Improving the weak assessments of GMO risks

Having identified the lack of a coordinated and fully rigorous international approach to measuring the potential effects of Genetically Modified Organisms (GMOs), CSIRO scientists have been working on improving the way we assess the actual environmental risks associated with their release.

In a polarised debate, GMOs are still often seen either as modern solution or the root of all evil. The truth probably lies somewhere in between.

In countries belonging to the Organisation for Economic Co-operation and Development (OECD), the number of GMO releases, especially plants, has grown dramatically since the first field trial in 1986; it almost doubled each year between 1988 and 1994. The total area of GM crops and trials around the world grew from just 1.7 million hectares in 1996 to 67.7 million in 2003, mostly soybean, corn and cotton, and mostly in the United States.

Dr Keith Hayes, of CSIRO Marine Research, says there is actually no universally adopted procedure for doing ecological risk assessments for GMOs and his recent review of current practice, here, in Europe, the United States and elsewhere around the world, suggests there is room for improvement.

Canola is the first GM food crop approved for release in Australia. Rick Horbury

A study group checks for genetically modified canola in a field of wheat. Keith Hayes

'The most common approaches to risk assessment essentially involve unstructured brainstorming and deductive checklists,' says Hayes. 'Checklists, some lengthy and well developed, others rather cursory, are the status quo in most risk assessment frameworks for unconfined release of GMOs. The problem is, checklists do not ask, "What can go wrong?" and important interactions or possible events can be unconsciously overlooked or ignored.'

Hayes and his colleagues recommend, among other things, 'inductive' techniques for risk assessment to identify a larger range of potential hazards and to gain an understanding of the chains of events associated with these hazards.

Hayes also points out that uncertainty analysis is the very rationale of risk assessment, yet this is by far the weakest link in current practice. Well-established statistical techniques already exist for determining the uncertainty associated with risk assessment predictions and for moving from qualitative to quantitative approaches. Even simple models can incorporate uncertainty.

'This is fundamental to ensuring that we don't have any regrets about releasing particular GMOs,' says Hayes. 'It is sensible to adopt a precautionary approach to highly uncertain hazards and ensure more rigor in the analysis. Our research shows that inductive techniques, such as Hierarchical Holographic Modelling, which capture the complexity of large systems, give a much better idea of the risks associated with release of GMOs.'

● **Steve Davidson**

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More information:
Hayes, KR, Gregg, PC, Gupta, VVSR, Jessop, R, Lonsdale, WM, Sindel, B, Stanley, J, and Williams, CK. (2004). Identifying hazards in complex ecological systems. Part 3: Hierarchical Holographic Model for herbicide tolerant oilseed rape. *Environ. Biosafety Res.* 3: 109–128.

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