STUDIES REGARDING THE INFLUENCE OF CHEMICAL PESTICIDES IN COMBATING THE PESTS FROM THE SUN FLOWER FIELDS, UPON THE DECREES OF THE BEE FAMILIES IN THE YEARS 2006-2007

CERCETĂRI PRIVIND INFLUENȚA PRODUSELOR CHIMICE PESTICIDE ÎN COMBATEREA DĂUNĂTORILOR DIN CULTURA DE FLOAREA SOARELUI, ASUPRA DEPOPULĂRII FAMILIILOR DE ALBINE ÎN ANII 2006-2007

ALIN JIVAN[1], SILVIA PĂTRUICĂ[2], GH. POPESCU[3]

USAMV-Timişoara

Abstract: *The purpose of this study was to observe the quantity of younglings raised by the bee family studied in the blooming period of the sun flower culture , in the conditions in which the seed was treated with the imidacloprid pesticide (Gaucho 600g/l)and the BACTERIAL procloraz(Mirage 450g/l). In July 2006 and 2007, for 4 weeks 5 studied bee families where the aspect of their behavior during the sunflower springing and under the aspect of offspring deposits. As a witness, the gathered pollen from the acacia blooming was taken. During the sun flower culture blooming the maximum number of 1800mm2 surface covered with offspring was recorded, at the bee family nr.5. All the offspring frames where measured from all the studied hides and one could observe that the bee family where during 15 minutes more than 650 bees where observed coming into the hide with pollen and nectar loaded in the morning, the surface of frames covered with offspring was bigger than at the other hides the maximum value recorded was of 1800mm2 in the first week and at the bee family where less than 500 bees where counted entering the hide pollen and nectar loaded the surface covered with offspring was of maximum 1300mm2. The work is original through his methods of research, the counting of the bees and the measurements of the surfaces covered with younglings raised by the bee family in this period. This work is very important because through such researches it can be demonstrated if one product is toxic for the bees or not.*

Rezumat: *Scopul cercetărilor a fost observarea cantităţii de puiet crescută de familiile de albine studiate în perioada de înflorire a culturii de floarea soarelui, în condiţiile în care sămânţa a fost tratată cu insecticidul imidacloprid (Gaucho 600g/l)şi fungicidul procloraz (Mirage 450g/l). În luna iulie 2006 şi 2007, timp de 4 săptămâni 5 familii de au fost cercetate sub aspectul comportamentului în perioada de înflorire a florii-soarelui şi al gradului de acoperire al fagurilor cu puiet. Ca şi martor sa folosit culesul din timpul înfloririi florilor de la salcâm În perioada de înflorirea culturii de floarea soarelui înregistrându-se valoarea maximă de 1800mm^2 suprafaţă ocupată cu puiet pe fagure, la familia cu numărul 5. S-a observat că, la familiile de albine unde au fost observate timp de 15 minute intrând în stup un număr de peste 650 de albine încărcate cu polen dimineaţa, suprafaţa ramelor acoperită cu puiet a fost mare respectiv valoarea maximă înregistrată a fost de 1800 mm^2 în prima săptămână, iar la familiile de albine la care au fost numărate sub 500 de albine intrate în stup cu plen la aceleaşi ore, suprafaţa de puiet măsurată a fost de maxim 1300 mm^2. Lucrarea este originală prin modul de cercetare, respectiv numărarea albinelor şi măsurarea suprafeţelor de puiet crescut de către familiile de albine în această perioadă. Dau importanţă acestei lucrări, pentru că prin astfel de cercetări se poate demonstra dacă un produs este toxic pentru albine s-au nu.*

Key words*: substance, bee. Younglings, measure, decrees*
Cuvinte-cheie*: substanţă, albină, puiet, măsurat, depopulare.*

INTRODUCTION

Bees are poichilothermic insects with wings from the Hymenoptera category, from the

Apide family, the Apis mellifera species, entering so in to the category of polifomic, social insects. The necessity to concentrate in a group is due to their organism, which can not allow the insect to keep her body temperature required to survive M. BURA şi colab. - 2005; Al MĂRGHITAŞ şi colab. - 1995, 2005). A bee isolated from the colony is like a cell from an organism; she can act only together with other bees, even if she gets the best food. From this cause the bees that remain behind after leaving a provisory dwelling search for other bees with whom to associate in order to survive (GUEZ DAVID -1992).

