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**Rural Industries Research and
Development Corporation**

How much canola pollen is in canola (*Brassica napus*) honey?

**A report for the Rural Industries Research
and Development Corporation**

by Michael Hornitzky

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Foreword

Genetically modified (GM) varieties of canola (*Brassica napus*) have been developed and introduced into various countries including Australia although GM canola has not been released commercially in Australia. Beekeepers commonly place bees on these crops for pollination purposes and often produce honey in the process. Honey which contains more than 1% of a genetically modified component must be labelled as being genetically modified. This may have an impact on domestic sales and also influence the export potential of honey from this crop. It is important to determine the relative content of pollen to honey by weight to clarify the status of GM canola honey.

While Australian rural industries are typically based more on a competitive spirit than on active cooperation and coordination, there are a number of instances where a particular industry or section of an industry has adopted a successful collaborative approach to the export or domestic marketing of their produce.

Collaborative marketing groups have the potential to be an effective alternative to other marketing arrangements.

This publication considers some of the features of group marketing together with general features of membership groups and how they influence the effectiveness of collaborative marketing groups. It analyses data from case studies and surveys collected from representatives of 13 primary industry groups and other industry representatives in Western Australia.

This project was funded from industry revenue which is matched by funds provided by the Australian Government.

This report, an addition to RIRDC's diverse range of over 1000 research publications, forms part of our Honeybee R&D program, which aims to improve the productivity and profitability of the Australian beekeeping industry.

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Simon Hearn
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Executive Summary

In Australia mandatory labelling of GM foods, where introduced DNA or protein is present in the final food, came into effect on 8th December 2001. Food or ingredients labelled “genetically modified” either contain new genetic material or protein as a result of modification. A 1% threshold, where labelling is not required, exists for the unintended presence of GM material in non-GM foods.

This study has determined that the canola pollen content by dry weight in a range of canola honey samples from diverse geographical areas in Australia to be $0.2\% \pm 0.12$. GM canola honey samples sourced from Canada contained 0.2% and 0.24% pollen, values which are well within the range of canola pollen content found in Australian canola honey.

All canola honey samples tested in this study contained significantly less than the 1% threshold and as such any honey derived from GM canola crops will not need to be labelled as a GM food.

1. Introduction

Genetically modified varieties of canola (*Brassica napus*) have been developed and introduced into various countries including Canada and Australia although GM canola has not yet been released commercially in Australia. In the event that GM canola is commercially produced in Australia beekeepers would place bees on these crops for pollination purposes and would be likely to produce honey in the process. Pollen represents the most likely source of transgene DNA and novel proteins in bee products. It is also commonly present in the most widely-consumed product, honey.

In Australia mandatory labelling of GM foods, where introduced DNA or protein is present in the final food, came into effect on 8th December 2001. Food or ingredients labelled “genetically modified” either contain new genetic material or protein as a result of modification. A 1% threshold, where labelling is not required, exists for the unintended presence of GM material in non-GM foods (Anon, 2003). This is a more stringent requirement than if honey containing up to 1% of the GM material itself was permitted, since transgene DNA or novel protein will comprise only a fraction of the weight of a GM pollen grain (<http://www.maf.gov.nz/mafnet/rural-nz.../gm-plants-bees-03.ht>).

Honey, which contains more than 1% of a genetically modified component must be labelled as being genetically modified. This may have an impact on domestic sales and also influence the export potential of honey from this crop. It is important to determine the relative content of pollen in honey to clarify the status of canola honey.

2. Objective

To determine the percentage canola pollen content by dry weight in a range of canola honey samples.

3. Methodology

3.1 Honey samples

Thirty four honey samples that were derived from canola crops were submitted by beekeepers and a honey packing plant. These samples consisted of 20 samples from New South Wales, 8 samples from Western Australia, two samples from South Australia, two samples from Victoria and two samples of GM canola honey sourced from Canada.

3.2 Determining the weight of a dry canola pollen grain

Three samples of honey bee collected pollen sourced from three different geographical areas in New South Wales were used to determine the weight of canola pollen grains. Five bee collected pollen pellets from each of three canola crops were each weighed. The pellets were ground in a mortar with a pestle and 1 mL of water was added and thoroughly mixed to form an even suspension. The number of pollen grains was determined by counting in an Improved Neubauer Chamber at X400 magnification. The weight of a pollen grain was determined by dividing the weight of the pollen pellets by the number of grains contained in the pellet.

