Journal of Apicultural Research

ISSN: 0021-8839 (Print) 2078-6913 (Online) Journal homepage: http://www.tandfonline.com/loi/tjar20

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To cite this article: C Giovani, R Padovani, F Frilli, R Barbattini & M Greatti (1998) Potassium Evaluation in Metcalfa Pruinosa Honeydew Honey by Means of ^{40}K Measurement, Journal of Apicultural Research, 37:1, 47-49, DOI: 10.1080/00218839.1998.11100954

To link to this article: https://doi.org/10.1080/00218839.1998.11100954

Notes and comments

POTASSIUM EVALUATION IN *METCALFA PRUINOSA* HONEYDEW HONEY BY MEANS OF ^{40}K MEASUREMENT

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(Received 31 March 1997,
accepted subject to revision 19 June 1997,
accepted for publication 6 November 1997)

Keywords: gamma spectrometry, ^{40}K, radionuclide, *Metcalfa pruinosa*, honeydew honey

The nearctic flatid planthopper *Metcalfa pruinosa* was accidentally introduced into north-eastern Italy about fifteen years ago (Zangheri & Donadini, 1980) and during the following years spread into the whole of Italy and the south of France. The rapidity with which it spread is due in part to its ability to live on a wide range of woody and herbaceous plants (Barbattini *et al.*, 1991). The species is univoltine in Italy and overwinters in the egg stage; in northern Italy the eggs begin to hatch in the second half of May and the adult stage is reached about fifty days later.

In the last few years production of honeydew honey has been extensive in north and central Italy. In Friuli-Venezia Giulia (north-eastern Italy) in particular, *M. pruinosa* produces abundant honeydew that is collected by bees from early July to mid-September (Barbattini *et al.*, 1991, 1997). Observations during 1990–1994 determined that an average of about 40 kg of honeydew honey per hive was produced. In order to define the characteristics and quality of this honey more than 100 samples were collected from different parts of the Friuli region and analysed (Barbattini *et al.*, 1991, 1997). All characteristics were typical of honeydew honey. The colour was of an average Pfund value of 98 mm, the average pH was 5.0, and the average electrical conductivity was $1.64 \times 10^{-3} S \times cm^{-1}$. The sugars were typical of honeydew honey, i.e. a low content of monosaccharides and a higher amount of trisaccharides relative to nectar honeys. Moreover, the ratio between number of honeydew indicator elements and pollen grains was always very high. Other parameters which appear to characterize this honey, and also differentiate it from fir tree honeydew (the only type of honeydew honey with defined characteristics produced in Italy) were the high