Considering the three main factors which form the integrity of a bee colony the working bees ,the mother bee, and trantori), the colony can be seen as whole biologic unitary, the collective life but also the individual are leaded by unconditioned, instinctively reflexes which are inborn and which never will change and are transmitted hereditary (HAINZL D. 1996).

The intoxication of the bees can not be fought at present, death occurring in short time. The intoxication of the bees are determined be the contact or ingestion of organic or inorganic substances, which deeply affect their cellular metabolism and vital functions. The acute and chronic intoxications create a minimum field of resistance against the aggressively of the infectious and parasitic agents (R. WOLFGANF - 1996).

The fungus, the toxic substances which destroy the parasites harmful for the plants, the acaricide insecticide which destroys the insects of some fruit trees, the insecticides who destroy the harmful insect and the herbicides who destroy the weeds are combined with arsenic, phosphor, chlorine or sulphur or sometime with two or three of this toxic substances (GH. POPESCU - 2005; C. FLECHE-1995).

Generally in such occasions, the strongest bee families have the biggest loss. It has been calculated that from the strongest perish up to 68%, from the middle one up to 22% and from the weakest only 10% (M. L. WINSTON -1993).

The substances used in the protection of the plants intoxicate through contact, the substance traverses the chitinous tissue through pores and intoxicates the insect. Others have effect through ingestion, through the introduction of the poison in the digestive tube. The most have a mixed action, through ingestion but also through contact. (Al. L. MĂRGHITAŞ, 2002).

MATERIALS AND METHODS OF RESEARCH

Researches have been made in Bulgarus locality in Timis county. For the experiment a field of bloomed sun flower has been used. The seed of this hybrid has been treated against pests from the soil with insecticide based on imidacloprid (Gaucho), and procloraz substance (Mirage).

The *Brassica* cultivated field is situated at a big distance from the hive and because of this the hive was brought near the field and after three weeks from blooming it was treated with firopronil(Regent) against the harmful creatures *(Athalia rosae – Brassica wasp* and *Meligethes aeneus* – shiny bug) The researches took place for three weeks.

At each hive the number of frames covered with younglings for three weeks time, and the younglings were also measured in height and width on both sides of the honey comb to determine the surface covered with them (mm^2) there were measured the hatched and the unhitched offspring. There have been made three observations concerning the younglings in the interval of seven days in a period of three weeks at each family.

As a witness probe was used the values of the surfaces covered with younglings in the blooming period of the acacia flower; the nectar gathered from the acacia flower is considered in literature to be biologic, because these trees are not maintained with chemical products.

RESULTS AND DISCUSSIONS

In 2006 research upon the offspring of the studied bee families was made, these where watched during the whole period of the sunflower culture blooming, in Julie the offspring was measured with the ruler and the surface covered with it was determined. During the acacia blooming period detailed research upon the surface covered with offspring was made so that we could have a term of comparison (Table nr.1).

Table 1

The medium surface covered with offspring (mm2) for the studied bee families On 09.05.2006

Studied family	Number of analyzed frame.							
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
F_{1s}	1290	1440	1238	1400	1350	900	1552	1370
F_{2s}	1142	1406	808	1320	1260	1208	1340	1360
F_{3s}	1450	904	425	720	1160	620	1330	1208
F_{4s}	1360	1600	1040	1450	1240	800	1456	1350
F_{5s}	1500	1500	790	900	950	680	1380	1420

In order to observe if the imidacloprid and procloraz concentration used for the treatment of the sunflower seed got into the hide and if it has influenced the offspring in the frames observations in a interval of 7 days where made during the 3 weeks when the sunflower culture bloomed. During the 3 weeks every frame of each hide was studied, and the surface covered with offspring was measured and the medium sum of offspring on one frame was made. The procedure was repeated for each frame covered with offspring from each studied hide. The result obtained in the first week of study is viewable in table 2.

