First Global Record of Podisus nigrispinus (Hemiptera: Pentatomidae) as Predator of Gonipterus platensis (Coleoptera: Curculionidae) Larvae and Adults

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Source: Florida Entomologist, 100(3) : 675-677
Published By: Florida Entomological Society
URL: https://doi.org/10.1653/024.100.0331
First global record of *Podisus nigrispinus* (Hemiptera: Pentatomidae) as predator of *Gonipterus platensis* (Coleoptera: Curculionidae) larvae and adults

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The genus *Gonipterus* (Coleoptera: Curculionidae) is originally from Australia (Mally 1924; Mapondera et al. 2012) and has a wide geographic distribution, having been reported in Africa, Europe, North America, Asia, and South America (Lanfranco & Dungey 2001; EPPO 2005). *Gonipterus* was detected for the first time in Brazil in 1928, but in field manuals, the first scientific report was given in 1982 from the state of Santa Catarina with the species *Gonipterus platensis* Marelli and *Gonipterus gibberus* Boisduval (Fenilli 1982), which later spread to the state of São Paulo (Rosado-Neto 1993).

The introduction of *G. platensis*, the main eucalypt leaf-eating beetle in the world, causes economic losses in various regions. The larvae feed on young leaves and defoliate the top parts of the plant canopy (Mansilla-Vázquez 1992), and the adults feed on the edges of mature leaves (Mally 1924), impairing the growth of the plant. The larval stage has 4 instars, each lasting approximately 1 wk (Santolomazza-Carbone 2002). The females lay up to 800 eggs (Arzone & Meotto 1978). Since the discovery of this pest in Brazil, this scientific report is the first to document the action of a predatory species, *Podisus nigrispinus* Dallas (Hemiptera: Pentatomidae), preying on larvae and adults of *G. platensis*.

Predators in the order Hemiptera and the family Pentatomidae, such as *Supputius cincticeps* Stål (Souza et al. 2012), *Brontocoris tabidus* (Signoret) (Zanuncio et al. 2000), and *P. nigrispinus* (Torres et al. 2008) are reported as biological control agents of forest pests. *Podisus nigrispinus* also preys on various agricultural pests in Brazil, being a significant natural enemy and widespread in the whole country (Zanuncio et al. 2008; Torres et al. 2006). This paper evaluates the potential of *P. nigrispinus* to be used in an integrated pest management program following the first worldwide observation of *P. nigrispinus* nymphs preying on *G. platensis* larvae in a commercial plantation near Itararé, São Paulo, Brazil. *Gonipterus* species are currently being controlled in Brazil, and in other countries where they occur, with the egg parasitoid *Anaphes nitens* (Girault) (Hymenoptera: Mymaridae) (Wilcken et al. 2008; Reis et al. 2012) and the entomopathogenic fungus *Beauveria bassiana* (Bals.-Criv.) Vuill. (Cordycipitaceae) (Berti-Filho et al. 1992). Additionally, the larva parasitoid *Entendon magnificus* (Girault & Dodd) (Hymenoptera: Eulophidae) has been studied in Chile (Gumovsky et al. 2015). The introductions of new parasitoid species highlight the limitation of the current biological control efforts with *A. nitens*.

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In this study, we evaluated the predation efficiency of *P. nigrispinus* on *G. platensis* in the Forest Protection Laboratory of Suzano Pulp and Paper Company. Larvae and adults of *G. platensis* were collected 3 d before the experiment from an infested field site and were kept on *Eucalyptus urophylla* S. T. Blake × *Eucalyptus grandis* W. Hill ex Maiden (Myrtaceae) leaves at a constant temperature of 24 ± 2°C. Nymphs and adults of the predator *P. nigrispinus* were reared at the Forest Protection Laboratory and fed *Tenebrio molitor* L. (Coleoptera: Tenebrionidae) larvae.

