ECOLOGICAL AND TOXICOLOGICAL STUDIES ON BAT SPECIES UNDER DIFFERENT CONDITIONS OF EGYPT

WILSON, M.B and Y.A.EISA

Plant Protection Research Institute, ARC, Dokki Giza, Egypt.

Abstract

Ecological and Toxicological studies on bat species under different conditions at some Governorates of Egypt were conduct. The survey and distribution of bat species were done at Cairo, Giza and Kafr El-Sheikh Governorates, during 2013/2014. Laboratory experiments have been conducted to evaluate the pesticidal activity of certain insecticides (Fentrothion, Chlorpyrifos, Bentazone, Lambda-cyhalothrin and Diazinon) against fruit bat, *Rousettus aegyptiacus* to determined LC_{50} of this tested compounds. *Rousettus aegyptiacus* and *Eplesicus bettal* were recorded in the three studied area , while *Myotis lucifugs* was abundantly found in two tested areas, (Cairo and Giza only).The highest population densities of bat was recorded in October, September and November. *Rousettus aegyptiacus* outnumbered all surveyed bat species followed with *Eplesicus bettal* while *Myotis lucifugs* were recorded with few numbers. The obtained result revealed that the five insecticides have high control rate on the tested bat *R,aegyptiacus*, recording 96-h/ LC_{50}. According to LC_{50}, LC_{90}, Toxicity index at the two levels, the descending order of tested insecticides was Lambda-cyhalothrin, Chlorpyrifos, Bentazone, Fentrothion and Diazinon respectively.

INTRODUCTION

Bats are winged mammal of the order Chiroptera, which includes 900–1,000 species classified in about 200 genera and 17 families. Bats range in size from a wingspread of over 5 ft (150 cm) to a wingspread of less than 2 in. (5 cm). They are found in nearly all parts of the world but are most numerous in the tropics; there are about 39 species in the United States. Most bats are economically valuable because of the large number of insects they consume. The body of the bat is mouselike and usually covered with fine fur. The face varies greatly from one species to another; many species have complex appendages on the snout and projections, or false ears, in front of the true ears; the ears themselves are often very large and elaborately convoluted. These facial structures are part of the sensory apparatus that emits and

receives sound vibrations. Some bats are solitary, living in caves, crevices, hollow trees, or attics; other species are communal, with thousands or even millions of bats roosting together in a cave or on branches in a section of forest. In some species of communal bats, the entire colony leaves the roost together in the evening and returns together in the morning; in others, individuals come and go at different times. Bats of northern regions migrate, hibernate, or both in winter. In most species, males and females do not associate except during the mating season. Females of most species bear a single young in the summer of each year. The young are then carried by the mothers for a few days, after which they are left in the roost when not nursing; they begin to fly in a few weeks. The life span of some bats is 20 years in captivity.

In Egypt, fruit bats, *Rousettus aegyptiacus* found in Greet Pyramids, Giza and holotype and has the common name in Egypt which is khafash El-Fawakeh and Khafash El-Masri. Bats feed on sycamore, mulberries, dates, and figs, (Anderson 1902). The Egyptian fruit bats, *R. aegyptiacus* (Order: Chiroptera, Family: Pteropodidae) is considered an agricultural pest (Kock, 2001).

Tomas *et al.,* (1984) observed that in most cases the fruit bat caused a great damage on vegetables and fruits, Palaeotropical bats (Pteropodidae) ingest up to 25 times their body mass of fruit nightly. On a mass-specific basis, this is about double the amount reported for neotropical fruits. *R. aegyptiacus* is regarded as a pest for agriculture in Israel and feed mainly on fruits sometimes leaves and pollen. Persimmons, loquats, figs and dates fruits constitutes 15% of the bats diet (Korine *et al.,* 1998). Other researchers reported that bats feed on wide kinds of plant (54 plant species) according to plant availability and quality. Season also, need of energy and prote in (Feldhamer *et al.*, 1995; Kunzand Diaz, 1995; Bizerril and Raw. 1998; Lult *et al.*, 2003). Many researchers and farmers are painstaking to protect the plant farms of vegetables and fruit against attacks of fruit bats. In the nest bat, controlling is made by burning sulpher 30g) with peprik (1g) per m3. Another method used silky net for 7 days (Eissa, 2007).