Table 2

The medium surface covered with offspring (mm2) for the studied bee families On 05.07. 2006

Studied family	Number of analyzed frame.							
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
F_{1fs}	1350	1356	644	960	1100	620	1680	1250
F_{2fs}	1400	1450	900	1000	830	700	1540	1280
F_{3fs}	850	1285	700	850	960	750	1000	1300
F_{4fs}	1656	1580	700	1240	1400	930	1500	1602
F_{5fs}	1360	1600	840	1300	1200	790	1700	1800

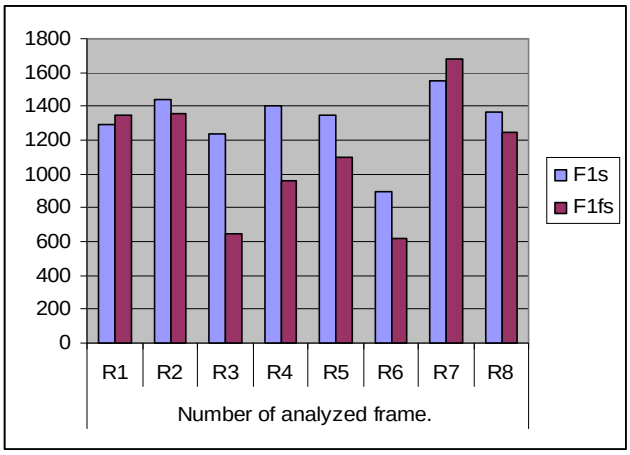

Fig.1 The graphic representation of the surface covered with offspring for f1 in the first week of the acacia blooming compared with the first week of the sunflower blooming

In fig nr 1 the studied bee family numbered with 1 is viewable, family witch in the first week o the acacia blooming had frames with a bigger surface coverage of offspring than in the first week of the sun flower blooming. The maximum value of offspring registered for the acacia blooming was of 1552 mm2 and the minimum was of 900mm2. In the period of the sunflower blooming the maximum number of offspring registered on the surface of one frame was of 1680 mm2, and the minimum number was of 620 mm2. Out of this graphic we can observe that at the beginning of the first week of acacia blooming, the studied hides where better provide with offspring, and they where better grouped on the frame, than in the first week of the sunflower bloomig.

In the 3rd week of study on an interval of one week after the ending of the acacia collecting, the bee families behaved normal, they continued to collect pollen and nectar, and the surface on the frame covered with offspring got bigger. The result of this study is present in table nr3.

Table 3

The medium surface covered with offspring (mm2) for the studied bee families On 20.05.2006

Studied family	Number of analyzed frame							
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
F_{1s}	1640	1430	950	1300	1660	1050	1620	1520
F_{2s}	1600	1604	1250	1580	1400	985	1300	1508
F_{3s}	1230	1500	1680	1540	1300	950	1080	1300
F_{4s}	1620	1600	740	1630	1280	640	1650	1700
F_{5s}	1550	1530	980	1520	1640	420	880	-

In the 3rd week of study upon the bee families in the period of the sunflower culture blooming the bees behaved normal, they continued to getter pollen and to deposit it on the frames, the queen hade a normal behavior, the nanny bees kept feeding the offspring, and the hole hide had a normal behavior in this period. The results of this observation can be viewed in table nr 4.

Table 4

The medium surface covered with offspring (mm2) for the studied bee families On 15.07.2006

Studied family	Number of analyzed frame							
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
F_{1fs}	1320	1510	620	1200	1300	510	1600	1310
F_{2fs}	1004	1280	850	950	1200	700	1300	1360
F_{3fs}	1410	1350	920	840	1230	840	1640	1360
F_{4fs}	1500	1520	900	1300	1200	940	1480	1560
F_{5fs}	1360	1420	960	1560	950	820	1760	1650

For a better observation of the offspring evolution from the same bee family, in the 3rd week of research, in the 2 collecting periods of the same year, we will represent the values in to ea graph Fig.2

At the end of the acacia blooming period the maximum number of offspring measured was 1660 mm2 on one frame and the end of the sunflower blooming period when the maximum number of offspring pro frame was of 1600, and the minimum number registered was of 510 mm2 of offspring pro frame at the end of the sunflower blooming period.

Out of this graphics we can observe that the imadacloprid insecticide (Gaucho) used for the treatment of the sunflower seeds at the planting, for the combat of harmful insects of the soil didn't affected the bees witch collected pollen and the offspring on the frame. But the number of offspring grown during the sunflower blooming period didn't reached the number of offspring grown during the acacia collecting period, probable the remains of the insecticide has a effect upon the queen, witch reflects in the quantity of the offspring during that period.

