Delia damage scored in 9 week old radish «Rettich» plants in a field trial after applying the three biocontrol agents alone and in combination

- Combinations of the three biocontrol agents can reduce *Delia* development in screening, greenhouse and semi-field experiments
- Combinations can reduce plant damage caused by *Delia*, e.g. feeding tunnels in produce, in greenhouse, semi-field and field trials

Study systems

Screening, greenhouse, semi-field and one field experiment were conducted with radish bulbs resp. plants

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