THE PHYTOSANITARY TREATMENTS USED IN CANOLA CULTURE REPRESENT AN IMPACTFUL FACTOR ON HONEYBEE FAMILIES

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Abstract: *Beekeeping has a major economic importance, because these have an important role in most crops pollination that are destined for seed production. This study is part of the first researches realised on canola culture, in Romania and was observed the evolution of honeybees family, before and after the application of pesticides, which represents a stress factor. After seven days from the treatment application the number of honeybees identified at the entry in the beehive decreased sudden, from a maximum number of 367 honeybees registered at the beehive entrance at the beginning of researches to a minimum number of 77 honeybees, and after 14 days from the pesticides application, the number of identified honeybees started to increase till 323 honeybees. The witness had a slight increase during the entire measurement period, at the beginning of the study it had a maximum of 330 honeybees at the beehive entrance and in the second week of observation the maximum recorded value was of 512 honeybees at 12 o'clock. In the third week of observations in the control variant the maximum number of honeybees recorded was of 605, honeybees identified at 12 o'clock. Based on these observations we have noticed that in the three studied variants the number of honeybees in the control variant where no pesticides had been used, has been throughout the entire period higher than in the two studied variants and where insecticides had been applied for protecting the canola culture. Therefore we can say that the honeybees in the first area suffered more because of insecticide used in canola culture. Number of bees found in the first area was less than in the second area, and also was less than the control area where the bees did not suffer at all, and have had steady growth throughout the flowering period of rape culture. The second area has the smallest amount of honey. To prevent these negative aspects, occurs the necessity of friendly relations between the beekeepers in pastoral and farmers cultivators of canola, for avoid negative phenomena that can happen during collecting.*

Key words: *canola, honeybee, decreased, insecticides, toxic.*

INTRODUCTION

Bees are irreplaceable in the pollination of canola. High yields can be obtained by using a suitable chemical protection (JIVAN A. et al. 2011).

The sublethal effects of chemical ingredients on the honeybee behaviour and on other useful insects are reported by a large number of publications. The sublethal doses of insecticides affect the movement of bees, harvesting and transport of nectar, flight guidance observed at bees changes in the development, survival, fertility and queen capacity of laying eggs, the ability of bees to orient over short distances (using visual or olfactory memory) the ability of bees to orient over long distances (orientation dependent on the sun and the associated memory to this capacity), feeding behaviour and ability to improve, the intensity of feeding, thermoregulation (DESNEUX et al., 2007).

Severe poisoning can completely destroy bee population or only reduce the number of individuals and weaken the family. This may enter the winter with a few number of bees and little food reserves, which may cause the death of colonies over the winter season (LAZĂR, 2002).

Despite their importance for the human being, bees die with alarming speed. The disappearance of bee colonies is caused by the use of insecticides in intensive agriculture, pollution, misapplication of beekeeping techniques, and especially by bee colony pathology (GENERSCH, 2010; MORITZ et al., 2010; VANDAME & PALACIO, 2010; SOROKER et al. 2010; ANDERSON et al., 2011; HAMDI et al., 2011; KOCH & HEMPEL, 2011 citati de PATRUICA si MOT, 2012).

The surfaces cultivated with canola in Romania have grown by each year, canola has become one of the most important meliferous plants in our country. However, the canola cultures are very vulnerable to pests; therefore the phytosanitary treatments are usually inevitable, even in the blooming period, when bees visit flowers. This situation may entail bee intoxication leading ultimately to massive or moderate depopulation onto families (IORDACHE, 2008).

The toxicity of the transported chemical product in the hive through pollen or nectar from cultures treated with pesticides is so striking that, over time, it can destroy the entire bee colony.

MATERIAL AND METHODS

In order to observe the influence of insecticides used in combating the canola pests on the pollinating bees, collecting honeybees entering the hive have been monitored. The method consists in counting the collecting honeybees for 15 minutes, once in two hours. The monitoring was done on honeybee families in 3 localities. In each locality 5 honeybee families were studied. For each locality there were three determinations. The data collected are representative for each locality, expressing the level of toxicity of the insecticide used.

The evolution of the honeybee family has been studied before there was a stress factor, i.e. the pesticide and after introducing the stress factor. Researches were carried out in 2011 in localities Grabat, Comlosul Mare and Bulgarus (control area).

In the locality Grabat, the canola culture treatment was carried out on April 15 and the used insecticide was Mavrik 2F (the active substance is tau-fluvalinat 240g/l).

In the locality Comlosul Mare, the canola culture treatment was carried out on April 14 the used insecticide was Fastac (the active substance is 100 g/l alfa-cipermetrin) very toxic to the honeybees.

In the locality Bulgarus the canola culture was not treated with insecticides during the study period. Researches were carried out for 4 weeks.