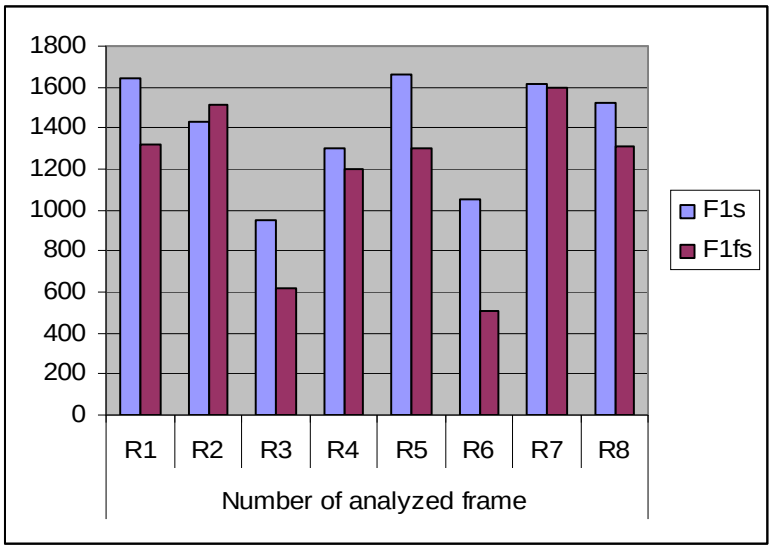

Fig. 2 The graphic representation of the offspring covered surface for f1 in the 3rd week from the beginning of the acacia blooming, compared with the 3rd week of the sunflower blooming

In 2007 in order to see if the concentration of imidacloprid and procloraz used to treat the sunflower seeds has reached into the hide, and if it had an influence upon the offspring on the frame observations where made in an interval of 7 days at all the studied hides during 3 weeks when the sunflower cultured was blooming. During this 3 weeks every frame out of each hide was studied, and the surface covered with offspring was measured and the sum of offspring on each frame was made. The procedure was repeated for each frame covered with offspring from each hide studied. The results obtained in the first week of research are present in table nr 5.

Table 5

The medium surface covered with offspring (mm2) for the studied bee families on 02.07. 2007.

Studied families	**Number of analyzed frame**							
	R_1	**R_2**	**R_3**	**R_4**	**R_5**	**R_6**	**R_7**	**R_8**
F_{1fs}	700	960	850	1000	1300	1300	850	750
F_{2fs}	900	830	1400	1540	1450	1280	1000	700
F_{3fs}	644	1100	1350	1680	1356	1250	960	620
F_{4fs}	700	1400	1656	1500	1580	1602	1240	930
F_{5fs}	840	1200	1360	1700	1600	1800	1300	790

In fig.3 the studied bee family is shown, numbered with 1 witch in the first week of the acacia blooming period had a high number of offspring on a frame, than in the first week of the sunflower blooming period. The maximum number of offspring registered for the acacia blooming was of 1450 mm2, and the minimum was of 460 mm2. In the sunflower blooming period the maximum number of offspring was of 1300 mm2.

In the 3rd week of research upon the bee families during the sunflower culture blooming period the bees behaved normally, the continued to gather pollen to deposit it in frames, the queen behaved normal, the nanny bees kept feeding the offspring and the hole hide behaved normal in this period. The obtained results of this observation are present in table nr.6.

