

## PROJECT SPECIFICATION

<b>Competition Code:</b>	<b>CTE1001</b>
<b>Date for return of tenders:</b>	<b>4:00pm on Monday 15 March 2010</b>
<b>Address for tender submission:</b> (the Competition Code must be shown on the envelope and the tender submitted in line with the instructions in the attached guidance, otherwise your tender may not be accepted)	Mrs Elizabeth James Defra Area 4D Nobel House London SW1P 3JR
<b>Number of electronic &amp; hard copies required:</b>	1 copy on CD-ROM <b>plus</b> 6 hard copies
<b>Contact for information relating to this project specification:</b>	Name: Richard Brand-Hardy Tel no: 020 7238 5005 E-mail: <a href="mailto:richard.brand-hardy@defra.gsi.gov.uk">richard.brand-hardy@defra.gsi.gov.uk</a>
<b>Proposed ownership of Intellectual Property (contractor or Defra):</b>	Contractor
<b>Proposed start-date (if known):</b>	1 April 2010
<b>Proposed end-date (if known):</b>	31 March 2015

### PROJECT TITLE:

### IMPROVING THE MANAGEMENT AND SUCCESS OF ARABLE PLANT OPTIONS IN ELS AND HLS.

#### Background

Arable plants represent the most threatened group of plants in Britain today. Diverse arable plant assemblages were formerly a distinctive constituent of farmland biodiversity but modern arable production has reduced both the quantity and geographical spread of the habitats in which they need to survive and flourish. More than 60% of the 30 plant species showing the largest relative declines in Britain since 1930 are characteristic of arable and other cultivated land (Preston et al., 2002). Fifty-four arable plant species are considered rare or threatened, whilst 7 species are now extinct on arable land (Cheffings & Farrell, 2005) and 24 are UK BAP priority species. The requirements of arable plant communities are complex, with no fewer than 48 different communities already identified, reflecting subtle variations in soil, aspect and climate.

Despite their declines, most arable plants respond well to a change to sympathetic management, often germinating, growing and seeding within months. However, with mounting pressures on English farmers to produce more food and energy crops, the adoption of management practices that secure arable plant populations will only take place where incentives are sufficient to counter market demands.

Agri-environment schemes (AES), such as ELS and HLS, both include options specifically targeted at helping farmers adjust their arable management in key areas of fields where arable plants are already known to be, or might be. However, the effectiveness of these options to deliver the required habitat and safe growing conditions is tempered by current constraints on cultivated margin management, particularly potential herbicide use/choice and timing that are difficult to modify due to a lack of research evidence. As a consequence, uptake of AES options targeted on arable plants has historically been low.

The differing levels of management that are needed across sites to achieve desired outcomes for arable plants makes it very difficult to compensate some farmers fully, especially when the options are paid at a fixed rate (based on average management inputs). Research into novel field management techniques that preserve and enhance arable plant populations, whilst being easier for farmers to adopt at reasonable costs, will make compensation rates more competitive and, hence, the relevant ELS and HLS options more attractive.

There is still a reluctance by arable farmers to adopt options that will mostly result in weedier crops. This is understandable to a degree as they currently have some significant arable weeds to deal with such as blackgrass, wild oats and sterile brome which are now resistant to some herbicides making their control very difficult. Pernicious arable weeds can infest the land managed for the conservation of desirable arable plants, producing a weed problem whose subsequent control in other crops in the crop rotation impacts financially on the farmer. Thistles and couch also present unique challenges for arable plant conservation where they are present. As a result, options to support arable plants remain unattractive.

To be effective, management actions to conserve arable plants should be inexpensive, easy to carry out and must fit with the main arable practices. For most plants, conservation management will be straightforward, although some arable plants do have specific individual needs that need to be addressed. Management actions need to be suitable across a wide variation of sites, although those put on heavy land or land subject to repeated herbicide and fertiliser use, are less likely to perform well, so these will need to be carefully considered and researched.

## **Research needs**

Work by the Centre for Ecology and Hydrology (CEH) and ADAS (Walker et al., 2006) found that species richness within conventional conservation headlands was not significantly different from the conventionally managed control margins as they provided similar habitats. Minimum input conservation headlands were significantly more species-rich because of an open crop canopy and less fertile soil. Uncropped cultivated margins are best for arable plants, exhibiting the widest diversity of annuals, perennials, grasses, forbs (non-woody, broad-leaved plants other than grass) and spring and autumn germinating species (Walker et al., 2006).

