RESEARCH REGARDING BEE BEHAVIOR DURING THE BLOOMING TIME OF MELLIFEROUS PLANTS

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***Abstract**: Highly toxic chemicals are widely used in agriculture to combat diseases and pests of crop plants or forest area. This paper aims to demonstrate he impact on the bees of the pesticides treatment used on agricultural entomophilous crops, bees that are their main pollinator. It is also researching measures to protect bee families and humans against poisoning with pesticides. The honey bee has considerable economic importance and is indirectly of great interest, through the benefits it brings to the agricultural field through through crop pollination (rape, mustard, sun flower, etc.).Bees play an important role in the pollination of the most crop batches destined for seed production. From the conducted research, the year 2006 was the most favorable for the bees, because in April, the melliferous plants benefited from better weather conditions, compared to the other years. In the third week after the pesticide treatment, the number of bees has fallen sharply from a maximum of 313 bees recorded in the second week to a minimum of 52 bees in the third week and after another 12 days, after insecticide application, that is, in the fourth week, there was again a maximum of 382 bees. The amount of brood reared in the reference period ranged from 1090 cm^2 and 544 cm^2 and was dependent on the pesticides used in the rape culture and on climate. After the statistical processing of the data a link is observed between the amount of brood as a dependent variable and the number of bees, a proven low value of Pearson correlation coefficients (0.598 to 0.615) and determination of R-Square (0.358-0.378), with the guarantee of experimental results within the acceptable coefficient of 5% given by the Sig. coefficient, i.e. 4%.*

***Key words**: bee, Younglings, measure, decrees*

INTRODUCTION

Bees are irreplaceable in the pollination of winter rape. High yields can be obtained by using a suitable chemical protection (M. BURA -2005).

The rape presents an economic importance for its seeds; it has an oil content of 40-49%, with an iodine value of 94-112. The oil is used as a row material for the manufacture of margarine, paints, varnishes and soap.

In the textile industry, in combination with sulfur, rape oil results in an elastic material that can be used to replace refined rubber. The oil used as biofuel has engine lubrication properties similar to those of Diesel (V. TABARA -2005).

Combating pests is one of the most important tasks of rape technology.

The most important pests of rape and their control:

- Earth fleas *(Phyllottreta sp.)* are controlled by seed treatment with Chinook FS -20 l/tone of seed;
- Gray Scale of Cabbage (*Brevicoyne brassicae*) is controlled when there are more than 20 specimens/m^2, with Mavrik 2F 0 - 2%;
- the ladybug of strains (*Ceuthorrhynchus sp*.) is controlled through three treatments with Sinoratox 35 CE - 3 l/ ha;
- the shiny rape beetle (*Meligethes aeneus*) is controlled through treatment with Cipermetrin 10 CE, Fastac 10 CE-0,075 l/ha; Mavrik 2F-2 l/ha or Victenon 50WP, 0.75 kg/ha;

these products may be also used to control the rape wasps (*Athalia Rosa*), (V. TABARA -2005).

If the producer doesn't obey all the details of the treatment method or under special circumstances the bees can be poisoned (N. POPESCU -1997).

MATERIAL AND METHODS

In determining the amount of brood reared by the studied bee families, separate measurements were made for each individual family. All the brood frames were analyzed for four weeks and the arithmetic average weekly amount of brood reared by each family was calculated. The research was conducted during a period of 3 years: i.e. 2006, 2007 and 2008. The evolution of bees was followed before the stress factor, i.e. the pesticide, and after its implementation.

In 2006 rape culture treatment was made on the 21st of April and the insecticide Decis25CE (deltamethrin active ingredient) was used, insecticide which is highly toxic to bees.

In 2007 rapeseed treatment was made on the 17th of April and the insecticide Karate Zeon (active ingredient – lambda cyhalothrin) was used. It is an insecticide easily tolerated by the bees.

In 2008 rapeseed crop treatment was made on 22 April and the insecticide Faster 10 CE was used (active ingredient - cypermethrin), which is again highly toxic to bees. The research was conducted for 4 weeks.

Crop treatment with insecticide was done in all the studied years, and the application of insecticides was done with the total herbicide machine (MET).