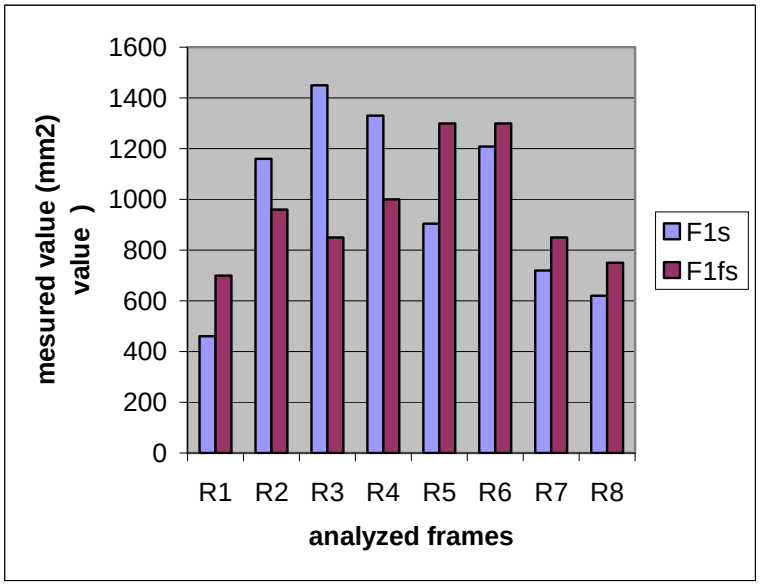

Fig. 3 The graphic representation of the offspring covered surface for f1 in the first week

Table 6

The medium surface covered with offspring (mm2) for the studied bee families on 16.VII.2007

Studied family	Number of analyzed frame.							
	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
F_{1fs}	850	1200	1004	1300	1280	1360	950	700
F_{2fs}	620	1300	1320	1600	1510	1310	1200	510
F_{3fs}	920	1230	1410	1640	1350	1360	840	840
F_{4fs}	900	1200	1500	1480	1520	1560	1300	940
F_{5fs}	960	950	1360	1760	1420	1650	1560	820

In figure nr 4 the frames covered with offspring from the family nr 1 are represented at the end of the acacia blooming period, when a maximum number of surface covered with offspring was of 1604mm2, and the end of the sunflower blooming period when the maximum number of offspring on one frame was of 1360mm2. Out of this graphic we can observe that the imdacloprid insecticide (Gaucho) used for the treatment of the sunflower seeds didn't disturbed the bees witch where collecting pollen or the offspring on the frames. But the number of offspring razed up during the sunflower blooming period didn't manage to overcome the number of offspring during the acacia collecting period. At the end of the sunflower collecting the studied families where characterized by a visible depopulation.

Also trough this study, we can say that the depopulation of the studied families at the end of the sunflower blooming period, as well as the bees observed giving signs of confusedness, are the effects of the remaining of the insecticide. In the specific literature there is mentioned that after studies in France during 2002-2006 imidacloprid and other chemic substances where found in most of the analyzed pollen. The French bee growers also mentioned a depopulation of the bee families at the end of the sunflower blooming period.

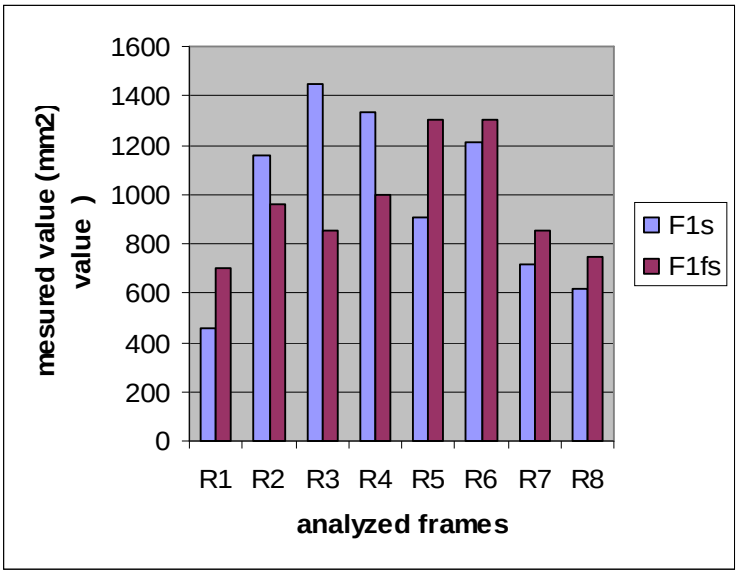

Fig 4 The graphic representation of the surface covered with offspring for f1 in the 3rd week.

CONCLUSIONS

• In the first 3 weeks from the sunflower blooming period, the substance imdacloprid (Gaucho) didn't affect the collecting bees or their offspring (1800mm2 offspring on fram).

