

Ref: BT
Brief No: 02/50

13 August 2002

Minister for Biosecurity

GM CONTAMINATION IN MAIZE SEEDS

Summary

1. *On 7 August 2002, the Ministry of Agriculture and Forestry (MAF) was informed by Pacific Seeds that maize seeds from two crops grown in New Zealand had tested positive for genetically modified (GM) material. MAF biosecurity officers secured the seeds in three locations and have taken samples for further testing. The company has decided to destroy the seeds and this will be done under MAF supervision, probably over the next two weeks. MAF and the Environmental Risk Management Authority will investigate whether further actions are required once more information is available from the company and from follow-up tests.*
2. Representatives of Pacific Seeds and Corson Grain met with officials on the morning of 8 August 2002 to inform officials of the initial test results. The minutes of that meeting are attached, together with MAF's press release, and results from follow-up tests commissioned by the company.

The contaminated crops

3. Pacific Seeds imported six parent lines (three pairs) of maize seeds from the USA in 2001 to produce hybrid seeds in New Zealand. One pair, from Garst Company (a sister company of Pacific Seeds), was grown in Gisborne. Another pair, from Monsanto Company, was grown in Pukekohe. All parent lines were sampled (1400 seeds) and tested before shipment according to MAF's testing protocol that was mandatory for sweet corn seeds at the time but not mandatory for maize seeds. No GM material was found. The Gisborne seeds were tested by GeneScan Melbourne, one of the laboratories accredited by MAF for seed testing, the Pukekohe seeds were tested by Monsanto.
4. The Gisborne crop was grown under contract by Corson Grain and produced about 9 tonnes of seed (approx. 7 hectares). The Pukekohe crop was grown under contract by Seed Solutions in ten plots, nine of which are on Crop & Food Research's research station, and produced about 20 tonnes of seed (approx. 15 hectares). The crops were

grown according to international standards for seed purity that include isolation (both physical and temporal) from other maize crops.

5. Samples (1400 seeds) from the three hybrid crops were sent to GeneScan Melbourne for testing as part of Pacific Seeds' quality assurance practices. The test results were reported to Pacific Seeds on 6 August 2002 and two samples were positive for the 35S sequence and negative for the nos3' sequence. The third crop tested negative for GM seeds and is not subject to any further action. Pacific Seeds ordered further testing for specific GM maize sequences and reported the results to MAF on 9 August. They showed that one of the hybrid lines contained DNA sequences characteristic for the GM maize Bt176 (produced by Syngenta/Novartis) while the other contained DNA sequences characteristic for the GM maize Yieldgard (such as Mon802, Mon809 and Mon810 produced by Monsanto). These crops all contain the Cry1A(b) gene from the soil bacterium *Bacillus thuringiensis* subsp. *kurstaki* (Btk). The follow up results strongly suggest that GM seeds were present, although false positives cannot be completely ruled out because all the gene sequences occur naturally in some form
6. The seeds from both crops have been harvested and are stored in Corson's warehouse in Gisborne. They have not been distributed to farmers for sowing. There are remnant seeds of the parent lines in both Pukekohe and Gisborne. Plant residue from processing, including some viable seeds is in Edgecumbe where it was waiting to be processed into stock feed.

Actions taken

7. On 9 August, three MAF biosecurity officers were appointed as enforcement officers under the Hazardous Substances and New Organisms Act 1996. They secured the seeds in Pukekohe and Gisborne and secured the stock feed in Edgecumbe and have taken 5kg samples from each of the lines of seeds (parent lines and hybrid progeny). We are confident that this accounts for all the contaminated seeds. Test results should be available by the end of next week (23 August) depending on the availability of testing resources.
8. Pacific Seeds has decided to destroy the seeds. Under MAF supervision, the seeds will be trucked to Auckland and burned at Waste Resources Ltd. Destroying the seeds will take about 14 days.
9. MAF has asked the company to provide the following information:
 - copies of all the test results for both the parent lines and the hybrid seeds, as well as confirmation of the sampling and testing techniques used;
 - locations of all the farms where the parent lines were grown in New Zealand;
 - the specifications for separation mechanisms (isolation distances, timing) set out by Pacific Seeds and also the actual measures that took place;
 - the status of waste plant and vegetable material remaining at the farms where the parent lines were grown;
 - a brief chronology of the handling and movements of the parent lines and the hybrid crop; and
 - where all the parent and hybrid seeds are (need to account for all seeds).

Future actions

10. Depending on the results of the tests, MAF and the Environmental Risk Management Authority will investigate the source of the contamination and assess any risks arising from cross-pollination of any receptive maize crops grown within pollination distance.

