

Record of egg parasitoid in *Erinnyis alope* (Drury, 1773) (Lepidoptera: Sphingidae) in Brazilian cassava crops

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Abstract: Parasitoids of genus *Trichogramma* (Hymenoptera: Trichogrammatidae) are one of the most studied groups of insects in the world because they function as biological control agents when the pest is still in the early developmental stages, eliminating it before the injury shows up. Therefore, it was investigated the occurrence of egg parasitoids of *Erinnyis* spp. collected during a technical visit at cassava plantations located in Fazenda Juçara, Murici, Alagoas. Samples were transported to the Centro de Ciências Agrárias, Universidade Federal de Alagoas (CECA, UFAL) in Rio Largo, AL, for observations. Caterpillars hatched from non-parasitized eggs were reared until adult emergence, when they were killed and mounted. Parasitoids that emerged from parasitized eggs were placed inside plastic microtubes with 70% alcohol. Both hosts and parasitoids were sent for identification to the Laboratory of Taxonomy, at the Departamento de Entomologia e Acarologia, ESALQ, USP, Piracicaba, SP, where the specimens were preserved in the Institution's Museum. From the samples, *Erinnyis alope* (Drury, 1773) (Lepidoptera: Sphingidae) and *Trichogramma marandobai* Brun, Moraes & Soares, 1986 (Hymenoptera: Trichogrammatidae) were collected from cassava plantations, at Alagoas State. This is the first record of occurrence of *E. alope* in the State and its parasitism by *T. marandobai* in Brazil.

Key words: Alope Sphinx Moth, Euphorbiaceae, *Manihot esculenta*, *Trichogramma*

Registro de parasitoide de ovos de *Erinnyis alope* (Drury, 1773) (Lepidoptera: Sphingidae) em cultura de mandioca no Brasil

Resumo: Parasitóides do gênero *Trichogramma* (Hymenoptera: Trichogrammatidae) constituem um dos grupos de insetos mais estudados no mundo, por atuarem como agentes de controle biológico no estágio inicial de desenvolvimento da praga, eliminando-a antes que a injúria seja ocasionada. Assim, investigando a possibilidade de ocorrência de parasitismo, foram coletados ovos de *Erinnyis* sp. em visita técnica realizada em plantio de mandioca localizado na Fazenda Juçara em Murici, Alagoas. Estes foram levados ao Laboratório de Entomologia do Centro de Ciências Agrárias, da Universidade Federal de Alagoas (CECA, UFAL) em Rio Largo, AL para as observações. As lagartas obtidas dos ovos não parasitados foram criadas, até a emergência dos adultos. Os parasitoides que emergiram dos ovos parasitados foram colocados em microtubos plásticos em álcool a 70%. Ambos foram enviados à identificação ao Laboratório de Taxonomia, do Departamento de Entomologia e Acarologia da ESALQ, USP, Piracicaba, SP. Constatou-se tratar de *Erinnyis alope* (Drury, 1773) (Lepidoptera: Sphingidae) e *Trichogramma marandobai* Brun, Moraes & Soares, 1986 (Hymenoptera: Trichogrammatidae), em mandioca em Alagoas. Este é o primeiro registro da ocorrência de *E. alope* no estado e seu parasitismo por *T. marandobai* no Brasil.

Palavras chave: Mandarová, Euphorbiaceae, *Manihot esculenta*, *Trichogramma*

Introduction

Brazil is the second world's biggest producer of cassava with 26 million ton/year (CONAB, 2012). Cassava is produced by all Brazilian states, but most of the yield comes from the Northeast region, where, on average, 35% of the national yield is produced (IBGE, 2012). The crop can be attacked by several mites and insects during all plant phenological stages, belonging to the genus *Atta* (Hymenoptera: Formicidae), *Erinnyis* (Lepidoptera: Sphingidae), *Bemisia*, *Aleurotrachelus*, *Aleurothrixus*, *Trialeurodes*, *Aleurodicus* e *Tetraleurodes* (Hemiptera: Aleyrodidae), and *Vatiga* (Hemiptera: Tingidae) (Schmitt, 2002; Bellotti, 2002; Farias e Bellotti, 2006; Gomez et al., 2006; Silva et al., 2012) among the most frequent pests.

