

Studies on the using electrical bee-venom collector devices for Varroa mite control

By

M. M. Khattab, F. A. El- Lakwah, A. A. Darwish , R. E. Omar, and K. A. El – Ashhab .
Faculty of Agriculture, Moshtohor , Zagazig University, Egypt

ABSTRACT

The effect of using the electrical bee venom collector device on *Varroa jacobsoni* mite control was more active for falling and dead this mite during the collection of bee venom from honeybee colonies , the numbess of varroa mites controlled was ranged from 4.6 to 18.5 mites at 30 min./ day. Evidently' mites fall off the adult bees frequently.

INTRODUCTION

Varroa jacobsoni Oud. Is reported to cause damage to *Apis mellifera* L. colonies, the overall effect of mite mfestation is to weaken the honeybee colonies and thus to decrease honey production. (Bailay, 1981, Ritter, 1981 and Khattab 2001).

Since (1954) by Markoiv and Molnar, it consisted of wooden collector frame with wires that were wound seven millimeters apart. Underneath the wires there was thick rubber sheet to hold the stingers left by the bees after receiveing the shock and an absorbent paper to collect. The bees sting through a sheet of nylon when shocked, the venom remains on the underside of the sheet when the current is turned off, and sting are with drawn. The stinger of the worker bees penetrates through the protective material and the vemnom is deposited dirctly onto the glass sheet, it dries quickly on the glass and is lates scraped off on crystallized form. The collector devices used was electrical current at 4-12.5 V. (Benton et al. 1963, Mitev, 1971, Omar, 1994 and Khattab, 1997).

In this research some different types of electrical bee-venom collection devices are examined for Varroa mites control in honeybee colonies without chemicals or pesticides used in this treatment.

MATERIALS AND METHODS

The bee-venom collection from honeybee colonies was carried out at the apiaries of national project of honeybees for pests and diseases control, faculty of agriculture, moshtohor, zagazig university, the experiments have been treated during the nectar

flows seasons (June to September, 1997, 1998 and 1999) also the experiment was treated during the dearth seasons in the same years., (in December).



These experiments were treated on two generations F_1 and F_2 of the three races of the honeybee (Carniolan, Italian and Manzala bees) 18 colonies were used in this experiment (3 colonies for each race). Each colony of honey bee was headed with a mated queen in the langstretth hive that contain 7 combs, covered with young bees; (3 combs of breed + 2 combs of pollen + 2 combs of honey).

In the above colonies, the sealed areas of brood were stabilized at 228 and 240 in.². The artificial feeding of colonies was applied at least 3 months before the bee-venom collection. The sugar syrup (1:1) was used in moshtohor feeder, and pollen substitute was used in feeding of the colony also, for stimulating the queens for eggs laying and more brood fearing activities in the experimental colonies.

The methods of bee-venom collection devices was used for bee-venom collected from honeybee colonies (Khattab 1997) also the Varroa mites which fallen and dead on the plates of the above bee-venom collector devices was counted during the experiments.

The treatment for bee-venom a collection and controlling Varroa mites was applied as follows:-

- 1- Every ten days the electrical devices was attached on the bottom board of the hive under the combs of colony, the electrical contact works for 30 min./ day and replicates for 3 times / week (3 run for each colony / week). The female mite of *Varroa jacobsoni* which dead and fall on the palter of electrical device was counted.
- 2- Five types of electrical devices were used in these experiments:-
 - a) Transform from 220 volts to 3 volts at 0.4 Am.
 - b) Transform from 220 volts to 6 volts at 1 Am.
 - c) Transform from 220 volts to 12 volts at 1 Am.
 - d) Transform from 220 volts to 14 volts at 3 Am.
 - e) Wet Battery at 12 volts with 16 Am.

Date was projected in means together with then respective stander deviation.

RESULTS & DISCUSSION

Effect of using bee venom electrical collector device on dead numbers of, *Varroa jacobsoni*.

A-Effect of collected bee venom on *Varroa jacobsoini* mites collected on the device in the three bee races F_1 .



Table (1) showed that numbers of *Varroa* mites fall onto the plates of electrical device of bee venom during the first run plates of electrical device of bee venom during the first run of treatment were 10, 15 and 0 mites with an average of (8.33 mites / colony) in (June run). In the second run the number of *Varroa* mites were 25, 30 and 15 with an average of (23.33 mites / colony) in (September run). While in the 3rd run the number of *Varroa mites* fall onto the electrical plate were 20, 25 and 15 mites, with an average of 20 mites per colony (December run). The total amounts of *varroa* mites falling onto the electrical device were 155 with an average of 17.22 in (three seasons).

From the above results, all bee venom collectors device used for bee venom secretion (table 1 and 2) were effective on the *Varroa jacobsoni* mites falling on the devices plates. This results indicated that these devices could be used efficiently in the control of *Varroa* in honeybee colonies. The dead mites may be due to the electrical shock method that mites may be due to the high temperature occurring during the collection of venom. This point whoever needs more studies and further work to establish the relationship between *Varroa* deaths and the devices used in venom collection.

Table (1) Effect of different seasons on bee venom collection.

