Bol. San. Veg. Plagas, 35: 423-428, 2009

A natural refuge for an Anobiidae species (*Tricorynus sp*) in persistent pods of *Acacia caven* (Mol.) in Uruguay

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The persistent pods of *Acacia caven* provide a refuge for a variety of insect species. Unfavourable climatic conditions may induce the semi-dehiscence of these pods, providing a favourable condition for bruchid beetles, which normally attack the seeds after they fall to the ground or after they pass through the gut of cattle. This study has quantified the populations of *Tricorynus* sp (Anobiidae) larvae and adults in the persistent pods of *A. caven* and compared them with the bruchid population. Each dark brown pod collected in Uruguay during the spring (November) of 2005 was opened to count the number of seeds attacked by bruchid beetles. Out of 45 pods collected, 34 were attacked by *Tricorynus* sp. In 30 pods, these xylophagous coleoptera were found living in sympatry with the bruchidae *Pseudopachymeria spinipes* and *Stator furcatus*. Per pod, between 1 and 10 seeds with bruchidae were parasitized by *Monoksa dorsiplana* (Pteromalidae) and *Horismenus* spp (Eulophidae) (51.55%). This was the first time that the successful development of an Anobiidae species, *Tricorynus sp,* had been observed on the woody walls of the ripe persistent pods of *A. caven,* living in sympatry with two bruchidae species of the seeds.

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Key words: Leguminous seeds, biodiversity of insects, sympatry.

INTRODUCTION

Acacia caven (Mol.) (Fabaceae, Mimosoideae) is a small nitrogen-fixing leguminous tree characteristic of arid and semi-arid woodlands of southern South America. It is usually found in the continental climate of the Grand Chaco region of northern Argentina, central Paraguay and southern Bolivia, as well as in the Mediterranean-type climate zone of Chile, a few parts of southern Brazil and part of Uruguay (ARONSON and OVALLE, 1989). *A. caven* is colloquially known as "espino" or "espinillo", and is a prominent woody invader in over-grazed cow pastures or abandoned fields.

It flowers in the spring before the appearance of the leaves, and may produce several hundred small golden yellow inflorescences. An inflorescence may initiate several pods, but only one reaches maturity (occasionally two to five) (TORRES *et al.*, 2002).

The pods ripen in autumn, and the majority of indehiscent pods fall to the ground, but some remain on the trees for several months (MUÑOZ *et al.*, 1993).

The persistent pods of *A. caven* provide a refuge for a variety of insect species, including two bruchid beetles, *Pseudopachymeria spinipes* (Erickson) and *Stator furcatus* (Johnson) (ROJAS-ROUSSE, 2006). Unfavourable climatic conditions (rainy season

during winter and spring) may induce the semi-dehiscence of these pods, providing a favourable condition for the bruchidae *S. furcatus* which normally attack the seeds after they fall to the ground or after they pass through the gut of cattle (JOHNSON, 1981).

The bruchid eggs and/or larvae are parasitized by hymenopterous parasitoids: one oophagous trichogrammatid parasitoid, *Uscana espinae* group senex (Pintureau and Gerding), and two larval-pupae gregarious parasitoids, *Monoksa dorsiplana* Boucek (Pteromalidae) and *Horismenus* spp (Eulophidae) (ROJAS-ROUSSE, 2006, 2007).

In 2005, the persistent pods collected after a rainy spring were found to contain a species of Anobiidae, *Tricorynus sp*. The xylophagous feeding behaviour of the larvae enabled them to develop in the woody walls of the pods. However, among the species of Tricoryninae known in South America, few of them are economically significant (WHITE, 1974). One of them, *Tricorynus herbarius* (Gorham) (Mexican book beetle), in addition to damaging books, feeds on a wide variety of organic materials, including leather goods, upholstered furniture, wood, seeds of various sorts, and spices (WHITE, 1974; SILVA *et al.*, 2004). Another species, *T. tabaci* (Guèrin), feeds on tobacco and tobacco seeds, and on various dry seeds, herbs, and assorted plant material (WHITE, 1974).

This study quantified the populations of *Tricorynus* sp larvae and adults in the persistent pods of *A. caven* and compared them with the bruchid population. Previous studies (ROJAS-ROUSSE, 2006) have confirmed the parasitism of the bruchid population by the pteromalidae *M. dorsiplana* Boucek and the eulophidae *Horismenus* spp.

