

MONITORING OF CEREAL FIELD MARGIN OPTIONS IN DEFRA AGRI-ENVIRONMENT SCHEMES: PHASE 3.

Background and Introduction

Cereal Field Margins are a Priority Habitat in the UK Biodiversity Action Plan (BAP). The objective for the UK Cereal Field Margin Habitat Action Plan is to maintain, improve and restore, by management, the biodiversity of some 15,000 ha of cereal field margins on appropriate soil types in the UK by 2010. The Agri-environment (AE) Schemes are seen as Defra's principal mechanism for delivering its share of the target.

A series of options for the management of arable land were initially trialled through the Arable Stewardship (AS) Pilot Scheme. As a result of the evaluation of the AS Pilot Scheme (1998-2000) arable options were introduced to the Countryside Stewardship Scheme (CSS) in 2002. These new arable options, in addition to existing CSS (and in a few cases, notably Breckland, ESA) prescriptions for grass margins and cultivated ('Rare Arable Weed') margins provide a range of options for the management of Cereal Field Margins for biodiversity.

This project, which is being let in three phases, will involve an evaluation of Cereal Field Margin management within agri-environment schemes to provide information on:

1. The relative contributions of the main arable margin options to the achievement of the above objective for Cereal Field Margins.
2. The overall contribution that the AE schemes make to the objective for the Cereal Field Margins UK HAP (based on uptake and relative contribution).

The Cereal Field Margin Evaluation will consist of three separate phases spanning three years (Apr 2003 – Dec 2005):

- Phase 1: A re-evaluation of AS pilot area cereal field margin fixed options and conservation headlands for plants and bumblebees (now completed)
- Phase 2: Part 1. An evaluation CSS grass margins and pollen and nectar strips for plant and bumblebees.
Part 2. A re-evaluation of Breckland ESA uncropped wildlife strips.
- Phase 3: An evaluation of cultivated cereal field margin options for arable plants.

This tender contains only the details for Phase 3 (2005).

PHASE III SPECIFICATION

Arable Plants in cultivated cereal field margins

Objectives: To verify that appropriate arable options are being targeted effectively to areas of high arable plant diversity.

To assess the relative plant species richness in cultivated cereal field margins within different option types

To assess the relative abundance of uncommon arable plants in cultivated cereal field margins within different option types

To provide an estimate of the overall 'stock' of species richness and of uncommon species in cereal field margins within Countryside Stewardship.

Options to be surveyed

Options should be selected from both the CS and ESA schemes. Only some of the ESAs have cultivated margin options: Conservation Headlands within the South Downs and South Wessex Downs ESAs and Uncropped Wildlife Strips in the Breckland ESA. (The Clun and the Cotswold Hills also have Conservation Headlands but uptake is less than 1 ha and these areas may be excluded.)

Code	Option
Control	'Conventional' Cereal Field Margin
CH1 (including headlands in South Downs/ SW Downs ESAs)	Conservation Headland with fertiliser
CH2	Fertiliser-free Conservation Headland
R3 (RAWM) (including Breckland UWS)	Cultivated, uncropped margins (Rare Arable Weed Margin/ Breckland Uncropped Wildlife Strips)
OS3	Fallow. Over wintered stubble followed by fallow – survey fallow period only.

Sampling strategy:

Proportionate random sampling should be used. Sample size for each option in each region should be proportionate to the relative uptake in that region. This is to ensure that the sample is representative of the scheme as a whole. Total sample size for each option should be the same. Alternatively, equal numbers of each option type may be sampled within each region, provided the analysis takes into account the relative uptake in each region.

CFM options in ESAs should be 'pooled' with the appropriate CS samples before selecting the final random sample.

Total sample size should be at least 160 (an average of four replicates per region).

Each replicate of five options should be 'grouped' to reduce travel times between sample sites, provided this does not bias the sample.

Defra will supply spreadsheets with full field details for all options. Options should be sampled up to and including 2003 should be sampled. Agreements from 2004 should be excluded from the sample – OS3, in particular, will not be in fallow until 2006.

