

**Flower fly *Eupeodes nuba* (Wiedemann , 1830) (Diptera: Syrphidae) : A review study****Sahar M. S. Alkhafaji*, Feryal Hasony Sadiq, Baraa M. Thakir and Muqdad Ali Abdullah**

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*Corresponding author e-mail: sahar.muhsin1004@coagri.uobaghdad.edu.iq**Abstract:**

The hoverflies of the genus *Eupeodes* have many species included :*E. corollae* *E.bucculatus* , *E. lapponicus* , *E. lucasi*, *E. luniger* , *E. nielsenii* , *E. nuba* . A recent review focused on identify and describe the species *Eupeodes nuba* (Wiedemann , 1830) and showing the distribution of this species in the world and explaining differentiation between the common species *E.corollae* and *E. nuba*. One of the most prevalent hoverflies in Iraq, *E. corollae* (Fabricius), is one of the species to which *E. nuba* is strikingly similar. The first recorded instance of *E. nuba* in Iraq was found in Aljadria, located in the Baghdad province. It's typically found among wheat and cucumber plants in this area, where the syrphid larvae feed on aphid-infested plants. In ecology, this genus' species have an important function since their adults assist in cross-pollination and their larvae act as biological controls to reduce pest insects.

Keywords: *Eupeodes* , *E. nuba* , *E. corollae* , Syrphidae**ذباب الأزهار (*Eupeodes nuba* (Wiedemann , 1830) (Diptera: Syrphidae)**

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الخلاصة

ان الجنس *Eupeodes* يعود لذباب الازهار (الذباب الحوام) يتضمن العديد من الانواع مثل : *E. corollae*, *E.bucculatus* , *E. lapponicus* , *E. lucasi*, *E. luniger* *E. nielsenii* , *E. nuba* . هدفت هذه المراجعة على وصف وتشخيص النوع *Eupeodes nuba* من ذباب الازهار , توزيعه وانتشاره الجغرافي في انحاء العالم وتوضيح الاختلافات المظهرية بين النوع السائد لذباب الازهار *E.corollae* والنوع *E.nuba*. فالنوع *E.corollae* من انواع ذباب الازهار المستوطنة في العراق وهو قريب الصلة لحد كبير للنوع *E.nuba* الذي سجل في العراق لأول مرة في منطقة الجادرية جنوب محافظة بغداد على نباتات الخيار المصابة بحشرات المن و محصول الحنطة المزروع في المنطقة . يرقاته تفترس حشرات المن التي تصيب النباتات . انواع هذا الجنس من ذباب الازهار لها دور في النظام البيئي، اذ تعد البالغات ملقح مهم للعديد من المحاصيل الزراعية والبستانية ، ويرقاتها من اهم الاعداء الطبيعية للآفات الحشرية ، ويمكن ادخالها في برامج مكافحة متكاملة للآفات.

الكلمات المفتاحية: *Eupeodes* ، *E.nuba* ، *E.corollae* ، عائلة السرفيدي**INTRODUCTION**

The hoverflies of the genus *Eupeodes* belong to family syrphidae. Species of this genus are widely distributed in all zoogeographical regions except Australasian has approximately 95 species mostly found in the Palaearctic and Neotropical regions (Jilong et al, 1998; Mazánek et al. 1999; Hassan, 2021, Alkhafaji et al,2022). Syrphids are predatory insects that have preference for flower because they only feed on nectar and pollen (Smith et al.,2008 ; Kalita and Singh, 2012; Thompson,2013; Faheem et al.,2019) . Their main energy source is nectar, which also helps them survive longer. Pollen enables both sexes' reproductive systems to mature (Schneider, 1969; Gilbert, 1981; Chambers, 1988; Al-Rubaea and Al-Khafagei, 2014) Moreover, hoverfly females are known to exhibit high mobility, enabling them to distribute eggs over large areas (Chambers, 1988) , and to locate aphid colonies earlier in season than other aphidophagous (Dixon, 2000).

