

(RESEARCH ARTICLE)



## *Zelus longipes* (Linnaeus, 1767) (Hemiptera: Reduviidae: Harpactorinae) as a predator of *Apis mellifera* L., 1758 (Hymenoptera: Apidae) in Brazil

Carlos Henrique Marchiori\*, Marco Vinícios de Oliveira Santana and Klebert de Paula Malheiros

Department Medicine and Biological Science, Instituto Marco Santana, Goiânia, Goiás, Brazil.

International Journal of Life Science Research Archive, 2024, 06(02), 021–026

Publication history: Received on 18 February 2024; revised on 28 March 2024; accepted on 30 March 2024

Article DOI: <https://doi.org/10.53771/ijlsra.2024.6.2.0045>

### Abstract

*Zelus longipes* (Linnaeus 1767) is an insect known as an assassin bug (Reduviidae) member of the subfamily Harpactorinae. Its distribution includes southern North America, Central America, and South America (except Chile), and especially in agroecosystems in Brazil. *Z. longipes* has been considered a potential biocontrol agent, as it prefers the caterpillars of *Spodoptera frugiperda* (Smith, 1797), which is a pest moth of corn fields. This article aims to describe the predatism of *Z. longipes* on the prey *Apis mellifera* L., 1758 (Hymenoptera: Apidae) in *Terminalia mantaly* Perrier (Combretaceae). During the collection of flies with an entomological net in the urban area of the Federal University of Goiás, in November 2017, the stink bug of the species *Z. longipes* was collected carrying in its trunk a specimen of *A. mellifera* in an almond tree known as the Madagascar almond tree of the species *T. mantaly*, also called Sete Copas.

**Keywords:** *Apis mellifera*; Assassin bug; Biocontrol; Natural enemy; Predatory

## 1 Introduction

### 1.1 Order Hemiptera

The order Hemiptera is characterized by having biting-sucking mouthparts and, like other insects, its body is divided into head, thorax and abdomen and covered by an exoskeleton that is periodically replaced in the process known as molting or ecdysis, allowing the insect to grow into adulthood. The antennae, rostrum, legs, and wings are the main characteristics used to differentiate the families of Hemiptera. The antennae may have four or five antennomeres. The front paws of most groups of predators are adapted for grasping prey and are called raptorial. [1-4].

### 1.2 Family Reduviidae

In the family Reduviidae, the head of insects is generally narrow and elongated, with two prominent compound eyes separated dorsally by a space called the interocular region and a transverse postocular groove. Right after this groove is located the ocellus, which can be prominent or flatter. The region anterior to the eyes is called the antecular and posterior postocular. The clypeus is in the antecular region of the genus. The rostral mouthparts are trisegmented and generally curved and the tip rests in a groove in the prosternum. Most reduviids are predators of other insects [4-6].

### 1.3 Subfamily Harpactorinae

The subfamily Harpactorinae, has species that share the following characteristics: They live exclusively or frequently on plants that produce viscous substances, they use these substances to capture prey and they have a great appetite for sugars [6-8].

\* Corresponding author: Carlos Henrique Marchiori

Bedbugs from the Harpactorinae subfamily are distributed in 2,059 species in almost 300 genera and have a wide geographic distribution in America, Asia, and Oceania. However, the actual number of species in this subfamily and information about their diets, the biology, and ecology of many of their species are unknown [10-12].

The adequacy of the diet of Heteroptera predators can provide information about the effectiveness of these natural enemies in pest control programs. Therefore, knowledge of potential prey is important to understand the factors that regulate the permanence of Reduviidae predators in the field [10-12].

#### 1.4 Description

Predatory stink bugs play an important role in regulating food webs in natural systems, but several studies have emphasized the use of these insects as biological control agents in artificial systems, both agricultural and forestry. The Reduviidae family includes the largest number of terrestrial predator species, being represented by several species that feed on pests in different agroecosystems. Despite their great economic importance, the biological adaptability of these bed bugs in laboratory conditions is still scarce. [13-14].

