

Physical and chemical quality of honey from hives fed with supplementary feeding

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INTRODUCTION

The aim of this study was to evaluate the influence of honey bees feeding with different sugar pastes all manufactured in Zukan S.L.U. (Murcia, Spain): sugar paste (Apipasta®), sugar paste + vitamins + free aminoacids (Apipasta® Vitamins) and sugar paste + vitamins + protein (3%) (Apipasta® Plus), in order to act as a pollen substitute, to examine the effect on the quality parameters and mineral composition of honey.

METHODOLOGY



LOCATION

Murcia, Spain (experimental apiary in the Campus of Espinardo of the University of Murcia).



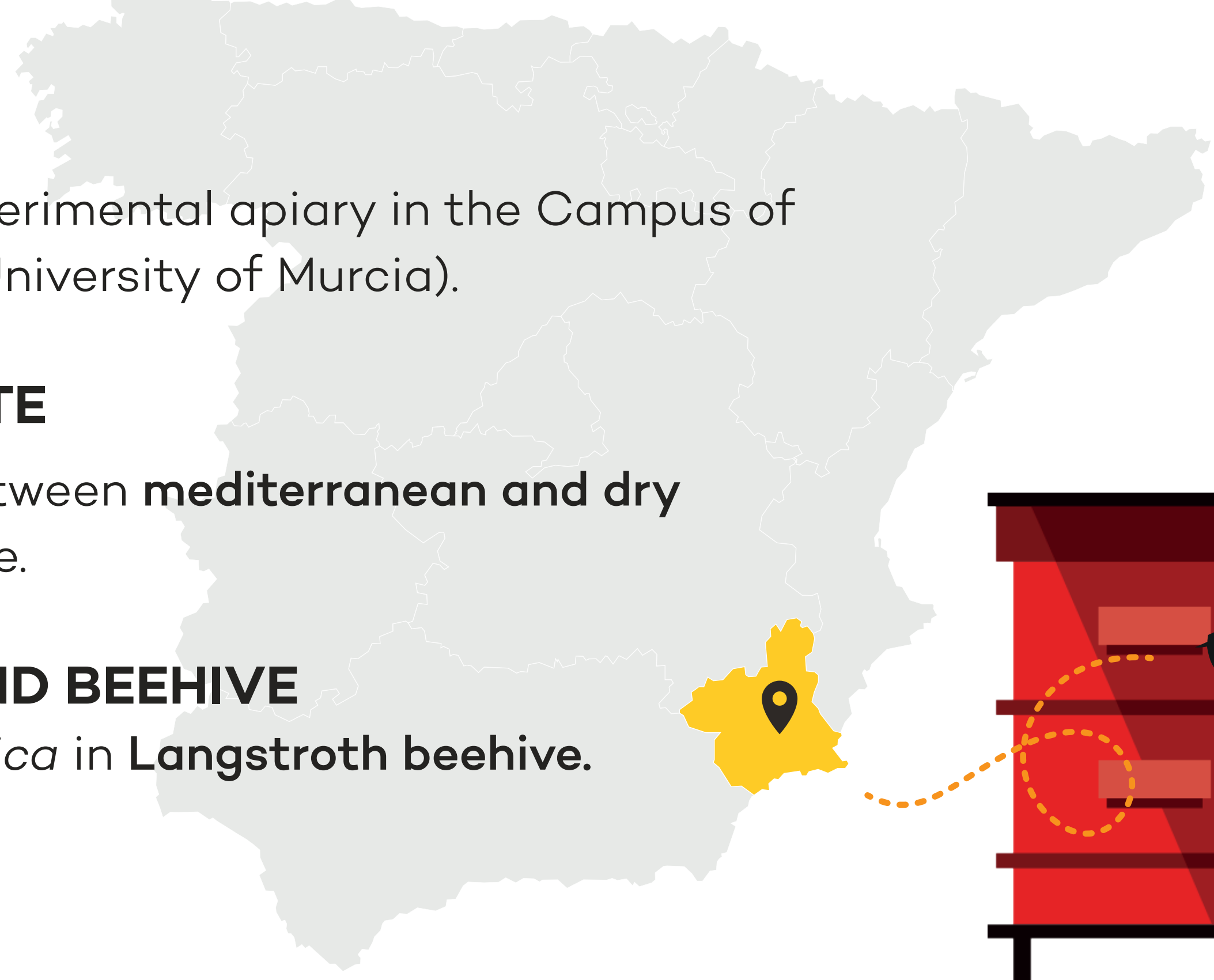
TYPE OF CLIMATE

Transition area between **mediterranean and dry subtropical** climate.



