

MERCURY CONTENT OF BROOD DIFFERENT REGION OF POLAND

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Introduction

High concentration of mercury may harmfully influence living organisms, such as humans or honeybees. Mercury contamination has been detected in pollen, nectar, honeydew, and water; in the substances collected by honeybees. Significant development of heavy industry, like also, automobile traffic have caused a higher content of mercury in environment. A number of differentiated methods can be used to determine this contamination in the selected areas. These are physical, chemical, and biological methods, where the most popular is the last one.

As the experimental material was used brood and was indicated the level of mercury. Many investigators commend upon the possibility to use bodies of adult bees, brood and bee products to monitor the purity of the environment (Gilbert and Lisk 1979, Jedruszczuk 1987, Roman 1998, 2000, Szczesna et al. 1993, Zarski et al. 1996). In many parts of the world attempts were made to use bees, brood, bee products to assay the degree of environment pollution. Harmful compounds penetrate into the bodies of adult insects and brood (Loper et al. 1980, Roman 2000, Zarski et al. 1996).

Brood has a quite good quality to use to monitor the purity of the environment because is exposed to indirect contamination of environment. In the area where plants, soil, air, and water are polluted, for instance mercury, honeybees collect components of brood feed: pollen and nectar, contaminated with this heavy metal (Zarski 1996). When the contamination of mercury is high in the selected areas, then the contamination of this trace element should be also higher in brood.

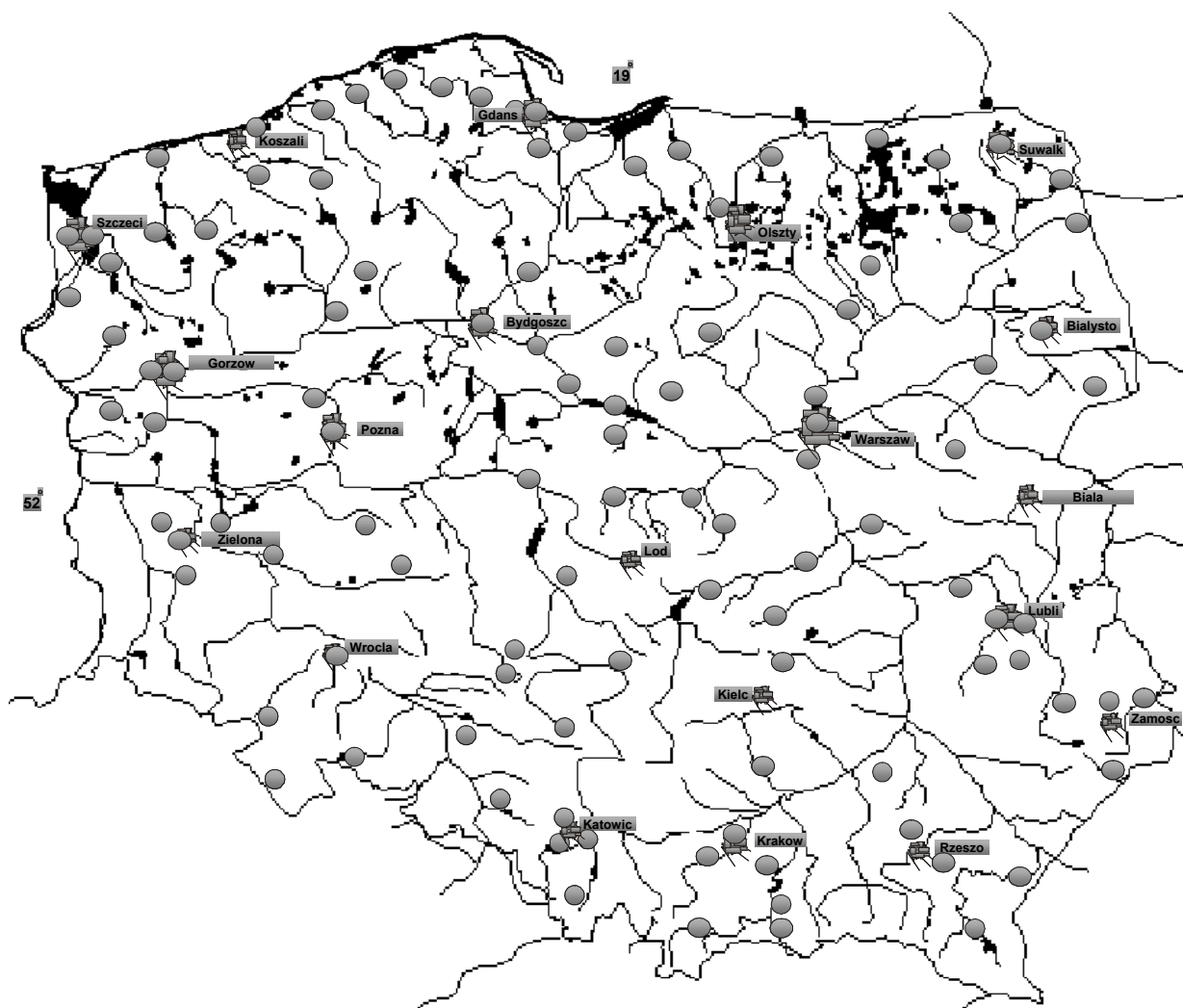
The aim of the experimental was to determine the mercury content of brood collected from different region of Poland.

