



Ciência Rural

ISSN: 0103-8478

cienciarural@mail.ufsm.br

Universidade Federal de Santa Maria
Brasil

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Ciência Rural, vol. 45, núm. 12, diciembre, 2015, pp. 2121-2124
Universidade Federal de Santa Maria
Santa Maria, Brasil

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Incidence of *Mythimna sequax* parasitized in wheat crop

Incidência de parasitismo de *Mythimna sequax* em lavoura de trigo

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– NOTE –

ABSTRACT

This study investigated the natural parasitism of *Mythimna sequax* Franclemont, 1951, in wheat during the crop season of 2008. In total, 237 larvae were captured, of which 10.12% were parasitized. The Tachinidae species *Winthemia trinitatis* (Thompson, 1963), *Winthemia tricolor* (Wulp, 1890), *Lespesia aletiae* (Riley, 1879), and *Lespesia archippivora* Beneway, 1963 are reported for the first time parasitizing the wheat armyworm in Brazil. In addition, two other genus of parasitoids were identified, one Tachinidae *Peleteria* Robineau-Desvoidy, 1830 and one Ichneumonidae *Ophion* (Fabricius, 1798). This study reported for the first time four Tachinidae species parasitizing *W. sequax*, and further studies are needed to promote the conservation of these parasitoids in agroecosystem and development biological control programs for management of the wheat armyworm.

Key words: natural biological control, wheat pests, *Tachinidae*, parasitoids.

RESUMO

Este estudo investigou o parasitismo natural de *Mythimna sequax* Franclemont, 1951, em uma lavoura de trigo, durante a safra 2008. No total, foram capturadas 237 lagartas, registrando-se um parasitismo de 10,12%. As espécies de taquinídeos *Winthemia trinitatis* (Thompson, 1963), *Winthemia tricolor* (Wulp, 1890), *Lespesia aletiae* (Riley, 1879) e *Lespesia archippivora* (Beneway, 1963) são registrados pela primeira vez parasitando a lagarta-do-trigo no Brasil. Adicionalmente, dois gêneros de parasitoides foram identificados, um taquinídeo *Peleteria* sp. (Robineau-Desvoidy, 1830) e um ichneumonídeo *Ophion* sp. (Fabricius, 1798). Este estudo registra pela primeira vez a ocorrência de quatro espécies de parasitoides em *M. sequax* no Brasil, e estudos adicionais são necessários para promover a conservação desses parasitoides no agroecossistema, assim como o desenvolvimento de programas de controle biológico para o manejo da lagarta-do-trigo.

Palavras-chave: controle biológico natural, pragas do trigo, *Tachinidae*, parasitoides.

Endoparasitoids are one of the main potential natural enemies of *Mythimna* [*Pseudaletia*] spp. (GASSEN, 1986) that are able to regulate the pest's seasonal abundance (LAUB & LUNA, 1992). Development of successful biological control programs requires the knowledge of potential natural enemies that regulate pest populations. In Brazil, some studies have been developed in laboratory conditions (DOETZER & FOERSTER, 1998; YAMAMOTO et al., 1998; FOERSTER et al., 1999), but scarce information is already available about natural parasitism in agroecosystems. Thus, to assist in the development of better biological programs, it was investigated the occurrence of natural parasitism of *Mythimna sequax* Franclemont, 1951, in a wheat crop.

The study was carried out in a commercial wheat field during the 2008 crop season. The field is located in Ibiporã (23°17'14" S, 51°05'26" W), in the northeastern region of the State of Paraná, Brazil. Wheat armyworm occurs annually in this field, thus, allowing this study to be completed.

The larvae were captured using a trap (a floorboard 0.10m wide and 0.80m long) that was placed in the row spacing of the wheat crop. A total of 40 traps were distributed equidistantly (at 10m distance) in the wheat field. Assessments

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were performed every seven days, starting from the emergence (the first visible leaf) (May, 25th) until the grain maturation stage (September, 08th). Wheat armyworm larvae are nocturnal pests (SPECHT & CORSEUIL, 2002) that during the day remain probably beneath mulch or soil clods of soil, sheltered from the sunlight. Therefore, collection of *M. sequax* larvae was carried out daily, at around 14hs, by raising the trap and examining carefully the soil surface for larvae sheltered among the clods of soil. Wheat armyworm larvae were identified by morphological characteristics.

The larvae were counted and placed in a Petri dish (10cm diameter) and at the laboratory, the specimens were kept under controlled temperature (25±2°C), humidity (60±20%), and photophase (12h). All specimens were reared on an artificial diet (GREENE et al., 1976) offered *ad libitum* until the pre pupa stage or parasitoid emergence. The larvae were monitored daily to verify natural death or parasitoid emergence. During the study was report that 10 larvae dead by microorganism (virus and bacteria). All parasitoids were kept in 70% alcohol and subsequently identified using a stereoscopic microscope. This material has been deposited in the entomological collection of Universidade Federal de Santa Maria.

