

Acaricide residues in bee wax and organic beekeeping

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Introduction

The growing sensibility towards food safety and the tendency to opt for agricultural techniques which are more respectful towards the environment have led to an increase of the value of the organic market which now has a significant turnover in most European countries.

The European country in which the organic market is most developed is Germany but the country with the highest consumption of organic products is Austria. Estimates for the future show that in 2005 the consumption of organic products will be highest in Austria at 7%, followed by Germany, Italy and Switzerland.

Honeybee farms represent only 1% of the total animal production whereas if we look at the organic animal production the percentage of honeybee farms increases to 12%. This is probably due to the fewer difficulties encountered by beekeepers in converting their production techniques from traditional to organic. It is interesting to note that most of the organic honey farms are in the North of Italy and decrease while going to the south, although from an ecological point of view the South of Italy has more suitable areas because of both lower industrialization and human presence.

One of the conditions necessary for conversion from traditional to organic beekeeping is substitution of all the nest-combs with residue-free foundations; considering that a large number of beekeepers is converting to the organic production principles this has caused a great demand of organic wax, which isn't at the moment present on the market in sufficient quantity. In consequence, derogating from the existing jurisprudence on the matter, use of cap-wax from non-organic beekeepers has been allowed, following analytical ascertainment of compliance with organic standards.

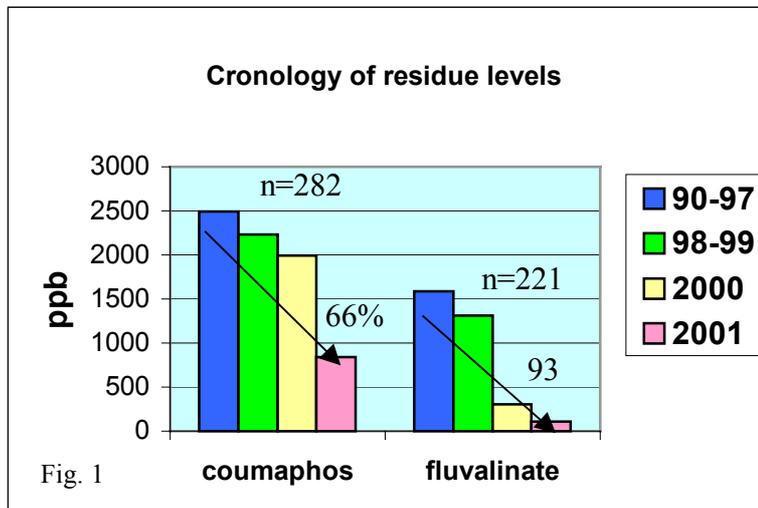
Methods

Over the last few years the Istituto Nazionale di Apicoltura (certified laboratory UNI CEI EN ISO/IEC 17025) has been monitoring residue levels in the wax brought to be analysed by beekeepers, associations and inspection bodies from all over Italy. Analyses were conducted with gaschromatography connected to selective revealers (nitrogen-phosphorous for coumaphos and chlorphenvinfos; electronic trapping for fluvalinate) and confirmed by mass spectrometry.

Results

Acaricide residue levels in wax have been decreasing over the years and this is particularly evident in the case of fluvalinate: mean levels in samples decrease from 1587ppb referred to years 1990-1997 to 111ppb found in 2001 (fig.1). And even though the maximum residue levels recorded for fluvalinate are 1/3 of maximum residue levels recorded for coumaphos (2490ppb in the 1990-1997 period) the reduction percentage

for fluvalinate is nevertheless much higher (93% for fluvalinate against 66% for coumaphos).



This data confirms the decrease in general use of both active substances during the last few years but it is probably **overestimated**: most of the wax samples come from beekeepers who are, in some way, interested in organic breeding methods and who therefore, with a greater possibility will have already started using thymol and oxalic acid (approved for use in organic beekeeping) as anti-varroa treatments rather than the traditional products. The decreasing trend is particularly evident in the case of fluvalinate. This is because Apistan® has not been used since 1994, when development of resistant mites caused thousands of colonies to die.