##### 1.4.1 *Zelus longipes* (Linnaeus 1767).

Its distribution includes southern North America, Central America, and South America (except Chile), especially in agroecosystems in Brazil. *Z. longipes* has been considered a potential biocontrol agent, as it prefers caterpillars, which is a pest in corn crops. The species is a generalist predator, commonly used to combat winged flies (Diptera: Ulidiidae), which cause damage to sweet corn production in Florida. *Z. longipes* prefers smaller caterpillars, probably because there is less risk of injury when subduing smaller prey [13-15] (Figure 1).



Source: <https://stock.adobe.com/br/search?k=%22zelus+longipes%22>

**Figure 1** *Zelus longipes* (Linnaeus 1767)

The adult has a robust body and measures 1.5-2 cm in length in females. The head is elongated, gradually narrowing to the base, yellow-orange, with a black spot extending from the back of the eyes to the base; In males, the frontal vertex is black. Antenna black in both sexes, but in males the third segment is slightly thickened in the anterior half. Curved beak, with three segments, the last two being black and sometimes also part of the first; the second segment is too long [14-15].

The thorax has a single black spot on the pronotum, pubescent disc, black lateral margins, and black scutellum. The elytra are as long as the body in males and slightly longer in females. The hindwings are membranous and black, with a pale anterior region. The ventral region of the thorax is yellow-orange [14-15].

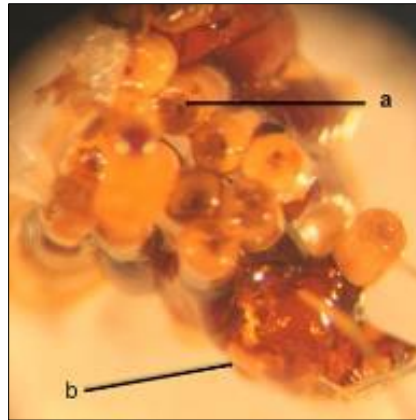
Legs with black thighs but a yellow-orange base, two straw-white rings visible on the femur, sometimes incomplete on the anterior pair. Orange abdomen with four black and white stripes on the ventral region, the latter being generally incomplete. Behind the last three black segments. The last segment of males has a thin, upward-curved spine [14-15].

## 2 Collect

During the collection of flies in the urban area of the Federal University of Goiás, in November 2017, the author noted the presence of the predator “killer bug” of the species *Z. longipes* carrying on its proboscis a specimen of *Apis mellifera* L., 1758 (Hymenoptera: Apidae) in the plant *Terminalia mantaly* Perrier (Combretaceae), also called Sete Copas. The two specimens were collected using an entomological network. The specimens were sent to the laboratory to confirm the species.

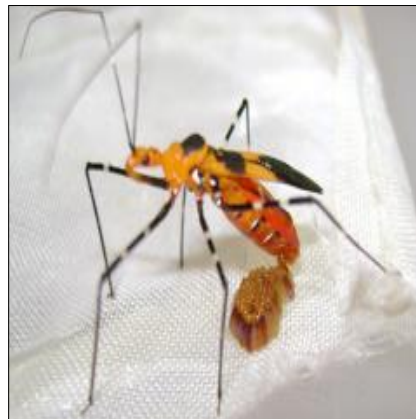
### 2.1 Biology

The eggs (2.5 mm wide) are deposited by tightly joined females in groups of up to 50 eggs that are shaped like a small pan. This insect is commonly found on cultivated plants moving elegantly. It is highly attracted to Lepidoptera and Homoptera larvae, and attacks them quickly by introducing its stylet, sucking its contents. Each adult consumes 2-3 medium larvae daily (Figures 2A-2B) [16-18].



Source: Photograph by Megha Kalsi, University of Florida

**Figure 2A** Eggs of the milkweed assassin bug, *Zelus longipes* (Linnaeus 1767), showing the central pore (a) in the operculum of one egg, and the mucilaginous layer (b) surrounding the main eggshells but not the opercula



Source: Photograph by Megha Kalsi, University of Florida

**Figure 2B** An adult female milkweed assassin bug, *Z longipes*, ovipositing eggs in a cage

They have many shapes and sizes; it is difficult to recognize them due to the wide variety of body shapes they have. Also, as nymphs, they are visually very similar to other insects. The only difference is that these insects can deliver a nasty bite if disturbed. (Figure 3) [16-18].



