EDUCATION, SCIENCE AND TRAINING

SENATE LEGISLATION COMMITTEE – QUESTIONS ON NOTICE
2004-2005 BUDGET ESTIMATES HEARING

Outcome: CSIRO
Output Group: - CSIRO

DEST Question No. E243_05

Senator Carr provided in writing.

Question:

1. The Ecological Implications of Genetically Modified Organisms (GMO) project promised a variety of reports relating to GMOs – the actual number varies a bit depending on where you look, but the list of maximum outputs from that project included the following:

    - Robust risk/benefit decision tools adapted for Australian conditions (2003)
    - Probabilistic/quantitative estimates of risk for GMOs (2003)
    - Recommendations for policy makers on best practice in risk assessment (2001)
    - Risk assessments, up to landscape scale, of direct and indirect ecological impacts of Bt cotton, legumes with high sulphur protein and herbicide tolerant canola (2003)
    - Risk assessments, up to landscape scale, of ecological impacts of potential GMOs in eucalypts, rumen biota, oysters and mouse cytomegalovirus (2003)
    - Reports on predicted risk and benefit scenarios resulting from different GMOs (2002)
    - Recommendations on how to mitigate undesirable impacts if they occur (200?)
    - Methods for large scale monitoring of GMO benefits and impacts (2001)

2. Of those proposed outputs, how many have actually been published?

3. Of the proposed outputs are any still being written? (if so, when are they due for release)?

4. Of the ones neither published nor in press, can you tell us why those particular reports were not produced?

5. Was any formal decision taken to abandon a particular output/report?

6. If so, who took the decision, when and could the correspondence be tabled?

Answer:

CSIRO has provided the following response.

Ecological Implications of Genetically Modified Organisms (GMOs) project

1. The above list of outputs represents an exhaustive list of all the ideas that were ever proposed for inclusion in the program at various stages. Not all of them were finally implemented.

2. See attached list of outputs (Attachment 1) for reference numbers. In summary, there were 13 output areas listed above. We have so far published outputs against seven of them, as detailed below.

- Robust risk/benefit decision tools adapted for Australian conditions (2003)

  Outputs Nos 3,4,5, represent tool development, while 6, 21, 24 are contextual documents that relate to this item.

- Probabilistic/quantitative estimates of risk for GMOs (2003)

  No output.

- Recommendations for policy makers on best practice in risk assessment (2001)

  Output No 3.

- Risk assessments, up to landscape scale, of direct and indirect ecological impacts of:

  Bt cotton: *Nos 13, 15 and 16*
  Legumes with high sulphur protein: *Nos 9, 10, 11, with output 7 as background*
  Herbicide tolerant canola: *No 12*

- Risk assessments, up to landscape scale, of ecological impacts of potential GMOs in

  Eucalypts: *no output*
  Rumen biota: *no output*
  Oysters: *no output*
  Mouse cytomegalovirus: *No. 17 (no. 19 was the abstract for this paper)*

- Reports on predicted risk and benefit scenarios resulting from different GMOs (2002)

  This item is partly represented by the items listed above for Bt cotton, legumes, HT canola, and mouse cytomegalovirus.

- Recommendations on how to mitigate undesirable impacts if they occur

  No output. We quickly focussed on exploring the potential risks, rather than on their management.

- Methods for large scale monitoring of GMO benefits and impacts (2001)

  No output.

3. The following outputs are still being written:

   Godfree, R. C., Young, A. G., Lonsdale, W. M., Woods, M. J. and Burdon, J.J. Ecological risk assessment of transgenic pasture plants: a community gradient modeling approach. Submitted to Ecology Letters, in revision (probably available late 2004).

   Gupta, V.V.S.R., Watson, S.K. and Roberts, G.N. (2003-) Production and release of Bt-protein by the roots of genetically modified cotton varieties. for submission to Soil Biology and Biochemistry. A poster paper on this topic will be presented at the 12th Aust. Cotton Conference to be held in Gold coast during August 2004.

   Gupta, V.V.S.R. Watson, S.K. and Roberts, G.N. (2003-) Microbial populations and biological activities associated with genetically modified cotton residues and soil. For submission to Biology and Fertility of Soils. (in preparation; probably available 2005).

Gupta, V.V.S.R., Crisp, P., Neate, S.N. and Roberts, G.N. (2003-) Populations and activities of microbiota in the rhizosphere of GM Cotton varieties grown under controlled environment. Paper in preparation for Soil Biology and Biochemistry (probably available 2005)

Hayes K.R. et al. Identifying hazards in complex ecological systems. Part 3: Hierarchical Holographic Model for HT canola (in review, probably available in 2005).

