A new mycoinsecticide for treatment of grain storage

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Opportunity in grain storage

• Spoilage, yield loss, rejection of traded grain
• Grain beetles, mites, psocids, moths
• Insects survive in building fabric, move into grain at harvest
• Most stores treated when empty
• Some products available for grain admixture
Opportunity in grain storage

• Reduction in available chemicals to treat grain storage
  – Pirimiphos-methyl, deltamethrin, chlorpyrifos-methyl, phosphine gas
  – Diatomaceous earth, heat treatment, CO₂

• Resistance concerns

• Consumer pressure
A mycoinsecticide for grain storage

• From over 100 UK storage premises, over 70,000 insect cadavers were processed
• 8 isolates identified as *Beauveria bassiana*
• Some isolates caused high levels mortality
• Need to improve delivery & efficacy in realistic conditions
DEFRA funded project
Entostat as a delivery system

Carnauba wax is a bipolar electret, tribocharging 80% to the negative
Entostat as a delivery system

• Spores adhere to the exterior of Entostat particles and detach on contact with insect

• Inclusion of Entostat raises mean particle size to safe threshold

• Treated beetles retain spores with Entostat > 72 h after exposure

Pilot scale tests of formulations

Isolate selected for further field testing was IMI389521

 Arenas containing 3 species were treated with:
 - Nothing (negative control)
 - Blank oil (vehicle control)
 - Blank Entostat (vehicle control)
 - Oil formulations (2 concentrations)
 - Entostat formulations (2 concentrations)
 - Actellic (Organophosphate)
Pilot scale tests of formulations

Entostat dusting was more efficacious than oil spray
Concerns of end users

- Level of efficacy and residual effects
- Application to reduce inhalable dust
- Possibility of isolate further down food chain
- Cost
- Reduce Organophosphosphate use through the whole supply chain?
Technology Strategy Board project

• Develop sprayable formulation
• Develop application methods
• Build registration dossier
• Large scale efficacy testing
• Long term population effects, secondary cycling, persistence, effects on non targets
• Exosect to commercialise with Sylvan Bio
Regulatory plan

- Register new isolate & formulation for fabric treatment. Admixture later?
- Isolates Annex 1 listed were reviewed by Germany
- Pre-submission meeting with the selected regulatory authority is proposed
- Typical review time is 3 yrs and a significant cost for Exosect & Sylvan Bio
- Data requirements identified in regulatory plan
- Large scale efficacy test protocol to be agreed with appropriate regulator
Thank you for your attention.