Source: Photograph by Megha Kalsi, University of Florida

**Figure 3** Nymph of the milkweed assassin bug, *Zelus longipes* Linnaeus, feeding on a nymph of the minute pirate bug, *Orius insidiosus* (Say, 1832)

The plants in which the presence of *Z. longipes* was observed were orange *Citrus sinensis* (L.), Osbeck, currant *Physalis peruviana* L., rosemary *Salvia rosmarinus* (L.) Schleid., 1852, blackberry *Rubus glaucus* Bentham, 1846, peanut forage *Arachis pintoii* Krapov. and Greg., 1994 and sweet potato *Ipomoea batatas* (L.) Lam. (Figures 4-5) [16-18].



Source: Photo by Thiago Morais | Agricultural Engineer | Agricultural Coordinator | Conquista Farm

**Figure 4** *Zelus longipes* (Linnaeus, 1767), attacking its prey, a cornsilk fly, *Euxesta stigmatias* Loew, 1868 (Diptera: Ulidiinae)



Source: Photograph by Megha Kalsi, University of Florida

**Figure 5** Nymph of the milkweed assassin bug, *Zelus longipes* 1767, feeding on *Euxesta stigmatias* Loew, 1868 (Diptera: Otitidae: Ulidiinae), a picture-winged fly

*Z. longipes* are generalist predators that feed on a wide variety of soft-bodied prey in gardens and fields, such as mosquitoes, flies, earthworms, cucumber beetles, caterpillars, fall armyworms, and rootworms. Important pests that can be controlled by *Z. longipes* include the species *Diabrotica* sp., *Cerotoma* sp., *Systema* sp. (Coleoptera: Chrysomelidae), *Tenebrio molitor* Linnaeus, 1785 (Coleoptera: Tenebrionidae), *Empoasca* sp., *Draeculacephala* sp. (Hemiptera: Cicadellidae), as well as some Membracidae (Hemiptera) and has been considered a potential biocontrol agent, as it prefers the caterpillars of *Spodoptera frugiperda* (Smith, 1797) (Lepidoptera: Noctuidae) [16-18].

The species *Z. longipes* uses an initially extracorporeal digestion mechanism to optimize the obtaining of nutrients from its prey. The species remains in groups during the early instars of the nymphs to protect itself from possible natural enemies; upon reaching adulthood, he moves away from the group to live a solitary life [16-19].

---

### 3 Conclusion

The species *Z. longipes* are generalist predators feeding on a wide range of soft-bodied prey in gardens and fields such as mosquitoes, flies, earthworms, cucumber beetles, and caterpillars (fall armyworm, and rootworm).

---

### Compliance with ethical standards

#### Disclosure of conflict of interest

No conflict of interest to be disclosed.

