

Parasitoids of pod borer, *Helicoverpa armigera* (Hubner) Lepidoptera: Noctuidae attacking pigeonpea in New Half, Eastern Sudan

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Abstract: The pod borer, *H. armigera* was found as major insect pest attacking pigeonpea in New Halfa, Sudan. The objective of this study was to determine parasitoids of *H. armigera* infesting Pigeonpea. Larvae of this pest were collected from Pigeonpea fields, during 2014/2015 and 2015/2016 Pigeonpea growing seasons. Two species of tachinid parasitoids were detected and identified as, *Palexorista (Sturmia) inconspicua* and *Tachina* spp. Total means of parasitism rates by *P. inconspicua* and *Tachina* spp. were 7.99% and 4.78% respectively during the first season. Total means of parasitism rates were 6.06% and 2.78% during the second season respectively.

1. INTRODUCTION

Pigeonpea (*Cajanus cajan* (L.) Millsp) is one of the most important legume crops of the tropic and subtropic of Asia and Africa (Patra *et al.*, 2016). Pigeonpea crop damage by more than 200 species of insects, of which *H. armigera* is the most damaging pest in the semi- arid tropics. It cause damage to the crop from flowering to maturity stage there by it cause an estimated annual loss over 350 million dollars in pigeonpea (Sharma 2001 and Sharma 2005).

Currently, biocontrol is one of the major component of integrated pest management (IPM), which seeks to maximize the contribution of naturally occurring parasitoids, predators and pathogens to the reduction of pest population (Pillai *et al.* 2016). The role of natural enemies in controlling the pod borer, *H. armigera* population is of a considerable importance, since cost of plant protection with chemical pesticides is very high and its hazardous chemical effect to the environment (Devi, *et al.*, 2002).

In nature *H. armigera* are attacked by a large number of larval parasitoids belonging to the families, Ichneumonidae, Eulophidae, Braconidae and Tachinidae (Ghadira, 2007 ; Cameron *et al.*, 2006 and Chaudhari, 2013). According to Romeis and Shanower (1996) tachinid, *Palexorista* spp are predominant parasitoid of *H. armigera* in different agro ecosystem. In Sudan the parasitoids of *H. armigera* have been recorded on cotton, sorghum, maize and sunflower (Beije and Ahmed 1997, Herrera 1986; Satti 2007; Abdalla and ElKhidir 2004). However there is no work on the parasitoids of *H. armigera* on pigeonpea in Sudan. Therefore , the objectives of this study are to identified parasitoids of *H. armigera* attacking pigeonpea in New Halfa area and their role in controlling this pest.

2. MATERIALS AND METHODS

To determine the parasitoids of *H. armigera* in pigeonpea crop, six in un sprayed fields were chosen, In each study field, four points were selected and the larvae of *H. armigera* were collected weekly from 10 plants. Collected larvae were placed individually in petri- dishes and reared on pigeonpea buds and pods in the laboratory of the Faculty of Agriculture, University of Kassala, New Halfa. The larvae were followed until they developed into adults or parasitoids observed. The

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emerged parasitoids were preserved in vials containing 70% alcohol. The preserved parasitoids were identified by taxonomists of crop Protection Research Center, Agricultural Research Corporation, Wad Medani, Sudan.

Percentage parasitism was calculated using the following formula :

$$\text{Percentage parasitism} = \frac{\text{Number of larvae parasitized}}{\text{Total number of larvae collected}} \times 100$$

3. RESULTS

Over the period of the present study two tachinid parasitoids were reared out from *H.armigera* of pigeonpea. The two parasitoids were identified as *palexorista (Sturmia) inconspicua* Mg. and *Tachina spp.* Table (1) shows that the incidence of *P. inconspicua* was observed from the fourth week of November while, the incidence of *Tachina spp.* was observed from the second week of December. The two parasitoids were active throughout the growing season and increased in number as the pod borer population increased. The percentage parasitism of pod borer, *H.armigera* by *P.inconspicua* and by *Tachina spp.* During the first season 2014/2015 ranged from 3.22% to 15% and from 0.00 to 9.17% respectively. The highest percentage of parasitism by *P.inconspicua* reached 15% on the third week of January. Also, the highest percentage of parasitism by *Tachina spp.* reached 9.17% on the third week of January. Total means of parasitism rates by *P.inconspicua* and *Tachina spp.* were 7.99% and 4.78% respectively during the first season. Table 2, indicated similar trend of the two parasitoids species during the second season. The percentage parasitism by *P.inconspicua* was recorded to range from 2.82% to 10.48% whereas, the percentage parasitism by *Tachina spp.* was recorded to range from 0.00% to 7.69%. The highest percentage of parasitism by *P.inconspicua* was 10.48% on the third week of January while, the highest percentage of parasitism by *Tachina spp.* was 7.79 on the second week of January. Total means of parasitism rates by *P.inconspicua* and *Tachina spp* were 7.99% and 4.87% in the first season while in the second season were 6.06% and 2.78% respectively.