TYPE OF BEE AND BEEHIVE

Apis mellifera iberica in **Langstroth** beehive.



GROUPS OF HONEY SAMPLES

28 hives were distributed randomly into four groups:

GROUP 1

Control group, no supplementary feed

GROUP 3

Fed with **Apipasta® Vitamins** (sugar paste with vitamins and free aminoacids)

GROUP 2

Fed with **Apipasta®** (sugar paste)

GROUP 4

Fed with **Apipasta® Plus** (sugar paste with vitamins and 3% of crude protein)



PHYSICO-CHEMICAL ANALYSIS OF HONEY (DIRECTIVE 2001/110/EC)

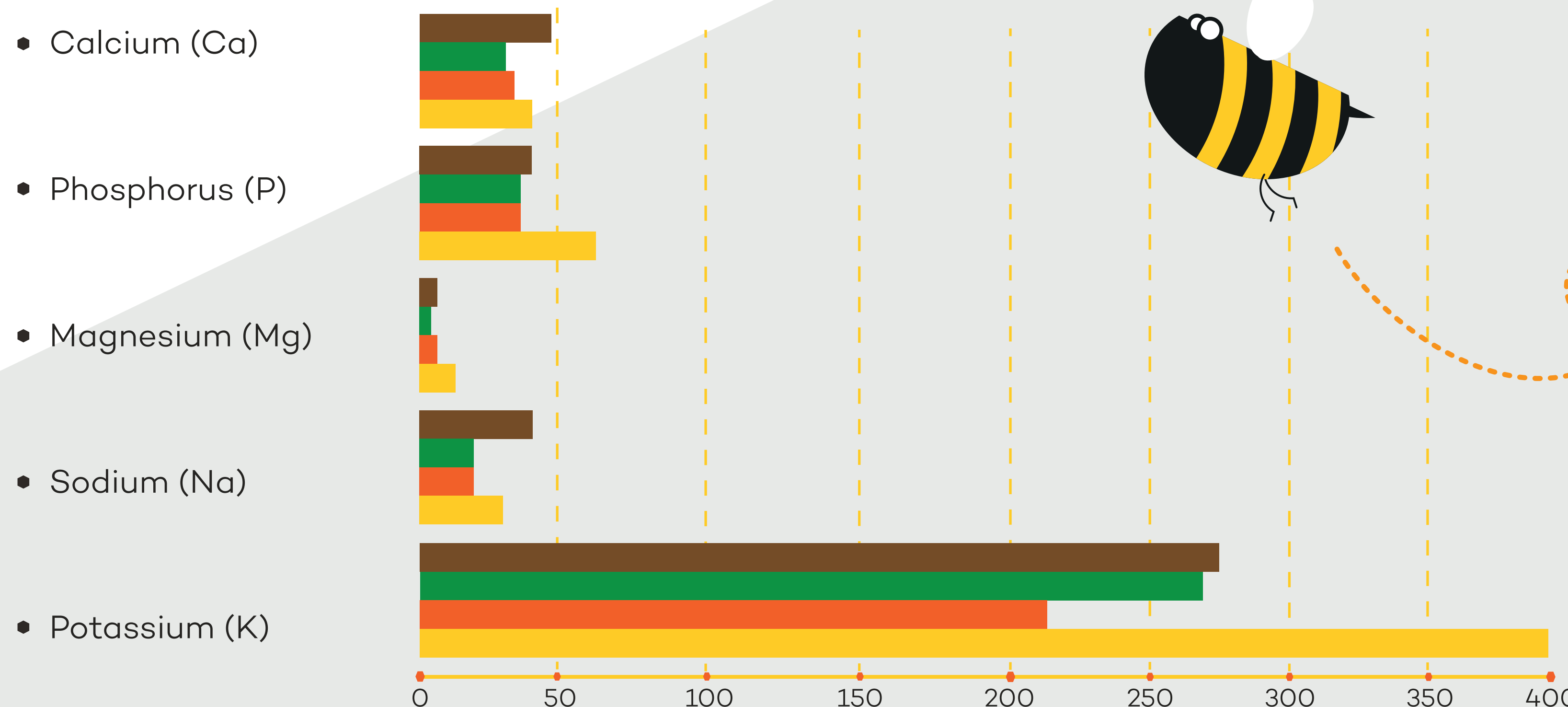
- Moisture content (%)
- Free Acidity (meq/kg)
- Colour (Pfund scale)
- Hydroxymethylfurfural content (mg/kg)
- Diastase activity (Gothe scale)
- Electrical conductivity (µs/cm)
- Ash content (%)
- Sugar profile (glucose, fructose and sucrose)
 - Gluc + Fruc (g/100g)
 - Glucose (g/100g)
 - Fructose (g/100g)
 - Sucrose (g/100g)
 - Maltose (g/100g)
- Mineral content (mg/L)

