

EPNs and EPFs: A summary of research, potential and prospects.



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HORTGRO science
Growing Fruit IQ

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That EP-whatever!

- There are many other types of biological control agents such as viruses, parasitoids, bacteria etc.
- Entomopathogenic fungi – EPF
- Entomopathogenic nematodes – EPNs
- Ento = insect
- Pathogenic = it kill



Contents

- The active ingredient?
- Screening of EPF and EPN
- Expectation of a biological
- From academia to commercial
- Conclusion

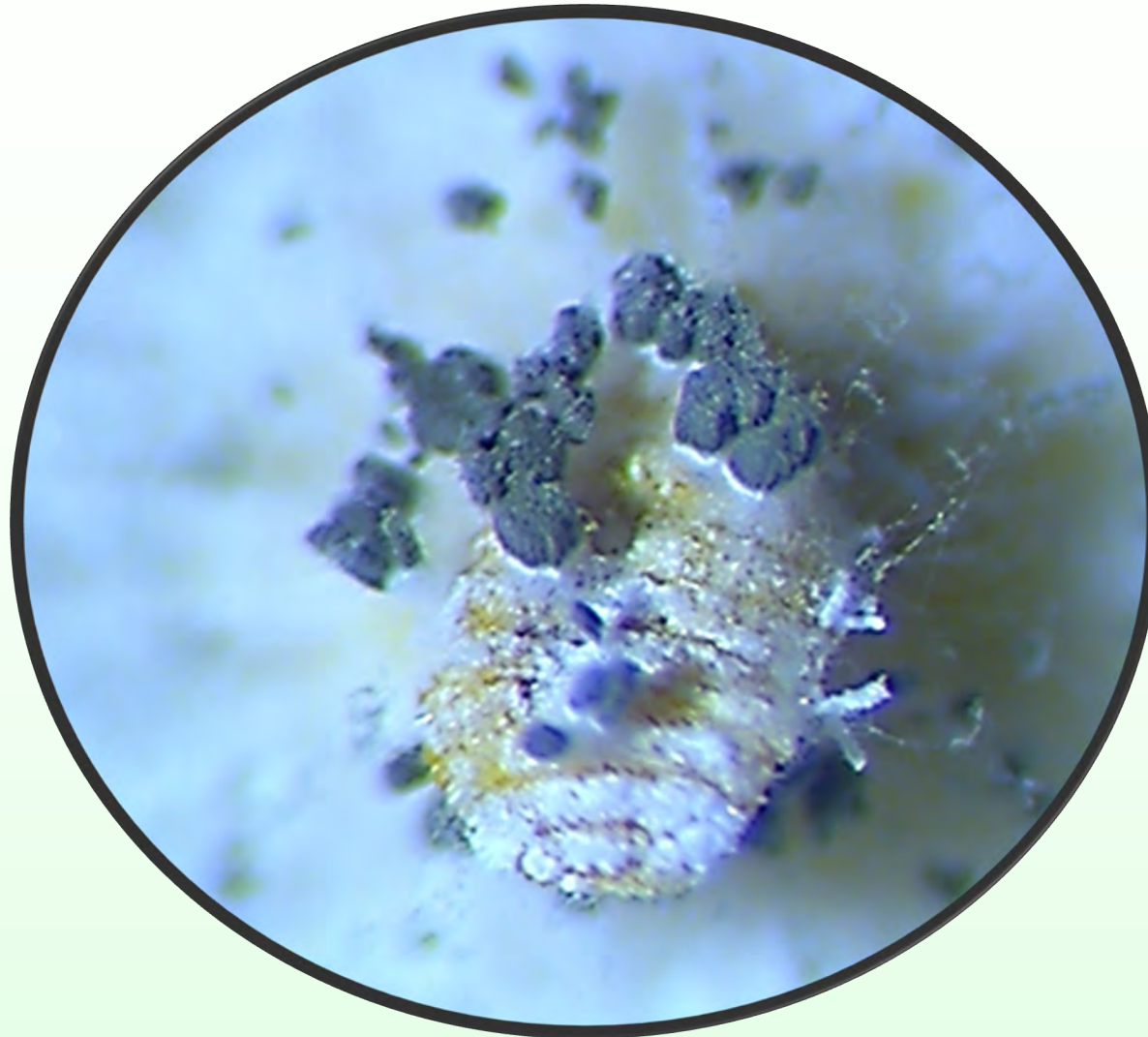


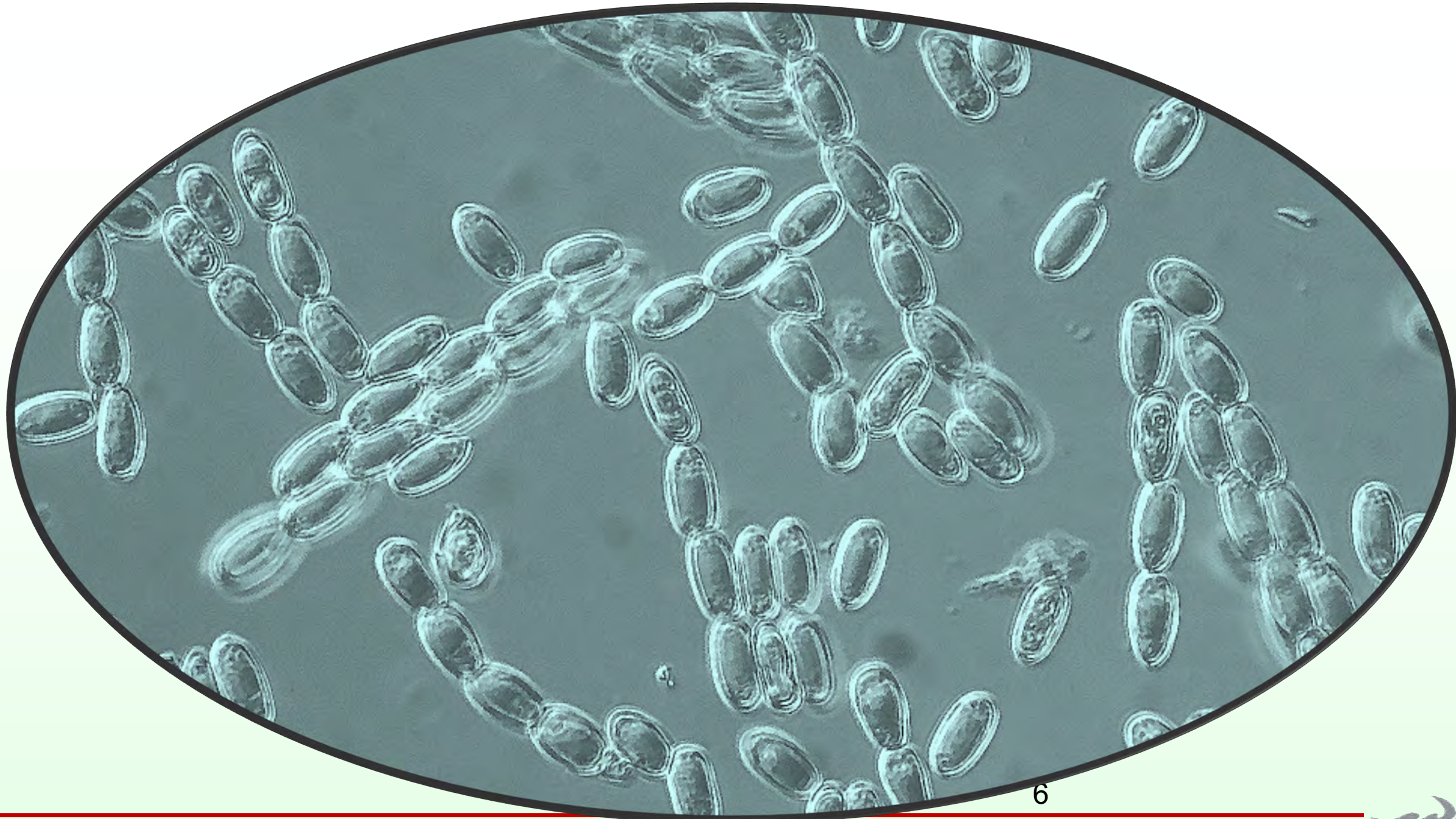
Difference between apples and pears

EPF (Fungus)	EPN (nematode)