Palexorista inconspicua was the dominant larval parasitoid of *H.armigera* during two seasons when compared to *Tachina spp.*

Table (1): Parasitism percentage of *H.armigera* larvae infested pigeonpea crop in New Halfa area during season 2014/2015

Sampling dates (weeks)	No. of H. armigera larvae collected	Emerged parasitoids			
		<i>Sturmia inconspicua</i>		<i>Tachina spp</i>	
		No	%	No	%
28/11/2014	31	1	3.22	0	0.00
6/12/2014	50	2	4.00	1	2.00
13/12/2014	62	3	4.34	2	3.23
20/12/2014	73	5	6.85	4	5.48
27/12/2014	81	7	8.64	5	6.16
3/1/2015	97	9	9.28	7	7.21
10/1/2015	112	15	13.39	10	8.93
17/1/2015	120	18	15.00	11	9.17
25/1/2015	98	10	10.20	4	4.08
2/2/2015	46	2	4.34	1	1.52
Total			79.96		47.78
Mean			7.99		4.78
S±			1.13		0.94

Table (2): Parasitism percentage of *H.armigera* larvae infested Pigeonpea crop in New Halfa area during season 2015/2016

Sampling dates (weeks)	No. of <i>H. armigera</i> larvae collected	Emerged parasitoids			
		<i>Sturmia inconspicua</i>		<i>Tachina spp</i>	
		No	%	No	%
30/11/2015	35	1	2.85	0	0.00
8/12/2015	45	2	4.44	0	0.00
15/12/2015	52	4	7.69	1	1.92
22/12/2015	60	3	5.00	1	1.66
29/12/2015	68	4	5.88	4	5.40
5/1/2016	80	6	7.50	3	3.75
15/1/2016	91	8	8.79	7	7.69
22/1/2016	105	11	10.48	5	4.76
29/1/2016	78	4	5.13	2	2.56
6/2/2016	35	1	2.82	0	0.00
Total			60.6		27.82
Mean			6.06		2.78
S±			0.76		0.78

4. DISCUSSION

During the current study two species of parasitoids belonging to the family Tchinidae were found associated with *H. armigera* larvae viz. *Tachina spp.* and *Palexorista (Sturmia) inconspicua* which was the most abundant parasitoid associated with *H. armigera* larvae during both seasons as its prevalent at weekly interval was recorded. This parasitoid species was the first recorded on *H. armigera* larvae in Sudan on pigeonpea. The present results agree with those of Romies and Shanower (1996) who mentioned that *Pleaxorista spp.* are predominant parasitoid of *H. armigera* larvae in different agro ecosystems *P. inconspicua* was recorded on the larvae of *H. armigera* attacking cotton in Uganda (El-Heneidy *et al.*, 1998). Also earlier reported by Parsons and Ulyyett (1934) revealed that *Sturmia inconspicua* attacked larvae of American bollworm, *Heliothis armigera* in cotton. Low parasitism rate by *Tachina spp.* on *H. armigera* larvae was observed during two seasons compared to parasitism rate by *P. inconspicua*. Many species of the genus *Tachina* have been recorded attacking the larvae of *H. armigera* on different host plants. Dindo *et al.*, (2003) found that *Exorista (Tachina) larvarum* was an important mortality factors of *H. armigera* larvae on cotton. This parasitoid also caused high parasitism of *H. armigera* larvae on maize in Turkey (Gozoacick *et al.*, 2009) In Egypt *Exorista larvarum* was recorded on *H. armigera* larvae in tomato (Hassanein *et al.*, 1985). Abate (1991) reported that *Tachina fera* have the great potential to control *Heliothis armigera* in bean fields. Depale *et al.*, (2012) revealed that *Exorista (Tachina) larvarum* was detected on larvae of the army worm *Mythima unipincta*.

Exorista (Tachina) sorbillans was recorded parasitizing larvae of silk worm *Antheraea assama* (Bora *et al.*, 2014). *Exorista japonica* was found associated with common armyworm, *Pseudaletia sepaawata* . (Nakamura, 1994).

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