Once the contractor has selected the fields to include in the sample, Defra will provide contact details for the agreement holder for that field and write to that farmer asking for their cooperation in the survey. Contractors will be expected to contact the agreement holders by telephone to arrange a survey visit. In particular they will need to ascertain the precise location of the CH1, CH2 and OS3 options as these are rotational and Defra would not be able to say which field they will be in for any one year.

It is accepted that some agreement holders may have amended their agreement subsequent to the sample being selected – these agreement holders may only be identified once they have been contacted by the contractor.

Methods:

Sample site selection

For each field, the sample site should be a margin of at least 100m length (maximum of 1km). The sample site will usually be on the extreme edge of the field although there may also be a grass margin on the edge with a cultivated margin inside that.

Plant species composition

Within the sample site a randomly placed section of 100 x 6 m section should be located for detailed sampling. Where the margin is wider than 6 m, only the outer 6m should be sampled. Within this section, thirty 0.5 x 0.5m quadrats will be sampled. Quadrats will be stratified so that the inner, middle and outer section can be assessed separately. Pin hits will be taken at each quadrat location to provide a broad estimate of vegetation cover.

A single sample of 100 x 1m randomly placed within section should also be taken to allow comparison with Countryside Survey field margin plots.

A single, bulked soil sample will be taken from each sample section and tested for pH, soil texture and key nutrients.

Other issues

If contractors need to enter fields in which livestock are being grazed, they should disinfect footwear before and after entering the farm.

Contractors will be expected to send copies of the survey results to any Agreement Holders that requests it of them.

Presence of uncommon arable plants

The entire sample site should be searched in two zones for uncommon arable plants (see Appendix 1). This list may be altered to complement that used in defining Important Arable Plant Areas – Defra will supply any changes prior to survey work commencing. Arable plants should be surveyed in two zones:

- Full sample site – to maximise chance of locating plants
- 100 x 6 m section to provide a standard sample size across all options and replicates.

Any records of Rare or Nationally Scarce species should be validated by a second recorder, retaining a voucher specimen or digital photograph where appropriate (refer to the BSBI code of practice on botanical collection and the list of plants with statutory protection on the JNCC website).

At the site of any records of Rare or Nationally Scarce plants or any other plants that are UK BAP Priority Species or Species of Conservation Concern (Table 2), at least 5 representative quadrats should be sampled using NVC methodology.

Additional requirements

1. The final report should include an assessment of the effectiveness of the targeting of arable options for uncommon plants. This should be based on coincidence mapping for Plant Atlas records against distribution of AE-options (which will have been completed to enable sample selection).
2. Contractors should provide a GPS grid reference point for the start and end point of the sample site (margin). Margins should also be identified by their full IACS field number, suffixed by the margin location (e.g. SR1234 5678 (NE)). Contractors should also give GPS locations of BAP Priority, Rare and Nationally Scarce plants and annotate on map of margin.
3. Contractors should record altitude, estimate aspect and slope of margin, presence and type of boundary and note adjacent land use.
4. Contractors should wherever possible collect management records for the margins, either from the management schedules (to be provided by Defra) or by asking the agreement holder when arranging the visit. In particular, information on frequency of cutting (left or removed) and on use of herbicides to spot treat problem species will be valuable in interpreting the results.

5. When contacting agreement holder, contractors will need to establish the following information:
 - Are there any suitable areas that have not had CS options in the last two years where a control could be sited?
 - Have any permitted herbicides been used on margins (i.e. spot treatment)?
 - What time of year and how frequently have margins been cut and have cuttings been left or removed?
 - How frequently, using which method and to what depth have margins been cultivated?
6. Contractors should include a time allowance towards the end of the contract for provision of data in agreed format.
7. If Breckland ESA fields are selected for sampling, contractors should assess whether the site was used in the 2004 evaluation, and inform Defra as soon as possible, so that alternatives can be sought, if needs be.

Outputs to be supplied to Defra:

1. Brief methods statement and initial sample selection – 1st April 2005 to be agreed with Defra Nominated Officer (Mark Stevenson)
2. Reports x 1: (Final draft for comment by the 31st Jan 2006, with a one page summary of main findings produced by the first week in Nov 2005). This report should include a synopsis of the findings from the three years.

The report should be provided in word and pdf formats. The reports should include the photographs labelled with site numbers & survey dates.