The key research needs are therefore based on optimising the delivery of uncropped cultivated margins and will involve two main areas of work:

1. A review of current arable plant option management requirements and actual on-farm management practices is needed to identify gaps in performance and evidence. Consideration of the relevant arable weed community literature may provide a valuable source of information.
2. Field research into appropriate management techniques that will minimise weed burden development in arable plant field areas. Research outputs will be used to help refine existing prescriptions to allow for more flexible and focussed weed control to be undertaken. Issues include herbicide choice and timing of application, together with use and timing of cultural methods such as cultivation technique, depth and timing, use of spring cropping and the rotation of cultivated margin management with conventional cropping around target sites.

In particular, the research should identify:

- The value of autumn glyphosate use to control perennial species. The aim is to create minimum damage to the important annual plant population, which will have largely set seed and senesced by the autumn, whilst controlling the pernicious weed burden to an agronomically acceptable level.
- More opportunities to exploit broad-leaved herbicide selectivity (or arable plant tolerance to grass herbicides) to improve arable plant populations
- The optimum crop and plant density to encourage specific species that prefer growing in a crop (a dense cereal crop will be more competitive than sugar beet, as will unfertilised crops compared with fertilised).
- How to better match the late-flowering requirements of some arable plants with pre- and post-harvest arable crop management practices.
- How to exploit opportunities to match crop type with arable plant needs so that cultivations and other management practices are synergistic (spring germinating arable plants prefer spring to winter cultivated crops – therefore a need for mixed rotations).

The specific objectives of the project are:

1. To undertake a baseline year assessment of farmers' and contractors' attitudes and approaches to arable plant conservation, and the constraints of management options available and practices currently used. A total sample size of no more than 20 (farmers and contractors) is recommended.
2. To apply a range of different management techniques specifically to support arable plants on existing areas of ELS and HLS options on farm. *These may include cultivating a proportion of an arable plant area in rotation to understand cumulative and seasonal effects, in autumn and spring on light and heavy soils. A similar approach should be applied to the use of selective and total herbicides, and depth of cultivation (scratch, shallow, normal). The*

*final aspect should be the impact on plant populations of introducing normal cropping on the managed plant areas for a period of years.*

3. To quantify performance of the change in practice. This would involve assessing sites annually at the optimum time to ensure the variation in germination and establishment of the species year to year is captured.
4. To provide recommendations for modifications to existing ES options or entirely new options that will both improve option uptake and the overall delivery of ES for arable plant conservation.

## **Resources**

It is expected that this project will last 5 years at a total cost of up to £375k. It is hoped that the project can start on 1 April 2010 to allow for some baseline assessments to be made. Proposals will be accepted which last for shorter periods if this can be shown to maximise the cost-benefit of this research.

Plantlife is a charity working to protect and aid the conservation of wild flowers, fungi and other wild plants in their natural environment. The organisation can provide valuable information and advice on suitable field trial sites and have considerable experience in liaising with farmers to encourage the application of management practices to benefit arable plants. Researchers are encouraged to include Plantlife in their bids to enhance the cost-effectiveness of the study.

The closing date for the submission of bids is 15 March 2010.

## **Further information**

Late applications will be returned unopened. Applications by fax or e-mail are not acceptable. However an electronic version of the application (CD-ROM) should be submitted with the signed hard copies.

Bidders will be expected to have extensive knowledge of past and on-going related research and to take this into account in their bids. No specific further information is available, as all bids will be assessed against this specification. No advice can be provided about the relative merits of different scientific approaches. However, if you need further information about specific issues relating to this competition, please contact:

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**Defra**  
**Area 3C**  
**Nobel House**  
**17 Smith Square**  
**London**  
**SW1P 3JR**

## References:

Cheffings, C. and Farrell, L. (Editors), (2005), *The Vascular Plant Red Data List for Great Britain*, ISSN 1473-0154

Preston, C.D., Pearman, D.A. & Dines, T.D., eds. (2002) *New atlas of the British and Irish Flora*. Oxford University Press.

Walker, K.J., Critchley, C.N.R., Sherwood, A.J., Large, R., Nuttall, P., Hulmes, S., Rose, R., Moy, I., Towers, J., Hadden, R., Larbalestier, J., Smith, A., Mountford, J.O., Fowbert, J.A. (2006) *Cereal Field Margin Evaluation. Phase 3. Evaluation of Agri-Environment Cultivated Options in England*. CEH & ADAS report to the Department for Environment, Food and Rural Affairs (MA01017).