During the crop season, all of the collected specimens of *M. sequax* were found in the reproductive stage, between the milky and soft grain stage. In total, 237 larvae were captured, of which 10.12% (n=24 specimens) were parasitized, mostly by parasitoids from *Tachinidae* family (Table 1). Among larvae, they were represented in majority (n=220 specimens) by larvae between

fourth and six instar. In total, four species of parasitoids were identified, and two additional genera were reported, a tachinid (most abundant) and an ichneumonid (Table 1).

In the present study, species of the genus *Winthemia* (Robineau-Desvoidy, 1830) were the most abundant (Table 1). Similar to the observation in this study, FOERSTER et al. (2001) reported an average of 10% of parasitism of *M. sequax* in wheat fields in southern Paraná state. However, unlike the present study, the main parasitoids were hymenopterous species, and only two *Tachinidae* species, *Peleteria robusta* (Wiedman, 1830) and *Patelloa similis* (Townsend, 1927) were detected. The most abundance of *Tachinidae* in the present investigation can be explained by the larval length (>1.5cm) of wheat armyworm captured. So, it was not possible to measure the parasitism in small larvae, and probably the parasitism rate could be different. For example, FOERSTER et al. (2001) reported the wasp *Campoletis flavicincta* (Ashmead, 1890) parasitizing *M. sequax*, which act in small larvae (<1.5cm) (DEQUECH, et al., 2014). In field, many factors can influence the parasitism rate in wheat armyworm; in some studies carried out in agricultural fields in USA, the level of natural parasitism on *Mythimna* spp. varied between 2.4% (MARINO & LANDIS, 1996) and 38% (MENALLED et al., 2003), and this differences can occur due climatic factors, local landscape and methodology.

The importance of *Winthemia trinitatis* (Thompson, 1963) has already been recently reported in Brazilian maize fields parasitizing *Spodoptera frugiperda* (JE Smith, 1797) (BORTOLOTTI et al., 2014). It indicates that

Table 1 - Parasitoids emerged from *Mythimna sequax* captured in wheat crop. Ibiporã, PR, crop season of 2008.

| Specie | Number | % | Stage of emergence |
|-----------------------------------|--------|--------|---------------------------------|
| <i>Diptera: Tachinidae</i> | - | - | - |
| <i>Winthemia trinitatis</i> | 8 | 33.33 | pupal |
| <i>Winthemia tricolor</i> | 8 | 33.33 | pupal |
| <i>Lespesia archippivora</i> | 2 | 8.33 | larval (6 th instar) |
| <i>Lespesia aletiae</i> | 2 | 8.33 | larval (6 th instar) |
| <i>Peleteria</i> sp. | 3 | 12.50 | pre-pupal |
| <i>Hymenoptera: Ichneumonidae</i> | - | - | - |
| <i>Ophion</i> sp. | 1 | 4.18 | larval (5 th instar) |
| Total | 24 | 100.00 | - |

this parasitoid is an important natural enemy of armyworm pests, and additional studies will elucidate the biological parameters of this parasitoid and the potential for its augmentative release in crop fields.

According to SABROSKY (1980), species from the genus *Lespesia* Robineau-Desvoidy, 1863 in the Western Hemisphere are among the largest and most important parasitoids within *Tachinidae* family, and recently they have been reported as important parasitoids in the Neotropical region. For example, the species *L. archippivora* has often been recorded in the fall armyworm *S. frugiperda* (DEQUECH et al., 2004; DELFÍN-GONZÁLEZ, 2007). On the other hand, the species *L. aletiae* has a limited distribution, although it has been recorded parasitizing *Mythimna unipuncta* (Haworth, 1809) in the United States (LAUB & LUNA, 1992). In Brazil, BORTOLOTTI et al. (2014) recently observed both parasitoids in maize fields parasitizing *S. frugiperda*. However, this is the first report of their occurrence in wheat armyworm.

In summary, this is the first report of the natural occurrence of *W. trinitatis*, *W. tricolor*, *L. aletiae*, and *L. archippivora* parasitizing wheat armyworm in Brazil. These results warrant further similar studies of Brazilian agroecosystems, in order to increase knowledge about the potential parasitoids of wheat armyworm, as well as the possibilities in the development of biological control programs against this important pest of many crop grasses.

ACKNOWLEDGMENTS

The authors are grateful to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) and to the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for providing the scholarships.

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