RESULTS AND DISCUSSIONS

The most affected experimental year of all for the bee families was 2008 when they were poorly developed in the spring, due to climatic conditions, i.e. April 2008 was colder than the same month of 2006 and 2007. It is also noted that in 2008 the amount of brood in the bee families fell significantly after the treatment of the fields with the insecticide FASTER (cypermethrin). One could notice a decrease in the amount of bee brood after treatment of crop-specific pests in the years 2006 and 2007, when other insecticides were used: Decis (2006) and Karate Zeon (2007). In those cases the reduction was not as high as 2008, which shows that in 2008 the bee families suffered because of the type of insecticide used.

From a statistical point of view there were two factors, which were particularly analyzed:

1 - the number of bees registered in each family

2 - the quantity of brood registered in each family.

Of the two analyzed factors, we wanted to follow the influence that the number of bees entering the hive with pollen has on each young family and the influence on the brood reared. Analysis was performed each year separately because the data are more homogeneous in terms of the moments of recording them.

In the first table the calculations of the average values of the two factors are presented, i.e. the quantity of brood and the number of bees and the standard variations.

For the year 2006 (Figure 1) the range of variation in the number of bees is between 50 and 382 (the variation is 332 bees) and the amount of brood is in the range between 558 and 1293 cm^2 (735cm^2 represents the variation).

As a result of the obtained data by calculating the variation range for 2006 we can say that the large number of bee hives seen in the analyzed hives did not result in excessive growth of young bee families, also in the first two weeks there was a normal development, and the third week, things began to change because the pesticide killed foraging bees, and this was also felt by the brood. The fourth week there was a return to normal. In 2007 the ranges of the analyzed factors are very different compared to 2006 (Figure 2).

Table 1

The average values and the standard variations for the analyzed years: 2006, 2007 and 2008

Specification	Year 2006		Year 2007		Year 2008	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Amount of bee brood	201	117.52	876	180.25	876	180.25
Bee number	940	208.39	55	29.77	55	29.77

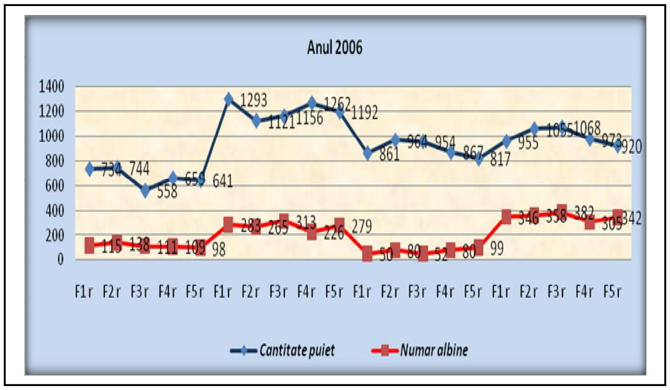

Figure 1. Changes in the amount of brood and the number of bees in 2006

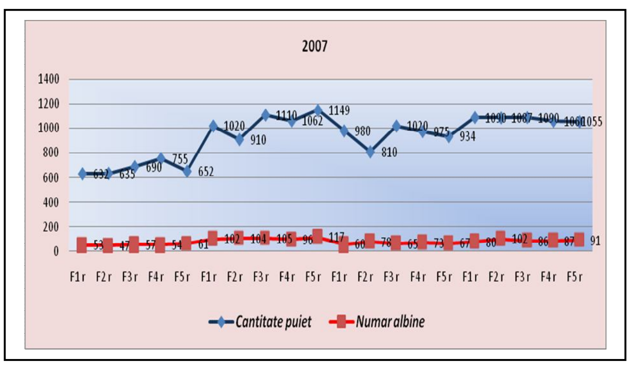

Figure 2. Changes in the amount of brood and the number of bees in 2007

This way:

- the amount of brood showed a range that is between 632 and 1055 cm^2 (the variation is 423 cm^2);

- the range of variation in the number of bees is between 47 and 117 (variation of 70 bees)

In 2007 there is a considerable balance between the number of bees and brood quantity of bee families analyzed: the larger the number of bees seen in the hive entrance, the lower the quantity of brood measured. In the third week we note a slight decrease in the amount of bee brood measured the families analyzed, but bee numbers has also slightly declined, and then increased gradually in the fourth week.

