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COMMUNICATION

Natural enemies of *Coelomera lanio* (Coleoptera: Chrysomelidae) in the region of Viçosa, Minas Gerais, Brazil

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Abstract: *Coelomera lanio* (Coleoptera: Chrysomelidae) is the most important defoliator of *Cecropia* trees. Natural enemies of *C. lanio* collected in the region of Viçosa, State of Minas Gerais, Brazil were identified on field observations in a forest fragment and on laboratory analyses. Individuals of *C. lanio* were not found on *Cecropia pachystachya* trees colonized by *Azteca mülleri* (Hymenoptera: Formicidae). The majority of the egg masses of *C. lanio* collected in the field were found to be parasitised by a species of the family Eulophidae (Hymenoptera), while larvae of this pest were attacked by a parasitoid of the family Tachinidae (Diptera). Individuals of *Oplomus catena* (Heteroptera: Pentatomidae) were observed preying on *C. lanio* larvae. The fungus *Beauveria bassiana* was found growing on larvae, pupae and adults of *C. lanio* while the fungus *Metarhizium anisopliae* only affected pupae of this insect in laboratory conditions.

Key words: *Cecropia*, biological control, *Coelomera*, *Oplomus*, Eulophidae.

Coelomera lanio (Dalman) (Coleoptera: Chrysomelidae) belongs to a family with many known agricultural pests and is the most important defoliator of *Cecropia* spp. (Cecropiaceae) trees (Jolivet 1987). The genus *Coelomera* has 35 known species, but biological aspects are known for only about 20% of them (Jolivet 1989), including *C. lanio* (Silveira 1996). The literature includes reports of two species of natural enemies of *C. lanio* (Parker *et al*. 1951, Jolivet 1987).

We aimed to identify natural enemies of *C. lanio* through periodic visits to forest fragments in the Universidade Federal de Viçosa campus, in Viçosa, State of Minas Gerais, Brazil, during 1994 and 1995.

Egg masses and larvae of *C. lanio* were brought to the laboratory, where natural enemies obtained from this insect were reared. Predators were observed feeding on larvae of this beetle in the field. In addition, larvae were reared in untreated soil (collected under *Cecropia* trees) to obtain pupae. All laboratory work was done under photophase, temperature and relative humidity of 12 hr, 24.1 ± 0.1ºC and 67.7 ± 0.6%, respectively.

Adults of *Oplomus catena* (Drury) (Heteroptera: Pentatomidae) were found feeding on larvae of *C. lanio* in the field, the first report of this association. Under laboratory conditions, *O. catena* fed on larvae of all instars but not on adults of *C. lanio*. Grazia and Hildebrand (1987) found *O. catena* feeding on larvae of *Actinote pellenea* (Lepidoptera: Acraeidae). This suggests that *O. catena* is a generalist predator such as *Podisus nigrispinus* (Dallas) (Zanuncio *et al*. 2001), *Supputius cincticeps* (Stal) (Zanuncio *et al*. 1996/97), *Brontocoris tabidus* (Signoret) and *Podisus rostralis* Stal (Molina-Rugama *et al*. 1998) (Heteroptera: Pentatomidae).

Oplomus catena first instar nymphs do not show predatory habits, as reported for other species of this family (Zanuncio *et al*. 1994), although they prey on larvae of *C. lanio* during their other four instars. Other *Oplomus* species are predators of several agricultural pests, including some chrysomelids, during egg, larva and adult stages (Drummond *et al*. 1987, Romero-Napoles 1990). For this reason, additional studies on *O. catena* as a possible biological control agent of *C. lanio* are necessary.

Adults of *C. lanio* were not found on *Cecropia pachystachya* Trec. trees harboring the ant *Azteca mülleri* Emery (Hymenoptera: Formicidae). This ant is known to protect *Cecropia* spp. trees against herbivores (Decker 1936). Besides feeding on Mullerian bodies, this ant also nests in naturally hollow stems of these trees. The competition for territory and for feeding on Mullerian bodies of *Cecropia* spp. trees between *C. lanio* and *A. mülleri* was expected because this was reported by Andrade (1984), Jolivet (1987) and Rocha and Bergalho (1992) for *Coelomera ruficornis* Baly.

