



MPI Technical Report

October 2018

Regional variation in mānuka honey markers

The MPI mānuka honey definition was developed to be representative of mānuka honey produced from across New Zealand. This means at a regional level, there could be locations in which honey once thought to be mānuka using industry grading systems does not meet the definition.

What was the issue being investigated?

Since implementation of the mānuka honey definition, the honey industry and the Ministry for Primary Industries (MPI) have been working together to monitor its performance and ensure it remains fit for purpose. Some in the industry have found that some of their honeys have low levels of the chemical marker 2'-methoxyacetophenone (2'-MAP) which means they have lower yields of monofloral mānuka honey. One possible reason is that the level of 2'-MAP in the nectar of mānuka plants differs across New Zealand and this difference is large enough to prevent honey produced there from having sufficient levels of 2'-MAP.

What did we do to investigate the issue?

The regional differences in the levels of all mānuka honey markers, including 2'-MAP, were investigated as part of the MPI mānuka honey science programme. There were no statistically significant regional differences found in the levels of 2'-MAP in the nectar of mānuka plants across the two seasons studied (2014/15 and 2015/16). In mānuka honey, there were no statistically significant regional differences in the level of 2'-MAP found for those produced in 2015/16, but some regional differences were found in for the 2014/15 season. However, the classification modelling approach used to develop the mānuka honey definition took these differences into account.

To further investigate the issue, the industry/MPI joint Manuka Honey Science Steering Group asked industry for more recent test results for the mānuka honey markers. With this data we aimed to determine whether there was a regional difference in the mean level of 2'-MAP and attempt to identify the proportional impact on honeys within a region not meeting the monofloral definition.

What data did we receive?

Data from 10 different suppliers were sent to MPI to investigate the regional variability of 2'-methoxyacetophenone (2'-MAP). From the total number received (tests results from 1,640 honeys), 1,518 honeys had levels for 2'-MAP tested. The majority of suppliers provided results for less than 10 honeys, with four suppliers providing results for more than 25 honeys.

The number of honeys tested from each region varied, but honeys included in the analyses were from: Bay of plenty, Central plateau, Coromandel, East Cape, Hawkes Bay, Manawatu-Whanganui, Northland, Taranaki, Waikato, Wairarapa, Wellington and Canterbury.

What did we do with the data?

Each supplier of the data provided a different level of detail to describe the geographic location of where the honeys came from. The original geographic information provided by the supplier was standardised to council land areas to help make a valid comparison (total of 12 regions). There are a large number of regions not represented in the data, particularly in



the South Island. For some regions (Bay of Plenty, Coromandel, Taranaki, Wellington) the number of honeys are very limited so they are unlikely to provide an accurate estimate of the level of 2'-MAP produced in a region. As such the results for these regions were combined with other regions for the comparison (total of 9 regions).

