

PRESENCE OF ACARICIDES AND ANTIBIOTICS IN SAMPLES OF ITALIAN HONEY

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INTRODUCTION

Residues of acaricides in honey

The presence of *Varroa* on the whole Italian territory has led to the necessity of periodic chemical treatments against the mite which have increased the risk of contamination of honeybee products with residues of acaricide substances.

The veterinary acaricides authorized by the Ministry of Health for use on bees are the following:

Bayvarol (active substance flumetrin); Api life var (active substances camphor, eucalipthol, menthol, thymol); Apistan (active substance fluvalinate); Perizin (active substance coumaphos); Apitol (active substance cymiazol); Apivar (active substance amitraz).

Some of these products, due to development of resistant mites (as happened to Apistan), to non practicality of use or to high costs, are not frequently used and the most used products are Perizin and Api life var.

It is also known that the active substances present in these acaricides are frequently used in different and unauthorized formulations causing various kinds of problems: variability in efficiency, low safety for the operator, risk of development of resistant mites, probability of presence of residues in honey or wax.

Added to the above is the possibility that acaricides destined to other veterinary or agricultural use could be employed.

A consequence of what has synthetically been described is that residues of these active substances can be present in honeybee products; in the specific case of honey the contamination can take place directly or through wax.

The problems connected to such an eventuality concern on the one hand the legal aspects of honey production (in the case of the substances for which a Maximum Residue Limit has been fixed) and on the other the question of food safety and of the image of honey as a natural and healthy food product.

Residues of antibiotics in honey

Due to the high incidence of AFB many beekeepers, convinced of preventing the development of new cases of infection, use inhibiting medicaments, mainly tetracyclines, with no veterinary control. On this subject it is maybe useful to underline that present laws allow the use only of prescribed registered products which for AFB are not available in any European country.

The "preventive" use of tetracyclines and of other antibiotics against AFB has not resulted in an improvement of the epidemiological situation, rather it has probably

contributed to the implanting of the infection in a sub-clinic state. However the worst risk is contamination of beehive products, above all honey (Matsuka & Nakamura, 1990; Lodesani et al., 1994; Prandin et al., 2000).

Due to the fact that antibiotics are not authorized for use on honeybees no MLR have been fixed, consequently any detectable residue is not tolerated. For this reason the Ministry of Health has included the research on tetracyclines in honey in the National Plan for Residues, actuated in compliance with the EC Directive 96/23.

The following table shows the MRL for acaricides and antibiotics fixed by the Italian law.

		L. 283/62	L. 753/82	O.M. 6/6/8 5	Reg. CE 2377/90 and succ.modifications
ACARICIDES	BROMOPROPYLATE			10 ppb	
	COUMAPHOS				100 ppb (proposed)
	CIMIAZOLO				1000 ppb
	FLUVALINATE				No MRL
	AMITRAZ				200 ppb
	FORMIC ACID				No MRL
	OXALIC ACID				
	LACTIC ACID				No MRL
	CAMPHOR				No MRL
	THYMOL				No MRL
	EUCALIPTHOL				No MRL
	MENTHOL				No MRL
	FLUMETRIN				No MRL
ANTIBIOTICS	TETRACYCLINES	absence	absence		
	SULFONAMIDES	absence	absence		
	STREPTOMICINE	absence	absence		

The National Institute of Apiculture is equipped with a accredited laboratory (EN ISO/IEC 17025) to which thousands of honey samples a year are sent to be analysed. The origin of the samples differs: they are sent directly from beekeepers, from wholesale dealers, from small tradesmen and from big supermarket chains, from the Public Health Services, from the Fraud Repression Services, from Customs. The most common analyses concern verification of compliance with MRLs and with quality requirements, examination of the botanic and geographic origin and control of the honey's wholesomeness.

METHODS AND MATERIALS

Samples of Italian honey, sent to the Institute between January 2001 and June 2002, were analysed for presence of acaricide (coumaphos, chlorfenvinphos, fluvalinate, amitraz) and antibiotic (tetracyclines, oxytetracyclines) residues.

The samples are indicative of the Italian honey picture as they come from all the different stages of the market. Samples of imported honey or of blends with imported honey were not considered so as to evaluate the residue levels with explicit reference to the National situation, which also applies to Italian honey commercialised in other countries.

The methods used to analyse the honey have been elaborated by the Institute so as to combine sensitivity, speed and repeatability.

Analysis of acaricide substances was conducted with gaschromatography connected to selective detectors (nitrogen-phosphorous for coumaphos and chlorpheninfos; electron capture for fluvalinate) and confirmed by mass spectrometry.

For the detection of oxytetracycline and tetracycline high performance liquid chromatography coupled with ultraviolet visible spectrophotometer using a photodiode array detector has been applied.

In both methods the detection limit is 10ppb.

RESULTS AND DISCUSSION

The results are illustrated in the following table.

	Coumaphos	Chlorfenvinphos	Fluvalinate	Amitraz	Tetracycline	Oxytetracycline
ANALYZED SAMPLES	215	18	71	121	112	112
< LOD	185	18	70	121	109	107
10 - 100 ppb	22	0	0	0	1	3
100 – 1000 ppb	7	0	0	0	2	2
>1000 ppb	1	0	1	0	0	0
Positive	13,9 %	0%	1,4%	0%	2,7%	4,5%

Various kinds of observations can be made:

The objective evaluation of the amounts of detected residues shows that they do not represent a risk for food safety. The important revelation of the use of un-authorized products: tetracycline residues were detected in some samples.

As far as the authorised products are concerned, residue levels above MRL were found in 8 samples for coumaphos and in 1 for fluvalinate.

Of the considered samples 14% were positive for coumaphos but residue levels were in most cases lower than the MRL values.

As far as the most commonly used antibiotics are concerned, less than 5% of the samples were found positive.

The substance which appears to be most problematic from the point of view of residues is coumaphos, probably when it is used in un-authorized formulations and therefore with uncontrollable dosages. The same considerations can be applied to the presence of antibiotics residues.

On the whole the risks of presence of residues in Italian honey productions are not high and could easily be reduced with the correct application of the prescribed medicaments against the most frequent honeybee pathologies.

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