The culture treatment with insecticide was done in in 2 of the 3 localities purpose of the studies, and the insecticide was applied with the ground sprayer.

Statistical analyses have been performed by STATISTICA 8 package, using Duncan test. Multiple comparisons between the number of honeybees coming from the control variant and the number of bees from the two variants researched.

RESULTS AND DISCUSSION

The research carried out have consisted in counting the honeybees that were arriving from the field bearing pollen. They have been monitored in order to establish which insecticide had been more toxic to the honeybees. Data has been collected once in two hours.

The number of honeybees identified in each moment of the day differed from one locality to another, and after applying the insecticide the witness was separated from the two variants within the experiment.

We observed that there are significant differences between the honeybees entering the hive with pollen from cultures of canola, counted for the control area at hive entrance, at 9 and at18 o'clock, because day of April 15th was cold and had bees harvest intensity reduced in the afternoon.

There are significant differences between the numbers of honeybees measured for the control area and for the first area at 9 o'clock, because in the first area, for a day before, the canola crop was sprayed with a contact insecticide and some of the honeybees were captured in the field and died.

Table 1

Multiple comparisons between the number of worker bees coming from the control variant and the number of worker bees from the two variants researched

	Var1	**{1} - 420,67**	**{2} - 444,00**	**{3} - 314,33**	**{4} - 188,33**	**{5} - 259,67**	**{6} - 256,67**	**{7} - 240,40**	**{8} - 105,93**	**{9} - 290,33**	**{10} - 258,13**	**{11} - 225,20**	**{12} - 109,67**
1	9 M		0,7410	0,1406	0,0074	0,0432	0,0468	0,0315	0,0005	0,0887	0,0455	0,0215	0,0005
2	12 M			0,0903	0,0037	0,0243	0,0258	0,0169	0,0002	0,0531	0,0252	0,0112	0,0002
3	15 M				0,1297	0,4675	0,4677	0,3595	0,0160	0,7339	0,4700	0,2754	0,0172
4	18 M					0,3764	0,3805	0,4888	0,2757	0,2134	0,3802	0,6021	0,2706
5	9 L1						0,9695	0,8043	0,0668	0,6642	0,9827	0,6638	0,0710
6	12 L1							0,8177	0,0666	0,6646	0,9835	0,6751	0,0692
7	15 L1								0,0954	0,5291	0,8132	0,8294	0,0976
8	18 L1									0,0306	0,0671	0,1296	0,9578
9	9 L2										0,6679	0,4188	0,0327
10	12 L2											0,6714	0,0706
11	15 L2												0,1296
12	18 L2												

We remarked that there are significant differences between the number of honeybees found in the control area at 9 o'clock, and the number of bees found in the second area corresponding to the 12, 15 and 18 o'clock, because the amount of insecticide disrupted flying bees. Some of the honeybee hoppers was damaged and died in camp.

Number of honeybees corresponding to the control area at 12 o'clock was significant different than the number of honeybees corresponding to the first area, because the amount of insecticide was poorly tolerated by the honeybees, and they have suffered more than the honeybees in the control area and the second area.

The 12 o'clock for the control area has significance for the second area because it can be seen that at 9 o'clock flew quite a few honeybees, and at 12, 15 and 18 o'clock the number of honeybees was lower compared with the control area. The explanation is the honeybees in control were not stressed by any factor, and in first and second area, the food source of honeybees was poisoned with insecticides. Until the dead bees will be replaced by others, it will need a period of 10 days.

Between data obtained at 15 o'clock in the control area and data from the first area at 18 o'clock, there are statistical differences because that the honeybees in control area were developed normal and the honeybees in the first area have suffered from the insecticide.

There were significant differences between the number of honeybees in the first and second area, because the honeybees in the first area died more than the honeybees in the second area.

The are also significant differences between the number of honeybees in the second area at 9 and 18 o’clock respectively, because the temperatures recorded during this period had wide variation and the number of honeybees has been identified depending closely linked with the secretion of nectar and pollen release by canola plants.

Therefore we can say that the honeybees in the first area suffered more because of insecticide used in canola culture.

In figure 1 data from the first monitoring are presented.

