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POPULATION DENSITY OF CHIRONOMID SPECIES AND EVALUATION OF SOME INSECTICIDES AGAINST LARVAE AT KAFR EL-SHEIKH GOVERNORATE RICE FIELDS

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ABSTRACT

This study was carried out at El-Sabein village, Sidi Salem District, Kafr El-Sheikh governorate during two successive seasons; 2014 and 2015 for studying the population fluctuations of the rice bloodworms, *Chironomus* spp. and evaluating three insecticides against the chironomid larvae at rice nursery. The population density of *Chironomus* spp. exhibited two peaks in each season. Diazinon was the most efficient insecticide in reducing the population density of *Chironomus* spp. larvae with reductions of 88.62 and 89.85% after 24 hours of treatment while the reductions were 87.14 and 89.42% after 7 days in the two seasons of study respectively. It was followed by Lambada- cychlothrin while Emamectin benzoate was the least effective compound that gave reductions of 76.48 - 77.56% and 79.09 - 82.94%.
Keywords: Insecticide, *Chironomus* spp., rice field, nursery.

INTRODUCTION

Rice plants are liable to attack of more than 100 insect species; only about 20 of which result in an economic damage. These pests attack rice plants from the seedling up to maturity. It is important to avoid the excessive application of insecticides that are commonly misused among rice farmers (Heong *et al*. 1994). Rice plants, in Egypt, are liable to attack by several insect pests from which are *Chironomus* spp. (Sherif *et al*. 2005).

Chironomus spp. larvae are damaging pests in rice fields. They cause extensive damage to the rootlets of young seedlings. Damage is worst in aerially-sown crops, in which the seed is dropped from aircraft into fields maintained under continuously flooded conditions (Stevens *et al*., 2003). In Australia, the crop loss increases rapidly in response to increasing *Chironomus tepperi* populations, however, maximum damage occurs when *C. tepperi* peak density is substantially high (Helliwell and Stevens 2000).

Biology of bloodworm is now fairly well understood. Pest bloodworm species feed primarily on the roots of establishing rice seedlings, and in bad years crop losses can exceed 60% unless pesticides are applied (Surakarn and Yano 1995; Clarke and Gorley 2001; Kim *et al*., 2001;Stevens *et al*., 2006).

Chironomus spp. larvae are controlled in rice fields in Australia by insecticides. All treatments by Chlorfenvinphos, diazinon and malathion caused 97% mortality of *Chironomus* spp. larvae (Stevens, 1991). A wide range of chemicals has been marketing for controlling *Chironomus* spp. because of their effectiveness and speed larval controlling (Stevens, 1992; Varma *et al*., 2003; Stevens *et al*., 2006; Latif *et al*., 2010; Rebechi *et al*., 2014).

The objective of this work was to study population fluctuations of adult bloodworm and to evaluate three insecticides; Diazinon, Lambada–cychlothrin and Emamectin benzoate in reducing the population density of *Chironomus* spp. larvae in rice nursery.

MATERIAIS AND METHODS

This experiment was carried out at El-Sabein village, Sidi Salem District, Kafr El-Sheikh governorate during two successive seasons; 2014 and 2015. An area of about 200 m^2 was assigned for each insecticide treatment, laid out in a randomized complete block design with four replicates. The plot size was 5x10m, cultivated with Sakha 104 rice variety on 12th April in both seasons. The normal agricultural practices were adopted throughout the growing season as recommended. Larvae of *Chironomus* spp. were collected by water fine screen net, while adults were collected by light trap, pitfall trap and water pan trap. Samples were taken 4 days after seeding, and continued at 3 - days interval till the end of the experiment.

1-Trade name: Lambada Arix
Common name: Lambada- cyahlothrin
Group: pyrethroid
2- Trade name: Diazinox
Common name: Diazinon (ISO, SA) O,O-diethyl O-(2-isopropyl-6-methylpyrimidin-4-yl) Phosphorothioate (IUPAC)
Group: Organophsphorous
3-Trade name: Highlex
Common name: Emamectin benzoate (4"R)-4"deoxy-4" (methylamino) avermectin B1 benzoate (1-1)
Group: Avermectin

A commercial formulation of Lambada – cychlothrin 5%EC. and the application rate is 500 ml/ fadden, a product of Company Arixfor Orbital Company. Diazinon is a product provided by Kafr El-Zaiat Company for Fertilizer and pesticides, Egypt.

Emamectin benzoate 5%SG and the application rate is 60gm/Fadden a product of Asia Chmical Company Ltd. Japan for El manar Company. Each pesticide rate was followed according to technical recommendations and the minimum dose that is effective for one feddan was used. The Knapsack sprayer (20L volume) was used to spray the tested compounds. Numbers of bloodworm were counted before spray, and then 1 and7 days after spray. The reductions in bloodworm population were calculated using Henderson and Tilton`s formula (1955).