3.3 Extracting pollen grains and determining the total dry weight of canola pollen grains in canola honey

Ten Grams of honey were weighed out into a 50 mL centrifuge tube. Forty mL of water was added to the tube and thoroughly mixed. The honey was centrifuged at 3000 g for 30 min. All but 1 mL of the supernatant was discarded. This was thoroughly mixed with the pellet.

The number of pollen grains in each honey sample was determined using an Improved Neubauer chamber on duplicate honey samples. The weight of canola pollen in the sample was determined by multiplying the number of pollen grains by the calculated average weight of a canola pollen grain.

4. Results

4.1 Weight of a canola pollen grain

The mean pollen grain weight in sample 1 was $0.0069 \mu\text{g} \pm 0.013$ Sample 1, $0.0055 \mu\text{g} \pm 0.002$ for sample 2 and $0.0053 \mu\text{g} \pm 0.00096$ for sample 3. The overall mean weight was $0.0059 \mu\text{g} \pm 0.00155$. A microscopic view of dry canola pollen grains is presented in Figure 1.

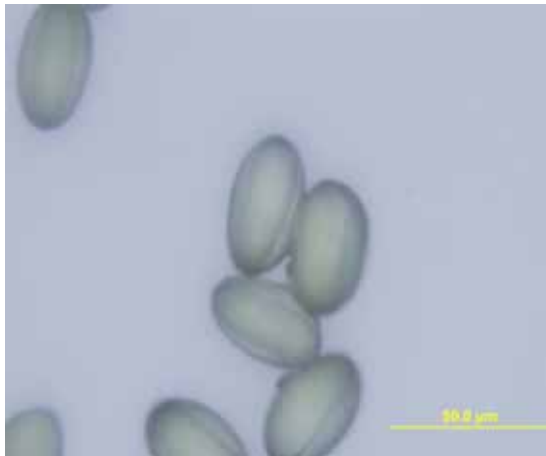


Figure 1. Dry canola pollen grain

4.2 Percentage dry weight of canola pollen in canola honey

The percentage of dry weight canola pollen in the 32 Australian canola honey samples ranged from 0.15% to 0.443% with a mean of $0.2\% \pm 0.12$. The two GM canola honey samples sourced from Canada contained 0.19% and 0.24% by weight.

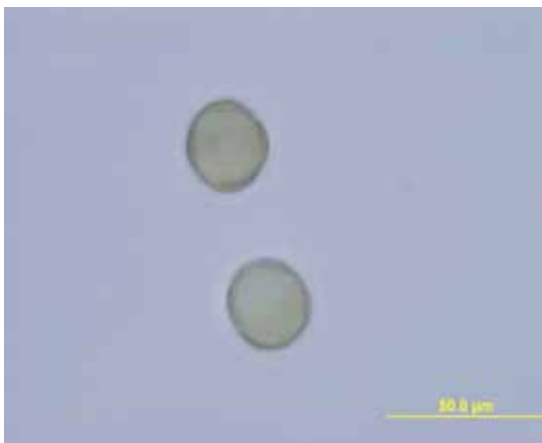


Figure 2: Canola pollen grain ex canola honey

Dry canola pollen had a “coffee bean” like morphology (Figure 1). However, pollen extracted from canola honey never had this morphology. When canola pollen was mixed in honey and centrifuged as described above the canola pollen grains became hydrated and developed a round morphology as shown in Figure 2.

It was also noted that 24 of 34 canola honey samples contained non-canola pollen grains.

5. Discussion

This study has determined the canola pollen content by dry weight in a range of canola honey samples from Western Australia, New South Wales, Victoria, South Australia and two GM canola honey samples from Canada. The pollen content was significantly less than the 1% threshold by weight above which honey derived from GM canola would need to be labelled as a GM food.

Australian GM canola honey is not available as GM canola crops have not been grown commercially. However, there is no evidence to suggest that the pollen content of non-GM canola honey is any different from GM canola honey. This was confirmed with the two GM canola honey samples which contained 0.2% and 0.24% pollen which were within the range (0.15% to 0.443%) of the pollen content for the 32 Australian canola pollen samples.

This work indicates that honey produced from GM canola crops does not need to be labelled as a GM food.

6. Reference

Anon. (2003) Agrifood Awareness Australia Ltd. Paper No 14. GM canola, pollen, bees and honey