Whitehouse M.E.A., Wilson L.J., Fitt, G.P. Bt Cotton: A comparison of arthropod communities in transgenic Bt and non-transgenic cotton. Date of publication: probably 2005.

Williams, C.K. Ecological risks of releasing genetically modified cotton (*Gossypium hirsutum* L.) in northern Australia. Date of publication: probably 2005.

Williams, C.K. Risk of exporting a genetically modified immunocontraceptive virus in mice, *Mus 'musculus-domesticus'*. Currently with internal referees: probably published early 2005.

4. The reasons for reports not being produced are as follows:

   - Probabilistic/quantitative estimates of risk for GMOs

     The goal of obtaining quantitative estimates of probabilities of hazard occurrence is the ideal in ecological risk assessment. It would have been a world first if it had been possible to do this for any GMO, but it proved too ambitious at this stage in our knowledge.

   - Risk assessments, up to landscape scale, of ecological impacts of potential GMOs in

     Eucalypts: *activity stopped on developing the technology – risk assessments became irrelevant.*

     Rumen biota: *activity stopped on developing the technology – risk assessments became irrelevant.*

     Oysters: *activity stopped on developing the technology – risk assessments became irrelevant.*

   - Recommendations on how to mitigate undesirable impacts if they occur

     This was more of a long term goal - the focus in the first three years was on exploring the potential risks, rather than on their management.

   - Methods for large scale monitoring of GMO benefits and impacts

     Such large scale monitoring schemes have not been required in Australia.

5. The formal process for terminating activities was delegated to each of the Divisions involved in the project, and was not co-ordinated centrally. Each Division terminated activates for the reasons noted above in answer to question 4, and in view of the fact that other public funds for co-investment in these studies failed to materialise.

6. Decisions to terminate were taken in project review processes in a variety of ways in several Divisions, according to the principles notes in 5 above. The process always involved project scientists reallocating their efforts towards areas that had higher relevance and co-investment.

Attachment 1: PUBLISHED OUTPUTS FROM THE CSIRO PROGRAM 'ECOLOGICAL IMPLICATIONS OF GMOs'

Draft reports held by the Department of Environment and Heritage (not provided by CSIRO)

MATERIAL PUBLISHED ON THE WEB BY CSIRO

1. Research plan for the entire project, published on the CSIRO Biodiversity web pages, 2000 http://www.biodiversity.csiro.au/2nd_level/3rd_level/plan_gmos.htm

2. CSIRO 2003: Findings from the UK Farm Scale Evaluation of Genetically Modified Herbicide Tolerant Crops – an appraisal of their implications for Australia. http://www.csiro.au/proprietaryDocuments/CSIRO_FSE_appraisal.pdf

ROBUST RISK ASSESSMENT TOOLS

Reports

Three reports by Dr Keith Hayes have been produced for the Department of Environment and Heritage (awaiting publication by DEH):

3. Robust methodologies for ecological risk assessment: Best practice and current practice in ecological risk assessment for Genetically Modified Organisms*
4. Robust methodologies for ecological risk assessment: Summary report: Best practice ecological risk assessment for Genetically Modified Organisms*
5. Robust methodologies for ecological risk assessment: Final report: Inductive hazard analysis for GMOs*

Conference abstracts

6. **Hayes KR 2003.** Best practice and current practice in ecological risk assessment for genetically modified organisms. *Proceedings of the International Joint Conference on the Biodiversity Implications of Genetically Modified Plants Held in Switzerland During Sept. 7-12, 2003, pp 22-23.* http://www.geobot.umnw.ethz.ch/bigmp/Abstracts.pdf

PATHFINDER STUDIES – NEAR-MARKET AGRICULTURAL PLANT GMOS

Published scientific papers

7. Godfree, R., Lepschi, B. and Mallinson, D. (2004). Ecological filtering of exotic plants in a subalpine environment. *Journal of Vegetation Science* 15: 227-236. (not specifically on GMOs but established the ecology and dynamics of the community into which GM clover might be released).

Draft scientific papers about to be published

8. Godfree, R. C., Chu, P. W. G. and Woods, M. J. (2004) White clover (*Trifolium repens*) and associated viruses in the subalpine region of southeastern Australia: implications for GMO risk assessment. *Australian Journal of Botany* 52: 321-331.

9. Godfree, R. C., Woods, M. J., Young, A. G., Burdon, J. J. and Higgins, T.J.V. (2004). Growth, fecundity and competitive ability of transgenic Trifolium subterraneum subsp. subterraneum cv. Leura expressing a sunflower seed albumin gene. *Hereditas* 141: 1-16.

