Pesticide Residues in Honey and Beeswax produced in Switzerland

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Introduction

It is important to evaluate the contamination potential of insecticides for biological beekeeping. Persistent insecticides used in agriculture or present in the environment can theoretically contaminate bee products. In Switzerland integrated pest control with minimal pesticide use is increasingly popular and is used by more than 80% of all agricultural units. In this first Swiss study the residues of commonly tested pesticides in honey and beeswax are determined.

Materials and Methods

Samples

27 **honey** samples, produced between 1998 and 2001 and originating from different Swiss regions were analysed: 12 of honeydew and 15 of blossom origine.
The **wax** specimen analysed were representative annual samples from all beeswax produced in Switzlerand during 1994, 95, 96, 97, 98 and 2000. It was prepared by melting representative wax samples from each wax producer in proportion to the wax produced by each manufacturer.

Determination of Residues

The quantification of pesticide residues was carried out in the specialized Ceralyse laboratory essentially after DFG S 19 (1999). The determination was carried out by Agilent capillary GC-MSD in SIM mode over 3 significant masses. The recoveries were between 75 and 105 % for all substances. The results in the table below are expressed in relation to the limit of quantitation, loq.The limit of detection, lod, was generally a factor of 10 below loq.

Treatment of rape field with a pesticide

Results

Organochlorine pesticides	Honey mg/kg	Wax mg/kg	Organo-phosphorus pesticides	Honey mg/kg	Wax mg/kg	Organo-phosphorus pesticides	Honey mg/kg	Wax mg/kg
Alachlor, Aldrin	< 0.01	< 0.1	Bromophos-ethyl; -methyl	< 0.01	< 0.05	Parathion-ethyl;-methyl	< 0.01	< 0.1
Chlordan, alpha, gamma	< 0.005	< 0.05	Carbophenothion	< 0.05	< 0.1	Pirimiphos-methyl	< 0.01	< 0.05
Chlorfenson	< 0.05	< 0.1	Chlorfenvinphos	< 0.01	< 0.1	Profenofos	< 0.01	< 0.1
Dicofol, metabolite	< 0.05	< 0.1	Chlorpyrifos-ethyl;-methyl	< 0.01	< 0.05	Prothiofos	< 0.01	< 0.1
DDD, o,p; p,p	< 0.005	< 0.03	Chlorthion	< 0.05	< 0.1	Pyrazophos	< 0.01	< 0.1
DDE, o,p; p,p	< 0.005	< 0.03	Chlorthiophos	< 0.01	< 0.05	Quinalphos	< 0.01	< 0.05
DDT, o,p; p,p	< 0.01	< 0.03	Diazinon	< 0.05	< 0.1	Sulfotepp	< 0.01	< 0.05
Dieldrin	< 0.02	< 0.05	Dichlorfenthion	< 0.01	< 0.05	Terbufos	< 0.01	< 0.05
Dichlobenil	< 0.02	< 0.1	Dichlorvos	< 0.03	< 0.1	Tetrachlorvinphos	< 0.01	< 0.05
Endosulfan, alpha; beta; -sulfate	< 0.01	< 0.1	Dicrotophos	< 0.05	< 0.05			
Endrin	< 0.05	< 0.1	Dioxathion	< 0.1	< 0.2			
HCB	< 0.005	< 0.05	Ethion	< 0.01	< 0.05	**Fungicides**		
HCH, alpha; beta; delta; gamma	< 0.005	< 0.03	Etrimfos	< 0.01	< 0.1	Chlorthalonil	< 0.05	
Heptachlor;-epoxid	< 0.05	< 0.1	Fenchlorphos	< 0.01	< 0.1	Dichlofluanid	< 0.05	
Isodrin	< 0.01	< 0.05	Fenitrothion	< 0.01	< 0.1	Pentachlorphenol	< 0.2	
Metolachlor	< 0.01	< 0.1	Fenthion	< 0.01	< 0.1	Procymidon	< 0.1	
Mirex	< 0.01	< 0.05	Jodofenphos	< 0.01	< 0.05	Iprodion	< 0.1	
PCB 28; 52; 101; 138; 180	< 0.005	< 0.05	Malathion	< 0.01	< 0.1	Vinclozolin	< 0.01	
Quintocen	< 0.01	< 0.05	Mecarbam	< 0.05	< 0.1			
Tecnacen	< 0.01	< 0.05	Methidathion	< 0.01	< 0.1			

Residues of 36 organochlorine pesticides, 32 organo-phosphorous pesticides and 6 fungicides (only in honey) were determined. No measurable amounts were determined above loq in all honey and wax samples. Also, no traces of these compounds were detected in honey. In wax only traces of hexachlorbenzene (HCB), chlropyrifos-ethyl and jodfenfos were found.

Conclusions

The results of this study show that pesticides, originating from agriculture and the environment are not a significant contamination source for honey and beeswax production in Switzerland. However, further specific studies are necessary to clarify specific contamination risks, especially after the use of fungicides in rape.

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