The family Sphingidae comprises around 1,300 species and 203 genera spread all over the world, except in Antartida and Greenland. In the Neotropical region, it is estimated about 400 species (DUARTE et al., 2012).

Two species of sphingids can occur in cassava crops. *Erinnyis ello* (L., 1758) is considered the main insect pest of the crop in several countries of Latin and Central America, where the insect exhibit a polyphagous habit eating more than 35 plant species, especially those belonging to Euphorbiaceae (Schmitt, 2002) and *Erinnyis alope* (DRURY, 1773) like papaya, rubber tree, cassava, and others, which occur in the Americas and Caribbean (CABI, 2002).

The occurrence of *E. alope* in Brazil was reported in the states of Amazonas (Mota e Andreazze, 2001), Rio Grande do Norte e Pernambuco (DUARTE-JÚNIOR; SCHLINDWEIN, 2005a, 2005b) e Paraná (SANTOS, 2012). In relation to the some host plants of *E. alope* in the country, Motta e Xavier-Filho (2005) reported *Jatropha* spp. ("pião-roxo", "pião-branco"); *Hevea* spp. and *Hevea brasiliensis* Muell. Arg. (rubber trees); *Manihot utilissima* Pohl. and *Manihot esculenta* Crantz (named "macaxeira", "mandioca" or "aipim" by local people) (all Euphorbiaceae); *Carica papaya* L. ("mamoieiro") (Caricaceae); *Allamanda* sp. ("dedal-de-dama") (Apocynaceae); *Gossypium herbaceum* L. (cotton plant) (Malvaceae). In Atlantic forest fragments in Pernambuco state, Duarte-Júnior e Schlindwein

(2005a) detected *E. alope*, where it was categorized as a rare species when considering its abundance. Information on the egg parasitism of *E. alope* is scarce (FARIAS; BELLOTTI, 1983).

Therefore, the aim of this study was investigated the occurrence of egg parasitoids collected during a technical visit at cassava plantations located at Fazenda Juçara, Murici county, Alagoas, Brazil.

Material and Methods

A technical visit was conducted in Fazenda Juçara, located in Murici, AL (9°18'18"S latitude, 35°56'30"W longitude, 88 m high), where there were cassava crops (600 m²; 30 m x 20 m), during November 2011. Collectors walked between planting lines, and observed if leaves of five-month-old plants contained insect eggs, which were frequent on adaxial leaf surface leaves were detached from plants and placed in plastic containers (32 cm x 24 cm x 11 cm) which were sent to the Laboratory of Entomology at the Centro de Ciências Agrárias, Universidade Federal de Alagoas (CECA, UFAL) in Rio Largo, AL.

Thereafter, leaf disks containing eggs were cut and the eggs were individualized in Petri dishes (8.5 cm x 1.5 cm) and maintained on 26°C ± 1°C, 70 ± 10% of relative humidity (R.H.). The eggs were daily observed until hatching-larvae or parasitoid emergence. Parasitism was previously evidenced by observing the dark color of eggs. Caterpillars were fed on cassava leaves, which were replaced daily until pupae and adults were obtained, which were killed and mounted. Percentage of parasitism was estimated by the number of parasitized eggs and the total number of eggs. Emerged parasitoids were placed inside plastic microtubes (1.5 mL), containing 70% alcohol, and sent together with the moths for identification to Laboratory of Taxonomy, at Department of Entomology and Acarology from Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba, SP, where they were kept and preserved in the Institution's museum.

Moths were identified by comparing the collected specimens with the ones from the

museum, while collected parasitoids were identified by molecular techniques (DNA extraction, PCR, purification and sequencing of the ITS2 region of rDNA) (VIEIRA, 2011).