The year 2008 registered the following values of intervals for the factors included in this study (Figure 3)

- the amount of brood showed a wide range between 644 and 1.076 cm^2 (the variation is 432 cm^2)

- the range of variation in the number of bees is between 8 and 48 (variation of 40 bees)

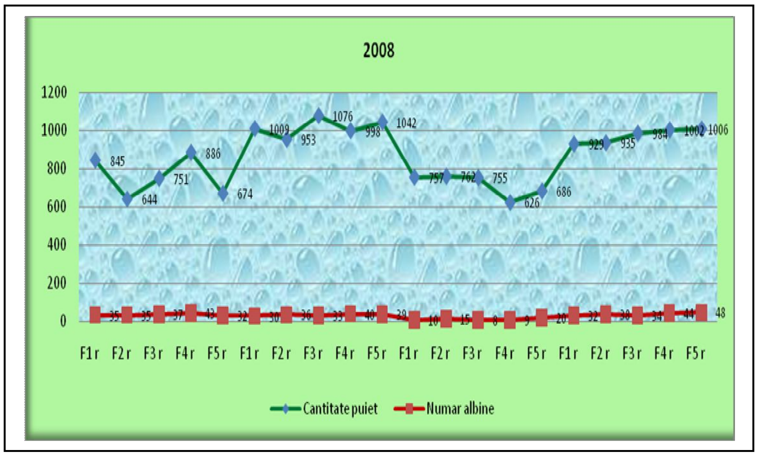

Figure 3. Changes in the amount of brood and the number of bees in 2008

Referring to 2008, one can note from Figure 3 that among the studied bee families there were wide variations in the amount of brood, differences started from the first week and in the second week the measured value were somewhat close to one another The proceeding week, in the third week of measurements and observations things started to change, because bee families reared less brood and the number of pollen bees observed at the entrance was lower. These are the results of a disturbance caused by a pesticide, because normally the brood quantity measurement should be getting bigger.

In 2006 the increase in the number of bees that entered the hive with pollen influenced the amount of brood to 0.614 with a guarantee of results of 0.2% (Sig.0, 002) – the maximum allowable value is 5%. In 2007, the influence coefficient dropped to 0.598 (a decrease of 0.16 points). In 2008 the coefficient of influence on the amount of brood is 0.615 with a probability of 0.2% result guarantee (Sig.0, 002) – The maximum allowable value is 5%.

The results regarding standardized and non-standardized coefficients of regression models estimated, their standard errors (Std. Error), standardized regression coefficients (Standardized Coefficients) with corresponding standard errors and ***t*** test statistics values and values to ensure proper results (SGI).demonstrate that the model estimated for 2006 is the most relevant when compared with 2007 and 2008 (Table 2).

The relationship between the quantity of brood as a dependent variable and the number of bees shows a low value of Pearson correlation coefficients (0.598 to 0.615) and the determination of R-Square (0.358-0.378), with the guarantee of the experimental results within the allowed limit of 5 % given by the Sig. coefficient, i.e. 4%.

Table 2

Standardized and non standardized coefficients of estimated regression models

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B		Correlations		
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part
2006	(Constant)	-123,988	100,839		-1,230	,235	-335,842	87,867			
	Number of bees	,346	,105	,614	3,303	,004	,126	,567	,614	,614	,614
2007	(Constant)	676,514	49,194		13,752	,000	576,927	776,102			
	Number of bees	3,623	,787	,598	4,604	,000	2,030	5,216	,598	,598	,598
2008	(Constant)	634,369	74,854		8,475	,000	477,106	791,631			
	Number of bees	7,496	2,266	0,615	3,309	,004	2,736	12,256	,615	,615	,615

CONCLUSIONS

Text Due to intense exchanges of food that is made between the individuals of a bee family, the bees take some of the harmful particles that may be found in the gathered pollen and nectar and transmit it to their products.

A decreased number of bees entering the hive with pollen and a decrease in the brood quantity, in the period immediately following treatment application are due to a disturbance caused by a pesticide.

Normally, the area of brood obtained from the measurement should be getting larger and the number of bees seen in bee entrance with baskets loaded with pollen increases slightly during the flowering of melliferous crops.

Prolonged retention of pesticides and their particular toxicity to bees requires the application of drastic measures, which are rapid, sustained and coordinated in order to limit losses and for the restoration of contaminated hives.

The first measure to be taken in case of apiary poisoning is moving the bee hive at a distance of at least 10 km from the contaminated site and identifying the causes of losses.

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