Fourteen egg masses of *C. lanio* collected in the field showed 93.0% parasitism by microhymenoptera (Eulophidae). A total of 81.0 ± 23.2 egg parasites were found for each *C. lanio* egg mass which had 129.2 ± 2.4 eggs with five to 277 wasps emerging from each egg mass. Although this parasitoid species was not identified, Parker *et al*. (1951) reported parasitism of *C. lanio* eggs by a *Tetrasticus* species in the region of Viçosa. Recently laid eggs of *C. lanio* exposed individually in the laboratory to this parasitoid resulted in an emergence of up to two wasps per egg of this beetle. Based on the viability and number of eggs per egg-mass of *C. lanio* reported by Silveira (1996), parasitism of this bug by eulophid species should reach 46.4% in field conditions. This value is higher than that found for the parasitism rate of a *Tetrastichus* species on eggs of the chrysomelids *Xanthogaleruca luteola* (Müller) and *Leptinotarsa decemlineata* (Say), which was 44.9% and varied from 15.5 to 31.1%, respectively (Williams 1987, Hamerski and Hall 1988). Other reports of parasitism by species of Eulophidae on eggs of chrysomelids of agricultural importance were made by Logan *et al*. (1976), Hall and Johnson (1983) and Dreistadt and Dahlsten (1991) and reviewed by Selman (1994).

Larvae of *C. lanio* collected in the field and reared in the laboratory showed parasitism by a Tachinidae (Diptera) fly species that pupated inside the body of the host and emerged as adults. Another tachinid, *Lydellothelaira collaris* Ths., was reported by Parker *et al*. (1951) in *C. lanio*, in Itaquaquecetuba, State of São Paulo, Brazil. The importance of this group of flies for biological control of Chrysomelidae species was also reported by Dolgin (1978), Tamaki *et al*. (1983), Loughran and Ragsdale (1986) and Charlet (1992).

Larvae, pupae and adults of *C. lanio* in contact with soil collected under *Cecropia* spp. trees were infected by *Beauveria bassiana* (Bals.) Vuill. (mitosporic fungi). Since larvae of *C. lanio* without contact with such soil were also infected by *B. bassiana*, it is possible that transmission of this fungus occurs through *Cecropia* leaves. On the other hand, *Metarhizium anisopliae* (Metsch.) (mitosporic fungi) was only found associated with last instar larvae and pupae of *C. lanio* that had contact with soil from under *Cecropia* trees. The natural occurrence of fungi such as *B. bassiana, M. anisopliae* and other species in the soil was reported by Tigano-Milani *et al*. (1993) in different regions of Brazil. The occurrence of these fungi as natural enemies of Chrysomelidae species of agricultural importance was also found by Anderson *et al*. (1988), Anjos *et al*. (1990) and Fargues *et al*. (1994), but this is the first report of these species associated to *C. lanio*.

The six natural enemy species of *C. lanio* found in the region of Viçosa shows that they should be evaluated for biological control programs against this pest. Also the relative importance of the various natural enemies of *C. lanio* should be better studied. The eulophid parasitoid and the pentatomid predator *O. catena* are apparently the most promising agents for programs of biological control of *C. lanio*

due to their capacity of attacking egg masses and larvae, respectively, of this beetle.

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RESUMEN

Coelomera lanio (Coleoptera: Chrysomelidae) es considerada la plaga defoliadora más importante de los árboles del género *Cecropia* (Cecropiaceae). Para identificar los enemigos naturales de *C. lanio* en la región de Viçosa, Minas Gerais, Brasil, se hicieron observaciones en el laboratorio (24.1 ± 0.1ºC, humedad relativa de 67.7 ± 0.6% y fotoperíodo de 12 hr) y en fragmentos forestales locales. Ninguna planta de *C. pachystachya* colonizada por *Azteca mülleri* (Hymenoptera: Formicidae) presentaba larvas o adultos de este coleóptero. Posturas de *C. lanio*, procedentes del campo, presentaron parasitismo por micro-himenópteros de la familia Eulophidae (Hymenoptera), con 81.0 ± 23.2 parasitoides por puesta de 129.2 ± 2.45 huevos de ese coleóptero. De la misma forma, las larvas de *C. lanio* recolectadas en el campo estaban parasitadas por larvas de mosca (Tachinidae, Diptera), que puparon dentro del cuerpo de las larvas de *C. lanio*. En el campo se vieron adultos y ninfas de *Oplomus catena* (Heteroptera: Pentatomidae) depredando larvas de *C. lanio*. En laboratorio, larvas, pupas y adultos de *C. lanio* fueron afectados por el hongo *Beauveria bassiana.* El hongo *Metarhizium anisopliae* solo se halló en pupas.

