

Conclusions from a meeting to discuss the interpretation of test results on seed grown at the affected sites in Gisborne and Pukekohe 18 September 2002

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Summary

The evidence provided by the test results demonstrates that genetically modified (GM) hybrid maize has been grown in two areas (Gisborne and Pukekohe) in New Zealand. It is almost certain that the source of this seed is solely due to the presence of very small concentrations of GM seed in the imported parent lines. It is very unlikely that any GM seed in the hybrid maize was the result of cross-pollination from adjoining crops during growth in New Zealand.

1. Purpose and Introduction

This document records the conclusions drawn by government officials from MAF's test results on maize lines grown in Gisborne and Pukekohe which are suspected to contain a small concentration of genetically modified (GM) seed.

There are a number of seed lines involved in this investigation. The maize seeds that initiated this investigation were from two hybrid maize crops, grown in Gisborne and Pukekohe. Each crop was produced from imported male and female inbred parent lines. The hybrid maize had been intended for sowing during the current season (2002-03). Some of the imported parent lines were also grown in New Zealand as inbred lines for future hybrid seed production. Tests were conducted on the residual imported seed from three of the four inbred parent lines, the four inbred parent lines multiplied in New Zealand and the two hybrid crops that resulted from crossing the imported parent lines.

2. Gisborne

MAF's results from Biogenetic Services and Genescan show that the hybrid line produced in New Zealand contains GM seed. The GM seed is present at a very small concentration (<0.05%, i.e. fewer than 1 in 2000 seeds are GM) and has been identified as Bt176. This confirms Pacific Seeds's results. Both testing facilities demonstrated that the imported female parent also contained GM seed and Genescan identified this variety as Bt176. None of the imported male parent was available but testing of the male line produced in New Zealand did not detect the presence of any GM seed. Therefore, it is deduced that the imported female parent is the source of GM seed in the hybrid line. Testing of the female line produced in New Zealand confirmed that this also contained GM seed. However, the variety of GM seed in this sample was identified as YieldGard. The female line was produced in one field in New Zealand and was separated by a distance of more than 400 metres from the nearest field of *Zea mays*. Therefore, considering international maize isolation distance standards of 200 metres, it was concluded that in all likelihood the imported female line contained both Bt176 and YieldGard GM varieties of maize and that this was not detected in the imported line because of the very small concentration of GM seed present. The concentration of GM seed in this line was less than 0.05%. The likelihood of sampling and detecting GM seed in a line using a sample of 3200 seeds at a GM seed concentration of 0.04% is 71%, at a concentration of 0.02% it is 47% and at a concentration of 0.01% it is 27% (assuming the GM seed is homozygous, randomly distributed and is correctly identified in 99% of samples). However, the limit of reliable GM seed detection is around 0.1 % and

therefore it may not be valid to assume that GM seed will be correctly identified in 99% of samples containing concentrations less than this.

It was concluded that since the imported female parent was the source of the GM seed there was no possibility for cross-pollination from fields on which the hybrid variety was produced, providing that the pollen-bearing tassels of all “female” plants were removed. It is most likely that the GM seed was not detected in the imported female parent when tested by Pacific Seeds because a smaller sample of each line was tested (c. 700 seeds). The likelihood of detecting GM seed in a line using a sample of 700 seeds at a GM seed concentration of 0.04% is 24%, at a concentration of 0.02% it is 13% and at a concentration of 0.01% it is 7% (assumptions as above).

3. Pukekohe

MAF’s results from Biogenetic Services and Genescan demonstrate that the samples of the hybrid lines grown at Pukekohe do not contain GM seed at a concentration that can be reliably detected; that is, a negative result from the 3200 seeds tested indicates that there is a 95% chance that any GM seed, if present, is at a concentration of less than 0.1%. Pacific Seeds’s results showed that GM seed of the variety YieldGard was present at a concentration of less than 0.05%. One possible reason that GM seed was not detected in MAF’s samples is that these were collected from the pooled harvest of all nine fields on which the hybrid was grown whereas the sample drawn by Pacific Seeds was from the seed harvested from only one field. However, a more likely explanation is that the hybrid seed contains a tiny concentration of GM seed, appreciably less than 0.05%. This hypothesis is supported by the fact that there were other inconsistencies in the test results obtained by the two testing facilities. Thus, Biogenetic Services found that the imported male line contained a detectable concentration of GM seed whereas no GM seed was detected in the Genescan samples, and Biogenetic Services showed that the imported female parent contained a detectable concentration of GM seed whereas the female line produced in New Zealand did not and Genescan’s results showed the reverse. The Genescan results demonstrated that the GM variety present in the female line produced in New Zealand was LibertyLink rather than YieldGard. However, the female line was produced in one field in New Zealand and was separated by a distance of more than 300 metres from the nearest field of *Zea mays* and therefore it was very unlikely that cross-pollination from crops in the vicinity had occurred. Finally it was noted that the imported female parent tested by Biogenetic Services had tested positive for both the 35S promoter and nos 3’ terminator. There are a number of possible explanations for this result including the presence of a GM variety containing both the promoter and terminator, e.g. the YieldGard varieties MON802 or MON809, or the presence of the common soil bacterium *Agrobacterium tumefaciens* in the seed sample.

It was concluded from MAF’s and Pacific Seeds’s results that in all likelihood the hybrid line produced in Pukekohe contained GM seed at a tiny concentration well below 0.05% and that this GM seed was of at least two varieties (YieldGard and LibertyLink). It was also concluded that the most likely source of this GM seed was from the imported female and male parents. Although both imported female and male parents almost certainly contained a tiny concentration of GM seed, the fields in which they were grown were spatially and temporally isolated from other fields of *Zea mays* in the vicinity. There are two likely explanations why this GM seed was not detected when the seed was initially tested on behalf of Pacific Seeds before importation. Firstly, the seed was tested using primers which detect some but not all commercially available GM varieties. However, the primer sets used would have probably detected all the GM varieties subsequently found. Secondly, only a 1100 seed

sample of each was tested. The likelihood of sampling and detecting GM seed in a line using a sample of 1100 seeds at a GM seed concentration of 0.04% is 35%, at a concentration of 0.02% it is 20%, at a concentration of 0.01% it is 10% and at a concentration of 0.001% it is 1% (assumptions as above). GM seed could not be reliably detected in the parent lines even when MAF tested samples of 3200 seeds.