Unicellular	Multicellular animal
Spores	Infective juveniles
Enter directly on contact	Enter through natural openings
Kill after 5 days or more	Kill after 2 days
High soil recovery rate 60%	Low recovery rate 5-7%
Easy to culture and formulate	Difficult
Stationary	Mobile



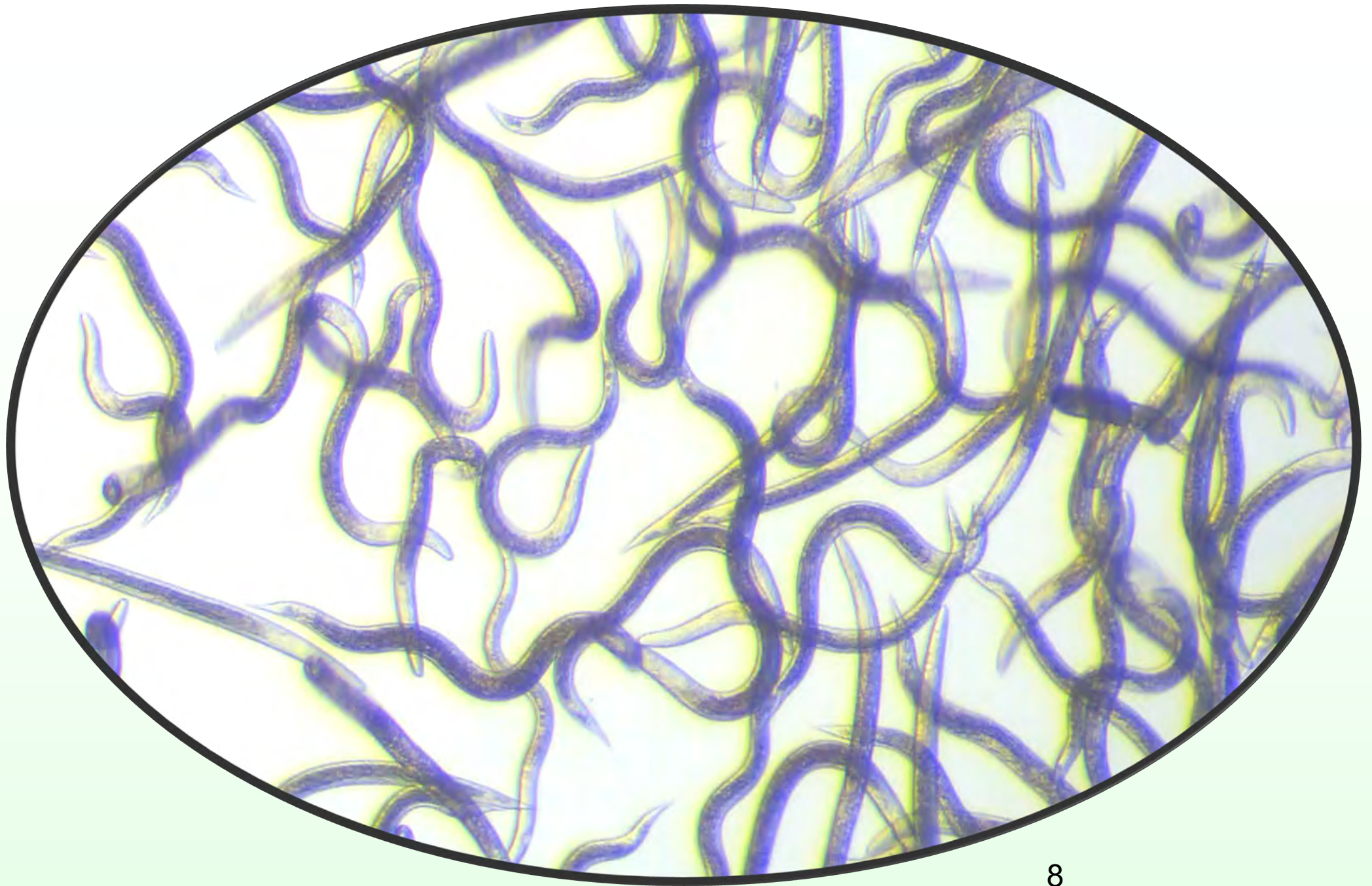
So, what does the active ingredient for
fungi look like?