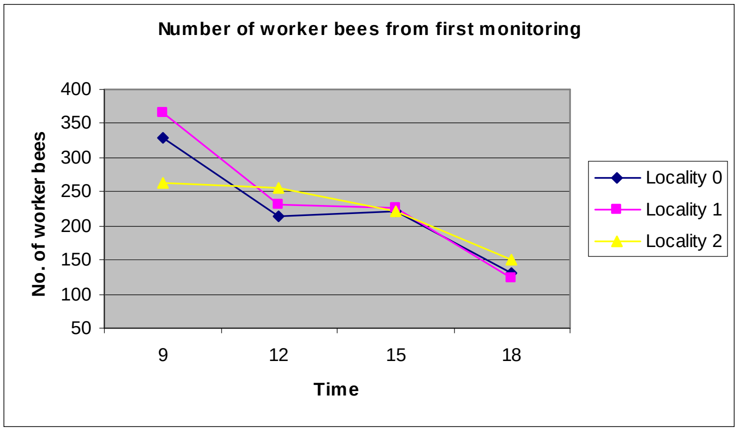

Figure 1. Number of worker bees counted at first monitoring

It may be observed that at the first monitoring, when there was no stress factor – the insecticide, there are no significant differences between the number of bees gone for collecting in the three localities under study.

In figure number two between the data taken from the control variant and the two variants there are significant differences between the numbers of honeybees monitored in different moments of the day. Thus, at the control variant (locality 0) the number of honeybees reached a peak at 12 o'clock, of 512 honeybees entering the hive. At the same hour, in localities 1 and 2, the number of honeybees entering the hive was of 183 and 235 honeybees.

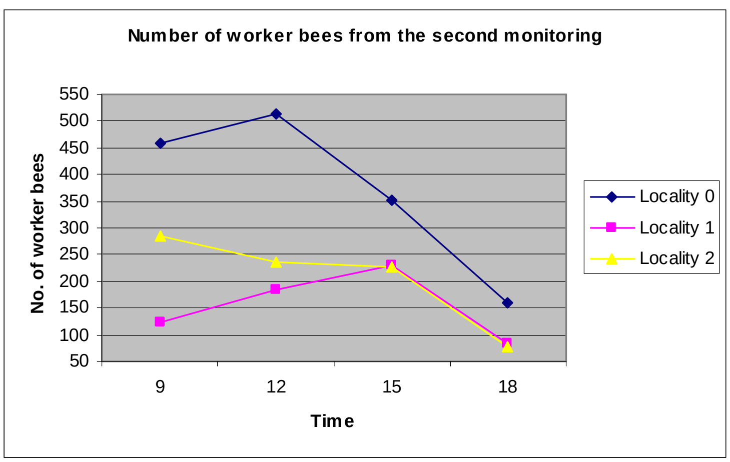

Figure 2. Number of worker bees counted at the second monitoring

In figure number three, the data are presented graphically from the last monitoring, where we may notice that the control variant reached a peak of collecting honeybees. In locality number 2, the number of collecting honeybees has been significantly lower, as compared to locality 1 as well. This is due to the fact that the insecticide used in locality number 2 was more toxic for the honeybees, these suffering from a delay in their development.

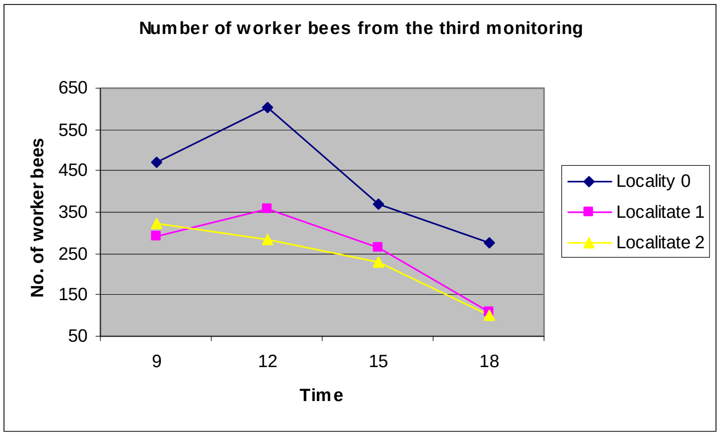

Figure 3. Number of worker bees counted at the third monitoring

Number of honeybees found in the first area was less than in the second area, and also was less than the control area where the honeybees did not suffer at all, and have had steady growth throughout the flowering period of canola culture.

CONCLUSIONS

Therefore we can say that the bees in the first area suffered more because of insecticide used in canola culture.

Number of bees found in the first area was less than in the second area, and also was less than the control area where the bees did not suffer at all, and have had steady growth throughout the flowering period of rape culture.

The second area has the smallest amount of honey.

To prevent these negative aspects, occurs the necessity of friendly relations between the beekeepers in pastoral and farmers cultivators of canola, for avoid negative phenomena that can happen during collecting.

ACKNOWLEDGMENTS

This work was published during the project "POSTDOCTORAL SCHOOL OF AGRICULTURE AND VETERINARY MEDICINE", POSDRU/89/1.5/S/62371, co-financed by the European Social Fund through the Sectorial Operational Programme for the Human Resources Development 2007-2013.

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