REFERENCES

Anderson, T.E., P. Roberts & R.S. Soper. 1988. Use of *Beauveria bassiana* for suppression of Colorado potato beetle populations in New York State (Coleoptera: Chrysomelidae). Environ. Entomol. 17: 140-145.

Andrade, J.C. 1984. Observações preliminares sobre a eco-etologia de quatro coleópteros (Chrysomelidae, Tenebrionidae, Curculionidae) que dependem da embaúba (*Cecropia lyratiloba* var. *nana* – Cecropiaceae), na restinga do Recreio dos Bandeirantes, Rio de Janeiro. Rev. Bras. Entomol. 28: 99-108.

Anjos, N., E. Berti Filho & S.B. Alves. 1990. Ocorrência de *Beauveria* e *Metarhizium* em besouro amarelo dos eucaliptos. Rev. Agri. 65: 279-280.

Charlet, L.D. 1992. Seasonal abundance and parasitism of the sunflower beetle (Coleoptera: Chrysomelidae) on cultivated sunflower in the Northern Great plains. J. Econ. Entomol. 85: 766-771.

Decker, J.S. 1936. Aspectos biológicos da flora brasileira. Casa, São Leopoldo, Rio Grande do Sul, Brazil. 640 p.

Dolgin, M.M. 1978. Tachinid flies (Diptera, Tachinidae), parasites of leaf beetles Chrysomelidae in Altai. Zool. Zh. 57: 1445-1446.

Dreistadt, S.H. & D.L. Dahlsten. 1991. Establishment and overwintering of *Tetrastichus gallerucae* (Hymenoptera: Eulophidae), an egg parasitoid of the elm leaf beetle (Coleoptera: Chrysomelidae) in Northern California. Environ. Entomol. 20: 1711-1719.

Drummond, F.A., R.A. Casagrande & E. Groden. 1987. Biology of *Oplomus dichrous* (Heteroptera: Pentatomidae) and its potential to control Colorado potato beetle (Coleoptera: Chrysomelidae). Environ. Entomol. 16: 633-638.

Fargues, J., J.C. Delmas & R.A. Lebrum. 1994. Leaf consumption by larvae of the Colorado potato beetle (Coleoptera: Chrysomelidae) infected with the entomopathogen, *Beauveria bassiana*. J. Econ. Entomol. 87: 67-71.

Grazia, J. & R. Hildebrand. 1987. Hemípteros predadores de Insetos, p. 21-35. *In* 1º Encontro Sul-Brasileiro de Controle Biológico de Pragas. Porto Alegre, Rio Grande do Sul, Brasil.

Hall, R.W. & N.F. Johnson. 1983. Recovery of *Tetrastichus gallerucae* (Hymenoptera: Eulophidae), an introduced egg parasitoid of the elm leaf beetle (*Pyrrhalta luteola*) (Coleoptera: Chrysomelidae). J. Kans. Entomol. Soc. 56: 297-298.

Hamerski, M.R. & R.W. Hall. 1988. Laboratory rearing of *Tetrastichus gallerucae* (Hymenoptera: Eulophidae), an egg parasitoid of the elm leaf beetle (Coleoptera: Chrysomelidae). J. Econ. Entomol. 81:1503-1505.

Jolivet, P. 1987. Remarques sur la biocénose des *Cecropia* (Cecropiaceae). Biologie des *Coelomera* Chevrolat avec la description d'une nouvelle espèce du Brésil

(Coleoptera: Chrysomelidae: Galerucinae). Bull. Soc. Linn. Lyon. 56: 255-276.

Jolivet, P. 1989. The Chrysomelidae of *Cecropia* (Cecropiaceae): a strange cohabitation. Entomography 6: 391-395.

