



**Horticultural
Development
Company**

Grower summary

FV 334

Perennial field margins with combined agronomical and ecological benefits for vegetable rotation schemes.

Annual Report 2009

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The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

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Headlines

- An extensive database on candidate field margin plants, classifying 50 candidate plant species on the basis of more than 20 criteria, has been generated. A perennial seed mix that combines plants with the potential to increase bird and pollinator biodiversity and plants that enhance natural pest control in Brassica, carrot and pea rotations has been developed.
- The seed mix also includes banker plants to build-up populations of biocontrol agents in the absence of pests. Four field margins have been successfully sown using the above seed mix.

Background and expected deliverables

The horticultural industry faces a range of issues linked to crop protection. These include a reduction in the available products approved for use, the potential for increasing resistance in target organisms, increasing pressures from consumers and retailers for residue-free produce, and a need to comply with legislation and industry initiatives. These pressures have resulted in a need for a more rational approach to pesticide use and for the full exploitation of the range of alternative methods available for maintaining pest populations below economic damage thresholds.

The development of stewardship schemes that encourage the management of the farmed environment in a way that increases levels of biodiversity, provides an opportunity to combine conservation objectives with the benefit of enhanced pest control (either through conservation biological control or through other methods such as trap cropping). Current stewardship options include pollen and nectar mixes targeting bees and butterflies, as well as separate margin prescriptions to encourage farmland birds. Previous work by members of the research team involved in the current project have developed the concept of designing flowering field margins for the specific purpose of optimizing biological pest control. The current project looks to build upon the above research and seeks to combine the biodiversity and pest-control benefits of perennial field margins, providing growers with a direct economic benefit in addition to the expected subsidies from stewardship schemes.

The expected deliverables from this work include:

1. Development of a seed mixture for perennial field margins that has the potential to optimize pest control and conservation benefits, while minimizing potential risks for vegetable rotation schemes.
2. Quantification of the impact of field margins on biological control agents, pests, pollinators and farmland birds.
3. Development of the use of flowering field margins as part of an insecticide assisted trap-cropping approach.
4. Development of field margins that support predator population build-up through provision of non-pest prey in field margins.
5. Assessment of the feasibility of using banker plants in field margins and development of these plants as sentinels to monitor levels of biological control agents.

6. Development of a database on the compatibility of available chemical control options with various biological control agents to optimize integrated pest management decisions.
7. Quantification of the impact of perennial field margins on pest levels, crop quantity/quality and pest management costs.
8. Communication of best practice to commercial growers in the form of 'blueprints' for margin establishment and management, drawing upon knowledge generated in the proposed project as well as in ongoing European biodiversity projects.

Summary of the project and main conclusions

Objective 1- Development of the seed mixture.

Following discussions with seed companies involved in the project, international research groups, and an extensive review of the available literature considering some 50 potentially useful flowering plant species and more than 20 specific selection criteria, a seed mix consisting of 22 flowering species was formulated for sowing into experimental field margins. Among others, the benefits of each plant species to pest natural enemies, pollinators and farmland bird species were considered in the selection process. Priority has been given to plant species native to the UK and where non-native species have been included in the seed mix, these have all been species that can be found growing in gardens and in areas such as roadside verges. Details of all attributes taken into account in the final seed selection, and the final margin seed mix (including fine grasses), are provided in the Science Section. The success of this Objective, and hence any conclusions drawn from it, will be determined with later work on margin establishment and performance.

Objective 2 – Establish field margins and quantify margin impact on selected species

Margin seed mixes were prepared and sown at STC Research Foundation between the 17.09.09 and 21.09.09 at an overall rate of 42 kg/ha. Four experimental margins (76 x 2 m) were sown by hand, raked over by hand immediately after sowing and then pressed. A further complete margin was sown to allow an additional experiment to be conducted to determine the most appropriate/beneficial margin management regime. Further small plots (1 x 1.6 m) were sown to determine whether or not the non-native species in the mix are essential to the functional agro-biodiversity benefits.

At this stage no conclusions can be drawn on this Objective.

Quantifying margin impact refers to future work.

Objective 3 - Development of the trap-cropping approach.

This Objective refers to future work.

Objective 4/5 – Development of banker plant species.

Some of the plant species included in the final seed mix have been selected on the basis of having been identified as potential banker plants. Banker plants, through provision of high levels of alternative prey/hosts, are likely to be especially beneficial to pest natural enemies in allowing naturally occurring predators and parasitic wasps to build up populations before the pest arrives. In addition, it is hoped that they can be used as sentinels to monitor the abundance/activity of parasitic wasps and insect predators in the system. Details of those species selected as banker plants are provided in the Science Section.

At this stage no conclusions can be drawn on this Objective.

Objective 6 – Development of a compatibility database of chemical control options.

Using data from LIAISON (a Fera-held database on approved products), a list of all active ingredients available for application to the crops relevant to the current project has been generated to inform any pest control interventions that may be required during the study period. Further details can be found in the Science Section.

At this stage no conclusions can be drawn on this Objective.

Objective 7 - Quantification of margin impact on pests, crops and pest management costs.

This Objective refers to future work, although establishment of crop quality criteria is underway in preparation for next years field season.

Objective 8 – Communicate best practice.

A database has been generated compiling experience from functional biodiversity projects and is in the process of being developed into a more user-friendly format. A project website is being developed and is expected to be online in late Dec/early Jan.

At this stage no conclusions can be drawn on this Objective.

Financial benefits

In accordance with the Government's longstanding policy of minimization of the use of pesticides, the boosting of native biological control agents in combination with a trap crop approach for key pest species should make it possible to reduce pesticide inputs while maintaining crop yield and quality through the use of functional field margins. In addition to financial savings associated with reduced pesticide use, economic benefits will also result from the expected development of a functional field margin that can count towards stewardship accreditation.

Action points for growers

These will be expected as the project progresses.