What does the active ingredient for
nematodes look like?





The research process to find a suitable candidate

Soil sampling



Trapping



Isolation



Identification



Screening



Mass culture



Formulation

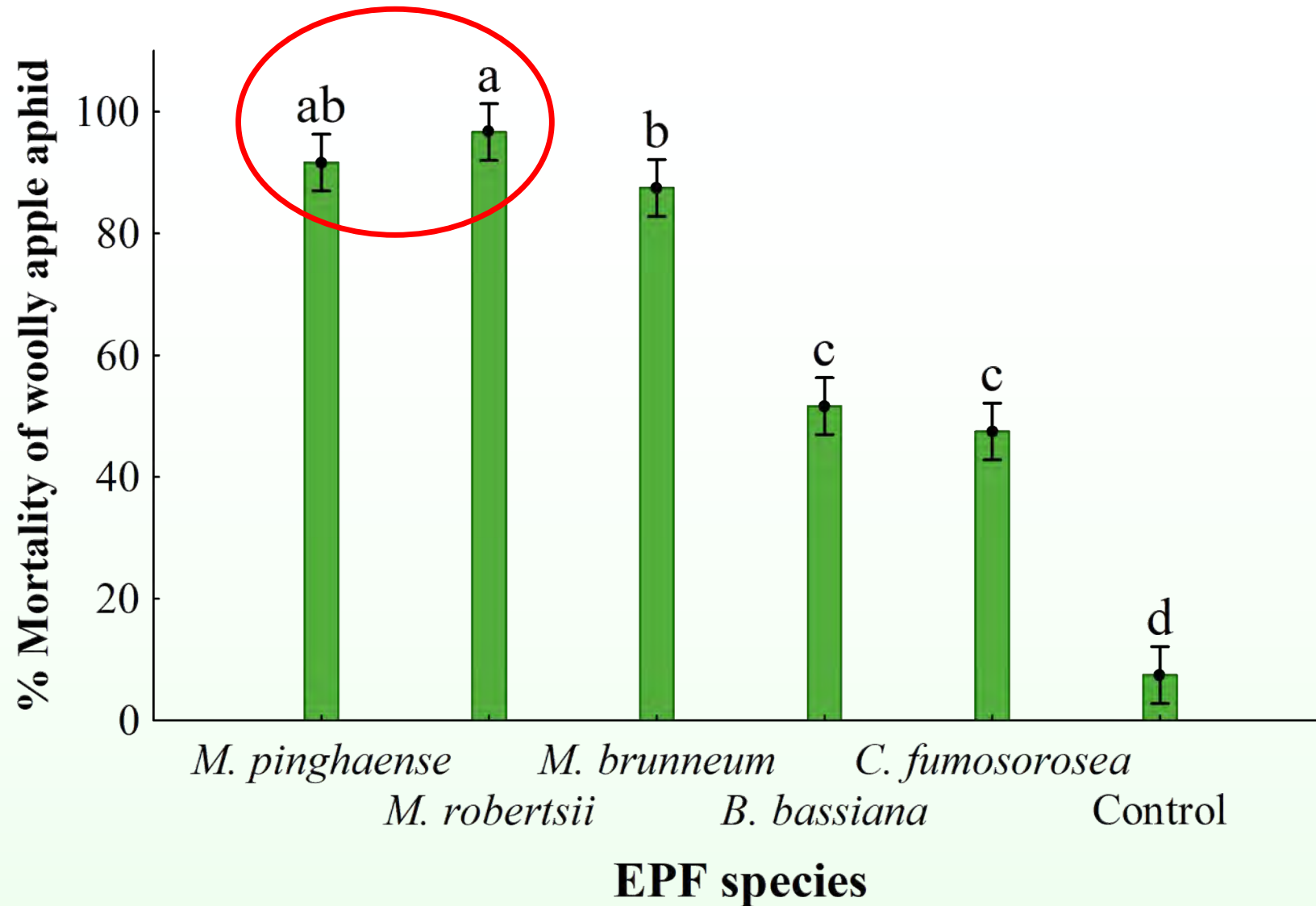


Commercialisation



Example of the selection of a fungal candidate