Logan, P.A., F.W. Stehr & R.J. Sauer. 1976. The subcolonization and buildup of *Tetrastichus julis* (Hymenoptera: Eulophidae) a larval parasitoid of the cereal leaf beetle (Coleoptera: Chrysomelidae) in the lower peninsula of Michigan. Great Lakes Entomol. 9: 75-78.

Loughran, J.C. & D.W. Ragsdale. 1986. *Medina* n. sp. (Diptera: Tachinidae): A new parasitoid of the bean leaf beetle. *Cerotoma trifurcata* (Coleoptera: Chrysomelidae). J. Kans. Entomol. Soc. 59: 468-473.

Molina-Rugama, A.J., J.C. Zanuncio, T.C. Zanuncio & M.L.R. Oliveira. 1998. Reproductive strategy of *Podisus rostralis* (Stal) (Heteroptera: Pentatomidae) females under different feeding intervals. Biocontrol Sci. Tech. 8: 583-588.

Parker, H.L., P.A. Berry & A.S. Guido. 1951. Host-parasite and parasite-host list of insects reared in the South American parasite laboratory during the period 1940-1946. Rev. de La As. de Ing. Agron. 92: 15-112.

Rocha, C.F.D. & H.G. Bergalho. 1992. Bigger ant colonies reduce herbivory and herbivore residence time on leaves of an ant-plant: *Azteca mülleri* vs. *Coelomera ruficornis* on *Cecropia pachystachya*. Oecologia 91: 249-252.

Romero-Napoles, J. 1990. Morfología y biología de *Ogdoecosta biannularis* (Coleoptera: Chrysomelidae) en su huésped silvestre *Ipomea murucoides* (Convolvulaceae) en el estado de Morelos, México. Folia Entomol. Mex. 78: 85-93.

Selman, B.J. 1994. Eggs and oviposition in Chrysomelidae beetles, p. 69-74. *In* P.H. Jolivet, M.L. Cox & E. Petitpierre (eds.). Novel aspects of the biology of Chrysomelidae. Kluwer, Dordrecht, Holland.

Silveira, R.D. 1996. Biologia de *Coelomera lanio* (Dalman) (Coleoptera: Chrysomelidae: Galerucinae). M.S. Tese, Universidade Federal de Viçosa, Viçosa, Brasil. 80 p.

Tamaki, G., R.L. Chauvin & A.K. Jr. Burditt. 1983. Laboratory evaluation of *Doryphorophaga doryphorae* (Diptera: Tachinidae), a parasite of the Colorado potato beetle (Coleoptera: Chrysomelidae). Environ. Entomol. 12: 390-392.

Tigano-Milani, M.S., M.R. Faria, I. Martins & R.E. Lecuona. 1993. Ocorrência natural de *Beauveria bassiana* (Bals.) Vuill., *Metarhizium anisopliae* (Metsch.) Sorok. e *Paecilomyces* sp. em solos de diferentes regiões do Brasil. An. Soc. Entomol. Brasil 22: 391-393.

Williams, C.E. 1987. Exploitation of eggs of the Colorado potato beetle *Leptinotarsa decemlineata* (Coleoptera: Chrysomelidae), by the exotic egg parasitoid *Edvum puttleri* (Hymenoptera: Eulophidae) in egg plant. Great Lakes Entomol. 20: 181-186.

Zanuncio, J.C., J.B. Alves, T.V. Zanuncio & J.F. Garcia. 1994. Hemipterous predators of eucalypt defoliator caterpillars. Forest Ecol. Manage. 65: 65-73.

Zanuncio, J.C., J.L.D. Saavedra, T.V. Zanuncio & G.P. Santos. 1996/97. Desarrollo y reproducción de *Supputius cincticeps* (Heteroptera: Pentatomidae) en dieta artificial por dos generaciones. Rev. Biol. Trop. 44/45: 247-251.

Zanuncio, J.C., A.J. Molina-Rugama, J.E. Serrão & D. Pratissoli. 2001. Nymphal development and reproduction of *Podisus nigrispinus* (Heteroptera: Pentatomidae) fed with combinations of *Tenebrio molitor* (Coleoptera: Tenebrionidae) pupae and *Musca domestica* (Diptera: Muscidae) larvae. Bio. Sci. Technol. 11: 331-337.