3. Provision of electronic data in agreed format (Access-based data sheet will be provided by Defra by the end of September 2005). Each survey record accompanied by GPS location for start and end-point of survey area. Survey records should be accompanied by unique field numbers (and an indication of which margin was surveyed), physical data, management history, presence of adjacent options and map and GPS information to show the exact location for rare arable plants.
4. Hard copy of data recording sheets. Paper & electronic data must be linked by site/ plot numbers (if any changes are made during or after the survey these must be applied to the paper data too). Paper data to be sent to Simon Smith at RDA Leeds, Government Buildings, Lawnswood, Leeds LS165QT.

Payments will be linked to deliverables and tenderers should suggest a payment schedule linked to relevant milestones.

Annex 1. Uncommon Arable Plants to include in the sample (may be adjusted to align with Important Plant Areas criteria) (supplied by Kevin Walker, CEH)

	Status	Conser- vation status	Rarity status	Change index	10-km GB recs)	in (all	Comment
1. Red data or Nationally Scarce = 24 species							
<i>Adonis annua</i>	AR	VU		-2.19	234		
<i>Agrostemma githago</i>	AR	EW		-0.75	815		Distribution obscured by planting
<i>Ajuga chamaepitys</i>	NA	VU	rare	-0.62	43		
<i>Arnoseris minima</i>	AR	EX		-3.72	83		Extinct in UK
<i>Bunium bulbocastanum</i>	N		rare	0.14	13		
<i>Bupleurum rotundifolium</i>	AR	EW		-4.58	287		Distribution obscured by planting
<i>Centaurea cyanus</i>	AR	EN		-0.39	884		Distribution obscured by planting Now widespread in game cover
<i>Echium plantagineum</i>	AR	EN		0.36	79		
<i>Filago gallica</i>	AR	CR		0.01	21		
<i>Filago lutescens</i>	NA	VU	scarce	-0.34	85		
<i>Filago pyramidata</i>	AR	EN		-1.14	132		
<i>Fumaria occidentalis</i>	NE		scarce	0.04	31		Confined to extreme SW
<i>Fumaria purpurea</i>	N		scarce	0.25	191		
<i>Galeopsis segetum</i>	AR	EX			32		Extinct in UK
<i>Galium tricornutum</i>	AR	CR		-4.78	386		Confined to two sites
<i>Gastidium ventricosum</i>	NA		scarce	-0.48	159		
<i>Gnaphalium luteoalbum</i>	NA	CR	rare	0.23	7		
<i>Lathyrus aphaca</i>	NA		scarce	-1.38	174		
<i>Lythrum hyssopifolium</i>	AR	VU		-1.12	112		
<i>Polycarpon tetraphyllum</i>	NA		rare	-0.04	16		
<i>Polygonum boreale</i>	N		scarce		109		Absent from England
<i>Valerianella rimosa</i>	AR	CR		-2.55	181		
<i>Veronica triphyllos</i>	AR	EN		-0.82	33		
<i>Vicia parviflora</i>	N		scarce	-1.05	136		
2. Not RD/NS but with a negative change index greater than -1.5 = 20 species							
<i>Anthemis arvensis</i>	AR			-1.79	696		
<i>Anthemis cotula</i>	AR			-1.60	1103		
<i>Chenopodium murale</i>	AR			-1.63	412		
<i>Chenopodium urbicum</i>	AR			-4.57	239		
<i>Chrysanthemum segetum</i>	AR			-1.80	1682		Distribution obscured by planting
<i>Galeopsis angustifolia</i>	AR			-3.31	616		
<i>Galeopsis speciosa</i>	AR			-1.82	999		
<i>Lithospermum arvense</i>	AR			-1.91	614		
<i>Lolium temulentum</i>	AR			-4.05	341		
<i>Papaver argemone</i>	AR			-1.79	874		
<i>Ranunculus arvensis</i>	AR			-3.77	824		
<i>Scandix pecten-veneris</i>	AR			-3.65	780		
<i>Scleranthus annuus</i>	N			-2.68	983		
<i>Silene gallica</i>	AR			-2.78	455		
<i>Silene noctiflora</i>	AR			-2.04	686		
<i>Sinapis arvensis</i>	AR			-1.76	2373		
<i>Spergula arvensis</i>	N			-2.30	0		
<i>Torilis arvensis</i>	AR			-2.56	389		
<i>Valerianella dentata</i>	AR			-1.86	600		
<i>Viola tricolor</i>	N			-1.52	1691		
3. Not meeting the above criteria but only ever recorded in fewer than 700 10-km squares = 21 species							
<i>Anthriscus caucalis</i>	N			-0.16	659		
<i>Apera spica-venti</i>	AR			-0.21	326		
<i>Briza minor</i>	AR			0.28	92		
<i>Bromus secalinus</i>	AR			-1.15	403		
<i>Camelina sativa</i>	AR				248		Now widespread as game cover
<i>Chenopodium hybridum</i>	AR			-0.32	285		
<i>Descurainia sophia</i>	AR			-0.29	636		
<i>Erodium moschatum</i>	AR			0.47	338		
<i>Euphorbia platyphyllos</i>	AR			-0.24	248		
<i>Fumaria bastardii</i>	N			0.39	423		
<i>Fumaria densiflora</i>	AR			-0.37	307		