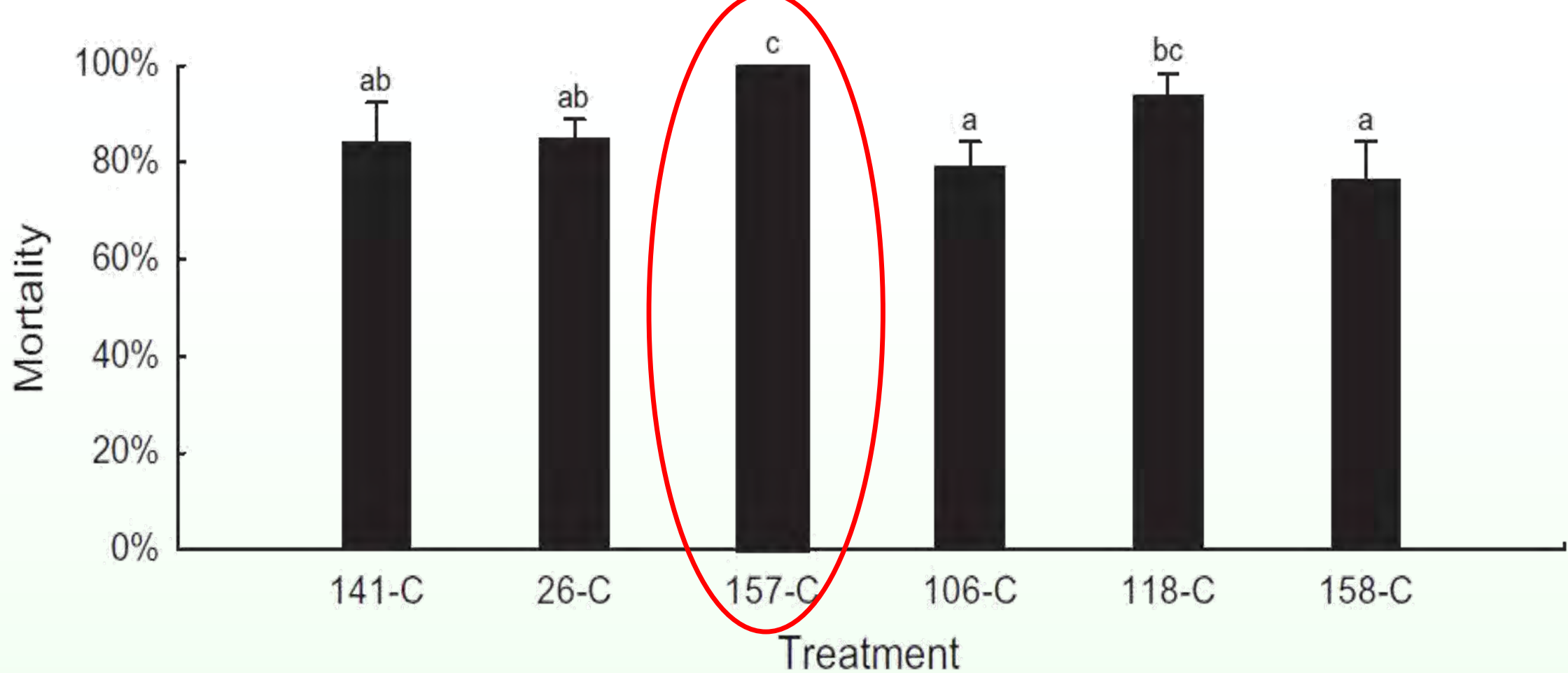


Average percentage mortality of **woolly apple aphid** 5 days after exposure to the conidia of *Metarhizium pinghaense*, *M. brunneum*, *M. robertsii*, *Beauveria bassiana* and *Cordyceps fumosorosea*.



Example of a nematode candidate



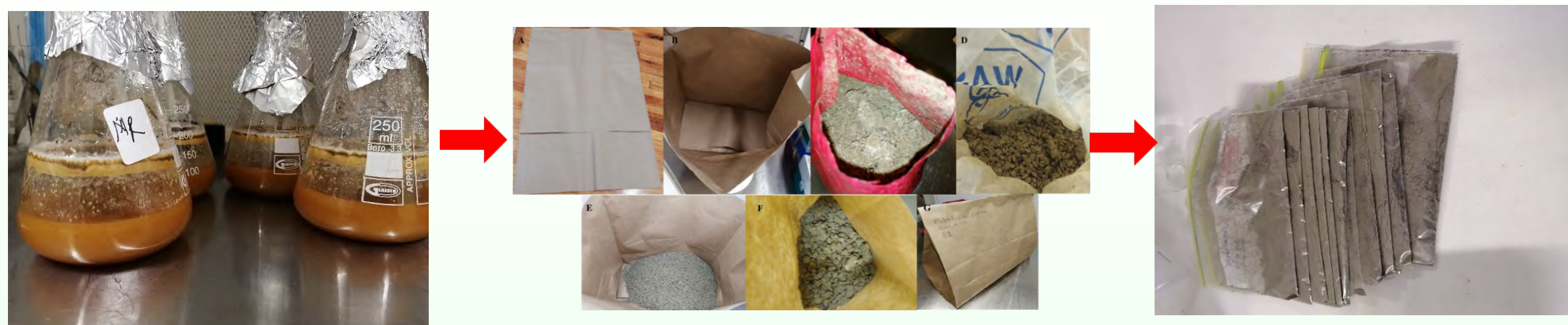


Mean percentage infection of **false codling moth** last instar larvae inoculated with **50 IJ/insect** of *Steinernema citri*(141-C), *Heterorhabditis bacteriophora* (26-C), ***S. yirgalemense*** (157-C), *S. khoisanae* (106-C), *H. zealandica* (118-C) and *Heterorhabditis sp.*(158-C) after 48 h at 25 C.



