



## ADVISORY COMMITTEE ON RELEASES TO THE ENVIRONMENT

### *Advice on the research paper on the Management of Genetically Modified Herbicide-Tolerant Sugar Beet for Spring and Autumn Environmental Benefit by May et al. (2005)*

Date: 26 May 2005

#### **A. Introduction and background**

1. The results of a field study on the management of genetically modified herbicide-tolerant (GMHT) sugar beet for spring and autumn environmental benefit were published on 19 January 2005 in the Proceedings of the Royal Society<sup>1</sup>. This study was carried out by Mike May and colleagues from Broom's Barn Research Station in Suffolk. The study forms part of an increasing body of research, which investigates ways of exploiting the opportunities provided by GMHT crops to provide a more optimal balance between weed populations and crop development.
2. The management of GMHT sugar beet crops as carried out in the Farm Scale Evaluations of genetically modified herbicide-tolerant crops (FSE, published in 2003<sup>2</sup>) resulted in a reduction in weed biomass and seed rain compared to conventionally managed sugar beet crops. Further research published by Broom's Barn scientists in 2003<sup>3</sup> showed that the use of GMHT sugar beet would allow farmers to delay herbicide sprays, which retains weeds in the crop for longer than in conventional sugar beet crops and thus provides more food for wildlife early in the season. English Nature and the RSPB expressed concerns that such late application of herbicide still would not allow surviving weeds to set seeds, resulting in fewer seeds entering the seed bank and reducing weed seed availability for birds in autumn, a particularly critical time for many bird species.
3. The new publication by May *et al.* (2005) suggests that by refining timing and application methods, GMHT sugar beet can be managed to increase production of weed seeds in the autumn while maintaining high sugar yields. The study presents different management scenarios that can be used to maximise either spring or autumn weed populations and to improve the trade-off between maximum yield and environmental benefit. Weed seed numbers and sugar yields similar or greater than in conventional sugar beet crops were obtained in GMHT sugar beet by a single overall herbicide spray early in the season or by single band sprays applied at 10% or 20% ground cover of crop and weeds but not necessarily where the single band spray was followed by an overall spray of glyphosate.

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<sup>1</sup> May, M. J., Champion, G. T., Dewar, A. M., Qui, A. and J. D. Pidgeon (2005) Proceedings of the Royal Society, London, B 272, 111-119.

<sup>2</sup> <http://www.defra.gov.uk/environment/gm/fse/index.htm>

<sup>3</sup> Dewar, A. M., May, M. J., Woiwod, I. P., Haylock, L. A., Champion, G. T., Garner, B. G., Sands, R. J. N., Qi, A. and J. D. Pidgeon (2003). Proceedings of the Royal Society, London, B 270, 335-340.

4. There are parallels between the Broom's Barn study and the Farm Scale Evaluations (FSE) project although the former was less highly replicated than the FSE and used smaller plots. Both studies have examined the impact of the management regimes associated with the use of HT sugar beet on in-field weed biodiversity compared to conventional practice. However, the Broom's Barn study tested different management scenarios for their effects on weed population in the spring and autumn while recording sugar yield in contrast to the FSE, which used one management strategy for GMHT sugar beet.
5. In its advice on the implications of the Farm-Scale Evaluations of genetically modified herbicide-tolerant crops issued previously<sup>4</sup> ACRE concluded as follows:

*46. Based on the evidence provided by the FSE results published in October 2003, if GMHT beet were to be grown and managed as in the FSEs this would result in adverse effects on arable weed populations, as defined and assessed by criteria specified in Directive 2001/18/EC, compared with conventionally managed beet. The effects of arable weeds would be likely to result in adverse effects on organisms at higher trophic levels (e.g. farmland birds), compared with conventionally managed beet.*
6. The application for the cultivation of GM sugar beet, which prompted inclusion of sugar beet in the Farm Scale Evaluations, has now lapsed. No new application for the cultivation of GM sugar beet in the EU has since been issued although there is a pending application for use of GM sugar beet in food and animal feed.

## **B. Advice**

7. ACRE welcomes the research published by May *et al.* (2005) and confirms that the evidence presented in the paper supports the authors' conclusions. This study demonstrates again that herbicide management is the crucial factor that determines how GMHT crops impact on weed biodiversity. The study by May *et al.* suggests that GMHT sugar beet could be managed to have fewer adverse effects on wildlife than shown for the GMHT regime used in the FSE.
8. ACRE considers GMHT crops a flexible and reliable tool for weed management and the committee considers the May *et al.* study a very good example of how the management of GMHT crops can be adjusted to achieve environmental goals. The Committee feels that the paper by May *et al.* describes approaches farmers could implement to achieve both high yields and environmental benefits.
9. ACRE discussed whether a similar result could be achieved without GMHT crops. The Committee feels that approaches only using herbicide application in band sprays along the crop row could also be feasible for conventional crops but these have so far proved to be less flexible and practical. ACRE also notes the current research at Broom's Barn using conventional herbicides to produce weed seeds late in the season for birds whilst retaining crop yields.
10. ACRE considered implementation of specific wildlife-friendly herbicide regimes and farmer compliance. The Committee notes the concern of English Nature that farmers may not comply with restricting herbicide applications to particular times in the cropping cycle since suitable timing would vary depending on weather conditions. However, ACRE feels that farmers already comply with similar

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<sup>4</sup> [http://www.defra.gov.uk/environment/acre/advice/pdf/acre\\_advice44.pdf](http://www.defra.gov.uk/environment/acre/advice/pdf/acre_advice44.pdf)

constraints on other products and that compliance could be easily monitored (although monitoring should involve more than solely a record-keeping exercise). As ACRE assesses every part C application on a case-by-case basis, specific advice would be issued regarding post market monitoring if a dossier involving application restrictions was going to be submitted. Post-market monitoring could also include an assessment of specific environmental impacts. Consent could be withdrawn if mitigation measures were not being implemented or if negative environmental effects were being observed.