The net effect is that these species exploit small aphid colonies that ar'nt attractive to other species such as *Syrphus ribesii* L. and *Eupeodes (Metasyrphus) corollae* Fabr. Newly larvae to hatch can cannibalize the others and then search for aphids and females lay in advance of aphid attack. Even in similar conditions) Udayakumar et.al. ,2023) hoverfly species choose different oviposition sites: Female *Eupeodes luniger* Meigen laid more than 50% of her eggs near Brussels sprouts (*Brassica oleracea* L.cv. gemmifera) aphids (*Brevicoryne brassicae* L.), and less than 1% on uninfested plants. *Eupeodes* species preferred glossy plants when both types were uninfested, but not if the plants were infested (Almohammad et al, 2009; Ahmed et al,2021). Larvae of these species live as predators of different species of insects, especially aphids (Mohammed and Abdulla 1985; Ekeberg et al, 2015; Ahmed et al, 2022) . The species of this genus are important to the ecology because the adults assist in cross-pollination and the larvae act as biological pest controllers by consuming pest aphids that harm various crops (Stubbs and Falk , 2002 ; Al-Rawy and Abdulhay, 2012; Turk et al. 2015). Many species of this genus were recorded in Portugal include : *E.bucculatus* , *E. lapponicus* , *E. lucasi*, *E. luniger* , *E. nielsenii* , *E. nuba* (Van Eck, 2011) , and Saudi Arabia and Iraq include : *E. corollae* (Hassan, 2021) and *E. nuba* (Dawah et al., 2020; Alkhafaji et al, 2022) .

Eupeodes nuba (Weidemann, 1830)

Syrphus nuba (Weidemann, 1830)

DISTRIBUTION

Worldwide distribution from the Mediterranean part of the Palearctic region, including North Africa, southwestern part of Asia and the eastern part of the Afrotropical region. This species has also been recorded from the Canary Islands (Smit et al, 2004). The first record of this species in the Madeira Archipelago , where it has been seen in a location on the south coast of Madeira Island it is found between March and May (Smit et al, 2004) . By Abu-Zoherah et al. (1993) this species had previously been discovered in Saudi Arabia. It was first mentioned in Sudan and has since been reported in Afghanistan, Algeria, the Canary Islands, Crete, Cyprus, Egypt, Israel, Italy (Sicily), Kirghizistan, Mongolia, Morocco, Nepal, Portugal, Switzerland, Tajikistan, Uzbekistan, and Yugoslavia. It was also found in eastern parts of the Afrotropical region, from Ethiopia south to South Africa (inclusive) (Whittington, 2003; Sengupta et al. 2016 ; Speight, 2020 ; Mebarkia et al. 2020). New species in Portugal, According to the Syrph the Net species accounts (Speight, 2010), the species is found widespread around the Mediterranean basin, in Europe as well as in Africa (Van Eck, A.2011). *E. nuba* has a wide distribution from Afrotropical Africa and southern Asia, but it extends northwards only until Switzerland; the species was included in the Italian checklist only

recently (Burgio et al., 2015). This species has been found in Iran in Ahwaz (Dousti, 1999), Khorramabad, Mazandaran (Dousti and Hayat, 2006), Fars, Ilam (Bedoreh and Ansari pour, 2012), Gorgan, Guilan, Mashhad, Kashmar and Bardaskan, Khorasan, Kurdistan, and Khorasan Razavi (Shojaei Hesari, and Pashaei Rad, 2015). After that, it was reported from the Arabian Peninsula's UAE Smit et al, 2017). Finally, Marvdasht County provided the first report on it (Ansari pour et al, 2019). Former Yugoslavia, China (Jilong et al, 1998), Turkey (Reemer and Smit, 2007), Serbia (Nedeljković et al., 2009), Portugal (Pita et al., 2009), Canary Islands, Mediterranean basin, southern France to Italy, Crete, Cyprus, Canary Isles, Egypt, Morocco, Switzerland, Romania, Uzbekistan, Kirghizia, Afghanistan, Mongolia, and Ethiopia (Shojaei Hesari et al., 2016). Miandoab, West Azerbaijan Province, 36°57'N 46°00'E, 14–16 April 2013. Additionally, the Canary Islands, the Mediterranean basin, including the former Yugoslavia, Crete, Cyprus, Lebanon, Egypt, and Morocco; Switzerland in central Europe; Romania; the Transcaucasia; and the south-western regions of Asia, including Afghanistan and Mongolia (Uzbekistan, Kyrgyzstan, and Tajikistan) from Ethiopia to South Africa, in the eastern parts of the Afrotropical region (Samin et al. 2015). Several species common in southern and central Italy are present on these Hills, such as, *Eupeodes nuba*, *Merodon funestus*, *M. natans* and *Eumerus basalis* (Samoggio, 2017). The first record of this species is from Iraq in one location in Aljadria of Baghdad province (Alkhafaji et al., 2022).

