



ADVISORY COMMITTEE ON RELEASES TO THE ENVIRONMENT

Advice on the implications of findings in a Defra-funded desk study: 'Technologies for biological containment of GM and non-GM crops'

27 February 2006

Background:

The importance of minimising the dispersal of transgenes into the environment (gene flow) was one of the many conclusions reached in the GM Science Review and by the ACRE sub-group on Best Practice in GM Crop Design¹. The desk study reviewed and assessed the technologies for biological containment of GM and non-GM crop plants that are aimed at reducing the dispersal of transgenes into the environment and to make recommendations for future research².

The study provides a survey of the European crops with genetic containment issues. It outlines three main GM containment strategies being developed for conventional crop species:

- Physical containment - in greenhouses, growth rooms and bioreactors.
- Biological containment, both natural (using vegetative parts of the plant to produce pharmaceutical products) and plastid transformation (to prevent gene flow via pollen).
- Transgenically controlled genetic containment strategies, such as conditional lethality, inducible promoters, engineered male sterility, seed lethality, apomixis, cleistogamy and others.

The study also reviews bio-containment methodologies being developed for plants expressing pharmaceutical products. It highlights that field crops are unlikely to be the vehicle for any future specialised production of plant-made industrial products and pharmaceuticals and that it is more likely that non-food crop systems in contained facilities would be the method of choice in the future. The report identifies some areas where further information would be of value, for example, factors to be considered in environmental risk assessments of lower plants as production platforms for industrial products and pharmaceuticals.

¹ First Report: <http://www.gmsciencedebate.org.uk/report/pdf/gmsci-report1-pt5.pdf>.
Second Report: <http://www.gmsciencedebate.org.uk/report/pdf/gmsci-report2-pt3.pdf>, section 4.5.
ACRE sub-group: <http://www.defra.gov.uk/environment/acre/bestprac/index.htm>

² The desk study has been published at
http://www2.defra.gov.uk/research/project_data/More.asp?I=CB02036&M=KWS&V=CB02036&SUBMIT1=Search&SCOPE=0

The report concludes that none of the methodologies currently available guarantee transgene containment and that the adoption of any genetic containment strategy will require continuous assessment and monitoring.

ACRE was asked to advise on the findings of this report for future environmental risk assessments - particularly with respect to minimising the dispersal of transgenes - for crops genetically engineered to be biologically contained, including those intended for production of industrial products such as pharmaceuticals.

Advice:

ACRE has considered the report on technologies for biological containment and advises that it serves as a comprehensive and informative review of the current research activity in this sphere.

ACRE accepts that none of the current GM containment technologies, including physical containment, guarantee complete transgene containment and emphasised that whatever method was used, it was clear that strict management of production facilities would be necessary to ensure no significant risks of harm to the environment.

In assessing the potential environmental risks posed by a GMO, the Committee always considers whether dispersal of a particular transgene into the environment could have implications for the safety of the GMO. The Committee advises that it would continue to deal with applications to cultivate GM crops on a case- by- case basis.