Differences between the current incident and the Jubilee crop in late 2000

11. The screening test for GM material looks for two specific sequences of DNA called 35S and nos3' that are commonly used in GM crops. Both sequences occur naturally, so a positive result indicates that GM material may be present, but is not conclusive proof.
12. The Jubilee crop in late 2000 tested positive for nos3' but negative for 35S. All varieties of GM sweet corn contain both sequences suggesting the possibility of a false positive result, particularly because the nos3' sequence comes from a common soil bacterium *Agrobacterium tumefaciens*. Follow-up tests were mostly negative, though one was positive for a Bt gene sequence (from a different soil bacterium) that is used in GM sweet corn. It was negative for 35S.
13. The initial results in the current incident were reversed: positive for 35S but negative for nos3'. Unlike with sweet corn, there are some varieties of GM maize that contain only one of the two sequences. Although 35S is derived from a common plant virus, the virus only infects cruciferous plants and does not infect maize or sweet corn, which reduces the likelihood of a false positive due to contamination. A false positive might come from foreign plant material mixed with the maize seeds or contamination within the testing laboratory. Follow-up tests indicated specific gene sequences used in GM maize that provided strong evidence that GM material was present. MAF is arranging its own tests to confirm these results.

Sources of corn seeds

14. Currently, New Zealand only allows corn seeds to be imported from fourteen countries: Australia, Austria, Canada, Chile, Finland, France, Germany, Hungary, the Netherlands, Norway, Sweden, Switzerland, the UK, and the USA. In the 2001-02 season, imported corn (both maize and sweet corn) seeds came from:

USA	123,029 kg	42.7%
Chile	120,760 kg	41.9%
Australia	29,116 kg	10.1%
France	12,323 kg	4.3%
New Zealand return	1,550 kg	0.5%
Austria	540 kg	0.2%
Netherlands	421 kg	0.1%
Canada	160 kg	0.1%
Germany	20 kg	0.0%
Switzerland	20 kg	0.0%
TOTAL	287,939 kg	100.0%

15. Many of the most desirable varieties of corn are hybrid plants that have specific features that enable them to be grown in a range of different environments and/or display desirable characteristics (e.g. uniform ripening, consistent size and sugar content). Less access to desirable varieties of corn would reduce the competitiveness of New Zealand industries that rely on imported corn seeds, including the dairy industry. It is

impossible to calculate the impact but as a guide, MAF estimates that the gross margin of corn grown in New Zealand is \$70 million per year, and corn contributes over \$60 million per year in increased dairy production.

16. To be able to produce hybrids with different characteristics requires a large, sophisticated, and expensive breeding program. This makes the large multinational seed companies the main source of these seeds. The USA, as one of the world's major agricultural producers, is an important source of desirable corn varieties. Many of the seeds produced in Chile are likely to have come from the same companies, who use Chile for counter-season multiplication. Hybrid seed produced in Chile is likely to come from parent lines imported from the USA. MAF does not have much information about the use of GM crops in Chile. There are no approvals listed in the databases of regulatory approvals for GM crops, nor are any GM crops recorded in the annual reviews of commercial GM production. We have found unconfirmed reports that Chile allows GM crops for seed multiplication and export purposes, but not for domestic uses.
17. It is likely that there is GM contamination in corn (and canola) in Europe. France, Spain and Germany have previously grown commercial GM corn. Nature Biotechnology reported¹ that: 21% of Europe's corn seeds are imported, only 14% of the corn available in Italy could be declared "GM-free" (though there was no definition of "GM-free"), and 7-41% of conventional lots of corn in France in 2001 contained GM seeds. At the moment (until we have more information or an application for "area freedom"), MAF considers that the only way to provide assurances that corn from Europe is non-GM is by testing, which is no better than importing seeds from the USA that have been tested.
18. MAF is confident that corn from Australia is unlikely to contain GM seeds, but is yet to process an application for "area freedom" from commercial GM production. Australia has not approved GM corn for either field trials or commercial release, and appears to have strict controls over imported corn seeds. The current drought in Australia may impact on the supply and price of seeds next season.

Comments

19. This incident highlights the problem that no matter what testing regime is applied to imported seeds there is always a possibility that GM seeds will go undetected.
20. At this stage MAF does not know the source or cause of contamination. MAF is having all the seed lines involved (parent and hybrid) re-tested. Once we have the results (expected two weeks from now), we will be in a better position to determine the most likely explanation.

Recommendations

21. We recommend that you:
 - a) **note** the contents of this briefing;
 - b) **forward** a copy of this brief to the Prime Minister, the Minister for the Environment, and the Minister for Research, Science and Technology; and

noted

¹ A Meldolesi; European Union in disarray over GM seeds; Nature Biotechnology 20(4), pp324-325, April 2002

agreed/not agreed

- c) **agree** to make this briefing and its attachments public (we have not yet informed Pacific Seeds of our intention to make this information public).

agreed/not agreed

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Hon Jim Sutton
Minister for Biosecurity

Encl.

/ / 2002