Date of bee venom	No. of Combs in hive	Brood Combs inch ²	Honey and pollen Combs inch ²	No. of dead Bees	No. of Varroa in the plate	Amount of bee venom collection (g/colony)
June run	8	90	35	10	10	0.32
	9	95	45	15	15	0.36
	9	85	45	25	0	0.32
Mean	8.67	90	41.67	16.67	8.33	0.33
September run	7	80	45	35	25	0.3
	7	90	37	25	30	0.31
	8	95	35	20	15	0.33
Mean	7.33	88.33	39	26.67	23.33	0.313
December run	7	60	39	15	20	0.27
	7	65	32	15	25	0.21
	8	75	15	0	15	0.25
Mean	7.33	66.67	28.67	10	20	0.243
\bar{X}				17.78	17.22	0.295
SE				9.4	8.53	0.042
$\bar{X} + SE$				27.18	25.75	0.337
$\bar{X} - SE$				8.38	8.69	0.253

* V.= Volt , A.= Amber



B-Effect of using electrical transformer 220 V. to 14 V. at 3 A. on the amount of bee venom collection in carniolan bee race F₂. colony and its effect on Varroa treatment.

Table (2) indicated that the amounts of be venom collected during 30 min. were 0.32, 0.36 and 0.32g./ colony with an average of 0.333g. during the day of treatment (30/8/1998) and (10/9/98). In case of bee venom collected in 30 min, by the same electrical device were 0.27, 0.25 and 0.26 gm./ colony, with an average of 0.26 gm in (20/9/98). The total amounts of bee venom collected during days at 30 min from 3 colonies was 2.72 gm. With average of (0.30 gm./ colony). The number of varroa mites during the collection of bee venom were 10, 15 and 12 with an average of 12.33 Varroa mites / colony in the first day treated. While the numbers of Varroa mites on the electrical plate in the second days were 25, 30 and 15 with an average of 23.3 varroa mites / colony. In the 3rd days, the numbers of varroa mites on the electrical plate were 20, 25 and 15 with an average of 20 varroa mites / colony . When using electrical transformer 220 V. to 14 V. at 3 A. For bee venom collection, the total amounts of dead bees, the total of varroa mites during 9 days at 30 min. from 3 colonies was 167 Varroa mites, with general averag of 18.5 varroa mites / colony.

From the above results, all bee venom collectors device which used for bee venom secretion (table 1 and 2) were effect on the Varroa jacobsoini mites fall the devices plates, this results could be used for varroa control in honeybee colonies, the dead mites may be de to the electrical shock method has been used to stimulate the bees to sting. Also the dead mites may be due to the high temperature, because the illustrated of bee venom from honeybee colonies increase the hive temperature, during the application of the elecrease device colector (30 min. period and treatment), in hive of honeybee colonies. This point will be need more studies in the further worker for using this method to varroa control without chemicals.



Table (2) The relationship between bee venom collection and Varroa mites caught using electrical transformer 220 V. to 14 V. at 3 A.

Date of bee venom collection run	No of Combs in hive	Brood combs inch ²	No. of varroa on the plate	Amount of bee Venom collection (g/ colony)
30/8/98	8	90	10	0.32
	9	95	15	0.36
	9	85	12	0.32
Mean	8.66	90	12.33	0.33
10/9/98	8	80	25	0.30
	7	90	30	0.31
	8	95	15	0.33
Mean	8.3	88.33	23.3	0.313
20/9/98	7	60	20	0.27
	7	67	25	0.25
	8	75	15	0.26
Mean	7.3	67.3	20	0.26
\bar{X}	7.88	81.88	18.55	0.302
SE	0.73	11.72	6.413	0.0339
$\bar{X} + SE$	8.61	93.6	24.963	0.3359
$\bar{X} - SE$	7.15	70.16	12.137	0.2681

V. = Volt, A. = Amber



REFERENCES

- (1) Bailey L. (1981): Honeybee Pathology. Academic press subsidiry of Harcourt Brace Jovanovich, London, New York, 124 PP.
- (2) Benton, A.; Morse R.A.; and Stewart, J.B. (1963): Venom Collection from honeybees. Science 142 : 228 - 230.
- (3) Khattab, M.M. (1997): Bee Venom collection as new product from apiaries in Egypt. International symposium on apitherapy, March 8-9th, 1997 qpitherapy center El-Doki, Cairo.
- (4) Khattab, M.M. (2000): Varroa Disease. National Project for Honeybee diseases & pests control, 450 PP. (in Arabic press). Fas. Of Agric., Moshtohor, Egypt.
- (5) Markovie, O. and Molnar, L. (1954): Contribution and characterization of bee venom. Chemicke Zvexti, 8, 80 PP.
- (6) Mitev, B. (1971): Collection of bee venom using a weak electric currentits effect on the condition and performance of the colony Zhivonov dni nauki, 8 (1) : 103-108 AA 236 - 174 (in Bulgarian).
- (7) Omar, M.O.M. (1994): New device to extract venom by electrical impulses from honeybee colonies. Assiut Journal of Agricultural sciences. Vol. 25:1, 114-126.
- (8) Ritter, W. (1981): Varroa disease of honeybee (*Apis mellifera* L.). Bee world, 62 (4) : 141 - 153.

المخلص العربي

أ.د متولي مصطفى خطاب ، أ.د. فارس أمين اللقوة ، أ.د. أحمد عبد الغفار درويش ، د. رضا السيد عمر ،
م/ خالد عبد المرزي الأشهب - كلية الزراعة بمشتهر - جامعة الزقازيق - جمهورية مصر العربية.

دراسة استخدام جهاز جمل سم النحل الكهربائي كأحد الأساليب المستخدمة في مكافحة أكاروس الفاروا بدون استخدام الكيماويات ، وقد أوضحت النتائج أن أعداد الفاروا المتساقطة على سطح الجهاز الذي عوملت له الطائفة لمدة نصف ساعة ، وتراوحت أعداد الطفيل المتساقطة من ٤,٦ إلى ١٨,٥ أنثى فاروا لكل طائفة خلال مدة المعاملة .