Conference Papers/Abstracts

10. Godfree, R. C., Young, A. G., Burdon, J. J. and Woods, M. J. Ecological risk assessment of transgenic clover. Proceedings of the International Joint Conference on the Biodiversity Implications of Genetically modified plants held in Switzerland during Sept. 7-12, 2003 pp 18-19. http://www.geobot.umnw.ethz.ch/bigmp/Abstracts.pdf

11. Godfree, R. C., Young, A. G., Burdon, J. J. and Woods, M. J. Ecological risk assessment of transgenic Trifolium subterraneum. Abstract of talk presented at the Ecological Society of Australia Meeting 2002 held in Cairns, Qld, Dec 2-6, 2002.

12. Gupta, V.V.S.R., Roget, D.K., Rovira, A.D. and Sivasithamparam, K. (2004) Herbicide tolerant crops and soil-borne plant diseases. In: Proceedings of 3rd ASD Symposium. Ophel Keller, K and Hall, B (eds.) pp. 71-72, SARDI, Adelaide.

13. Knox, O.G.G., Gupta, V.V.S.R. and Roberts, G.C. (2004) Genetically modified cotton influence on soil microbiota. In: Proceedings of 3rd ASD Symposium. Ophel Keller, K and Hall, B (eds.) pp. 166-167, SARDI, Adelaide.

14. Gupta, V.V.S.R., Watson, S. and Roberts, G. (2003) Impacts of cultivation of genetically modified plants on soil biota communities and biological processes. Proceedings of the International Joint Conference on the Biodiversity Implications of Genetically modified plants held in Switzerland during Sept. 7-12, 2003, pp. 20−21. http://www.geobot.umnw.ethz.ch/bigmp/Abstracts.pdf

15. Gupta, V.V.S.R., Roberts, G.N., Neate, S.M., Crisp, P., McClure, S. and Watson, S.K. 2001. Impact of Bt-cotton on biological processes in Australian soils. In: *Proceedings of the 4th Pacific Rim conference on the biotechnology of Bt-Environmental impacts*, R.J. Akhurst, C.E. Beard and P. Hughes (Eds.), pp. 191-194. CSIRO, Australia.

Other Reports:

16. Gupta, V.V.S.R. and Watson, S. (2002): Ecological impacts of GM cotton on soil biodiversity. Summary report to the Department of Environment and Heritage and published on their website http://www.deh.gov.au/industry/biotechnology/preview-summary.html

PATHFINDER STUDIES – POTENTIAL GMOS OF CONTRASTING ECOLOGICAL IMPACT

Published scientific papers

17. Williams, C.K. (2002). Risk assessment for release of genetically modified organisms: a virus to reduce the fertility of introduced wild mice, *Mus domesticus*. *Reproduction Supplement*. 60: 81–88.

Conference papers/abstracts

18. Bax, N. 2002. Is the Trojan Gene an empty metaphor? Abstract of talk presented at the 2002 IOBC Conference, The role of genetics and evolution in biological control. Montpellier, France 14-16 October 2002.

19. Williams, K. (2001). Risk assessment for release of genetically modified organisms: a virus to reduce the fertility of exotic wild mice, *Mus domesticus*. Proceedings of the 5th International Symposium on Fertility Control in Wildlife, Kruger National Park, South Africa, 19-22 August 2001, pp. 14-15.(but written up as a full paper; **see Williams 2002 (no. 17) above**)

Other Reports:

20. Richards, A. and Scown, J: 2001 Environmental Risks Associated with Viral Recombination in Virus Resistant Transgenic Plants. Report to DEH and published on their website http://www.deh.gov.au/industry/biotechnology/final-report/

OTHER PUBLICATIONS RELEVANT TO "PATH TO ADOPTION"

21. Lonsdale W. M. 2002 A scientific framework for assessing transgenic organisms in the environment. Roseland CR. In LMOs and the Environment: Proceedings of an International Conference. 185-194. Paris, OECD.

22. Lonsdale W. M. 2002. GMOs: risk, environment and perception. Biotechnology of *Bacillus thuringiensis* and its environmental impact. In Proceedings of the 4th Pacific Rim Conference. 239-243. Canberra, CSIRO.

23. Lonsdale W. M . 2003 New Zealand's research into the environmental impacts of biotechnology - alignment with international research. Report to NZ MORST. CSIRO, Canberra.

24. Walker, B. and Lonsdale, W. M. 2000 Genetically modified organisms at the crossroads: Comments on "Genetically Modified Crops: Risks and Promise" by Gordon Conway. Conservation Ecology Online 4(1), 12. http://www.ecologyandsociety.org/vol4/iss1/art12/