MATERIALS AND METHODS

Biodiversity of insects living in persistent pods of *A. caven*

Ripe pods (N=45) of *A. caven* persisting on trees were collected in Uruguay (Prado Park, Montevideo) during the spring (November) of 2005.

Each dark brown pod was opened to count the number of seeds attacked by bruchid beetles, detected by their round emergence holes. Smaller round holes on some seeds were the exit holes of parasitoids developing on the bruchid larvae (ROJAS-ROUSSE, 2006).

The two valves of each pod are thick-walled with a cork-like mesocarp. The adults and larvae of Anobiidae were found living inside the mesocarp. The adults were counted and taken out while the larvae were left in the mesocarp until they reached adulthood.

The two valves and the seeds of the same pod were placed in a box covered with a thin cloth, and retained to count any further emergent insects. Boxes were stored in a climatic chamber with a 12h/12h photoperiod and a 30°/20°C thermoperiod.

RESULTS

Intensity of attack by the Anobiidae *Tricorynus* sp

Boris Büche (Berlin, Germany) identified the adults and larvae with xylophagous feeding behaviour as *Tricorynus* sp (Anobiidae). *Tricorynus* sp adults and larvae were found in the mesocarp of pods partially or completely destroyed by their feeding behaviour. Out of 45 pods collected, 34 (75.55%: 34/45) were attacked by *Tricorynus* sp. In 30 pods, these xylophagous coleoptera were found living in sympatry with the bruchidae *P. spinipes* and *S. furcatus* (66.66%: 30/45).

When all the mesocarp of the valve had been eaten by *Tricorynus* sp larvae, they were found in the middle of the mass of faeces, which looked like small hard brown balls. These balls of faeces covered the entire body of the larvae, sticking to their setae. Pupation occurred in a cocoon composed of balls of faeces mixed with fragments of the mesocarp, stuck together by larval mouth secretions. Generally, the cocoon was stuck to the wall of the epicarp of the valve. However, pupation occasionally occurred inside a seed after emergence of the bruchid adult, the bruchid larva having consumed most of

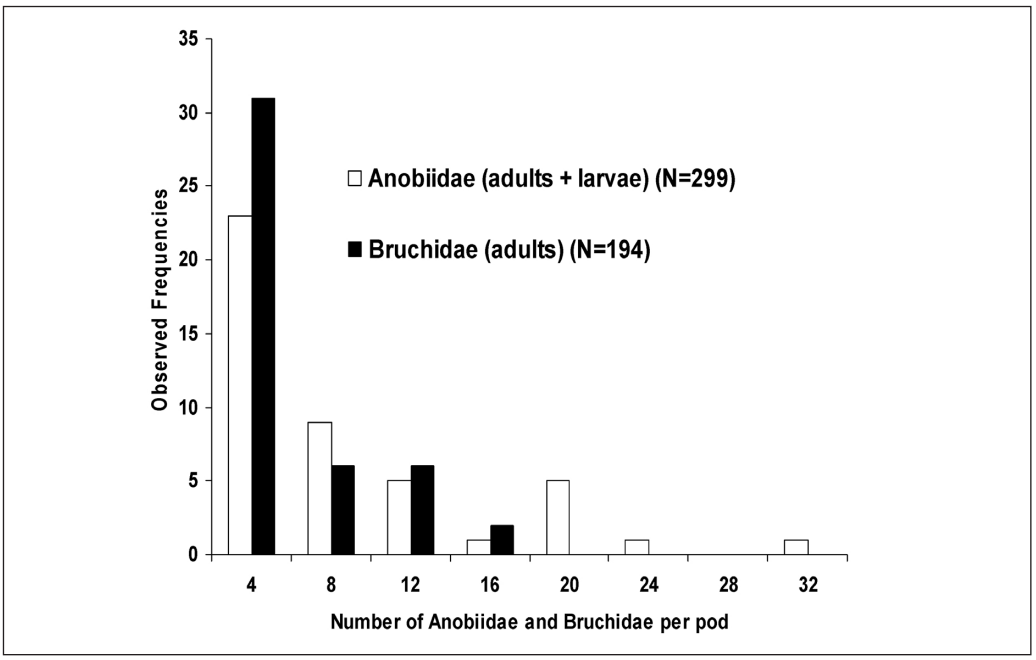

Figure 1. Intensity of attack by the Anobiidae *Tricorynus* sp living in sympatry with the Bruchidae *P. spinipes* and *S. furcatu*s.

the seed apart from its epicarp, leaving a suitable space for pupation of *Tricorynus* sp. The duration of the pupation was around one month (12h/12h photoperiod and 30°/20°C thermoperiod).

