

THE LEVEL OF SUNN PEST OOPHAGOUS PARASITOIDS  
(HYMENOPTERA: SCELIONIDAE) IN INFESTED WHEAT FIELDS OF  
NORTHERN GOVERNORATE IN IRAQ WITH AN IDENTIFICATION  
KEY OF *TRISSOLCUS* SPECIES

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ABSTRACT

Surveys has done for collecting Sunn Pest which been parasitized by oophagous parasitoids in infested wheat fields of villages around Erbil, Sulimanya and Dohuk governorates from April to the end of May 2010, the result showed that a high rat of eggs hatching was 96.3% within Erbil governorate and its cleared from results that not all laid eggs had been hatched normally . The percentage ratio of egg parasitism in general was low in most studied villages. In this study: *Trissolcus grandis* Thompson, *Trissolcus semistriatus* Nees., and *Telenomus* sp. on sunn pest eggs has been observed. Identification keys supported with figures were formulated to identify of these species.

Keyword: Sunn Pest, Oophagous parasitoids

INTRODUCTION

Sunn pest *Eurygaster integriceps* Puton (Hemiptera , Scutelleridae) is a very damaging pest of wheat in west and central Asia and eastern Europe (Javaheery , 1995). Iraq has been considered by many authors' as among the middle eastern countries which suffered through time from serious damage to its cereals annual production by sunn Pest (Voegelé; 1996). Since 1989 Sunn Pest has been considered as an economic pest on wheat and barley grown in rain-field regions in the northern governorate of Iraq (Mohammed *et al.* 1998). Control by chemical insecticides is virtually the sole method currently used in Iraq, however, Sunn Pest populations could be reduced by Scelionid egg parasitoids in nature, but its vary among regions and from year to year( Kivan and Kilic , 2005). The most important biological control agent of sunn pest is the egg parasitoid that can cause high levels of mortality under natural conditions (Kodan & Gurkan , 2007). According to Radjabi and Nazari (1989) the field rates of parasitism by *Trissolcus grandis* Thompson in Iran reached 90%, and the most common and effective egg parasitoids in Turkey was *T. semistriatus* Nees (69.3%) followed by *T. grandis* (9.4%) (Koçak and Kilincer, 2001), while the field rates of parasitism was ranged between 28.5-50% in Syria (Abdulhai , 2003).

In Iraq, several Scelionids like: *T. semistriatus*; *T. grandis*.; *T. rufiventris* Mayer.; *T. vassilievi* Mayer., and *Telenomus* spp. has been determined by many authors' as a biological control agents (Ali 1970; Al-Azawi *et al.* .1990; Zuwain and Al-Khafaji 1993; Ali 1995). There is no evidence to suggest that egg parasitoids in Northern Iraq has played a significant role in population control, therefore the objective of this study were to estimate the level of sunn pests egg parasitoid in infested wheat fields in northern governorate of Iraq with attempts to identify them.

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### MATERIALS AND METHODS

#### Area description

The region (that is the borders with Turkey and Iran) is dominated by the northern end of the Zagros Mountains, with the range running approximately NW - SE through the region. These mountains reach a height of 3000 m above sea level at the maximum, the south of the mountain are foothills, reaching heights of 1500- 2000 m. below the foothills are large plains areas, which have served for many years as a major source of cereals for the region and provides ideal conditions for the development of *E. integriceps*. This area is between 300m and 700m above sea level.

#### Climatic conditions:

Northern Iraq is subject to continental weather patterns. Cold winters and extremely hot summers modified in the hills and mountain areas by altitude. In the winter the plains areas, the winter temperature can decline below 0 C° and snow has been noted in this area. The average annual rainfall varies throughout the region. The main' area of wheat cultivation has an average annual rainfall of 400mm, with a pronounced dry season June, July, August and September.

#### Egg mass collection:

Surveys had been done for collecting sunn pest parasitized eggs in the infested wheat fields in villages around Erbil , Sulimaniya and Duhok governorates during April to end of May in 2010. The egg mass of *E. integriceps* were transferred to the laboratory and replaced into 9 cm petridish held at 25 ±1C° and 60 ± 5%RH, they were noticed daily until the appearance of the parasites, the percentage of parasitism in each village was estimated, with preserving the emerged adult egg parasitoids in alcohol 70% containing 5% glycerol. The identification is made depending on Javahery (1968), Johnson (1985); and Kocak and Kilincer (2003). Specimens were sending to the Iraqi natural history museum for confirming its identification.