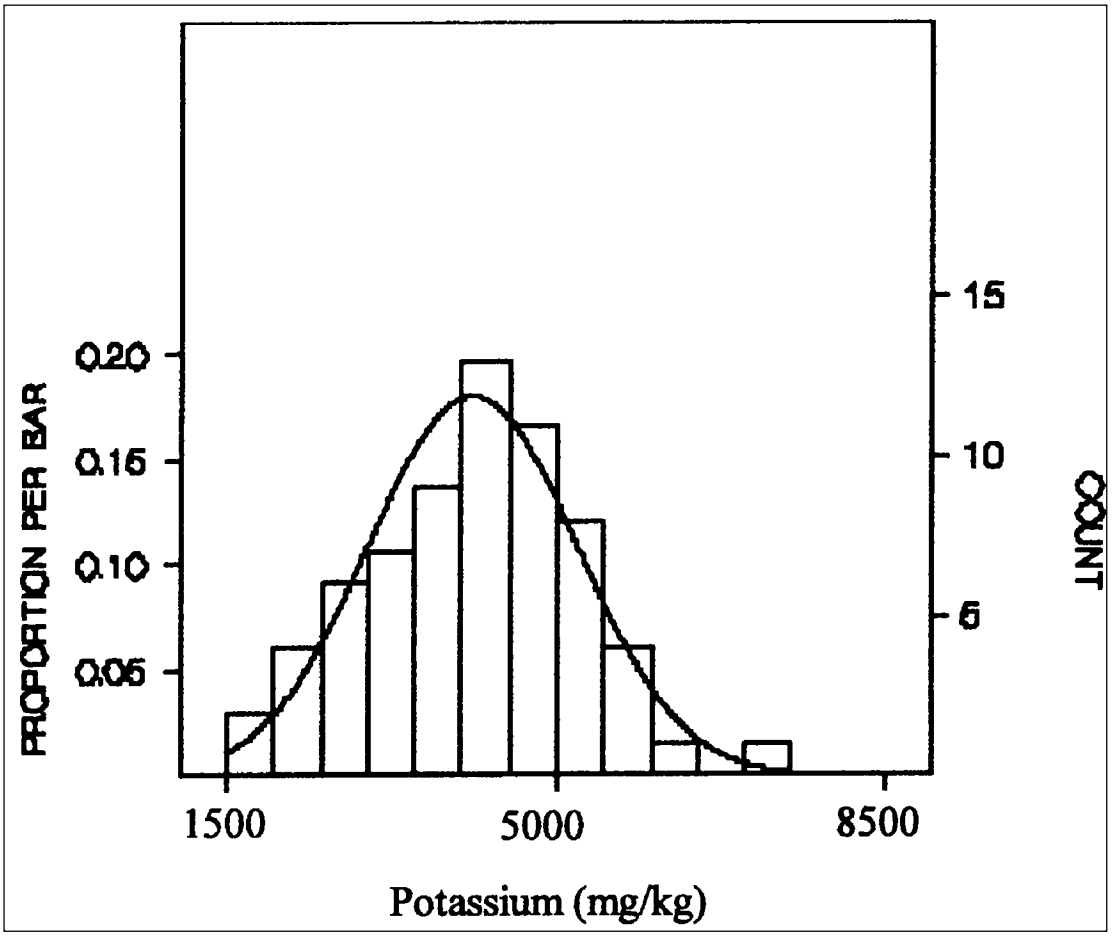

FIG. 1. Distribution of potassium content in 66 samples of honey produced from honeydew of the planthopper *Metcalfa pruinosa*.

diastase activity (31.9 diastase units/g) and acidity (36.6 meq/kg). Finally it was found that melezitose, a trisaccharide typical of fir tree honeydew honey, was rarely found but that the trisaccharide maltotriose was always present, although in limited amounts. The presence or absence of these two sugars depends on specific enzymatic reactions in sap-feeding insects (Sabatini & Spina, 1972).

Because *M. pruinosa* honeydew honey has begun to be produced and marketed only recently, it is of interest to know its potassium (K) content because potassium is a distinctive feature of the honeydew honeys and the most abundant mineral found in honey. The aim of this study was to evaluate both the content and distribution of potassium in *M. pruinosa* honeydew honey.

Gamma spectrometry analysis was carried out (Giovani *et al.*, 1993) on 66 samples of *M. pruinosa* honeydew honey to determine ^{40}K content. ^{40}K is a natural radioisotope and its isotopic abundance is a constant proportion of total K; therefore it is easy to estimate K content from ^{40}K measurements. To compare ^{40}K content of honeydew honey with that of other types of honey produced in north-eastern Italy, the same analysis was performed on 42 and 113 samples of *Robinia pseudoacacia* and multifloral honey, respectively. The honeydew honey tested was produced during the years 1992 and 1993 and collected from 66 different sites of the Friuli-Venezia Giulia plain. Gamma spectrometry measurements were performed using a high-purity intrinsic germanium detector with 80% efficiency. A gamma-ray source calibrated by ENEA Metrology Laboratory (Casaccia, Italy) having about the same density as honey (1.3 kg/l) was used for the efficiency calibration.

Measurement time was 24 h; to improve radionuclide estimation, a background spectrum was subtracted from the measurements. The honey samples were measured in 150 cm^3 Marinelli beakers. In order to verify K distribution in the honeydew honey, a Kolgomornov-Smirnov test was used. The K content in the different types of honey was compared by means of Student's *t* test.

TABLE 1. Mean values and standard deviations (s.d.) of potassium content in different types of honey (*n* = number of samples).

	Botanical origin		
	honeydew from *Metcalfa pruinosa*	multifloral	*Robinia pseudoacacia*
Mean (mg/kg)	4106	1158	282
s.d. (mg/kg)	1104	544	157
n	66	113	42

Potassium content in *M. pruinosa* honeydew honey was determined to have a Gaussian distribution ($P < 0.001$) centred around a value of 128 Bq/kg (corresponding to 4.1 g/kg stable K) (fig. 1). The mean values and the standard deviations of ^{40}K content in the different types of honey are reported in table 1; as expected, the *M. pruinosa* honeydew honey has a much greater K content than that observed in the other types of honey produced in the same area ($P < 0.01$).

By measuring electrical conductivity in *M. pruinosa* honeydew honey (Barbattini *et al.*, 1991) and applying the correlation between electrical conductivity and total ash content (Accorti *et al.*, 1987), the mean value of ash for *M. pruinosa* honeydew honey was estimated to be approximately 8.6 g/kg.

The K content in *M. pruinosa* honeydew honey was estimated to be about 50% of the total ash content. This value agrees with that reported by Sabatini (1991) for the Italian honeydew honeys. This investigation confirmed that K content is greater in honey made from *M. pruinosa* honeydew than in other honeys produced in northern Italy. Our test also demonstrated that gamma spectrometry is a valid method to quantify potassium in honey.

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Journal of Apicultural Research 37(1): 49–51 (1998)

CONGRUENCE OF RAPD AND MITOCHONDRIAL DNA MARKERS IN ASSESSING *VARROA JACOBSONI* GENOTYPES

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(Received 5 January 1998,
accepted subject to revision 9 January 1998, accepted for publication 14 January 1998)

Keywords: *Varroa jacobsoni*, genotypes, RAPD, mitochondrial DNA, restriction endonuclease, CO 1 region

Different genotypes of varroa have been described which may explain reported differences in the degree of virulence on infested hosts. Delfinado-Baker (1988) designated three biotypes of varroa based solely on reports of injuries caused by the mites and mite behaviour. Molecular variation in varroa populations showed differences between mites collected from Brazil and Germany based on isozyme structure (Issa, 1989, Rosenkranz *et al.*, 1989). Kraus and Hunt (1995) showed that German mites can be distinguished from US mites, and that both western groups of mites could be distinguished from Malaysian mites using random