



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

FV 334a

Automated Field Margin Design for
vegetable crops

Annual 2012

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Further information

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

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HDC is a division of the Agriculture and Horticulture Development Board.

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Project Leader:	Pat Croft
Contractor:	STC Research Foundation
Industry Representative:	Richard Moynan
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Headline

A database of field margin plant species has been reviewed and is being used to create a website for growers to provide seed mix suggestions tailored to their own crops and management. This will help growers to create evidence-based seed mixes that reduce pests and conserve biodiversity simultaneously.

Background

The horticultural industry faces a range of crop protection issues. Pressures to reduce pesticide use have led to the investigation of many alternative methods for maintaining pest populations below economic damage thresholds. Non-crop plants in farming landscapes can provide a range of important ecological services, including conservation of native flora and fauna and the enhancement of pollination and biological pest control (Gurr et al., 2003). Field margins can contain these plants and can play an important role in meeting current UK conservation targets (Vickery et al., 2004). Margin seed mixes have already been developed that target conservation of bees (Carvell et al., 2006), butterflies (Pywell et al., 2004) and farmland birds (Vickery et al., 2009). The effectiveness of field margins in boosting pest control strongly depends on their botanical composition. Not all flowers are suitable for supporting pest natural enemies, despite many biological control agents requiring flowering plants as a source of nectar and pollen (Wäckers et al., 2005). Often non-crop elements that are designed for bird or pollinator conservation do not simultaneously make resources available to biological control agents (Olsen & Wäckers, 2007). It is even possible that inclusion of certain flowering species in field margins can promote pests and their impact on nearby crops (Winkler et al., 2010).

Research is now being conducted to design multifunctional field margin seed mixes that can be sown to provide benefits to many target groups simultaneously. Such margins still provide desirable conservation benefits to farmland birds and pollinators, but by also providing resources to encourage pest natural enemies (without encouraging pests) these margins can play a much improved role in pest control than they have previously. To achieve this aim, the plants included in a seed mix must be carefully and individually selected based on many criteria and tailored to the crop next to which they are sown.

Ongoing research is also looking to develop field margins that can be employed on a longer-term basis, using perennial species in seed mixes (FV 334 / HortLink HL0192). Such field

margins should offer an improved return in the long-term, where repeat sowing after several years would not be necessary to retain the multifunctional margin.

It has been shown that growers are more likely to sow flowering margins if these can be tailored to their own fields and circumstances, and are designed to provide beneficial pest control, as well as pollination and conservation. Ensuring that margin mixes provide minimal resources to pest species is important to increase grower confidence in, and uptake of flowering field margins, particularly as evidence is emerging to suggest that this is not always the case (Winkler et al., 2010).

Whilst growers commonly construct their own seed mixes, developing mixes that are multifunctional is a knowledge-intensive and lengthy process, unlikely to be embarked upon by the majority of growers. However, an automated system capable of providing details of field margin seed mixes best suited to a grower's crop, management and budget, could make tailored, multi-functional margins available to all.

Summary

The database has been finished but the website is still under development. After a review of the literature, the database contains 109 species that are described using many criteria relating to the agronomy, benefit and general attributes of each species. To create an easy-to-use tool for growers, and after feedback, five criteria from the database were selected as most relevant. These relate directly to questions on the website:

1. lifespan (annual only or perennial)
2. provenance (to include naturalised non-native species or not)
3. soil type (clay, loam or sand)
4. cost of seed
5. pest associations (relating to the accompanying crop).

The remaining criteria from the database were all included in the development of the of the seed mixes but do not directly relate to the questions asked. Instead, they will be included in the information provided once the questions have been answered (e.g. red clover has been included in your mix because it provides nectar and pollen for pollinators, has a lot of extra-floral nectar for parasitoids and hoverflies and typically flowers from May to September).

The website, still under development, can be seen at <http://peter.the-branding-iron.co.uk/stc/> and accessed using the password **entomos**. The website is currently being hosted by the IT consultants. Once complete, the site will transfer to the STC server and be hosted by STC.

Growers will be able to access the site through a link from the HDC website or directly through the STC website (www.stockbridgetechnology.co.uk).

There is a welcome page, explaining the background behind the project and the rationale for the website. The top of the page has tabs relating to:

Home – returns the user to the welcome page

Establishment – will contain notes on land preparation and margin establishment. To be developed with further consultation (to be included in best practice guidelines).

Management – will contain notes on how best to manage the margin once establish. Particularly relevant for mixes with perennial species included. Again, to be developed with further consultation with growers (to be included in best practice guidelines).

FAQ – will contain ‘frequently asked questions’ relating to margins generally and this project more specifically.

Links – will contain links to appropriate seed producers and information on field margins. Also included will be links to the AHDB, HDC, STC and ecostac (FV334 – Hortlink project HL0192) websites.

The workplan and activities of the project have been revised for Year 2. The main aim in the second year is finish the website and obtain grower feedback, thereafter changing the format and content accordingly. A factsheet will then be produced to promote the site.

Financial Benefits

1. Reduced labour costs and seed inputs where perennial rather than annual margin seed mixes are selected (where annual options would still be available if preferred), and through the use of seed mixes tailored to establish well under the conditions present on site.
2. Expected reduction in insecticide inputs as a result of improved pest control where field margins are used.
3. Provision of a quick and easy-to-use tool to generate field margin seed mixes, tailored to a growers crops, site, requirements and budget, for use with vegetable crops in the UK. This will potentially save time and money compared to conducting their own research.
4. Provision of ‘best practice’ guidelines to assist margin establishment and management, potentially reducing the risk of a flowering margin failing to establish.

Action Points

- Provide feedback on the website, once it is ready.
- Use the 'automated margin design' tool, once the final version is constructed.