



## ADVISORY COMMITTEE ON RELEASES TO THE ENVIRONMENT

### *Advice on the implications on atrazine use in the farm-scale evaluations of genetically modified herbicide-tolerant maize*

Date: 2 April 2004

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

1. The results of the Farm Scale Evaluations (FSEs) of spring-sown GM herbicide-tolerant (HT) crops were published on 16<sup>th</sup> October 2003<sup>1</sup>. The FSEs were aimed at studying the effect that the weed management practices associated with three GMHT crops (maize, beet and spring-sown oilseed rape) might have on farmland wildlife, when compared with weed control used with non-GM crops. ACRE considered the implications of the results of the FSEs and, following two open meetings, published detailed advice on 13<sup>th</sup> January 2004<sup>2</sup>.
2. Shortly before publication of the FSE results it was announced that atrazine and other triazine herbicides were to be phased out in April 2005, because of the risk of unacceptable contamination of groundwater. Subsequently the date when these herbicides will no longer be able to be used in maize has been adjusted to September 2005. Atrazine was used as the primary means of weed control in the conventional halves of maize fields in the FSEs<sup>3</sup>. In the future a different herbicide regime will replace the use of atrazine and other triazines on conventional maize, which raises issues concerning the interpretation of the maize results from the FSEs.
3. In its advice on the implications of the results of the FSEs the Committee concluded as follows concerning this issue:

*39. As it is already known that the principal management practice for conventional maize is to be phased out in April 2005, ACRE recommends that studies are initiated immediately that consider the validity of the conclusions of the FSE results in the light of this phasing out of atrazine and the introduction of new weed management regimes for non-GM maize. Such studies might include further analysis of the FSE dataset. A comparison of the impacts of new management regimes with that based on atrazine might also be appropriate, focussing on critical indicators such as weed seed biomass and seed rain.*

4. Recently, further analysis of the FSE dataset for maize, as recommended by ACRE, has been published by the FSE research team (Perry *et al.*) in the journal

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<sup>1</sup> *Phil. Trans. R. Soc. Lond. B* (2003) **358**, 1777-1913

<sup>2</sup> ACRE's advice on the implications of the FSE results is available at [http://defraweb/environment/acre/advice/pdf/acre\\_advice44.pdf](http://defraweb/environment/acre/advice/pdf/acre_advice44.pdf)

<sup>3</sup> *Phil. Trans. R. Soc. Lond. B* (2003) **358**, 1801-1818

*Nature*<sup>4</sup>, and the Committee has considered the implications of the results of this work. This advice supplements that published on 13 January.

## B. Advice

5. ACRE considers the work by Perry *et al.* (2004)<sup>4</sup> to be a helpful contribution to this issue. The further analysis demonstrates that a range of practices were used on the conventional halves of maize fields in the FSEs, and that greater effect on weed populations was achieved when atrazine was used as a pre-emergence herbicide compared to both other conventional weed management regimes and that used on the GMHT crop. The work provides evidence that conventional herbicide regimes used in the FSEs that did not involve the triazine herbicides (such as atrazine, simazine and cyanazine) lead to a similar impact on weed populations as the management regime associated with GMHT maize. As Perry *et al.* (2004) concede, it is a 'tentative approximation' to assume that future conventional herbicide management regimes will resemble current regimes based on post-emergence herbicides in respect of their impact on weed populations.
6. The nature and impacts of future herbicide regimes that may be used on conventional maize remains uncertain and the Committee does not have sufficient evidence to make predictions at this stage. However, it is important to emphasise that atrazine is being phased out not because of its effectiveness for weed control, but because of the risk of unacceptable contamination of groundwater. Future replacement herbicide regimes for use with non-GM maize could have equivalent impacts on weed populations.
7. ACRE suggests that further experimental work will be necessary to characterize fully the impact of future conventional herbicide management regimes on maize. The Committee recommends that work should concentrate on comparing future herbicide regimes with the current atrazine-based regime and that the key indicators that should be examined are weed seed biomass and seed rain. While the Committee does not wish to be prescriptive concerning the design of such future studies, on the basis of the data generated in the FSEs a number of conclusions can be drawn:
  - Less replication is likely to be necessary than in the FSEs as this study had greater statistical power than would be required.
  - Plots will be required of smaller area than those used in the FSEs as the focus will be on measurement of weed population indicators. The FSEs clearly demonstrated the primacy of weed density and seed return as the drivers for the non-farm food chains in the FSE fields.
  - Less coverage of time periods, geographical areas and management intensities will be required than in the FSEs, as the effects reported in the FSEs were consistent between sites and years.
8. Taking these points together, it is clear that further work on the scale of the FSEs is not required, and sufficient robust data could be obtained with small-scale experimental studies of limited duration.

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<sup>4</sup> *Nature* 428, 313-316; published online on 4 March 2004