Henderson Tipton's formula

$$Corrected\% = \left(1 - \frac{n\ in\ Co\ before\ treatment \times n\ in\ T\ after\ treatment}{n\ in\ Co\ after\ treatment \times n\ in\ T\ before\ treatment}\right) \times 100$$

Where: n = Insect population, T= treated, Co =control

RESULTS AND DISCUSSION

Data in Table (1) and Figure (1) show the population density of *Chironomus* spp. adults in rice nursery, during two rice seasons. In the first season (2014), the bloodworm numbers were low in the first sample. The population density of *Chironomus* spp. exhibited the first peak as 270 individuals on 24th of April, followed by the second one (285 individuals) on 3rd of May. In the second season (2015), the *Chironomus* spp. exhibited two peaks; 376 and 309 individuals on 22nd and 27th of April, respectively. The obtained results are in agreement with those of Helliwell and Stevens; 2000 and Saha and Mazumdar, 2013.

Data in Table (2) and Figure (2) show the efficiency of tested insecticides against bloodworm larvae under field conditions during two successive rice seasons; 2014 and 2015.

Data in Table (2) showed that Diazinon was the most potent compound in reducing the population density of *Chironomus* spp. in 2014 and 2015 seasons after one day (88.62 and 89.85% reductions, respectively), after 7 days, the reductions were 87.14 and 89.42% in the two seasons with overall average of 87.88 and 89.63%, respectively. Lambada resulted in *Chironomus* spp. population reductions of 85.18 and 85.96 % one day after treatment in first and second seasons, respectively. Seven days after treatments, the reduction were 82.73 and 84.27% in 2014 and 2015 seasons, respectively. Emamcetn benzoate was the least effective insectside recording 77.56 and 82.94% after one day and 76.48 and 79.09% after 7 days from treatment in2014 and2015 seasons, respectively.

Fig. (2) Show that Lambada – cychothrin gave overall average 85.57 and 83.32% mortality after 24 hours and 7 days from application in two seasons, respectively. Diazinon gave overall average of 89.47 and 88.28% mortality after 24 hours and 7 days from treatment, respectively. While Emamcten benzoate gave overall average 80.25 and 77.78% mortality after 24 hours and 7 days from application in two seasons, respectively.

These results are in line with those of Stevens *et al*.(2006), Girish *et al*.(2012), Saha and Mazumdar (2013) and Rebechi et al. (2014) who recommended using alternations of pyrethroids and conventional insecticides for more effective control of *Chironomus* spp.

Table (1): Population density of *Chironomus* spp. adults per one light trap and 5 water pan traps rice nursery at Kafr El- Sheikh Governorate.

Sampling date	Number of *Chironomus* spp. adults		Mean
	2014	2015	
April 16	145	198	172
19	208	347	278
22	217	376	297
24	270	181	226
27	190	309	250
30	200	197	199
May 3	285	135	210
6	190	148	170
Mean	213	237	226

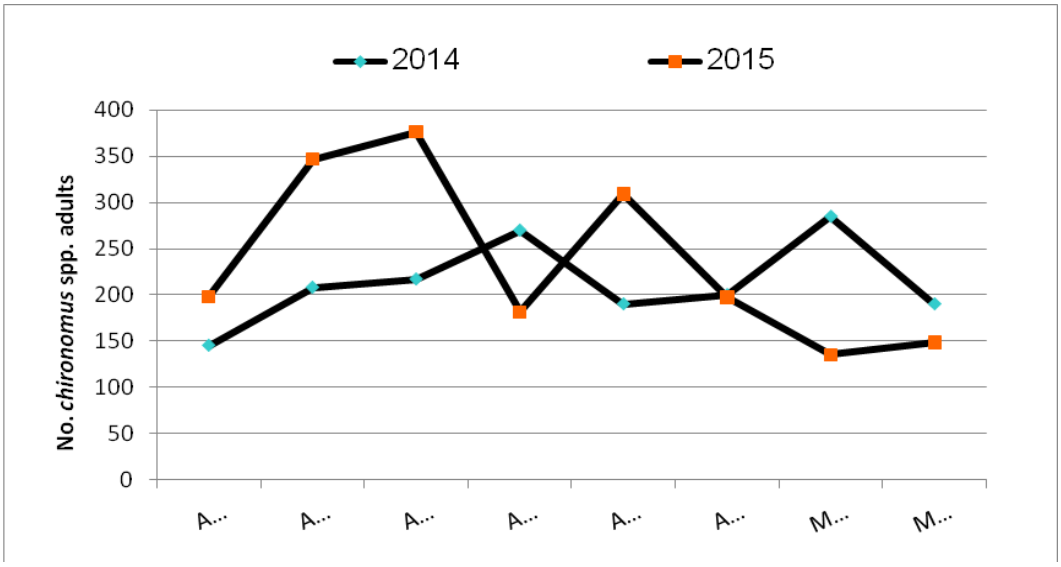

Fig.(1): Population density of *Chironomus* spp. two adults in rice nursery at Kafer El- sheikh Governorate.

