



Efficacy of two biocides on biological aspects of the spider, *Chericanthium jovium* Denis (Araneida: Eutichuridae) at Fayoum Governorate

El-Khouly, N. M.*

Plant Protection Dept., Fac. of Agric., Fayoum Univ.

ABSTRACT:

The present work were conducted to determine the effect of two biocides (*i.g.*, Dipel Df and Biofly) on the biological aspects of true spider, *Chericanthium jovium* Denis which collected from tomato fields at laboratory conditions ($25\pm 1^{\circ}\text{C}$ and $75\pm 5\%$ R.H.). Both the biocides not effected on biological parameters of this predator, when reared on treated larvae of *Spodoptera littoralis* Boisd.

KEYWORDS: *Chericanthium jovium*, biological parameters, *Spodoptera littoralis*, Dipel Df and Biofly.

1- INTRODUCTION:

The spiders are important predaceous, feeding mostly on insect pests (Sallam, 1996, El-Khouly, 2016 and Ahmed, 2018). It is important to study the different ecological and biological aspects of the spiders to maximize their important role as biological control agents (Rahil, 1988, Ghabbour et al, 1999 and Mohafez, 2006). The chemical pesticides very harmful and highly effects on the spiders and the other organisms in the environment (Abd-Elgayed, 2004) while the safe biocides, (*i.e.* the fungal pesticides and the bacterial pesticides) neither low effective

nor no effect on this the beneficial organisms (Youssef and Abd-Elgayed, 2015).

Family of the species *Chericanthium jovium* Eutichuridae is one of the big families of spiders, it includes 347 species of 12 genera, distributed all over the world (Rakha et al., 1999 and El-Sebaay, 2003).

The present work was determined to evaluate the efficacy the biocides (Dipel Df and Biofly) on biological aspects of the spider *Chericanthium jovium* at lab. condition.

*Corresponding author Email: : ✉nma01@fayoum.edu.eg

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2- MATERIALS AND METHODS:

The present experiments were conducted at laboratory of plant protection Department, Faculty of Agriculture, Fayoum University under conditions of ($25\pm 1^{\circ}\text{C}$ & $75\pm 5\%\text{R.H.}$). Adult females of *Chericanthium jovium* were collected from tomato plants at Fayoum Governorate and reared during the period from 1st March to end of July 2022. For making pure culture from the spider species; adult females were collected and placed in plastic box (3cm dia. & 5cm high), supplied with prey, kept to laboratory and left until deposit eggs. Newly hatched spider lings were transferred to other cells. The number of preying capacity were counted, recorded and replaced by fresh ones. The newly hatched spider lings fed on the prey until molting, then isolated singly in another cell and examined every day (Ahmed, 2018).

Rearing of the prey:

The cotton leaf worm larvae of *S. littoralis* were obtained from Agricultural Research Centre, Cairo, Egypt and were reared on fresh leaves of castor bean (*Ricinus communis*) under laboratory condition (Adham et al., 2009 and Youssef& Abd-Elgayed, 2015). As larvae reached to the 2nd instars, they were used in the experiments.

Tested compounds:

Commercial formulations of the following insecticides tested against 2nd instar larvae of *S. littoralis* were obtained from the Agriculture Research Centre, Cairo, Egypt. Dipel-Df (WP) 6.4%: commercial product

formulation contains 32×10^3 Iu/mg of the bacterium, *Bacillus thuringiensis* var. *Kurstaki* and Biofly (WP): commercial product formulation contains 30×10^6 spores/mg of the fungus *Beauveria bassiana*. (Yousief& Abd-Elgayed, 2015).

Bioassay:

The biological activities of Bt formulation and fungi, each at four concentration were prepared in distilled water and used against 2nd instar of *S. littoralis* larvae by using the dipping leaf technique (Ahmed, 2009). The clean leaves were dipped in solution of the desired concentration of Bt or biofly commercial formulation Dipel Df, (*Bacillus thuringiensis*) and Biofly (*Beauveria bassiana*). Each leaf was dipped for 30 second, then held individually in petri-dish (9 cm diameter). The castor bean leaves for treatment of *S. littoralis* were treated with sterile distilled water for control. Then ten larvae from 2nd instars were separately placed in each petri dish for each treatment. Four dishes were used as replicates for each treatment and control.