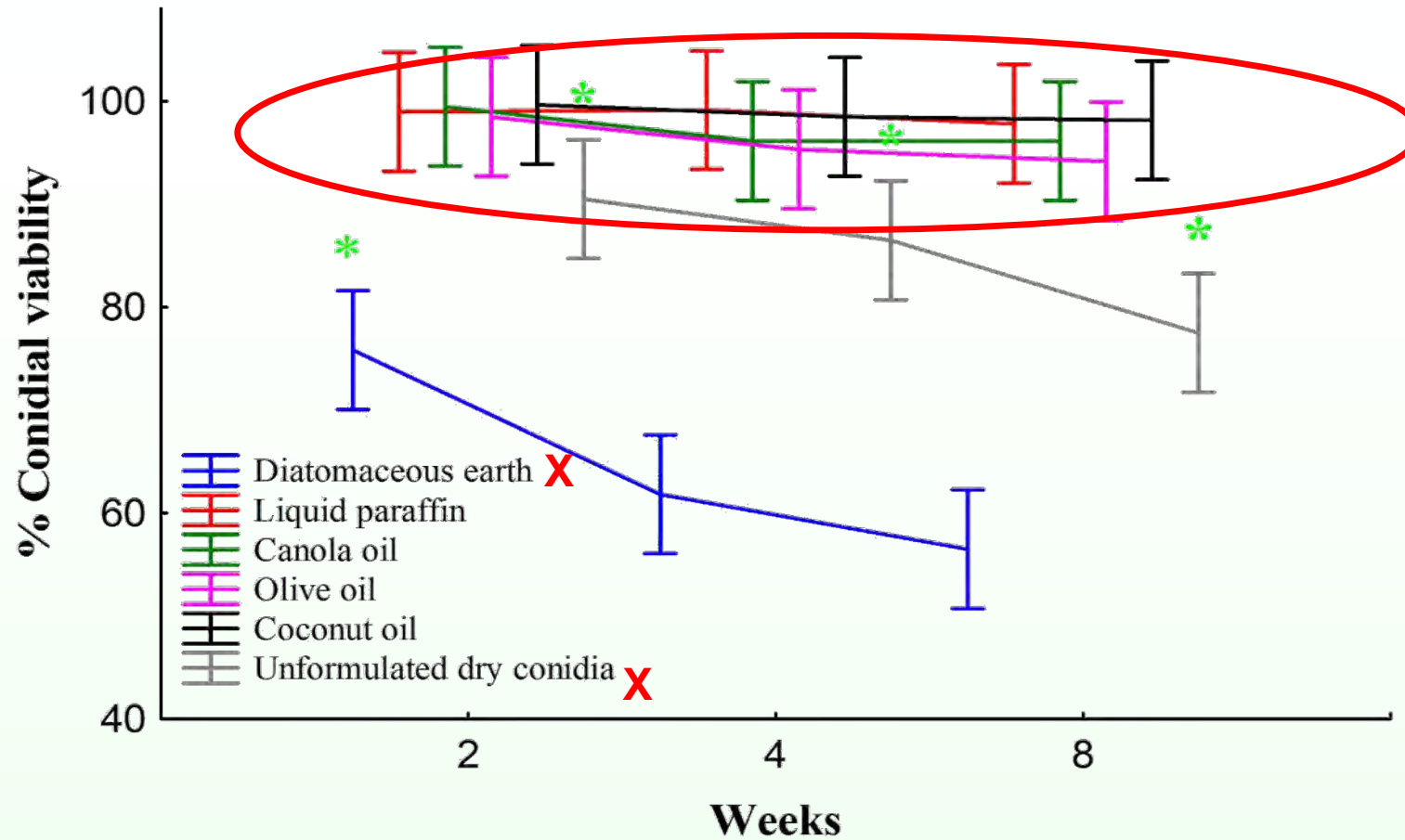
Mass culture and formulation of Fungi

(Jove video published)



Mathulwe, L.L., Malan AP & Stokwe, N.F., 2022. Mass Production of entomopathogenic fungi, *Metarhizium robertsii* and *Metarhizium pinghaense*, for commercial application against Insect Pests. Vis. Exp. (181), e63246. <https://doi.org/10.3791/63246>





Percentage viability of *Metarhizium robertsii* conidia formulated in diatomaceous earth, liquid paraffin, canola oil, coconut oil and unformulated dry spores, over eight weeks.



Mass culture



What to expect from a biological control agent

- Knowledge transfer company/representative
- Not a silver bullet - IPM
- Stringent product quality control
- Label with full instructions – which should be carefully read
- Registration ensure warranty



From academia to industry

- Lack of connection between the two entities
- Registered exotic EPF and EPNs
- Registration of local indigenous products prevented by legislation and politics
- Exotic nematodes cannot cause any harm
- Local biologicals are ready to be produced on a small scale!!!



Conclusion

- Not only control but also inoculative
- SA should start with small to medium companies
- Can even be done on farm level
- Divide between research and commercial application should be bridged
- Biphasic technique for nematode culture – temporary solution
- There is a place for both local production and imported products!!



Thank you