A total of 299 *Tricorynus* sp were counted, with 1 to 34 individuals per pod, mean 6.22 ± 2.10 (mean ± SE) (Fig. 1).

Biodiversity of insects living in persistent pods of *A. caven*.

In 87% of the collected pods (39/45), seeds were attacked with two species of Bruchidae (*P. spinipes* and *S. furcatu*s). The bruchid beetle attack was quantified by the round emergence holes on the seeds. Between 1 and 16 seeds per pod were attacked, with an average of 4.33 ± 1.22 (mean ± SEM) (Fig. 2).

Per pod, between 1 and 10 seeds with bruchidae were parasitized by *M. dorsiplana* (Pteromalidae) and *Horismenus* spp (Eulophidae) (51.55% =100/194: number of parasitized seeds/number of seeds attacked by bruchids) (Fig. 2). This parasitism attack was greater in 2005 than in 2002 when only 26.75% (131/490) of the seeds attacked by bruchids were parasitized (*t*-test for percentage comparison t =5.61; significance level: a = 0.05 $t_{[.05]\infty} = 1.96$).

From the 100 parasitized seeds, 149 *M. dorsiplana* adults and 460 *Horismenus* spp adults emerged (Fig 2). The large number of parasitoid adults compared to the number of parasitized seeds (100) was only possible due to their gregarious larval development, as previously studied for *M. dorsiplana* (ROJAS-ROUSSE, 2006; ROJAS-ROUSSE *et al.*, 2007).

DISCUSSION

The persistent pods of *A. caven,* collected in Uruguay at the end of November 2005 after a rainy season, can remain on the trees for several months. The woody walls of

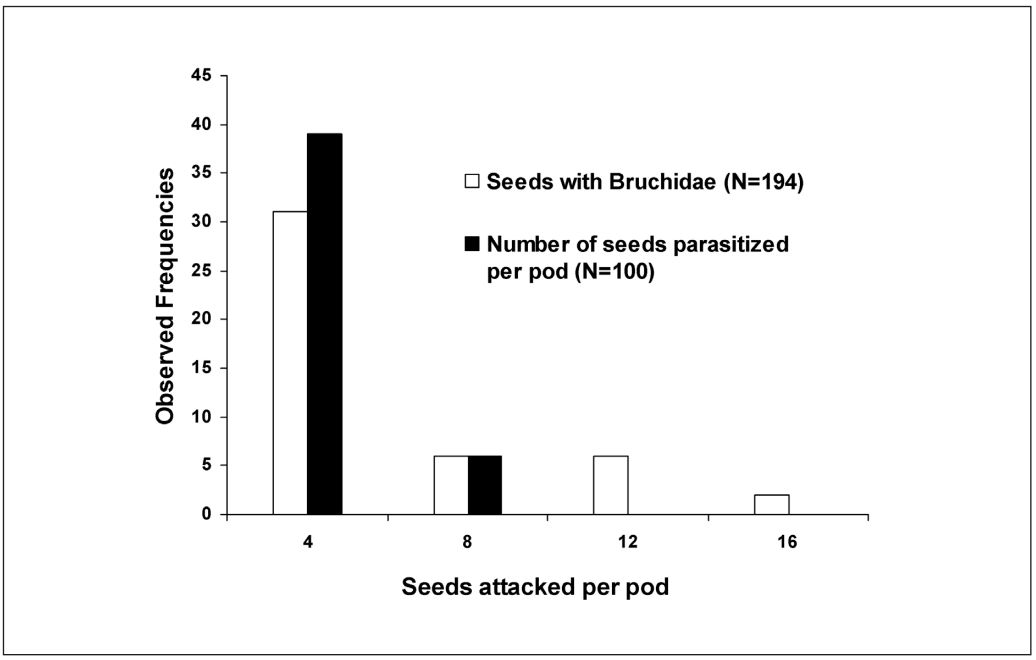

Figure 2. Distribution of seeds attacked by the bruchidae and the larval parasitoids *M. dorsiplana* (Pteromalidae) and *Horismenus* spp (Eulophidae).

these ripe pods, which might be considered as dead or dying wood, serve as host material to the larvae of *Tricorynus sp* (Anobiidae) which completely destroy the mesocarp of pods. The *Tricorynus sp* population could thus be qualified as saproxylic because it is dependent during part of its life cycle on dead or dying wood (LACHAT *et al.*, 2006). In fact, Tricoryninae larvae frequently feed on a wide variety of organic material (paper, leather goods, etc.) as well as various seeds, spices, twigs, vines, wood (wood-work), fungi, galls and bark (WHITE, 1974; ALLEMAND *et al.*, 2008).

