

## Adulteration study in Brazilian honey by SNIF-NMR method

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The increase in production and exportation of Brazilian honey specially for Europe require that we have an analytical tool to guarantee the control quality. SNIF-NMR is proving to be an efficient technique to control the food authenticity and products adulterations when it can be detected by their isotopic content (MARTIN, 1986).

Honey adulteration is easily carried out by several ways like a simple sucrose addition, a mixture of honey from different source and more recent, to feeding the bees with solution of sucrose or sucrose syrup with vegetal extract.

The deuterium/hydrogen ratios measured at the methyl site of ethanol ( $^2\text{H}/^1\text{H}$ )<sub>I</sub> in honeys differ significantly according to the nectar origin. By feeding the bees with sucrose solutions from sugar-cane it will increase the ( $^2\text{H}/^1\text{H}$ )<sub>I</sub> value if compared with that produced from C<sub>3</sub> plant (LINDNER, 1996), like nectar from eucalyptus and citrus.

This work describes the use of SNIF-NMR method to determine the biosynthetic origin from forty honey samples which were submitted to fermentation during 48 hours. The  $^2\text{H}$  and  $^1\text{H}$  NMR spectra of ethanol were carried out on BRUKER DRX400 9.4 Tesla equipment without fluorine lock and all measurements were made in triplicate in a 5 mm probe at 298K. The internal reference for  $^1\text{H}$  NMR spectra was TMS and for establish the isotopic ratios was TMU. The results are resumed on the table below.

Table 1. ( $^2\text{H}/^1\text{H}$ ) relation value for methyl(I) and methylene(II) site in ppm

	eucalyptus	citrus	wild	sugar-cane	assa-peixe
( $^2\text{H}/^1\text{H}$ ) <sub>I</sub>	96.9-99.7	100.3-103.4	97.1-103.5	111.8	101.2-101.7
( $^2\text{H}/^1\text{H}$ ) <sub>II</sub>	127.5-129.6	127.2-129.2	127.4-129.3	128.0	127.8-127.9

For two samples which pretend to be eucalyptus and citrus honeys we found the ( $^2\text{H}/^1\text{H}$ )<sub>I</sub> values 112.2 and 112.0 ppm, respectively. These are very similar to the ratio for honey produced when the bees are feeding with sucrose solution (111.8 ppm). Probably these samples were adulterated.

### References:

- LINDNER, P. *et al.* *J. Agric. Food Chem.*, **44**, 139 – 140, 1996.  
MARTIN, G. J. *et al.* *J. Am. Chem. Soc.*, **108**, 5116 – 5122, 1986.