The experiment was conducted at a temperature of 24 ± 2°C, relative humidity of 60 ± 10%, and a photoperiod of 12:12 h L:D. The experimental setup was completely randomized with 4 replications of the following treatments: 20 adults of *G. platensis* (T1, control), 20 larvae of *G. platensis* (T2, control), 2 adults (1 male and 1 female) of *P. nigrispinus* with 20 adults of *G. platensis* (T3), 2 adults (1 male and 1 female) of *P. nigrispinus* with 20 larvae of *G. platensis* (T4), 2 nymphs of *P. nigrispinus* with 20 larvae of *G. platensis* (T5), and 2 nymphs of *P. nigrispinus* with 20 adults of *G. platensis* (T6). The insects were kept in plastic pots (250 mL) covered with a voile cloth lid, upon which a damp...
A method of computing the effectiveness of an insecticide. 


References Cited


Key Words: Eucalyptus; biological control; integrated management; Brazil.

Zootaxa 3957: 577–584.

This predatory species is native to Brazil and a promising biological control agent for use in the integrated pest management of G. platensis.

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Summary

Native to Australia Gonipterus platensis Marelli (Coleoptera: Curculionidae) is the main beetle defoliator of eucalyptus worldwide, causing damage in various regions in which it was introduced, where its management relies mostly on biological control with the parasitoid Anaphes nitenis (Girault) (Hymenoptera: Mymaridae). In this report, we present the first laboratory evidence of efficient predation by Podisus nigrispinus Dallas (Hemiptera: Pentatomidae) on G. platensis larvae.

Table 1. Average number ± SE of dead Gonipterus platensis larvae or adults on each evaluation day of predation by Podisus nigrispinus nymphs or adults tested in the laboratory (temperature of 24 ± 2 °C, photoperiod of 12:12 h L:D, and total duration of predation of 5 d).

| Treatment | Prey | Predator | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | F value | C.V. 
|-----------|------|----------|-------|-------|-------|-------|-------|---------|------
| T1        | Adults | none     | 0.0 ± 0.0aA | 0.3 ± 0.0aA | 0.0 ± 0.0aA | 0.0 ± 0.0aA | 0.0 ± 0.0aA | 1.0 | 15.8
| T2        | Larvae | none     | 0.0 ± 0.0aA | 0.5 ± 0.5aA | 0.0 ± 0.0aA | 2.8 ± 0.3bcB | 1.5 ± 0.6aAB | 9.6 | 27.8
| T3        | Adults | Adults   | 0.0 ± 0.0aA | 0.3 ± 0.3aA | 0.3 ± 0.3aA | 0.5 ± 0.3aBA | 0.0 ± 0.0aA | 1.1 | 26.1
| T4        | Larvae | Adults   | 2.5 ± 0.3cA | 3.5 ± 0.6bA | 4.8 ± 1.5cA | 6.5 ± 0.6cA | 2.5 ± 1.0aA | 3.0 | 23.0
| T5        | Larvae | Nymphs   | 1.3 ± 0.3bA | 3.8 ± 0.5bA | 4.0 ± 2.0bcA | 4.5 ± 1.5cA | 2.5 ± 1.0aA | 1.5 | 31.7
| T6        | Adults | Nymphs   | 0.0 ± 0.0aA | 0.3 ± 0.3aA | 0.8 ± 0.5abA | 1.0 ± 0.6abA | 1.0 ± 0.4aA | 1.3 | 36.1

Statistics

| F value | 77.7 | 15.6 | 8.1 | 15.2 | 3.2 |
| C.V. | 10.2 | 24.4 | 38.1 | 24.5 | 38.8 |

Original values are presented; data were transformed by (x + 0.5)0.5 for statistical analysis. Means ± SD followed by the same lowercase letter in a column and uppercase letter in a row did not differ significantly according to the Tukey test (P > 0.05). Four replicates with 20 prey insects per replicate were conducted.

C.V. = Coefficient of variation.

This first laboratory evidence of efficient predation by Podisus nigrispinus Dallas (Hemiptera: Pentatomidae) predating larvae of G. platensis. Este predador está nativo do Brasil e promissor para ser usado no controle biológico da praga dentro do manejo integrado de G. platensis.

Palavras Chave: Eucalyptus; controle biológico; manejo integrado; Brasil.