In the same area, after a rainy winter and spring at the end of November 2002, this species had been found with a species of Scolytidae (with its characteristic galleries piercing the mesocarp), but the Anobiidae and Scolytidae were not counted on that occasion, as the focus of interest was the bruchidae and its parasitoids (ROJAS-ROUSSE, 2006).

The rainy spring of 2005 might have governed the physicochemical quality and stage of decomposition of the woody walls of the ripe pods which remained on the trees for several months, allowing attacks by *Tricorynus sp*. This Anobiidae species was found in 75.55% of the pods collected.

Four Anobiidae species have currently been described in Uruguay: *Nicobium castaneum* var, *hirtum* (III) which damages wood, *Xyletinus brasiliensis* var *argentinus* (Pic) which damages wood and sugar cane, *Stegobium paniceum* (L.) found on manufactured products, and *Lasioderma serricorne* (Fabr.) found on a variety of grain-based products, spices and tobacco (MONNÉ, 1970).

This was the first time that the successful development of an Anobiidae species, *Tricorynus sp,* had been observed on the woody walls of the ripe persistent pods of *A. caven,* living in sympatry with two bruchidae species of the seeds. As this Anobiidae species develops in the outer part of the tree, colonisation

does not affect tree vigour. Moreover, when ripe pods fall to the ground, their dead woody walls constitute an important medium-term store of carbon, and as they decay, nutrients gradually return to the soil helping to restore soil fertility in ecological rehabilitation zones (LACHAT *et al.*, 2006; OVALLE *et al.*, 2006).

ACKNOWLEDGEMENT

Thanks to Dr Boris Büche (Berlin-Germany) for his help in identifying the Anobiidae species. This article has been read and corrected by Inter-Connect, translation and proof-reading-services.

RESUMEN

ROJAS-ROUSSE, D., G. GRILLE, C. BASSO. 2009. Un refugio natural para una especie de Anobiidae (*Tricorynus* sp) en vainas persistentes de *Acacia caven* (Mol.) en Uruguay. *Bol. San. Veg. Plagas*, **35**: 423-428.

Las vainas persistentes de *Acacia caven* provén un refugio para una variedad de especies de insectos. Condiciones climáticas desfavorables pueden inducir la semi-dehiscencia de esas vainas, proveyendo condiciones favorables para especies Bruchidae, las cuales normalmente atacan las semillas después de su caída al suelo o de pasar a través del intestino del ganado. Este estudio ha cuantificado las poblaciones de larvas y adultos de *Tricorynus* sp (Anobiidae) en vainas persistentes de *A. caven* y las ha comparado con las poblaciones de Bruchidae. Cada vaina marrón oscuro colectada en Uruguay durante la primavera (Noviembre) de 2005 se abrió, y en ella se contó el número de semillas atacadas por los Bruchidae. De las 45 vainas colectadas, 34 estaban atacadas por *Tricorynus* sp. En 30 vainas, esos coleópteros xilófagos se encontraban viviendo en simpatría con los Bruchidae *Pseudopachymeria spinipes* y *Stator furcatus*. Por vaina, entre 1 y 10 semillas con Bruchidae estaban parasitadas por *Monoksa dorsiplana* (Pteromalidae) y *Horismenus* spp (Eulophidae) (51,55%). Esta fue la primera vez que se observó un desarrollo exitoso de una especie Anobiidae, *Tricorynus sp,* sobre la pared leñosa de una vaina madura persistente de *A. caven,* viviendo en simpatría con dos especies Bruchidae de esa semilla.

Palabras clave: Semillas leguminosas, biodiversidad de insectos, simpatría.

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(Recepción: 3 junio 2009)
(Aceptación: 9 septiembre 2009)