MATERIALS AND METHODS

1 – Bat collection:-

The present study was done during 2013 / 2014 at Giza, Cairo and Kafr El-sheikh Governorates to count the Population of the bat, *R. aegyptiacus* in Mango, citrus, dates, and Guava orchard. Bats were collected for successive five days in the three tested areas. The Trapping of bots was conducted by adding mist net which set at the sunset in the surveyed areas Collected animals were retained individually in wire nosh hollow cages (90 x 50 x 50 m) during the acclimation period, animals were supplied with water and guava fruits for 2 weeks.

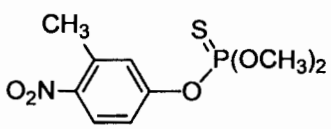
2- Toxicological study:

In this experiment, five poisonous fenitrothion(335),Chlorpyrifos, bentazone (67), lambda-cyhalothrin (198) and diazinon (227) were used in the laboratory conditions against fruit bat *R. aegyptiacus* to determine LC_{50} of tested materials. To determine the LC_{50} values, series of different doses of tested compounds active ingredients calculator. Five bats of each concentrations from each poison were used by direct. The treated baits were observed to 5 days and dead bats were recorded, The LC_{50} was detected according to Probit method.

1 – fenitrothion (335) :

Commen name:

O,O-dimethyl *O*-4-nitro-*m*-tolyl hosphorothioate

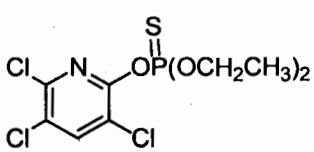


2 – Dursban

Commen name chlorpyrifos

Trade name

O,O-diethyl *O*-3,5,6-trichloro-2-pyridyl phosphorothioate

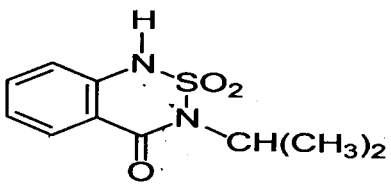


3 – Bentazone (67)

Commen name: Bentazone

Trade name:

(BSI, E-ISO, (*f*) F-ISO, JMAF);



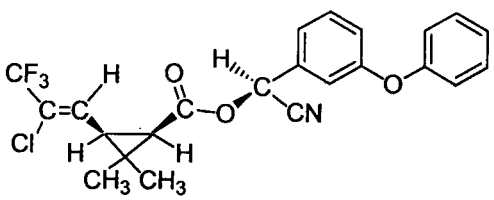
4 – Lambda-cyhalothrin (198)

Commen name: Lambda-cyhalothrin

Trade name:

(BSI, draft E-ISO); lambda-cyhalothrine ((*f*) draft F-ISO)

(*S*) (*Z*)-(1*R*)-*cis*-



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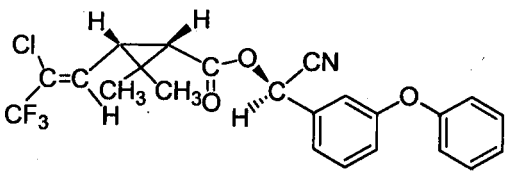


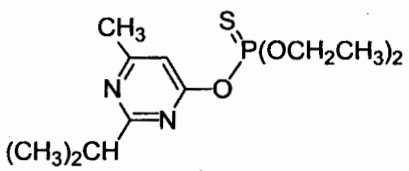
(*R*) (*Z*)-(1*S*)-*cis*-

5- **Diazinon (227)**

Commen name: Diazinon

Trade name:

(BSI, E-ISO, (*m*) F-ISO, ANSI, ESA, BAN, JMAF); dimpylate (INN)



Five adult acclimatized animals cages individually were used for each dose administrated by oral injections. In addition to another group treated with water as check control. Animals were fasted 4 hours before treatment then water and dose were offered 2 hours after treatment.

Symptoms pointing, mortality and time to death were recorded up to 72 hr. post treatment.

LC_{50} values were calculated by moving average interpolation Method using special tables.

RESULTS AND DISCUSSION

1 – Survey and Distribution of bat Species:

The results obtained revealed that the bat species collected from different nests of bats of Cairo, Giza and Kafr El sheikh governorate were classified as follows :

Order : Chiroptera

- Family : Pteropodinae
  - Genus : *Rousettus*
    - Species : *aegyptiacus* (Kock 2001)
- Family :
  - Genus : *Eplesicus*
    - Species : *bettal*
- Families :
  - Genus : *Myotis*
    - Species : *lucifugs*

The above mentioned species were identified according to the full description of bat species of Egypt adopted by Kock (2001).

