Honey authenticity: collaborative data sharing feasibility study overview

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According to the UN,1 there are more than 90 million managed beehives around the world producing about 1.9 million tonnes of honey worth more than £5 billion a year. That honey will then be packaged, as single origin or a blend of honey from different sources, and sold for consumption. Given the size of the market and the immense environmental benefits of beekeeping – three out of four crops depend on pollination by bees – it is an industry on which both livelihoods and lives depend.

Target for adulteration

As a labour-intensive, high-value expensive product with an often complex supply chain, honey is subject to internationally and nationally agreed definitions – and is a target for adulteration. Testing honey is therefore critical, but there is no single universal analytical method available which is capable of detecting all types of adulteration with adequate sensitivity. A variety of methods are used to detect honey adulteration, each test has strengths and weaknesses, and there are issues with interpretation.

NMR analysis

Testing for honey adulterated with added sugars may be based on analytical techniques using analytical tools, such as those using nuclear magnetic resonance spectroscopy (NMR). This is especially helpful in detecting certain types of adulteration, such as the addition of cane or beet sugars. Bees generally forage on plants that use the same photosynthetic pathway as beet sugars. This makes it difficult for traditional tests based on isotopic differences to provide effective results. The ‘chemical fingerprint’ provided by NMR is specific to the sample that has been tested and can be compared with the fingerprint from other sample results enabling the user to assess consistency.

Reference databases

Interpretation of results depends on comparison against a reference database of authenticated samples. The reference database needs to be representative of the variation that can occur, which includes differing beekeeping practices, origins, seasonality and variations in climate.

Information is also needed on the collection of reference samples, curation of databases, interpretation and reporting of data. The nature of the reference databases is key to understanding how the results have been interpreted.

However, these reference databases are owned by and commercially sensitive for the testing laboratories that have developed them. How can such data be shared in a trustworthy way between key stakeholders along the honey and analytical supply chain so that all parties can have confidence in honey authenticity test results?

This research is looking into the implications of these hidden databases, especially in terms of the trust related to the validation certificates and the value that they have in the honey supply chain.