

SCIENTIFIC NOTE

Polyandrous Behavior in *Cerconota anonella* Sepp (Lepidoptera: Oecophoridae)

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Neotropical Entomology 35(2):277-278 (2006)Comportamento Poliândrico em *Cerconota anonella* Sepp (Lepidoptera: Oecophoridae)

RESUMO - Entre insetos, o comportamento poliândrico é comum e tem significado importante no sucesso reprodutivo das fêmeas. Este trabalho objetivou estudar a frequência de acasalamentos, em laboratório, da broca-da-graviola, *Cerconota anonella* Sepp, de forma a determinar se o comportamento poliândrico nessa espécie é comum. Cerca de 47% das fêmeas acasalaram mais de uma vez, porém houve diferenças no período das cópulas (precoce ou tardia). No geral fêmeas precoces foram mais frequentes do que fêmeas tardias ($P < 0.001$, teste Binomial). Tais resultados sugerem que a poliandria em condições de campo pode ser possível em *C. anonella*.

PALAVRAS-CHAVE: Poliandria, graviola, espermatóforo, acasalamento

ABSTRACT - Among insects polyandrous behavior is common and plays an important role in female reproductive output. The present study aimed to evaluate the mating frequency of the moth *Cerconota anonella* Sepp under laboratory conditions and to verify if polyandrous behavior is common in this species. Approximately 47% of females mated more than once. However they presented differences in the mating period (early or late). In general, precocious females were more frequent than late females ($P < 0.001$, Binomial test). Such results suggest that polyandry in *C. anonella* may be common in the field.

KEY WORDS: Spermatophore, *Annona muricata*, mating frequency, reproductive success

Among insects, polyandrous behavior is common and plays an important role in female reproductive output (Keller & Reeve 1995, Arnqvist & Nilsson 2000) as it allows the sperm replenishment into the spermatheca increasing egg viability (Thornhill & Alcock 1983). However, multiple mating offers some risks to the females, as a smaller longevity due to the largest energy expense of the sexual intercourse, as well as infection risks (Daly 1978, Dickinson 1997).

The fruit borer *Cerconota anonella* Sepp is the most important pest of the Annonaceae in the Neotropical region. Although larval damage leads to 60-100% direct losses (Braga Sobrinho *et al.* 1999), little is known regarding their reproductive behavior. Lab rearing has been carried out successfully (Pereira *et al.* 2003) allowing studies on its biology. Possibly, polyandrous behavior is common in *C. anonella*, due to high population density, usually attributed to the crop-pests to facilitate the encounter probabilities. Since polyandry can increase the female reproductive output of *C. anonella*, this work aimed to study the mating frequency of this insect in laboratory to determine if the proportion of polyandrous females is common or not.

Mature females and males of *C. anonella* were

conditioned in eight PVC tubes with 20 cm in diameter and 20 cm in height. In each tube 15 couples were released, totaling 240 individuals. The tubes were lined with filter paper to avoid escaping and were maintained under 10:14 h (D:L), $25 \pm 2^\circ\text{C}$ and $75 \pm 10\%$ RH. The adults were fed water and honey and maintained in the tubes for 17 days, since the average adult lifespan of *C. anonella* is approximately 19 days (Pereira *et al.* 2003). After that period the females were collected, sacrificed and dissected for spermatophore collecting. The number of sexual intercourses accomplished by females was evaluated by counting the spermatophore number (full or empty) in the bursa copulatrix (Svärd & McNeil 1994). Among the 120 females previously submitted to the experiment, 19 died before the previously defined 17 day-period and were discarded.

Most females performed one or two matings during the confinement period (Table 1). Twenty-seven (54%) females which mated once presented the spermatophore full of sperm. On the other hand, twenty (46.5%) females that accomplished two matings possessed the spermatophores completely empty. Besides, only five females (4.9%) presented two full spermatophores in a same bursa copulatrix.

Table 1. Number of matings, spermatophore quality and percentage of zero, one, two or three mated females of *C. anonella*.

Number of matings	Females with empty spermatophores	Females with full spermatophores	Females with empty and full spermatophores	Total number of females	Percentage of females (%)
Zero	-	-	-	3	2.9
One	23	27	-	50	49.5
Two	20	3	20	43	42.5
Three	1	0	4	5	4.9

These results are interesting because among lepidopteran species, the calling behavior and first mating of virgin females generally occur soon after 24h of female emergence (Batista-Pereira *et al.* 2004), with complete sperm transference from spermatophore to the spermatheca in approximately 48h (Svärd & McNeil 1994). Hence, females that mated once and were found with a full spermatophore had a late mating, from 10 to 12 days of age. Consequently, those females with one or more empty spermatophores indicate that they mated early, allowing them to remate. In general, precocious females (64) were more frequent than late (30) females ($P < 0.001$, Binomial test). The existence of two full spermatophores in a same bursa copulatrix indicates that most of females have a refractory period before the acceptance of another mating.

Such results allow us to suppose that polyandry may occur under natural conditions. Different mating events, however, indicate that females can choose whether a remating is necessary, may be to maximize her fitness. Further studies relating the effect of polyandry in the reproductive success of *C. anonella* females can help to understand the evolution of this behavior in the species.

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References

Arnqvist, G. & T. Nilsson. 2000. The evolution of polyandry:

Multiple mating and female fitness in insects. *Anim. Behav.* 60: 145-164.

Batista-Pereira, L.G., C.F. Wilcken, S.D. Pereira Neto & E.N. Marques. 2004. Comportamento de chamamento de *Thyrinteina arnobia* (Stoll) (Lepidoptera: Geometridae) em *Psidium guajava*, *Eucalyptus grandis* e em dieta artificial. *Neotrop. Entomol.* 33: 21-28.

Braga Sobrinho, R., C.T. Bandeira & A.L.M. Mesquita. 1999. Occurrence and damage of soursop pests in northeast Brazil. *Crop Protec.* 18: 539-541.

Daly, M. 1978. The cost of mating. *Amer. Nat.* 112: 771-774.

Dickinson, J.L. 1997. Multiple mating, sperm competition, and cryptic female choice in the leaf beetles (Coleoptera: Chrysomelidae), p.164-183. In J.C. Choe & B. J. Crespi (eds.), *The evolution of mating systems in insects and arachnids*. Cambridge, Cambridge University Press, 397p.

Keller, L. & H.K. Reeve. 1995. Why do females mate with multiple males? The sexually selected sperm hypothesis. *Adv. Stud. Behav.* 24: 291-315.

Pereira M.J.B., E. Berti-Filho & J.R.P. Parra. 2003. Artificial diet for rearing the Annona fruit borer *Cerconota anonella* Sepp., 1830 (Lepidoptera: Oecophoridae). *Insect Sci. Applic.* 23: 137-141.

Svärd, L. & J.N. McNeil. 1994. Female benefit, male risk: Polyandry in the true armyworm *Pseudaletia unipuncta*. *Behav. Ecol. Sociobiol.* 35: 319-326.

Thornhill, R. & J. Alcock. 1983. *The evolution of insect mating systems*. Harvard University Press, Cambridge, 547p.

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