The results obtained from Table (1) reveled that *R. aegyptiacus* and *Eplesicus bettal* present in all study areas, while *Myotis* absent at Kafr – El-Kheikh Governorate . All species of bat appeared throughout the whole year months with fluctuated numbers. Total collected animals from the different locations considerably differed from month to another, whereas the highest number of trapped animals were recorded during October (353 individuals), September (273 individuals and November 357 individuals). The lowest numbers were found in January (124 animals), February (132 animals) and March (149 animals). Regarding the relative abundance of these bat species, it was clear that *R.aegyptiacus* outnumbered all surveyed bat species followed with *E. bettal* while *Myotis lucifugs* was recorded with few numbers.

Similar results were obtained by Walsh and Harris (1996) who noticed that bat abundance remained constant during summer, season, but varied significantly between land classes and increase in temperature increased this abundance.

The high bat abundance was positively related to the availability of woodland, vegetation corridors lacustrine and novel habitats. Also Eissa (2007) found that the highest percentage of collected fruit bat *R. aegyptacus* males was noticed during February and the highest percentage of female a abundance needed during December, but the lower abundance level was determined during February.

2 – Laboratory studies:

2-1- Toxicity of five pesticides compounds activity to fruit bat *R. aegyotiacus*. (Fenitrothion, Chlorpyrifos, Bentazone, Lambda-cyhalothrin and Diazinon) were tested against *R. aegyptiacas* under laboratory conditions. Results in table (2,3) showed that Lambda- cyhatrin exhibited the highest toxic effect with LC_{50} value of 1.21 mg/kg followed by Dursban H 48% (1.43 mg/kg), Basgran 48% 1.5 mg/kg, Chlorpyrifos 1.6 mg/kg, Bentazone 1.6 mg/kg, Fentrothion 1.7 mg/kg, and Diazion 1.9 mg/kg respectively.

The results obtained by Eissa (2007) on *R. aegyptiacus* demonstrated that Another test LC_{50} of Phenothrim, Seiven, Alfacron and Bendiocarb were near the LC_{50} ranged between 1.4 and 1.6 % average 1.50 % while some gold recorded the highest toxic LC_{50} 1.03 %.

Table 1. Mortality Percentages of the fruit bat, *Rousettus aegyptiacus*

Compound	Concentration%	Mortality%
Lambda – cyhatrin	1.15	33.3
	1.66	66.7
(Lambda slar 5%Ec)	1.75	80.3
	2	100
Dursban H.48%	1.15	0
	1.38	20
(Chlorpyrifos)	2.5	80
	2.5	100
	1.2	0
(Bentazone)	1.4	25
	1.7	75
Basgran 48% Ec	2	100
Fenitrothion	1.3	0
	1.6	25
(Sumitian Kz 50%	1.9	75
	2.8	100
Diazinox	1	0
	1.5	25
(Daizinon 60% Ec)	2	50
	3	100

Table 2. Efficacy of Tested compounds against fruit bat, *R.aegyptiacus*

Insecticide	Slope	LC_{50}	LC_{90}
Lambda – Cyhatrin	8.4	1.5	1.9
Chlorpyrifos	6.9	1.6	2.1
Bentazone	19.9	1.6	1.8
Fentrothion	22.6	1.7	2.4
Diazinon	4.7	1.9	2.7

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دراسات بيئية واختبار السمية لبعض المبيدات على بعض أنواع الخفافيش فى مصر

مجدى ولسن بولس ، يونس احمد السيد عيسى

معهد بحوث وقاية النباتات – مركز البحوث الزراعية – الدقى –جيزة – مصر.

أجريت هذه الدراسة في عدد من المحافظات وهي القاهرة والجيزة وكفر الشيخ خلال الفترة 2013 / 2014لحصر وتعداد الكثافة العددية للخفافيش كما تم تقييم نشاط المبيدات Fenitrothion, Chlorpyrifos, Bentazone, Lambda-cyhalothrin and Diazinon ضد خفاش الفاكهة *Rousettus aegyptiacas* واوضحت النتائج تواجد خفاش الفاكهة *Rousettus aegyptiacas* وخفاش *Eplesicus bettal* فى جميع المحافظات محل الدراسة ,بينما سجل النوع *Myotis lucifugs* فى محافظة القاهرة والجيزة فقط كما أظهرت دراسات تقييم نشاط المركبات المستخدمة ضد خفاش الفاكهة *Rousettus aegyptiacas* على مستويين LC_{90} , LC_{50} خلال 96 ساعة وكان تأثير المركبات Lambda-cyhalothrin، Chlorpyrifos ، Bentazone ، Fenitrothion and Diazinonعلى التوالى.