

## Gene manipulation — the debate

Genetic engineering has become a standard laboratory tool, and the biological products of this powerful technology almost commonplace. Since 1988, in Australia alone, 10 live organisms (nine microbes and one plant) genetically altered by scientists have been approved for release into the environment. Many more are planned.

To date, the approved releases include a bacterium that prevents salmonella poisoning in sheep, a bakers' yeast that grows more efficiently, a virus that vaccinates lot-fed cattle against a respiratory disease and a potato resistant to a virus that damages the plant's leaves. These organisms have one thing in common: their genetic information (contained in each cell's DNA) has been modified in the laboratory by deleting an unwanted gene or adding a desired gene from another organism.

Genetic manipulation is not a new science — it has been practised by plant and animal breeders for centuries. What is new is that, with techniques developed in molecular biology, scientists can now manipulate genes much more precisely, cutting and splicing DNA almost at will; and they have a much bigger gene pool to draw on, making it possible to insert into organisms genes collected from bacteria, viruses or totally unrelated plants and animals.

Creating 'transgenic' organisms in this fashion has its controversies. Opinion research commissioned last year by CSIRO found that many people feel deep concern about genetic engineering, fearing a runaway Frankensteinian technology over which man would have no control. Some, including scientists, are concerned about the impact of genetic engineering on world agricultural trade, particularly the trade of Third World commodities, through the patenting of genes and new life forms.

The Australian Council of Churches argues that altering Nature 'in order to make profits' is immoral. Yet a 1989 report by the Victorian Law Reform Commission says genetic manipulation is neither religiously nor ethically wrong, and is not so different from other potentially risky scientific work as to require special regulation.

Some of the most controversial research involves CSIRO. As described in the main article, the Division of Plant Industry is currently working on the development of herbicide-resistant crops — that is, plants that can resist the application of chemicals needed for weed control in agriculture. The Division says the research may help shift the use of agricultural chemicals away from toxic and persistent compounds (atrazine, for example) towards more environmentally benign ones such as 2,4-D and glyphosate, which degrade quickly in soil.

However, the genetic engineering campaign officer for the Australian Conservation Foundation, Mr Bob Phelps, claims herbicide-resistant crops will lead to a greater use of herbicides and may create new pest problems. 'If we accept what the scientists say about genetically engineered plants being weaker than normal plants, then it follows they may be more susceptible to fungi and disease, and therefore the total burden of chemicals will rise,' he said.

While CSIRO acknowledges that plants made resistant to atrazine have been shown to be less fit, this, they claimed, is an isolated case.

Science policy researchers at Griffith University have also criticised CSIRO's work in this area, arguing that 2,4-D poses health and environmental risks. Overseas experience, they maintain, suggests that much of the research into herbicide resistance is not confined to benign chemicals.

Critics claim the real beneficiaries of herbicide-resistant crops will be the big seed companies, such as Sandoz/Hilleshog, ICI and Ciba-Geigy, which have parent companies with interests in agrochemical manufacture. However, in a recent report, ICI argues that the new chemicals that will follow the introduction of herbicide-resistant plant varieties will be safer, cheaper and more efficient than existing products. Chemical use, according to the company, is likely to drop dramatically.

The Chief of the Division of Plant Industry, Dr Jim Peacock, says the development of herbicide-resistant crops is controversial due to 'understandable public concern' over the misuse of agrochemicals. Nevertheless such development remains 'a very appropriate field of research'. As well as creating flexibility in pest and weed control, it would increase knowledge of the mode of operation of herbicide resistance among weeds. 'As there is nothing to suggest that 2,4-D is damaging, it might be a very sensible option for farmers to have', he said.

At present, no federal or State law specifically regulates the release of genetically modified organisms. However, CSIRO requires all its workers to comply with the voluntary guidelines laid down by the Genetic Manipulation Advisory Committee. It also supports the introduction of legislation to regulate genetic manipulation nationally.

Genetic manipulation. *Law Reform Commission of Victoria, Report No. 26, 1989.*

Herbicide-tolerant plants — weed control with the environment in mind. *ICI Seeds, January 1991.*