The highest number of positive results are from coumaphos and fluvalinate while amitraz is always absent; this is not because amitraz is not used but due to the fact that it is a highly instable and degrading substance (tab.1).

Tab.1

Active ingredient	analyzed samples	residue presence	positive presence
coumaphos	285	237	83%
fluvalinate	221	167	75%
clorfenvinphos*	53	4	7%
Amitraz (2,4 DA)*	60	0	0
cimiazol*	21	1	5%

*data referring to 2000 and 2000

The decreasing trend in residue levels while passing from wax produced in non organic apiaries to wax produced in organic apiaries is quite evident from the samples analysed in the years 2000 and 2001, which were classified according to the breeding methods adopted and the kind of honey they represented (Fig.2). The difference in coumaphos residues of the converting beekeepers in the 2 years is probably due to the fact that many beekeepers, attracted by the higher price of organic honey and the increasing demand, have tried to convert to organic although they had been using forbidden chemical treatments (such as Asuntol) until the previous year.

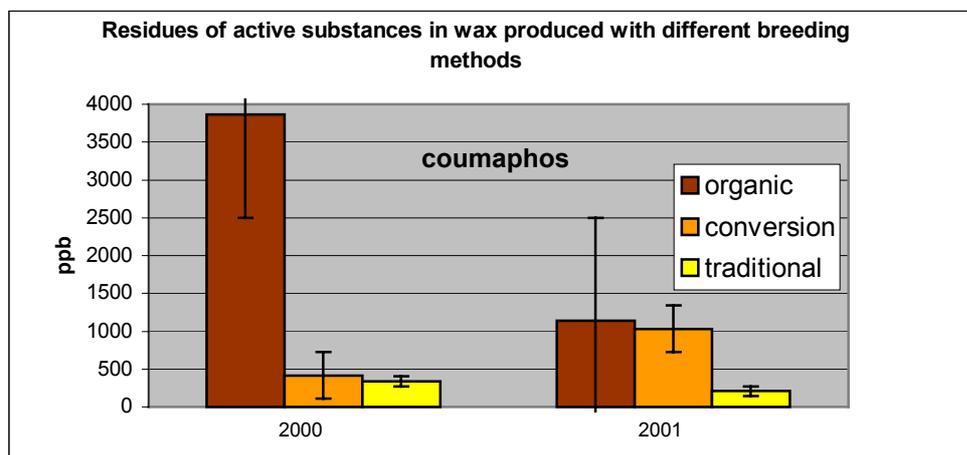


Fig.2

In average, wax from foundations contains higher levels of residues compared to melted wax (fig.3). This is explained by the fact that the melted wax comes from beekeepers who want to check the residue levels of their own wax whereas the majority of foundations come from wax transforming factories where there are cumulative transformations in which a single lot of highly contaminated wax can cause a high residual concentration in all the resulting foundations. The problem of residue-free wax contamination in transformation factories is one of the main difficulties encountered by beekeepers who wish to convert their breeding techniques from traditional to organic.

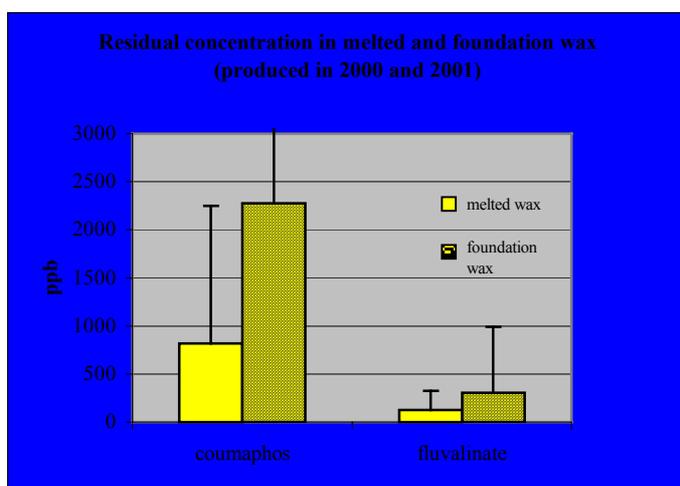


Fig.3