### RESULTS & DISCUSION

Study the level of parasitism in restricted areas of Northern Governorate show that there were high rate of egg hatching ranged from zero (Grdchal/Erbil and Qpakean/Erbil) to 100% (Hanara and Naw Kandani/ Erbil), while the rate of egg parasitism by the oophgous parasitoids was ranged from zero in most villages to 96.3% (Qpakean) and 65.8% (Korkacheen) within Erbil Governorate as its shown in Table (1). It's clear from these results that not all the laid eggs of *Eurygaster integriceps* which has been collected from studied fields will be hatched normally in which some of them remain unhatched due to their parasitization by the oophagous parasitoids and unknown reasons which could be related to entopathogenic fungi or bacteria. The result in table (1) clarified that the rate of egg parasitism in general was low in most villages and this probably resulted by highly using of chemical insecticide against the overwintering adult of sunn pest in all studied governorate. Zwain and Al-Khafaji (1993) indicated that insecticide applications for controlling sunn pest expanded in Iraq, in 1999 the treated area within Sulimaniya governorate only was reached 216.510 donm (Mohammed, 2000). This over wide and non programmed use of insecticide will affect on the population of oophagous parasitoids and lasted several years (Rosca et al. 1993).

Even that the high parasitism were observed in some districts in which reached 100% in Sarkand – Khelani as its shown in table (1) and this result can be explained by the fact that these areas were not treated with insecticides. This ratio of parasitism suggests that Sunn Pest population can be effectively suppressed by natural enemies occurring in north of Iraq. However, the results should be verified and more work should be done, also in this study three oophagous parasites has been identified as its shown in table (2).

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Table (1) Level of parasitism of *Eurygaster integriceps* Put. eggs by Oophagous parasitoids in infested areas of northern governorate of Iraq.

Governorate	Surveyed Villages	Area topography	Total No. of collected eggs	% Egg Hatching	Non-hatching eggs	
					% Egg parasitism	% Other reasons
Erbil	Salahaddin district					
	Berbean	Plain	14	85.8	0	14.2
	Zraw	Hill	33	45.4	27.3	27.3
	Grdchal	Hill	17	0	9.4	90.6
	Zabarok	Plain	19	78.9	0	21.1
	Perbetan	Hill	81	66.6	30.8	2.6
	Karakacheen	Hill	41	31.7	65.8	2.5
	Wsomerean	Hill	55	65.4	25.4	9.2
	Qpakean	Hill	27	0	96.3	3.7
	Sarkand - Khelani	Hill	28	57.2	42.8	0
	Hanara	hill	14	100	0	0
	Razgakhelan	hill	39	48.8	25.6	25.6
	Sewarook	hill	42	78.6	0	21.4
	Nawkandan	hill	40	100	0	0
	Darband said	hill	98	91.8	0	8.2
Khabat district						
	Molan	hill	52	88.5	0	11.5
	Ifraze	plain	42	83.4	0	16.6
Sulimaniya	Khormal / Deikon	plain	145	86.9	7.2	5.9
	Halabja / serwan	plain	136	51.3	0	48.7
Duhok	Bardarash	plain	14	57.2	0	42.8
	Zakho	hill	28	50	7.2	42.8

Table (2) Oophagous parasitoid observed on *Eurygaster integriceps* Puton egg mass that were collected from northern governorate of Iraq.

Governorate	Scientific name
Erbil, Sulimaniya, Dhok	<i>Trissolcus grandis</i> Thompson.
Erbil	<i>Trissolcus semistriatus</i> Nees.
Erbil	<i>Telenomus</i> sp.

### The Level of Sunn Pest Oophagous Parasitoids

All recorded species belong to the family Scelionidae within order Hymenoptera in which the main taxonomic characters were summarized as follow:

Genus *Trissolcus* Ashmead

*Trissolcus* Ashmead, 1893

Synonym:

*Asolcus* Nakagawa

*Microphanurus* Kieffer

The genus *Trissolcus* is one of the two main groups in the subfamily Telenominae (Hymenoptera: Scelionidae). All species are egg parasitoids of bugs of the super family of Pentatomoidea. Many of these hosts are economically important pests; there has been interest in species of *Trissolcus* for use as biological agents, many telenomine species possess character states usually attributed to *Trissolcus*, viz. notauli present, frons sculptured, female antennal clava with six closely articulated antennomeres, and bare eyes. However, these species are extremely unusual in other respects, so in this paper we try to simplified this character and formulate a simple key to identify the species observed.