---

### References

- [1] Galvão C, Jurberg J. External morphology of adults. In: Galvão C, eds. Vectors of Chagas disease in Brazil. 1st ed. Curitiba: Brazilian Zoology Society; 2014, p. 33-39.
- [2] Ambrose DA. Checklist of Indian assassin bugs (Insect: Hemiptera: Reduviidae) with taxonomic status, distribution, and diagnostic morphological characteristics. *Zoos Print Journal*. 2006; 21(9): 2406.
- [3] Ambrose DP. Assassin bugs (Reduviidae excluding Triatominae). In: Schaefer CW, Panizzi AR, eds. Heteroptera of economic importance. 1st ed. Boca Raton: CRC Press; 2000: p. 695-712.
- [4] Gil-Santana HR, Zeraik SO. Reduviidae from Cabo Frio, Rio de Janeiro, Brazil (Hemiptera, Heteroptera). *Brazilian Journal of Bioscience*. 2003; 5(1): 101-120.
- [5] Krein V. Killer bedbugs of the State of Rio Grande do Sul, Brazil, (Hemiptera: Heteroptera: Reduviidae). [P.h.d. dissertation]. Porto Alegre: Universidade Federal do Rio Grande do Sul; 2018.
- [6] Martin-Park A, Coscarón MC. Assassin bugs (Hemiptera: Heteroptera: Reduviidae) of Uruguay: A synoptic catalogue as a contribution to the study of Austral biodiversity. *Zootaxa*. 2011; 3006: 50–62.
- [7] Skvarla MJ, Fisher DM, Dowling APG. Arthropods of Steel Creek, Buffalo National River, Arkansas. III. Heteroptera (Insecta: Hemiptera). *Biodiversity Data Journal*. 2016; 4: e7607.
- [8] Oton MM, et al. Predatory bugs (Hemiptera, Reduviidae, Harpactorinae) in tobacco (*Nicotiana tabacum* L.) in the municipal district of Cruz das Almas, Bahia. *Brazilian Journal of Zoosciences*. 2006; 8(1): 55-59.
- [9] Ribeiro RC, et al. The preferred prey of the predator *Harpactor angulosus* (Lepelletier) (Reduviidae: Harpactorinae) [Internet]. Londrina: 13th Unopar Activities Meeting; @2010 [cited 2024 Jan 20]. Available from <https://repositorio.pgskroton.com/bitstream/123456789/15393/1/PRESAS%20PREFERIDAS>.
- [10] Ambrose DP, Maran PM. Polymorphic diversity in salivary and hemolymph proteins and digestive physiology of assassin bug *Rhynocoris marginatus* (Fab.) (Het., Reduviidae). *Journal of Applied Entomology*. 2000; 124: 315-317.
- [11] Sahayaraj K, Paulraj MG. Rearing, and life table of reduviid predator *Rhynocoris marginatus* Fab. (Het., Reduviidae) on *Spodoptera litura* Fab. (Lep., Noctuidae) larvae. *Journal of Applied Entomology*. 2001; 125: 321-325.
- [12] Zhao P, Constant J, Cai W. Revision of the Papua New Guinea genus *Elemacoris* Miller (Hemiptera: Reduviidae: Harpactorinae). *Zootaxa*. 2007; 1556: 51–60.

- [13] Cogni R, Freitas AVL, Amaral Filho BF. Influence of prey size on predation success by *Zelus longipes* L. (Het., Reduviidae) Journal of Applied Entomology. 2020; 126(2-3): 74 - 78.
- [14] Kalsi M, Seal DR, Nuessly GS, Capinera JL, Martin CG. Distribution of *Zelus longipes* (Hemiptera: Reduviidae) in South Florida corn fields and its functional response to corn-infesting picture-winged flies (Diptera: Ulidiidae). Environmental Entomology. 2014; 43(5): 1223-1234.
- [15] Castañeda-Vildózola A, Sánchez-Pale JR, Palemón-Alberto F, Valdez-Carrasco J, Flores-Maldonado KY. First record of *Zelus longipes* L. as a predator of two phytophagous chinchas associated with *Opuntia ficus indica* L. (Mill.) in the State of Mexico. Southwestern Entomologist. 2023; 48(1): 267-272.
- [16] Collantes GR, Santos-MA, Pittí-CJ, Atencio-VR, Jerkovic M. Vegetation associated with the genus *Zelus* Fabricius, 1803 (Hemiptera: Reduviidae) in Cerro Punta, Chiriquí, Panamá. Agricultural Science. 2023; (36): 24-36.
- [17] Atencio R, Aguilera VA, Arcia AA. Current status of huanglongbing disease (HLB) of *Citrus* fruits in Panama. Agricultural News. 2021; 268: 8-18.
- [18] Benavides MP, Góngora CE. The natural control of insects in the Colombian coffee ecosystem. 1st ed. Bogotá: Cenicafé. 2020.
- [19] Bernd NFC, Saraiva, ALC. There is cooperation between *Zelus longipes* nymphs during predation [Internet]. Dourados: 17º Anais of Scientific Initiation Meeting of the State University of Mato Grosso do Sul; @2022 [cited 2024 Jan 20]. Available from <https://anaisonline.uems.br/index.php/enic/article/view/6170>.