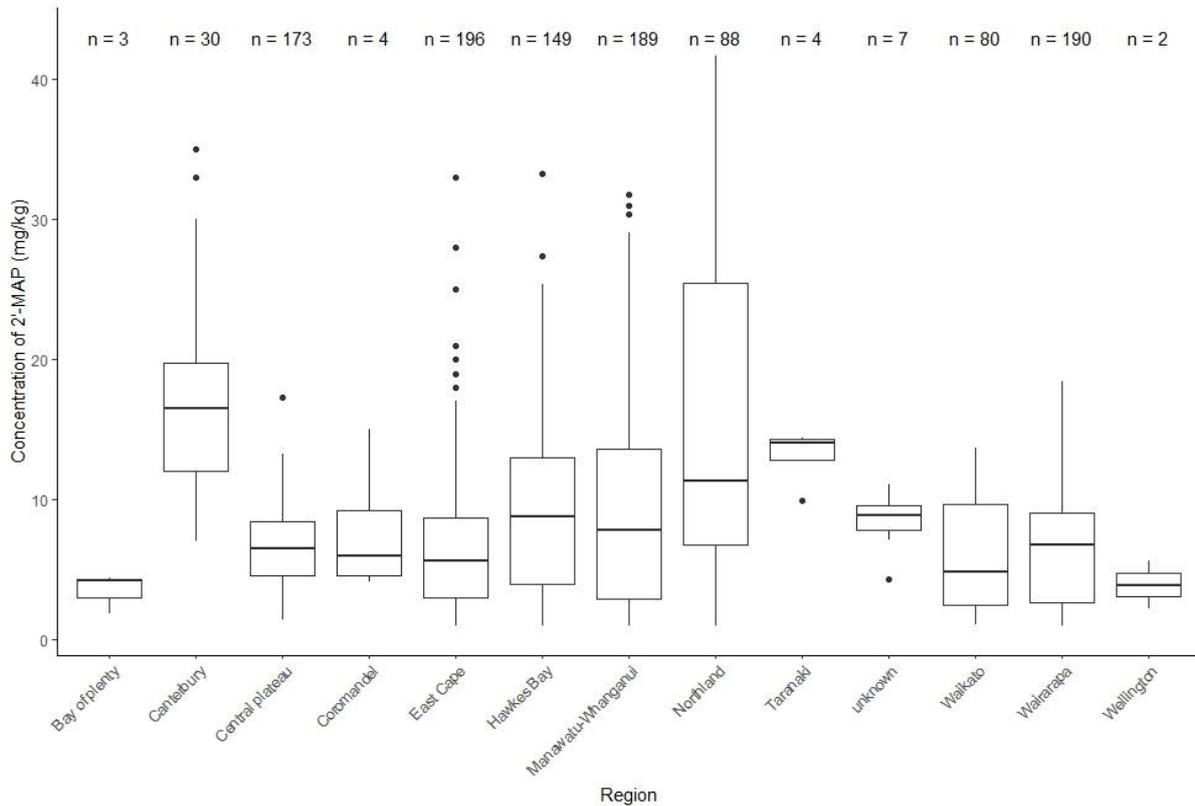


Figure 1 The 2'-methoxyacetophenone concentration in honey from each region for samples with values greater than or equal to 1 mg/kg of all data received (n = 1,115). The sample size for each region is also provided. The distribution of the data is summarised in boxplots (the central line, median; box limits, first and third quartiles; whiskers, 1.5x inter-quartile range; points, outlier data beyond the end of the whiskers).

Each region contains a different proportion of honeys which would meet the mānuka honey definition or not. This will influence the level of 2'-MAP calculated for a region, therefore, honeys with a level of 2'-MAP greater than or equal to 1mg/kg were included in the analysis (a total of 1,115 honeys).

For the analyses, it is assumed that honeys represented the region, although in reality they may variously only represent one site within the region. The levels of 2'-MAP in honeys from the same site within a region are likely to be more similar to each other than honeys at different sites. Ideally this would be accounted for directly within the analyses as it means they are not truly independent.

To compare the levels of 2'-MAP across the nine different regions, a linear model was fitted to the data. This gives a prediction of the mean level of 2'-MAP for each region, but also accounts for the different number of honeys included from each region. This difference can influence the variance within each region which must be equal to meet the assumptions of the linear model.



What did we find out?

Regional variability was observed in the data provided, with some honeys in a region falling below the predicted mean level for that region.

The data set did not show that the regional difference in the level of 2'-MAP discriminated against honeys within a particular region from meeting the monofloral mānuka honey definition compared with other regions. All regions had a predicted mean level of 2'-MAP greater than 6.04 mg/kg.

What are the next steps?

Although we have regions missing from the analyses, these findings are similar to those from the MPI mānuka honey science programme. There will always be variation in any marker across New Zealand and the level of variation will change across seasons.

Further science work is need to accurately quantify this level of variation. The data so far provided cannot be used to accurately quantify the differences between each region or predict the level of each marker for a particular region. To achieve this, targeted sampling of honeys from every region and across several seasons would be needed.