Accumulative larval mortality was recorded and corrected by using Abbott's formula (Abbott, 1925). Afterwards, the corresponding concentration probit line, were estimated in addition to determining 50% mortalities and slope values of tested compound (Finney, 1971). Data were analyzed by ANOVA and the means were separated using the Duncan's multiple range test (Duncan, 1955).

3- RESULTS AND DISCUSSIONS:

1. Effect of the Biocides on larvae of *S. littoralis*

Efficacies of four concentrations of all tested insecticides on 2nd instar larvae of *S. littoralis* at 7 days treatment were

presented in **table (1)**. The lowest mortality (55%) was recorded at 0.5gm/L, while the highest (100%) were recorded at 4gm/L for biocide, Dipel Df. While on the biocide, Biofly, the percentages of mortalities ranged between

(40-77.5%) at the concentrations (1-8gm/L).

Table 1: Accumulated corrected mortality percentages after 7 days of treatment by some commercial Bt and fungi formulations against 2nd instar larvae of *S. littoralis*.

Formulation	Conc.gm/L	Mortality
DipelDf	0.5	55
	1	62.5
	2	87.5
	4	100
	Mean	76.25
Biofly	1	40
	2	50
	4	55
	8	77.5
	Mean	55.63

The LC₅₀, values of the tested compound against 2nd instar larvae of *S. littoralis*, recording 1.13 and 2.75 for Dipel and Biofly, respectively. According to the

values of LC₅₀ and slope, Dipel was high toxic on larvae of *S. littoralis* than Biofly. (Table 2)

Table 2: Lethal concentration of Bt and Biofly formulation against 2nd instar larvae of *S. littoralis*

Formulation	LC ₅₀ (gm/L) (spores/ml)	Slope
Dipel-Df	1.13	3.07
Biofly	2.75	1.23

These results agree with Meshrief et al., (2007), recorded that the hyphomycete fungi effected on the development of the cotton leaf worm *Spodoptera littoralis*. Krthikeyan and Selvanarayanan (2011) reported that the bioassay with *B. bassiana* against *S. littoralis* percent mortality increased from 33.33 to 86.67% as the dose increased from 0.15 to 0.25%. Haggag, 2013 who reported that Dipel DF, Dipel 2x and Delfin high killed *S. littoralis* larvae, followed by Agray, Protecto and Agerin, respectively. Also, Youssef and Abd-Elgayed (2015), reported that the bacterial cides (Dipel DF, W.Bus and Protecto) were high toxic to 2nd and 4th instars larvae of *S. littoralis* compared with Biofly.

2. Effect of the Biocides on the spider *Chericanthium jovium*

2.1. Oviposition:

Adult female of the spider, *C. jovium* requires a pre-oviposition period before depositing the egg sacs. The average period was 9.1 days under laboratory conditions (25±1°C & 75±5 % R.H.). female usually stopped feeding for one day before beginning oviposition and devoted her effort to web silky webbing by her spinnerets. Number of deposited egg sacs per mated females 4.8 egg sac, during the oviposition period under

laboratory condition. The oviposition period was 65.4 days while, the post-oviposition period was 46.4 days (**table 3**). The total number of eggs average of 120.4 eggs. The female longevity and fecundity of the spider *C. jovium* fed on larvae of *S. littoralis* treated with LC₅₀ of the biocides Dipel DF and Biofly were affected non significantly compared with control.

The values of preoviposition, oviposition, postoviposition, longevity,

number of egg sac/female and total number of eggs/females were 9.1 day, 60.2 day, 40.6 day, 110.33 day, 4.1 egg sac and 118.6 eggs for the treatment with Dipel DF and were 8.9 day, 62.1 day, 43.6 day 113.3 day, 4.6 egg sac and 120.4 eggs for the treatment with Biofly. (**Table 3**) Adult longevity differed according to sex. Generally, males lived for a shorter period than females. Adult males longevity was 53.2 days, whereas females 88.5 days.

Table 3: Female longevity and fecundity of spider, *C. jovium* fed on larvae of *S. littoralis* treated with LC₅₀ of the biocides Dipel DF and Biofly under Laboratory condition.