Results and Discussion

Insects collected from cassava plantations at Alagoas state were identified as *Erinnyis alope* (Drury, 1773) (Lepidoptera: Sphingidae) and the parasitoid *Trichogramma marandobai* Brun, Moraes & Soares, 1986 (Hymenoptera: Trichogrammatidae). This is the first record of *E. alope* in Alagoas state and its association with *T. marandobai* in Brazil.

Species of *Trichogramma* are micro-hymenopteran egg parasitoids which usually parasitize lepidopterans. Some species have been employed in biological control programs in several regions of the world due to the efficiency and feasibility of mass-rearings (VIEIRA, 2011).

From a total of 187 *E. alope* collected eggs, five of them were parasitized (2.67%), from which 140 parasitoids were obtained, an average of 28 individuals per egg. Farias e Bellotti (1983) reported that 31% of *E. ello* (L., 1758) eggs were parasitized by *Trichogramma semifumatum* (Perkins, 1910) and *T. fasciatum* (Perkins, 1912) in Bahia state, from which an average of 18.7 parasitoids emerged per egg. In regard to *E. alope*, only 1% of the collected eggs were parasitized by *Telenomus* sp. (Hymenoptera: Platygasteridae), and there was no record of parasitism by *Trichogramma* spp.

Trichogramma marandobai was found for the first time associated with the Sphingidae *E. ello*, in Minas Gerais (Brun et al., 1986), and then, in Mato Grosso do Sul (OLIVEIRA et al., 2010), Amazonas, São Paulo state and Paraná (Vieira, 2011). The Sphingidae *E. ello* was dominant in regard to *E. alope*, fact that is in accordance with the data presented by Farias e Bellotti, 1983, which report the occurrence of only 4% of *E. alope* in surveys conducted in cassava in Bahia.

Despite the low level of infestation in cassava, *E. alope* can become an important pest of several crops, such as papaya, cotton plant, and rubber tree, among others (CABI, 2002; MOTTA; XAVIER-FILHO, 2005). Thus, surveys of

parasitoids of this Sphingidae with aim of suppressing its population are of great importance.

Conclusion

This is the first record of occurrence of *E. alope* on cassava in the Alagoas state and its parasitism by *T. marandobai* in Brazil.

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References

- BELLOTTI, A.C. Arthropod pests. In: **Cassava: Biology, production and utilization**. HILLOCKS, R.J.; THRESH, J.M.; BELLOTTI, A.C (Ed.). CAB International. Oxon, UK, 2002.p. 209-236.
- BRUN, P. G.; MORAES, G. W. G.; SOARES, L. A. *Trichogramma marandobai* sp.n. (Hymenoptera: Trichogrammatidae) parasitóide de *Erinnyis ello* (Lepidoptera: Sphingidae) desfolhador da mandioca. **Pesquisa Agropecuária Brasileira**, v.21, n.12, p. 1245-1248, 1986.
- CABI. *Erinnyis alope*. [Distribution map]. **Distribution Maps of Plant Pests**. Map 637. 2002. Disponível em: <<http://www.cabi.org/dmpp/?loadmodule=review&page=4049&reviewid=15493&site=164>>. Acesso em: 30 de agosto de 2013.
- CONAB. **Conjuntura sobre raiz, farinha e fécula de mandioca**. 2012. Disponível em: <<http://www.conab.gov.br/OlalaCMS/uploads/arqu>

ivos/12_06_27_09_20_06_mandioca_raiz_farinha_e_fecula_junho_2012.pdf>. Acesso em: 30 de agosto de 2013.

DUARTE, M. et al. Lepidoptera. In: RAFAEL, J. A.; MELO, G. A. R.; CARVALHO, C. J. B. de; CASARI, S. A; CONSTANTINO, R. (Ed.). **Insetos do Brasil: diversidade e taxonomia**. Ribeirão Preto, Holos, 2012. p. 625-682.