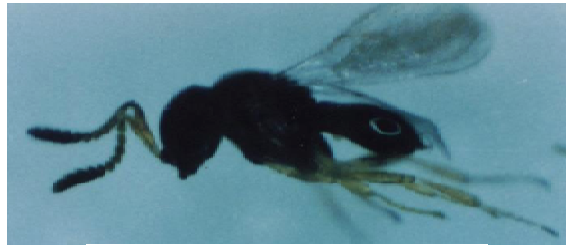
Key to genera

- 1-Elongate, with two distinct sub median rows of setae on the frons below the anterior ocellus (Fig 1A) ..... *Telenomus* sp.
- Short, stout without these setal rows (Fig 1B,C) .... *Trissolcus* sp. .... (2)

Key to *Trissolcus* species

- 2- Flagellomere 1 of 1 of male 1.5 times longer than its width and slightly longer than pedicel. Flagellomere 1 of female 2-2.5 times longer than its width (Figure 2 A, B) .... *Trissolcus grandis* Thomson
- Flagellomere 1 of male 2 times longer than its width and 1.5 times longer than pedicel. - flagellomere 1 of female 4 times longer than its basal width and 3 times longer than its apical width (Figure 2C, D) ..... *Trissolcus semistriatus* Nees

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***A. Telenomus* sp. ( 20x)**



***B. Trissolcus grandis* Thompso (20x)**



***C. Trissolcus semistriatus* Nees. (20x)**

Figure(1): The Adult of Sunn Pest Egg Parasitoids Observed in Northern Iraq.

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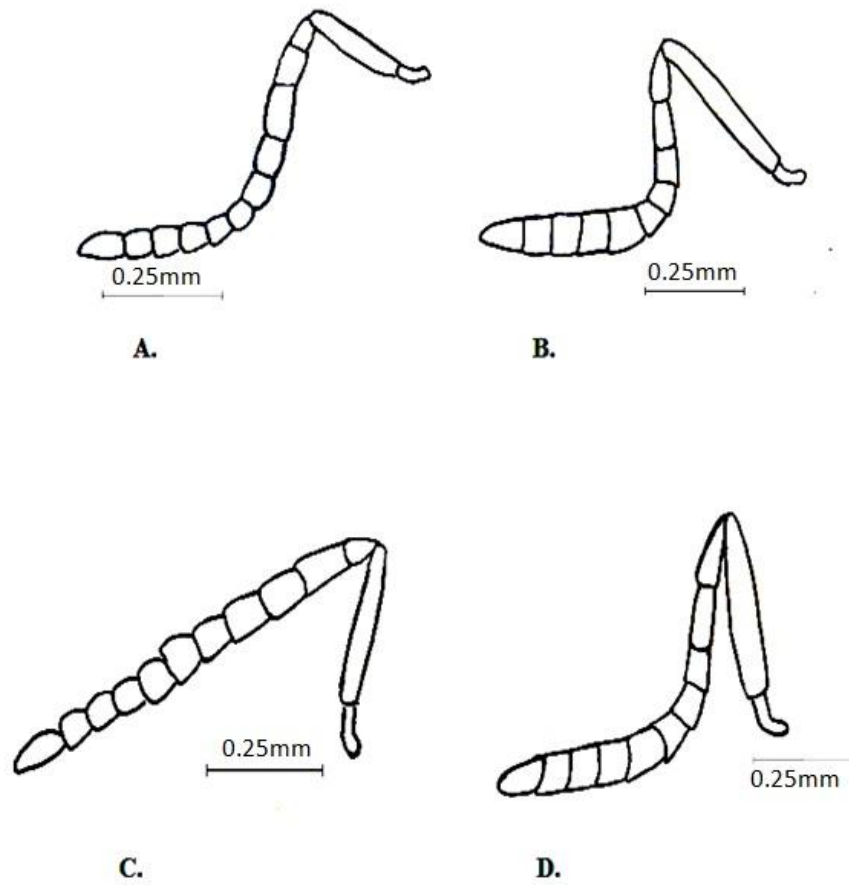


Figure (2): Antennae of *Trissolcus* species; *T. grandis* Thom . (A: Male; B: Female) and *T.semistriatus* Nees.(C. Male, D. Female)

