



Special Section on Biological Control

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Biological control is regarded as an important ecosystem service that can significantly contribute to sustainable agriculture. Losey and Vaughan (2006) estimated at \$5.9 billion (2018 dollars) the economic value for the pest control provided by natural enemies in the USA alone. In recent years, scientists in the area of biocontrol in Latin America have been seeing a trend in the agricultural sector towards favoring biological control, which has motivated the edition of this special section in *Neotropical Entomology*. This special section originated from a call for papers, which was part of the Symposium on Biological Control, held in August 2019 in the city of Londrina, Brazil.

A five-member expert committee selected the articles that make up this special section, after each of them had been independently peer-reviewed. This set of articles is only a sample of the range of ongoing research in Latin America, reflecting the favorable environment for this technology in the region's agricultural sector, which is leaning towards more sustainable agriculture. Pest problems result from the ecological oversimplicity of modern agricultural fields, planted in large monocultures and receiving frequent applications of broad-spectrum insecticides, which contribute to the outbreaks of herbivorous insect-pests typical of these systems (Pimentel 1961, Van Emden & Williams 1974). In turn, less hostile environments for natural enemies, leading to species-rich communities of predators, parasitoids and insect pathogens, strengthen biological control.

To open this special section we have included a Forum article by A. Peñalver-Cruz *et al* 2019, discussing how stable and diverse agricultural fields provide farmers with ecological services, such as biological control. They present the status of the research on habitat manipulation in South America through the planning of diversified agricultural fields and the application of different agricultural practices that influence pest management through the conservation of natural enemies.

In the following set of scientific articles, one proposes the implementation of conservation biological control of disease

vector mosquitoes by assessing the development and the predatory skills of *Belostoma anurum* (Herrich-Schäffer, 1948) (Hemiptera: Belostomatidae), an aquatic predator widely distributed in Neotropical region (Valbom *et al* 2019). Predation is also the subject of two other articles, one dealing with insecticide-resistant populations of a lady beetle (Lira *et al* 2019), and the other focusing on parasitism-mediated interactions between the ring-legged earwig and the sugarcane borer larvae (Nunes *et al* 2019), and the third identify molecular markers to recognize *Diaphorina citri* Kuwayama, 1908 (Hemiptera: Liviidae) DNA in gut content of predators (Nanini *et al*). Five other articles dedicate to propose improved techniques for rearing and field releasing parasitoids, aiming at greater efficiency in biological control programs (Castellanos *et al* 2019, Gonzalez-Cabrera *et al* 2019, Krüger *et al* 2019, Pereira *et al* 2019, Queiroz *et al* 2019). One last article analyzes the taxonomic status and reports the variation in population density of the parasitoid *Aphidius colemani* (Dalman, 1820) (Braconidae: Aphidiinae), introduced in Southern Brazil in the 1960s to control wheat pest aphids (Santos *et al*).

References

- Castellanos NL, Bueno AF, Haddi K, Silveira EC, Rodrigues HS, Hirose E, Smagghe G, Oliveira EE (2019) The fitness and economic benefits of rearing the parasitoid *Telenomus podisi* under fluctuating temperature regime. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00717-1>
- Gonzalez-Cabrera J, Moreno-Carrillo G, Sanchez-Gonzalez JA, Mendoza-Ceballos MY, Arredondo-Bernal HC (2019). Single and combined release of *Trichopria drosophilae* (Hymenoptera: Diapriidae) to control *Drosophila suzukii* (Diptera: Drosophilidae). *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00707-3>
- Krüger AP, Scheunemann T, Vieira JVA, Morais MC, Bernardi D, Nava DE, Garcia FRM (2019) Effects of extrinsic, intraspecific competition and host deprivation on the biology of *Trichopria anastrephae* (Hymenoptera: Diapriidae) reared on *Drosophila suzukii* (Diptera: Drosophilidae). *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00705-5>

- Lira R, Nascimento DV, Torres JB, Siqueira, HAA (2019) Predation on diamondback moth larvae and aphid by resistant and susceptible lady beetle, *Eriopis connexa*. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00702-8>
- Losey JE, Vaughan M (2006) The economic value of ecological services provided by insects. *BioScience* 56:311–323
- Nunes GS, Ramalho DG, dos Santos NA, Truzzi CC, Vieira NF, Cardoso CP, De Bortoli SA (2019) Parasitism-mediated interactions between the ring-legged earwig and sugarcane borer larvae. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00730-4>
- Peñalver-Cruz A, Alvarez-Baca JK, Alfaro-Tapia A, Gontijo, L, Lavandero, B (2019) Manipulation of agricultural habitats to improve conservation biological control in South America. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00725-1>
- Pereira FP, Reigada C, Diniz AJF, Parra JRP (2019) Potential of two Trichogrammatidae species for *Helicoverpa armigera* control. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00730-4>
- Pimentel D (1961) Species diversity and insect population outbreaks. *Ann Entomol Soc Am* 54:76–86
- Queiroz AP, Favetti BM, Hayashida R, Grande MLM, Neiva MM, Panizzi AR, Bueno AF (2019). Effect of the ages of parasitoid and host eggs on *Telenomus podisi* (Hymenoptera: Platygasteridae) parasitism. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00724-2>
- Valbon WR, Haddi, K Gutiérrez Y, Cruz FM, Azevedo KEX, Perez Campos JS, Salero AL, Oliveira EE (2019) Life history traits and predatory performance of *Belostoma anurum* (Hemiptera: Belostomatidae), a biological control agent of disease vector mosquitoes. *Neotrop Entomol* <https://doi.org/10.1007/s13744-019-00710-8>
- Van Emden HF, Williams GF (1974) Insect stability and diversity in agroecosystems. *Annu Rev Entomol* 19:455–475

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