DUARTE-JÚNIOR, J. A.; SCHLINDWEIN, C. Riqueza, abundância e sazonalidade de Sphingidae (Lepidoptera) num fragmento de Mata Atlântica de Pernambuco, Brasil. **Revista Brasileira de Zoologia**, v. 22, n. 662-666, 2005a.

DUARTE-JÚNIOR, J. A.; SCHLINDWEIN, C. The highly seasonal hawkmoth fauna (Lepidoptera Sphingidae:) of the caatinga of northeast Brazil: a case study in the state of Rio Grande do Norte. **Journal of the Lepidopterists' Society**, v.59, n.4, p. 212-218, 2005b.

FARIAS, A. R. N.; BELLOTTI, A. C. Parasitismo de ovos de *Erinnyis ello* e *Erinnyis alope* em condições de campo. **Revista Brasileira de Mandioca**, v. 2, n. 45-50, 1983.

FARIAS, A. R. N.; BELLOTTI, A. C. Pragas e seu controle. In: SOUZA, L. da S.; FARIAS, A. R. N.; MATTOS, P. L. P. de; FUKUDA, W. M. G. (Ed.). **Aspectos socioeconômicos e agrônômicos da mandioca**. Cruz das Almas: Embrapa Mandioca e Fruticultura Tropical, 2006. Cap. 20, p. 591-671.

GOMEZ, S. A. et al. **Entomofauna associada à cultura da mandioca na região sul de Mato Grosso do Sul**. Boletim de Pesquisa e Desenvolvimento. Dourados, Embrapa Agropecuária Oeste, 27 p. 2006.

IBGE Indicadores IBGE: estatística da produção agrícola. 2012. Disponível em <http://www.ibge.gov.br/home/estatistica/indicador/es/agropecuaria/lspa/estProdAgr_201203.pdf>. Acesso em 31 de julho de 2013.

MOTTA, C. da S.; ANDREAZZE, R. Esfingofauna (Lepidoptera: Sphingidae) da Parque Nacional do

Jaú e arredores, Amazonas, Brasil. **Acta Amazonica**, v.31, n.4, p. 643-654, 2001.

MOTTA, C. da S.; XAVIER-FILHO, F. F. Esfingídeos (Lepidoptera, Sphingidae) do município de Beruri, Amazonas, Brasil. **Acta Amazonica**, v. 35, p. 452-457, 2005.

OLIVEIRA, H. N. de et al. Registro de espécies de *Trichogramma* (Hymenoptera: Trichogrammatidae) em ovos de *Erinnyis ello* Linnaeus (Lepidoptera: Sphingidae), em Mato Grosso do Sul. **Pesquisa Agropecuária Tropical**, v. 40, p. 378-379, 2010.

SANTOS, F. L. dos. **Riqueza, abundância e variação temporal de Saturniidae e Sphingidae (Lepidoptera, Bombycoidea) na localidade de Vossoroça, Tijucas do Sul, Paraná, Brasil**. 2012, 103p. Dissertação (Mestrado em Entomologia) – UFPR, Curitiba, 2012.

SCHMITT, A. T. Principais insetos praga da mandioca e seu controle. In: _____. **Cultura de tuberosas amiláceas Latino Americanas**. São Paulo: Fundação Cargill, 2002. Cap.16, p.350-369.

SILVA, A. de S.; KASSAB, S. O.; GAONA, J. C. Insetos-pragas, produtos e métodos de controle utilizados na cultura de mandioca em Ivinhema, Mato Grosso do Sul. **Revista Verde**, v. 7, p. 19-23, 2012.

VIEIRA, J. M. **Caracterização de espécies de *Trichogramma* Westwood (Hymenoptera: Trichogrammatidae), parasitoides de ovos de *Erinnyis ello* (L.) (Lepidoptera: Sphingidae)**. 2011, 67p. Dissertação (Mestrado em Entomologia) - ESALQ, USP, Piracicaba, 2011.

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