Material and methods

The investigations were performed at Bee Division, Faculty of Animal Science, Agricultural University of Warsaw. The study material was collected in the spring of 1998 from private and state-run apiaries from across Poland (Fig. 1). All-in-all, the material

originated from 84 apiaries, randomly chose, (3 bee colonies from each apiary), a total of 252 samples.

Fig. 1 Location of apiaries



The samples were stored until the tests were conducted in the refrigerator at -12°C .

The samples were tested for mercury content at the Department of Physical and Chemical Analyses, Agriculture University in Warsaw. The biological samples were made uniform by carefully braking up and mixing each of them. Automatic analyser of the mercury traces AMA – 254 was used to measure mercury concentration of the samples.

The data were subjected to comprehensive statistical tests. LSD (Fisher) and multiple range test were used. The significance of differences was tested at 0.05 and 0.01 confidence levels. Bar graphs were used to visualise results.

Results and discussion

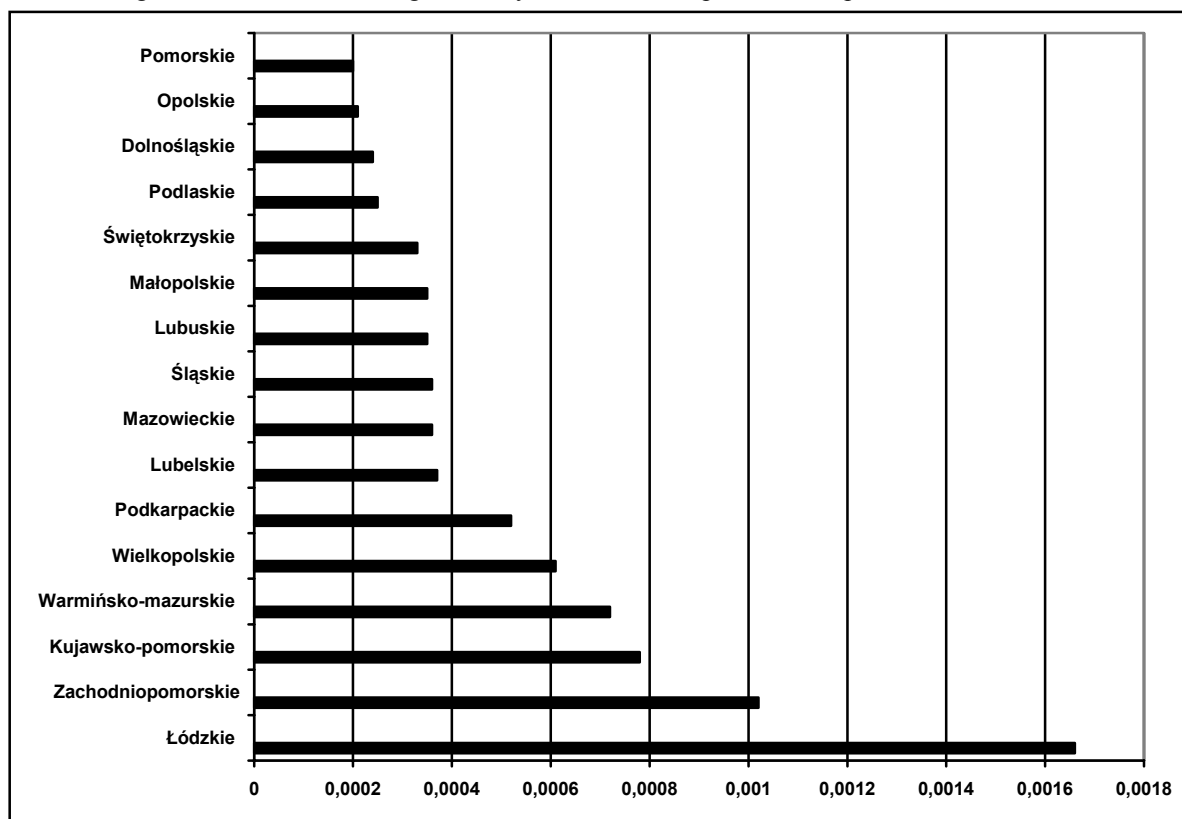
Table 1 Mercury content in tested samples broken down across the 16 provinces of Poland (mg/kg)

