

Applied Robotics in Biocontrol

Example of Trichogramma in row crops and perspectives for the future

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Bioline France, a 30+ year experience of Biocontrol in row crops



Bioline France launched *Trichogramma brassicae* with the INRA in the 80's

- *Trichogramma* is an egg parasitoid
- European Corn Borer control (*Ostrinia nubilalis*)
- 150 to 250,000 ♀ to optimize distribution
- 120,000 hectares covered, mostly with manual applications
- 3-5 hectares treated per person and per hour



Manual applications are a limitation in the development of *Trichogramma* in France and internationally



What's happening in row crops?



Row crops: large acreage and low added value per hectare, with limited concern on chemical residues → drivers are very different to that of specialty crops

Biocontrol is not represented enough in row crops

- No cross-over of products designed for specialty crops
 - *Trichogramma* is the only macroorganism sold in row crop
 - Micro-organisms and seaweed extracts
 - i.e. scalable technologies



To be adopted by farmers, Biocontrol must be:

- As efficient as chemicals ✓
- Cost-effective ✓
- Easy to apply ✓ / ✗ for large fields (>10 ha)



→ Need for new application techniques

A step by step approach of robotics on maize in France



Trichogramma capsules released by drone or by plane (2013-2017)

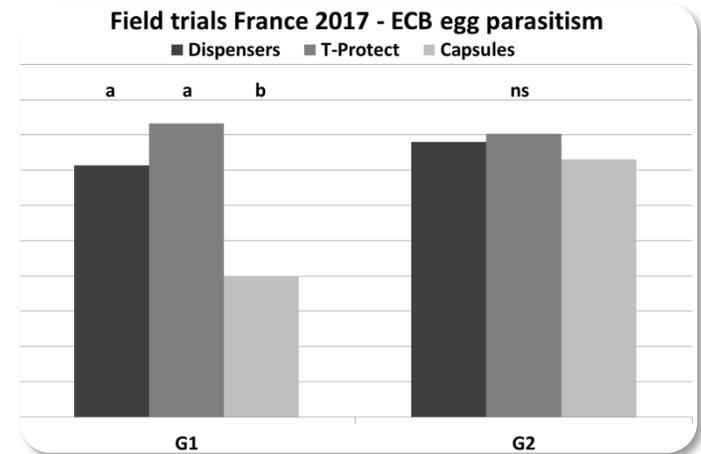
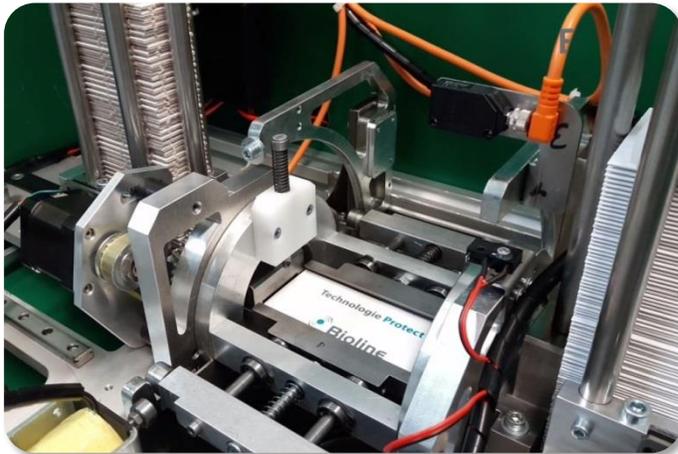
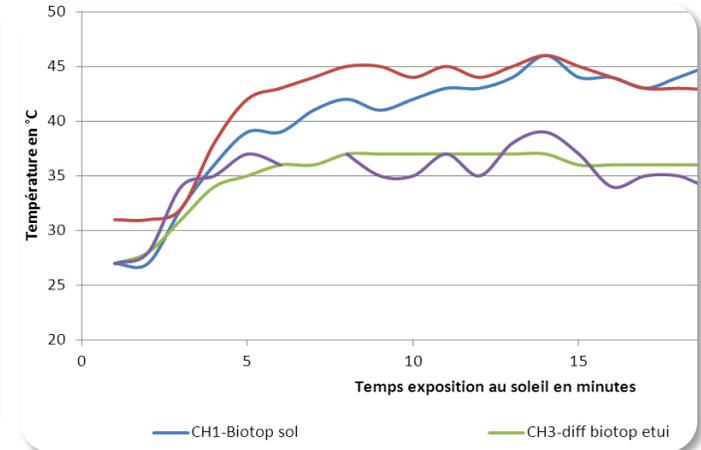
- 250 biodegradable capsules, with 300,000 ♀
- Distribution system for large areas
- Complementarity drone/plane
 - Drone: 15 ha per hour
 - Plane: 80 ha per hour
- Hurdles
 - Local regulation (licenses, aerodromes and high voltage lines)
 - Sunlight, crop density

→ Poorly efficient in non-covering crops



T-protect™ technology

- T-protect, a holder to protect the dispenser from soil heat
- Patented technology
- 15 hectares per hour



T-protect™ technology



Discussion & perspectives for the future



Impact of robotics

- They do make application easier, to raise the upper limit of the market
- But robotics question our business model
 - Leasing? Equipment park maintenance?
 - Is distribution willing to take this role?

Perspectives for *Trichogramma* applications

- Opening of new markets for *Trichogramma*:
 - Soybean in LATAM, maize in CE, ...

Robotics and digitalization are key for our future

- Bioline robotics department inside the R&D
 - Microbials applications in greenhouses
 - Mechanical weeding with A.I.
 - High speed pest monitoring, precision agriculture



IBMA should integrate Robotics companies to accelerate partnerships



Thank you!

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https://www.youtube.com/watch?v=uqkQD_W6v10