Parameters	Dipel DF	Biofly	Control	Duncan test
Pre-oviposition	9.1±2.1	8.9±2.2	9.1±2.5	2.30
Oviposition	60.2±2.1	62.1±3.6	65.4±3.7	4.90
Post-oviposition	40.6±3.1	43.6±2.9	46.4±0.9	7.20
Longevity	110.33±3.6	113.3±3.4	140.8±4.7	31.6
Number of egg sac/female	4.1±0.90	4.6±1.2	4.8±0.96	1.2
Total number of eggs/ female	118.6±5.2	120.4±5.3	120.4±6.3	2.9

2.2. Duration of different immature stages of *C. jovium* fed on treated 2nd instar larvae of *S. littoralis***2.2.1. Incubation Period:**

The incubation periods were 17.2, 16.9 and 17.0 days for females of the spider treated with Dipel DF, Biofly and control, respectively. The means differed insignificantly compared with control, while the respective values for the males were 17.3, 17.0 and 17.0 days.

2.2.2. Total of duration

The total duration of females and males were (92.5, 89.5& 88.5 days) and (58.4, 34.3& 53.2 days), respectively with non-significant differences.

2.2.3. Total of life cycle:-

The total of life cycle of the spider, *C. jovium* females longer than the males. The values recorded 118.3, 110.4 and 109.2 days for the females treated with Dipel DF, Biofly and control. The same values shorted to 91.2, 88.3 and 86.2 days for males. (Table, 4)

Table 4: Duration of different immature stages of *C. joviium* fed on treated 2nd instar larvae of *S. littoralis* under Laboratory condition.

stages	Duration (days)							
	Females				Males			
	Dipel DF	Biofly	Control	Duncan test	Dipel DF	Biofly	Control	Duncan test
Incubation period	17.2 ± 1.2	16.9 ± 1.3	17.0 ± 1.9	1.9	17.3 ± 1.1	17.0 ± 0.96	17.0 ± 1.8	1.96
1 st spiderling	13.7 ± 2.1	12.8 ± 2.1	12.6 ± 2.1	1.8	11.9 ± .96	12.0 ± 1.2	10.9 ± 2.4	1.66
2 nd spiderling	20.4 ± 3.1	19.4 ± 3.1	19.3 ± 2.3	2.1	15.3 ± 0.53	13.4 ± 0.96	14.2 ± 2.1	1.33
3 rd spiderling	13.6 ± 2.1	14.1 ± 2.4	13.2 ± 1.2	2.9	9.4 ± 1.02	8.7 ± 0.93	8.6 ± 2.3	0.98
4 th spiderling	14.2 ± 3.1	14.7 ± 3.2	13.9 ± 2.1	1.9	12.9 ± 1.11	10.8 ± 1.20	11.9 ± 2.4	2.1
5 th spiderling	15.3 ± 2.0	15.6 ± 4.2	14.8 ± 2.1	0.96	13.0 ± 1.31	13.0 ± 1.6	12.0 ± 0.96	1.95
6 th spiderling	16.3 ± 1.7	15.6 ± 2.3	15.2 ± 1.3	1.24	-	-	-	-
Total	92.5 ± 1.8	89.5 ± 2.3	88.5 ± 1.6	6.2	58.4 ± 3.7	54.3 ± 2.9	53.2 ± 3.4	7.3
Life cycle	118.3 ± 3.4	110.4 ± 2.4	109.2 ± 3.2	7.3	91.2 ± 3.2	88.3 ± 2.6	86.2 ± 1.2	6.4

Generally, the application of Dipel DF or Biofly effected significantly on the larvae of *S. littoralis* and effected insignificantly on the spider *C. joviium*.

The abovementioned results are agreement with the same treatments that recorded by (Ahmed, 2009; Yousef& Abd-Elgayed, 2015; El-Khouly, 2016 and Ahmed, 2018).

So, used the integrated pest management (IPM) for control the larvae of *S. littoralis* by used the biocides Dipel DF, Biofly and by used the predator, *C. joviium* in tomato fields for production safe foods and protect the environment from the hazard pesticides.

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