SAPPIO Programme Factsheet

Fungi to control insects in food & grain stores (MYCOPEST)

LINK COLLABORATIVE RESEARCH

Objective

To identify the most effective insect specific fungi for use in controlling pests of premises used in cereal processing and storage.

Introduction

Stored grain on farms, in commercial stores, and processed grain in mills is at risk of infestation by a range of insect and mite pests. Even when pest-free grain is brought into store it is still at risk from pests already present, hidden in the fabric and structure of the building.

At present, the control of all these pests relies heavily on the use of organophosphate (OP) pesticides, supplemented by the use of methyl bromide as a fumigant in flour mills. However, the use of OP pesticides is under review and methyl bromide has been classed as an ozone depleting material to be phased out in the UK by 2005. Recently, the control of post-harvest grain pests has become even more important following the designation in 1995 of the majority of grain stores as food premises subject to the Food Safety Act, and the introduction in 1997/98 of the Assured Combinable Crops Scheme.

Thus the potential loss of a key fumigant and the major residual pesticides used for structural treatments will necessitate the development of alternative control measures.

Some fungi, specific to insects have been shown to provide effective control against some storage pests under tropical conditions. The purpose of the project is to identify the most effective naturally occurring fungal bio control agents of storage pests in Britain. It will evaluate their use for the control of stored food pests in the UK, either alone or as part of an integrated pest management strategy.

Approach

Isolates of naturally occurring insect specific fungi in England, Scotland and Wales that will infect and kill the major invertebrate pests of stored food will be collected.

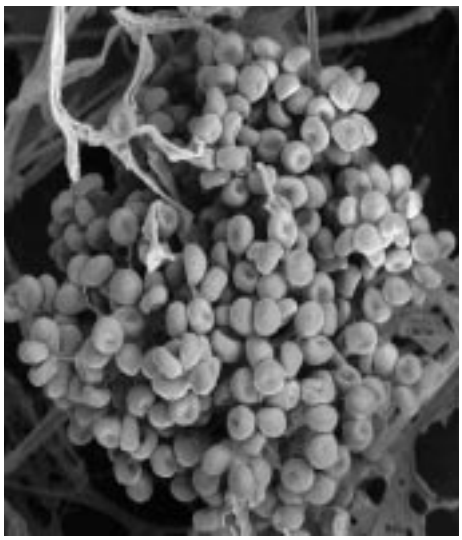
They will be established in laboratory culture, and their effectiveness against the major storage pests will be established and compared with existing isolates.

Ecological studies will be conducted to show how the efficacy and persistence of these fungi are affected by the structures, produce and environmental conditions found in UK food stores, and how the fungi alter pest population dynamics.

The most promising isolates will be formulated into test products to assess practicality of use, efficacy and residues. Efficacy will be tested by comparison with existing treatments and new treatment strategies developed.

The most effective strategies for application in practical situations will be examined, including the use of infection chambers and the direct treatment of the fabric of the buildings.

▸ **The grain weevil, *Sitophilus granarius*, one of the target pests in the MYCOPEST project.**



▸ **Scanning electron micrograph of the insect-specific fungus, *Beauveria bassiana*.**

Plans for exploitation

The target is to develop an effective commercial product for use on farms and in mills. The specialist biological control partner will produce, formulate and package commercial mycoinsecticides.

The Partners

The research partners are Central Science Laboratory (CSL), CABI Bioscience and ADAS. The industrial partners are the Home Grown Cereals Authority, I'Anson Bros, BOCM-Pauls, NPP, Marks & Spencer.

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SAPPIO Programme Factsheet

3D Farming – Making biodiversity work for the farmer

LINK COLLABORATIVE RESEARCH

Objective

To use field margin management to increase biodiversity on farmland and to manipulate beneficial insects so that they may provide effective aphid control.

Introduction

Modern intensive farming is perceived as being the principal cause of declining biodiversity in the countryside.

Recent attempts to reverse this trend involve the promotion of a range of field management options, including the establishment of wildflower and/or grass strips. Increasing the range of plant species in field margins will lead to diversification of the margin fauna, including beneficial insects and spiders.

There is considerable potential to manage such field margins, increasing their biodiversity and to increase simultaneously natural pest control, particularly of aphids.

Integrated Pest Management strategies depend upon successful manipulation of both the target pest and its natural enemies. This assumes an understanding of the spatial distribution of both natural enemies and their prey over time within the field and its margins.

It is important to determine how far into the crop the beneficial effects of field margin management and natural enemy manipulations extend to assess the efficiency of the biocontrol agents.

This project aims to develop field margin management strategies that will allow farmers to promote natural biodiversity and reduce pesticide use, without jeopardising profitable crop production. It is essential to develop these approaches in a unified way and test them on a commercial field scale.

Approach

At each of four sites, aphid sex pheromones and wild flowers in field margins will be used to manipulate aphid parasitic wasps and hoverflies, respectively. Margins developed to increase biodiversity will be utilised and surveyed botanically.

Predators and parasitic wasps will be regularly sampled in these margins, in unmanipulated control margins and at increasing distances into the crop, using a variety of trapping techniques.

Pest aphid populations will be monitored at increasing distances into the crop throughout the season. At a further site an intensive grid sampling scheme will be used to study the spatial and temporal distribution of pest aphids and selected natural enemies across fields of varying sizes and subject to varying crop and margin management practices.

New statistical techniques will be used to analyse this spatial information and identify which factors are the most important predictors of invertebrate distribution and diversity.

- **Parasitic wasps are attracted by aphid sex pheromones.**
- **Previous work has shown that synthetic pheromones can be released in field margins to enhance parasitic wasps for aphid control.**

- **Hoverflies need nectar/pollen to produce their eggs.**
- **Wild flowers in field margins can increase hoverfly numbers and thus reduce aphids.**

Results to date

This project started in May 2000 and runs for an initial four years.

Plans for exploitation

Much of the information on field margin management and its effects on biodiversity and pest control will be available for exploitation by the farming industry immediately after the project is completed. By supplying farmers with advice that makes both economic and environmental sense, the project will encourage more sustainable practices.

Advisors will be able to use the information to explain the principles and promote farmer uptake.

The project is also supported by The Chadacre Agricultural Trust, The Dulverton Trust, The Manydown Company, The Worshipful Company of Farmers and The Yorkshire Agricultural Society.

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