MICROBIAL BIO-STIMULANTS OF HUNGARY: A REVIEW OF THEIR POTENTIAL INSECTICIDAL EFFECTS

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What are plant bio-stimulants ?

- Plant bio-stimulants, sometimes called bio-fertilizers or soil conditioners, are ingredients stimulating plant nutrition processes independently of the product's nutrient content with the sole aim of improving characteristics of the plant or the plant rhizosphere (EU 2019; Ricci *et al*. 2019)
- Among them, there are non-microbial plant biostimulants and microbial plant bio-stimulants /bio-fertilizers (EU 2019).


Seed coating with fungal bio-stimulant (Photos: S. Edgington)


Powder formulation of fungal bio-stimulant (Photo: S. Edgington)


Commercial biostimulants (UK, Photo: P. Taylor; Zambia Photo L. Durocher-Granger)


Application of fluid fungal biostimulants (Photos: R. Reeder)

What is the problem ?

- There is inconsistency on the regulation of bio-stimulants across countries
- There are often multiple effects of microbial bio-stimulants on crops
- Those effects are often unclear or lack of awareness

Our hypothesis

- Some microbial bio-stimulants/ bio-fertilizers for crops may also have properties useful for pest management

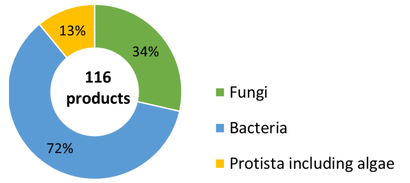
Our methods

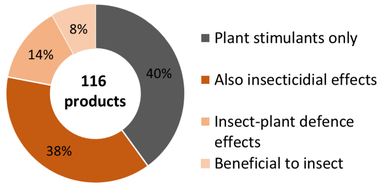
- We reviewed all microbial bio-stimulants/bio-fertilizers registered in Hungary (NebiH 2020)
- We conducted a literature review on potential side effects of microbial bio-stimulants/bio-fertilizers on insects (CAB Direct 1917 to 2020, Web of Science 1973 to 2020)

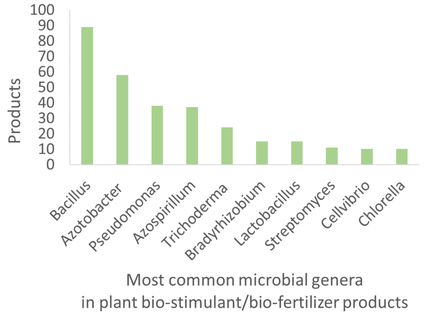
Farmers should be made aware that nearly half of the microbial bio-stimulants for crops may also have pest management effects

Our results

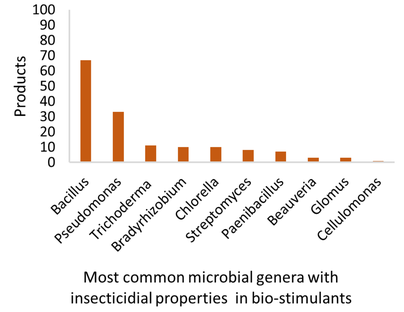
- Among 116 microbial plant bio-stimulant/bio-fertilizer products reviewed,
  - 53% are based on bacteria, 16% on fungi, 9% on protista incl. algae.
  - 16% contain bacteria-fungi mixes, 3% bacteria protista mixes, 2% fungi-protista mixes and 2% mixes of all three groups.
- 38% of the microbial bio-stimulant/bio-fertilizer products may also have insecticidal properties, 14% insect-plant defence properties and 8% may be beneficial to insects.
- The top 10 micro-organisms used in plant bio-stimulants/bio-fertilizers are *Bacillus megaterium, Acetobacter vinelandi, Acetobacter chroococcum, Pseudomonas fluorescens, Azospirillum brasiliense, Bacillus subtilis, Bradyrhizobium japonicum, Azospirillum lipoferum, Bacillus circulans, Chlorella vulgaris*







Most common microbial genera in plant bio-stimulant/bio-fertilizer products



Most common microbial genera with insecticidial properties in bio-stimulants

Please help us

- Please tell us your experiences with the diverse effects of microbial plant bio-stimulants
- Do you know about any other country that has a database on registered yield enhancers, biostimulants, biofertilizers, soil conditioners?
- Contacts: tarigan.sri.ita@phd.uni-szie.hu; s.toepfer@cabi.org

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KNOWLEDGE FOR LIFE