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#### LITERATURE CITED

- Abdulhai, M. (2003) A Taxonomical survey and biological study of Sunn Pest egg parasitoids and the search for sources of resistance to *Eurygaster integriceps* Puton (Hemiptera: Scutelleridae). M. Sc. Thesis. Aleppo university, Aleppo, Syria.
- Al-Azawi, A. F.; I. K. Kadao and H. S. El-Haidary (1990) The Economic Entomology. Ministry of Higher Education and Scientific Research, Iraq. 625pp. [in Arabic]
- Ali, A. R. (1970) Report on Sunn Pest in Iraq. Iraqi Agricultural journal, vol: 25 (72): 49-68.
- Ali, W. Kh. (1995) Biological and Behavioral Studies on Sunn Pest Insect *Eurygaster integriceps* put. (Hemiptera, Scutelleridae) in Erbil Governorate - Iraq. MSc. Thesis College of Science University of Salahddin.
- Javahery, M. (1968). The egg parasite complex of British Pentatomidae (Hemiptera): Taxonomy of Telenominae (Hymenoptera: Scelionidae).
- Javahery, M. (1995) A technical Review of Sunn Pests (Heteroptera : Pentatomidae) with Special References to *Eurygaster integriceps* Put. FAO Regional Office for the Near East, Cairo, Egypt.
- Johnson, N. F. (1985) Systematic of the new world *Trissolcus* (Hymenoptera: Scelionidae): Species related to *Trissolcus basalis*. Can. Ent. 117: 431-445.
- Kivan, M. and N. Kilic (2005) Effects of Some Plants on Parasitization of *Eurygaster integriceps* Eggs by *Trissolcus semistriatus*. Trakya Univ. J. Sci., 6(1): 41-44.
- Kocak, E. and N. Kilincer (2001) *Trissolcus* species (Hymenoptera: Scelionidae) parasitoids on the eggs of Sunn Pest *Eurygaster* spp., across Turkey. Plant Protection Bulletin, 41 (3-4): 167-181.
- Koçak, E. and N. Kilinçer (2003) Taxonomic Studies on *Trissolcus* sp. (Hymenoptera : Scelionidae), Egg Parasitoids of the Sunn Pest in Turkey. Turkish Journal of Zoology, 27 (4): 301-317.
- Kodan, M. and M. O. Gurkan (2007) Mass Production and Storage of *Trissolcus grandis* (Thomson) (Hymenoptera : Scelionidae). In: Sunn Pest Management, A Decade of Progress 1994-2004. B. L. Parker, M. Skinner, M. El Bouhssini and S. G. Kumari (eds.) Arab Society for Plant Protection, P. 295-301.
- Mohammad, S. M.; A. A. Hussain and S. N. Abobaker (1998) Seasonal Abundance of Sunn Pest in Erbil Governorate. Zanko journal of pure and applied science, SaJahddin University.
- Mohammed, S. M. (2000) Some comprehends on Sunn Pest in Northern Iraq. Lera publisher-Sulimaniya - Iraq. P. 39.
- Radjabi, G. H. and M. Amir, Nazari (1989) Egg parasitoids of the Sunn Pest in the central part of Iranian plateau. Entomologie et phytopathologie Appliquées, 56: 1-8.

#### The Level of Sunn Pest Oophagous Parasitoids

- Rosca, I.; Popov, C.; Brabulescu, A.; Vonica, I. and Fabritius, K. (1993) The Role of Natural Parasites in Limiting the Level of Sunn Pest Populations. FAO/ICARDA expert consultation on Sunn Pest and its control in the Near East region, Aleppo Syria. Transactions of the Royal Entomological Society of London, Vol. 120, Pt. 19; 417-436.
- Voegele J. (1996) Review of Biological Control of Sunn Pest. In: Sunn Pests and their Control in the Near East. R. H. Miller and J. G. Morse (eds.) FAO Plant Production and Protection Paper. No. 138, Rome, FAO.
- Zuwain, Q. K. and A. Al-Khafaji (1993) Sunn Pest in Iraq. FAO/ICARDA expert consultation on Sunn Pest and its control in the Near East region, Aleppo Syria.



تطرح لوقية ثولا قشنة يلبقى وتسمى تميلشلتا طفلة لي فةطه لا  
سجعا نلأيصجش ح انه فم مع قاعا *Trissolcus*

لم له فوي

نيدلا حلاصته ماج / تير لا تيكمة يه له له لآ - قاجا ا هواء

قبلاخ لا

تم إجراء مسح مدف جمع بيوض حشرة السونة المصابة بطفيليات البيض من حقول الحنطة في القرى التابعة لمحافظة اربيل - سلیمانية ودهوك شمال العراق خلال شهر نيسان وحتى اية شهر ايار لسنة ٢٠١٠. أظهرت النتائج ان اعلى نسبة مئوية لفقس البيض تراوحت من صفر الى حوالي ٩٦.٣% في محافظة اربيل ووضح النتائج انه ليس كل البيض التي تضعه حشرة السونة سوف يفقس بشكل طبيعي كما ان النسبة المئوية للتطفل بشكل عام كانت قليلة في معظم حقول الحنطة للقرى المشمولة بالدراسة. وسجلت بعض طفيليات البيض التابع لعائلة Scelionidae ووضع مفتاح تشخيصي لنوعها.