Table(2):Potency of tested compounds in reducing *Chironomus* spp.larva in rice fields at Kafer El- sheikh Governorate.

Treatment	/Rate Feddar	Population Pre Treat.	٢٠١٤			Population Pre Treat.	٢٠١٥			Overall average
			Population reduction%				Population reduction%			
			1day	7day	Average		1 day	7day	Average	
Lambada-Cychalothrin (%٥EC)	ml٥٠٠	٢٠٩	٨٥.١٨	٨٢.٧٣	٨٣.٩٥	٢١٥	٨٥.٩٦	٨٤.٢٧	٨٥.١١	٨٤.٥٦
Diazinon (%٦٠EC)	ml٥٠٠	٢١١	٨٨.٦٢	٨٧.١٤	٨٧.٨٨	٢٢٣	٨٩.٨٥	٨٩.٤٢	٨٩.٦٣	٨٨.٧٥
Emamectinbinzoate (%٥SG)	gm٦٠	٢٠٥	٧٧.٥٦	٧٦.٤٨	٧٧.٠٢	٢١٣	٨٢.٩٤	٧٩.٠٩	٨١.٠١	٧٩.٠١
Control	٠٠	٢٢٧	٠٠ .٠٠	٠٠.٠٠	٠٠.٠٠	٢٤٣	٠٠.٠٠	٠٠.٠٠	٠٠.٠٠	٠٠.٠٠

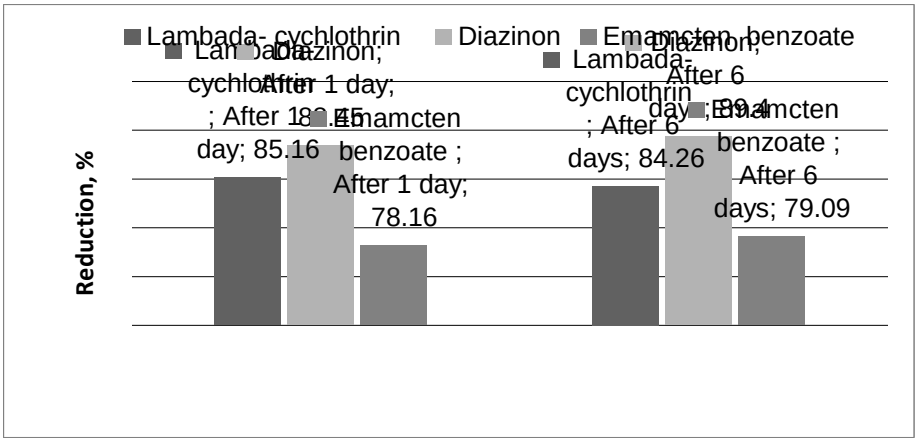

Fig. (2) : Potency of tested compunds in reducing *Chironomus* spp. larvae in rice fields at Kafer El- sheikh Governorate

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الكثافة العددية للديدان الدموية وتقييم فاعلية بعض المبيدات الكيماوية فى حقول الأرز بكفرالشيخ

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أجريت هذه الدراسة فى قرية السبعين مركز سيدي سالم بمحافظة كفرالشيخ خلال الموسمين ٢٠١٤و٢٠١٥ بهدف دراسة الكثافة العددية للديدان الدموية فى مشاتل الأرز و تقييم فاعلية ثلاثة مبيدات حشرية فى خفض الإصابة بالديدان الدموية فى حقول الأرز.

أوضحت النتائج وجود ذروتين للكثافة العددية للديدان الدموية خلال النصف الثانى من شهر أبريل

أثبتت النتائج أن مبيد Diazinon هو الأكثر تأثيرا على الديدان الدموية حيث أدى إلى خفض الكثافة العددية ليرقات الآفة بنسبة٨٧,١٤و٨٩,٨٥% بعد٢٤ ساعة من المعاملة بينما أعطى نسبة خفض بعد سبعة أيام ٨٨,٦٢و٨٩,٤٠% خلال موسمي الدراسة على التوالى. تبعه مبيد cychlothrin - Lambadaفى .بينما كان مبيد benzoate Emamectin أقل المركبات تأثيرا حيث أعطى نسبة خفض ٧٦,٤٨و٨٢.٩٤% بعد ٢٤ ساعة و٧٧,٥٦و٧٩,٠٩% بعد سبعة أيام خلال موسمى الدراسة على التوالى.