Province	minimum	maximum	Mean	standard deviation
Dolnoslaskie	0,00001	0,00049	0,00024 a*, AB**	0,00020
Kujawsko-pomorskie	0,00006	0,00164	0,00078 ab, AB	0,00057
Lubelskie	0,00008	0,00159	0,00037 a, AB	0,00059
Lubuskie	0,00009	0,00054	0,00035 b, AB	0,00017
Lodzkie	0,00011	0,00682	0,00166 a, B	0,00289
Malopolskie	0,00010	0,00049	0,00035 a, AB	0,00018
Mazowieckie	0,00006	0,00130	0,00036 a, AB	0,00041
Opolskie	0,00009	0,00038	0,00021 a, AB	0,00015
Podkarpackie	0,00035	0,00082	0,00052 ab, A	0,00026
Podlaskie	0,00009	0,00016	0,00025 a, AB	0,00013
Pomorskie	0,00003	0,00051	0,00002 a, A	0,00016
Slaskie	0,00019	0,00065	0,00036 a, AB	0,00021
Swietokrzyskie	0,00025	0,00043	0,00033 a, AB	0,00041
Warminsko-mazurskie	0,00002	0,00344	0,00072 ab, AB	0,00121
Wielkopolskie	0,0002	0,00149	0,00061 ab, AB	0,00059
Zachodniopomorskie	0,00016	0,00210	0,00102 ab, AB	0,00081
POLSKA	0,00001	0,00682	0,00053	0,00089

* means followed by different small characters are significantly different at 0,05

** means followed by different small characters are significantly different at 0,01

Fig. 2 The average mercury contents of samples from 16 province across Poland



Each examined sample contained mercury. The Nourishment quotas for children and infant of Polish Ministry of health and social care assume 0,01 mg Hg/kg. All averages results

are substantially lower than those quotes. Whole 252 trial groups had level of mercury content lower than the quotes for children and babies.

The following was determined: level of the contamination with mercury in brood is related to the place where the trial group was taken. The highest amount of mercury was detected in province of Lodzkie. In province, Pomorskim the level of mercury was the lowest.

The content of mercury in brood in the Poland was on the low level. The level of the content of mercury in the samples proves that examination region is ecologically clean in regard to the contamination with mercury.

The mercury content of brood was found to range from 0,00001 mg/kg to 0,00682 mg/kg. (Table 1). The nationwide average was 0,00053 mg/kg. The data in the domestic literature on the subject were found to be higher. A higher mercury content of brood was found by Zarski et al. (1996) average was 0,00888 mg/kg.

Conclusions

1. The mercury content of samples varied with sampling site.
2. The highest mercury content was found in province Lodzkie, in Kutno (the content of mercury was 0,00682 mg/kg) and the lowest in province Pomorskie is in the area Gora, (the content of mercury was 0,00001 mg/kg)
3. The mercury content of brood over of provinces and over of samples in Poland did not exceed the norms.

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