• The remaining of the imidacloprid (Gaucho) has a effect upon the queens of the families, witch is reflected upon the quantity of the offspring razed in this period – minimum surface of 620 mm2.

• The imibacloprid resides dos not kill the bees on the field or the offspring of different age, but it effects trough depopulation trough the modification of their behavior for example trough confusion of the bees, effect observed at the end of the sunflower blooming as well in 2006 as in 2007.

LITERATURE

1. BADENDREIER D., KALBERER N., ROMEIS J., FLURI P., BIBLER F., 2004 – Pollen comsumption in honey bee larvae: a step Fprward in the risk assessment of transgenic plants. Apidologie 35: 293-300.
2. BURA M., PĂTRUICĂ SILVIA, BURA AL., 2005 – Tehnologie apicolă; Ed. Solness Timişoara 408 p.
3. MOISE ADELA SI MARGHITAS L., 1993 - Studiul privind utilizarea albinelor ca si bioindicatori ai calitatii mediului inconjurator – Simpozionul International „Apicultura in contextul noilor cerinte Europene" Timisoara 14 februarie 2004.(p 158).
4. DIVILLERS J., FARRET R., GIRARDIN P., RIVIERE J. L., SOULAS G., 2005 – Indicateurspour évaluer les risques liés á l´utilisation des pesticides. Tec & Doc, Paris. Effets sublétaux de l´imidaclopride sur le comportement de l´abeille domestiqe (*Apis melllifera*). L´Universite Pierre Marie Curie, Franţa 30 martie 1992.
5. HAINZL D. AND J. E. CASIDA, 1996 – Fipronil insecticide: novel photochemical desulfinylation with retention of neurotoxicity. Proc. Natl. Acad. Sci. U.S.A. 93 : 12764-12767.
6. MĂRGHITAŞ AL. L. – 1995 – Creşterea albinelor; Ed. Ceres Bucureşti.

7. MĂRGHITAŞ AL. L. – 2002 – Albinele şi produsele lor ; Ed. Ceres Bucureşti.
8. PLACE AARON J.; ABRAMSON CHARLES I.; AQUINO ITALO S. ; FERNANDEZ ANDREA – 2004- Psychological reports (Psychol. rep.), ISSN 0033-2941, vol. 94 (2), no3,p 1107-1115 PMID: 15362379.
9. POPESCU GHEORGHE, 2005 – Tratat de patologia plantelor vol. I., Edit. Eurobit Timisoara 340 p.
10. POPESCU GHEORGHE, 2005 – Tratat de patologia plantelor vol. II., Edit. Eurobit Timisoara 341 p.
11. POPESCU GHEORGHE, 2005 – Tratat de patologia plantelor vol III., Edit. Eurobit Timisoara 416 p.
12. POPESCU NICOLAE, MEICA SERGIU, 1997- Produsele apicole şi analiza lor chimică (miere, ceară, lăptişor de matcă, polenul, păstura, propolisul şi veninu), Edit. Diacon Coresi Bucureşti 216 p.
13. PORRINI C., GHINI S., GIROTT S.I, SABATINI A.G., GATTAVECCHIA E. AND CELLI. R., 2002 – Use of honey bees as bioindicators of environmental polluation in Italy, pp.187-247. in J. devillers and M. H. Pham Delègue (eds.), Honey bees: estimating the environmental impact of chemicals. Taylor &Francis, London.
14. SABIK H., 1991 - Analyse de traces de pesticides organiques : intéręt, méthodologie, exemples. Thčse de doctorat en chimie. Université d'Angers, juin 1991.
15. RITTER WOLFGANG – 1996 – Diagnostik und Bekämpfung der Bienenkrankheiten. Gustav Fischer Verlag Jena.
16. VLADIMIR VESELY, 1997 – Armonizarea metodelor de detectare a influenței pesticidelor asupra albinelor. Vecelartvi Nr. 3.
17. XXX – 2003 – Compendium of Pesticide Common Names.
18. XXX – 2007 – România apicolă, martie, 3, 2007.
XXX - Codexul produselor de uz fitosanitar omologate pentru a fi utilizate in Romania – Ministerul Agriculturii, Padurilor si Dezvoltarii Rurale, Reprezentati prin Comisia Interministeriala de omologare a Produselor de uz Fitosanitar, Bucuresti 2004.