ECOLOGY

According to Speight (2020) this species is mainly found on open sparsely vegetated ground beside dry, seasonal rivers. The records from Madeira are from an area of waste ground next to a small stream (Jalal et al., 2019). Hoverfly biodiversity in this site is higher than in the surrounding, largely modified, Po Plain (Italy's largest alluvial basin). Also, it has been stated that *E. nuba* flies quicker than *E. corollae* and settles on low-growing plants after flying around and over them. It is found among wheat and cucumber plants in Aljadria, south of Baghdad, where the larvae of the syrphid feed on the aphid-infested plants (Alkhafaji et al., 2022).

The consumption of different aphid stages by *Eupeodes nuba* larvae was investigated in a laboratory. The results showed that the third-instar aphid was the most frequently consumed by the predator's larvae, followed by the first and second instars. However, syrphid larvae can control the number of this species of aphid in the early stages of the aphids' colonization of the host (Al-lami and Al-Rubeae, 2016), (Table 1) (Alkhafaji and Ahmed, 2023).

DESCRIPTION

One of the most prevalent hoverflies on the island, *E. corollae* (Fabricius), is one of the species in the genus to which *E. nuba* is remarkably similar (Ebejer, 1995). The adult body length is 4.5–7 mm (Shojaei Hesari and Pashaei Rad, 2015). *E. nuba* can be differentiated from *E. corollae* by the legs which are entirely yellow in *E. corollae* femora are black basally, smaller male genitalia, and the shape of the black markings on the sterna of the abdomen (Dawah et al., 2020). Its particularize color is light yellow, and its antennae which light brown, Scutellar is a shiny nutty color surrounded by yellow setulae, the Scutellum is yellow to light brown, and the abdomen is oval in shape, elongated, compared to the male (Sabr and Aljaf, 2017). The abdominal area is

Table (1) Predation efficiency according to the larval duration of flower fly *E. nuba* on black bean aphid *A. fabae* under incubator conditions

Larval Instars	Mean $\pm$ SE			
	Daily Prey	Total Prey	%Prey	Instar /day
Instar 1	16.26 $\pm$ 2.13	55.93 $\pm$ 4.52	15.33 $\pm$ 1.28	3.33 $\pm$ 0.16
Instar 2	35.73 $\pm$ 2.34	102.86 $\pm$ 10.95	25.76 $\pm$ 2.45	3.00 $\pm$ 0.36
Instar 3	49.13 $\pm$ 5.34	208.12 $\pm$ 20.73	56.96 $\pm$ 5.26	4.53 $\pm$ 0.46
LSD	12.41 *	47.71 *	10.28 *	1.224 *
* ($P \leq 0.05$).				

interspersed with black stripes beginning from the Scutellar in the shape of a letter Y, forming two yellow spots on both sides of the abdomen, followed by two thin black stripes. The male is similar to the female, but it appears darker in color and the abdomen is slightly wider than the female, the legs are yellow in color and smaller male genitalia in size compared to the species *E.corollae* (Alkhafaji, 2021).

CONCLUSION

In this review, biography to genus *Eupeodes* and the species *E. nuba*. The majority of hoverfly species' larvae are efficient predators of aphids and other agricultural pests, and those in the subfamily Syrphinae are particularly useful in biological management. We mentioned here the available information about this species in order to where known and worldwide distribution of the studies is provided. Biological data, a critical factor in their effective application in biological control strategies for pest insects.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this manuscript.

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