TABLE 1. The means and standard deviations of physicochemical parameters.

C	Ap	Av	Ap+
13.00 ± 0.00	13.20 ± 0.00	13.20 ± 0.00	13.40 ± 0.00
16.83 ± 0.28 ^b	15.33 ± 0.57 ^a	14.68 ± 0.29 ^a	4.17 ± 0.28 ^a
32.48 ± 1.19 ^a	46.84 ± 1.36 ^c	39.17 ± 2.52 ^b	28.40 ± 0.56 ^a
4.76 ± 0.08 ^c	0.55 ± 0.00 ^a	0.57 ± 0.00 ^a	2.81 ± 0.21 ^b
20.86 ± 0.06 ^a	22.75 ± 0.38 ^b	22.76 ± 0.81 ^b	23.11 ± 0.15 ^b
300 ± 0.00 ^b	363.30 ± 3.74 ^c	256.67 ± 3.70 ^a	456.67 ± 4.97 ^d
0.24 ± 0.02 ^b	0.30 ± 0.01 ^c	0.20 ± 0.01 ^a	0.37 ± 0.03 ^d
68.35	71.35	68.33	69.68
30.72 ± 0.14 ^b	31.41 ± 0.23 ^c	30.31 ± 0.40 ^b	29.71 ± 0.13 ^a
37.63 ± 0.08 ^a	39.94 ± 0.27 ^b	38.02 ± 0.33 ^{a,b}	39.97 ± 0.03 ^b
4.89 ± 0.06 ^a	2.24 ± 0.10 ^b	4.79 ± 0.04 ^a	4.67 ± 0.10 ^c
1.38 ± 0.16 ^{a,b}	1.43 ± 0.18 ^b	0.74 ± 0.77 ^{a,b}	0.65 ± 0.01 ^a

Values within rows with different letters differ significantly (P < 0.05).

FIGURE 1. Mineral composition expressed in mg/L.



RESULTS AND DISCUSSION

All honey samples analyzed from the different groups were in accordance with the criteria described in Directive 2001/110/CE (**Table 1**). In terms of mineral content, significant differences (p<0.05) were found between honey samples.

The honeys from hives fed with **Apipasta® Plus** and control group had higher values for Na, Mg, P, K, and Ca than hives fed with **Apipasta® Vitamins** and **Apipasta®**. In all honeys samples the potassium was the main mineral component. Variability in mineral content can be attributed to botanical, environmental, and geographical factors (Bogdanov et al., 2007).

CONCLUSIONS

Supplementary feeding (**Apipasta®, Apipasta® Vitamins, Apipasta® Plus**) range consumption do not affect the quality of honey and **provides high-quality honey** that meets the requirements established in Directive 2001/110/EC.



REFERENCES

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