<i>Fumaria parviflora</i>	AR	-0.55	128	
<i>Fumaria vaillantii</i>	AR	-0.51	116	
<i>Kickxia spuria</i>	AR	-0.07	622	
<i>Lamium confertum</i>	AR	-0.40	397	Northern distribution
<i>Legousia hybrida</i>	AR	-0.60	552	
<i>Misopates orontium</i>	AR	-0.89	488	
<i>Myosurus minimus</i>	NA	-0.66	339	
<i>Papaver hybridum</i>	AR	-0.35	357	
<i>Petroselinum segetum</i>	N	0.12	482	
<i>Polygonum rurivagum</i>	AR		274	

Notes: Status: N, native; NA, native or alien; NE, endemic; AR, archaeophyte. **Conservation status** (Cheffings 2004): EX, extinct; EW, extinct in the wild; CR, critically endangered; EN, endangered; VU, vulnerable. **Rarity status** (PLANTATT, Hill et al. 2004): r, rare 1-15 10-km squares in Britain 1987-1999; s, Scarce 16-100 10-km squares in Britain 1987-1999. All data taken from PLANTATT (Hill et al. 2004).

Table 2. UK BAP Priority species and Species of Conservation Concern

UK BAP Priority Species

<i>Centaurea cyanus</i>	Cornflower*
<i>Filago lutescens</i>	Red-tipped Cudweed
<i>Filago pyramidata</i>	Broad-leaved Cudweed
<i>Galeopsis angustifolia</i>	Red Hemp-nettle
<i>Galium tricornerutum</i>	Corn Cleavers
<i>Scandix pecten-veneris</i>	Shepherd's Needle
<i>Silene gallica</i>	Small-flowered Catchfly
<i>Torilis arvensis</i>	Spreading Hedge-parsley
<i>Teucrium botrys</i>	Cut-leaved germander
<i>Thlaspi perfoliatum</i>	Perfoliate pennycress
<i>Fumaria purpurea</i>	Purple ramping-fumitory
<i>Fumaria occidentalis</i>	Western ramping-fumitory
<i>Valerianella ramosa</i>	Broad fruited cornsalad

UK BAP Species of Conservation Concern

<i>Adonis annua</i>	Pheasant's Eye*
<i>Ajuga chamaepitys</i>	Ground-pine
<i>Euphorbia platyphyllos</i>	Broad-leaved Spurge
<i>Hypochoeris glabra</i>	Smooth Cat's-ear
<i>Lithospermum arvense</i>	Corn Gromwell
<i>Lythrum hyssopifolia</i>	Grass Poly
<i>Petroselinum segetum</i>	Corn Parsley
<i>Ranunculus arvensis</i>	Corn Buttercup
<i>Valerianella dentata</i>	Narrow-fruited Corn-salad
<i>Alyssum alyssoides</i>	Small Alison
<i>Fumaria reuteri</i>	Martin's ramping-fumitory
<i>Veronica triphyllos</i>	Fingered speedwell
<i>Melampyrum arvense</i>	Field cow-wheat