

Genetically Modified Organisms

ACRE Advice February 2006.

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

DEFRA have reviewed the available technologies for gene containment and ACRE support their findings. In essence, all containment strategies have weaknesses and post-release monitoring would almost always be required.

ACRE provided a summary and opinion of the DEFRA study; available at http://www2.defra.gov.uk/research/project_data/More.asp?I=CB02036&M=KWS&V=CB02036&SUBMIT1=Search&SCOPE=0.

One of the key features of safety assessment concerns the dispersal and uptake of transgenes into the environment. This would be particularly important if those transgenes had the potential to lead to harm e.g. they code for a biologically active protein.

Where there is the potential for harm it would be important to assess the proposed containment measures. There are three main GM containment strategies:

- 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, apomixes (pollen-free reproduction by the female), cleistogamy (where a flower does not open and is self-pollinated in the bud) and others.

Containment of plants which could produce biologically active chemicals is important regardless of the method of prevention of transgene dispersal. The report finds that it is unlikely that field crops would be used for the production of valuable industrial and pharmaceutical products. These would be grown contained facilities.

The authors of the report conclude that no method of containment would guarantee control of transgenes. Continuous monitoring would be required. ACRE agreed with this view.

Comment

In our view it is unlikely that ACRE would advise that GM crops for the production of pharmaceuticals etc, could be grown in open field conditions. Even if the plan is to grow them under cover, there is no guarantee that such a plan would be adhered to; mistakes can happen. Additional bio security would need to be added in proportion to risk.

Containment of transgenes is important when they have potentially toxic properties or provide a selection advantage to an unintended host. Most of the applications for a license to release transgenic plants, so far, focus on the possibility of inadvertent release of a selection advantage. Under most circumstances a low rate of transmission of transgenes and the low probability of their uptake and expression by unintended hosts would lead to self limiting gene spread; as a result the host line simply dies out over time unless the selection advantage is very significant. Nature would tend to provide a level of containment and this is considered very carefully when ACRE makes its assessments. They do not assume that human intervention will be reliable.