SCIENTIFIC NOTE

Occurrence of *Platypus mutatus* Chapuis (Coleoptera: Platypodidae) in a Brazilwood Experimental Plantation in Southeastern Brazil

Graziele S. Girardi[1], Rosana A. Giménez[2] and Márcia R. Braga [1,3]

[1]*Instituto de Botânica de São Paulo, Seção de Fisiologia e Bioquímica de Plantas, C. postal 4005, 01061-970 São Paulo, SP, Brazil*
[2]*Univ. Buenos Aires, Faculdade de Agronomía, Cátedra de Zoología Agrícola, Buenos Aires, Argentina*
[3]*Corresponding author, bragamr@ig.com.br*

Neotropical Entomology 35(6):864-867 (2006)

Ocorrência de *Platypus mutatus* Chapuis (Coleoptera: Platypodidae) em um Bosque Experimental no Sudeste do Brazil

RESUMO - O cerne da madeira de *Caesalpinia echinata* Lam. (pau-brasil, Pernambuco, ibirapitanga) é considerado o material mais adequado para a construção de arcos de violinos devido às suas propriedades vibracionais e a estabilidade. Embora a madeira dessa leguminosa seja resistente à deterioração causada por fungos apodrecedores e cupins, um bosque experimental de pau-brasil no Sudeste do Brasil vem sendo atacado pelo besouro de ambrosia *Platypus mutatus* Chapuis (= *Megaplatypus mutatus* e *P. sulcatus*). Esse coleóptero invadiu cerca de 3% das árvores, principalmente na região central do bosque. A infestação por larvas e insetos adultos foi maior durante a estação seca (inverno) quando comparada ao período chuvoso (primavera e verão).

PALAVRAS-CHAVE: Insecta, *Caesalpinia echinata*, coleobroca, besouro de ambrosia

ABSTRACT - The hardwood of *Caesalpinia echinata* Lam. (brazilwood, Pernambuco, ibirapitanga) is currently the most profitable material used for violin bow due to the unique vibrational properties and dimensional stability. Although this species is resistant to the wood decay caused by termites and rot fungi, an experimental plantation in Southeastern Brazil has been attacked by the ambrosia beetle *Platypus mutatus* Chapuis (= *Megaplatypus mutatus* and *P. sulcatus*). This species invaded ca. 3% of the individuals, mainly in the central part of the plantation. Infestation by larvae and adults was higher during the dry season (winter) when compared to the rainy period (spring and summer).

KEY WORDS: Insecta, *Caesalpinia echinata*, pest, ambrosia beetle

Platypus mutatus Chapuis is native from South America (Wood & Bright 1992) and attacks live standing of native and exotic tree species (Allegro 1995). This beetle preferentially invades trees with diameter greater than 0.15 m at breast height by entering the trunks and forming tunnels deep into the sapwood (Giménez & Panzardi 2003). *P. mutatus* is polyphagous with an extensive host range (Giménez & Etiennot 2003) and is especially prevalent in Argentina, where infestations have caused severe damage in commercial plantations of *Populus* spp. (Alfaro 2003), *Quercus* spp., *Eucalyptus* spp., and *Pinus* spp. (Bascialli *et al*. 1996, and refs therein). Recently it was detected in *Populus* plantations in Naples (Italy), possibly introduced by transportation of infested lumber from South America (Tremblay *et al*. 2000). In Brazil, there are few records of its presence but hosts include species of Fabaceae, such as *Acacia meanmsii* (Santana 2000) and *Erythrina crista-galli* L. (Giménez & Etiennot 2003).

P. mutatus is an ambrosia beetle since it carries a symbiotic fungus (ambrosia fungus) into a structure known as mycangium (Alfaro 2003). As the beetle travels through the tunnels, gallery walls are smeared with the ambrosia fungus (*Raffaellea santoroi* Von Arx), which is cultivated for larval feeding (Guerrero 1966). The growth of the ambrosia fungus within the galleries results in dark staining of the tunnels and weakening of the trunks. Two types of sawdust emerge from the trunks as a result of this tunneling: one composed of long particles resulting from the digging activity of the adult; the other is more granular and is produced as a result of larval feeding, which involves scraping the fungal mycelium grown on the wood cell walls.

The brazilwood *Caesalpinia echinata* Lam. (pau-brasil, Pernambuco), a Brazilian species, is at risk of extinction. This wood is currently the most profitable material used for violin bow due to the unique vibrational properties and dimensional stability and durability (Matsunaga *et al*. 2000). Due to exploitation and deforestation, this species is restricted

to only 5% of its original range in Northeastearn Brazil. Due to its endangered status, efforts to preserve the species have been undertaken by the cultivation in some experimental plantations in Southeastern Brazil.

Preliminary degradation assays showed that this legume species is highly resistant to wood decay caused by termites and rot fungi, which are known to decompose cell-wall carbohydrates (cellulose and hemicelluloses) and minor extension lignin (IPT, unpublished results). However, infestation by *P. mutatus* was observed in an experimental plantation of brazilwood. In the present work, we report for the occurrence of this pest in brazilwood.

Data were collected in a brazilwood plantation in the Reserva Biológica e Estação Experimental de Mogi-Guaçu, Mogi-Guaçu, State of São Paulo, Brazil (22°15'02,4"S 47°09'28,9"W, 660 m a.s.l). The study area was 3000 m^2 with 270 individual brazilwood trees; most of which older than 25 years and growing in a savanna (Aguiar 2001).

The presence of a woodborer beetle in the brazilwood plantation was detected due to the occurrence of holes and of two different types of sawdust coming out of the trunks (Fig. 1). Adult insects were captured using plastic traps (containing cotton wet in 20% ethanol) following the method described in Santoro (1962) and placed over the holes (Fig. 1B). Adults collected were examined using a 20x magnifying glass and, subsequently, identified as *P. mutatus*, according to Wood (1993). Infestation was evaluated in the plantation from June 2003 to December 2004 by counting the number of infested trees and holes in the trunk. The presence of adult or larval stage was evaluated by the presence of the different types of sawdust in the holes or on the base of the trunks. Relationships among infestation and mean temperature or total rainfall were analyzed using Pearson's correlation, which were tested for significance using Student's *t*-test.

Infestation was observed in trees with D.B.H.(diameter at breast height) greater than 0.15 m. One to six holes were found per trunk, ranging from 0.2 m to 2.9 m from the tree's base. The infestation level of the brazilwood trees by *P. mutatus* was low (ca. 3%, Fig. 2). This level of infestation is

Fig. 1. Infestation of *C. echinata* by *P. mutatus*. A – View of a trunk with hole (arrow) and imago sawdust, bar = 8.3 cm; B – Trap hold in the trunk, adapted from Santoro (1962), bar = 3.2 cm; C – Imago sawdust, bar = 0.5 cm; D- Hole (arrow) and larval sawdust, bar = 1.2 cm.

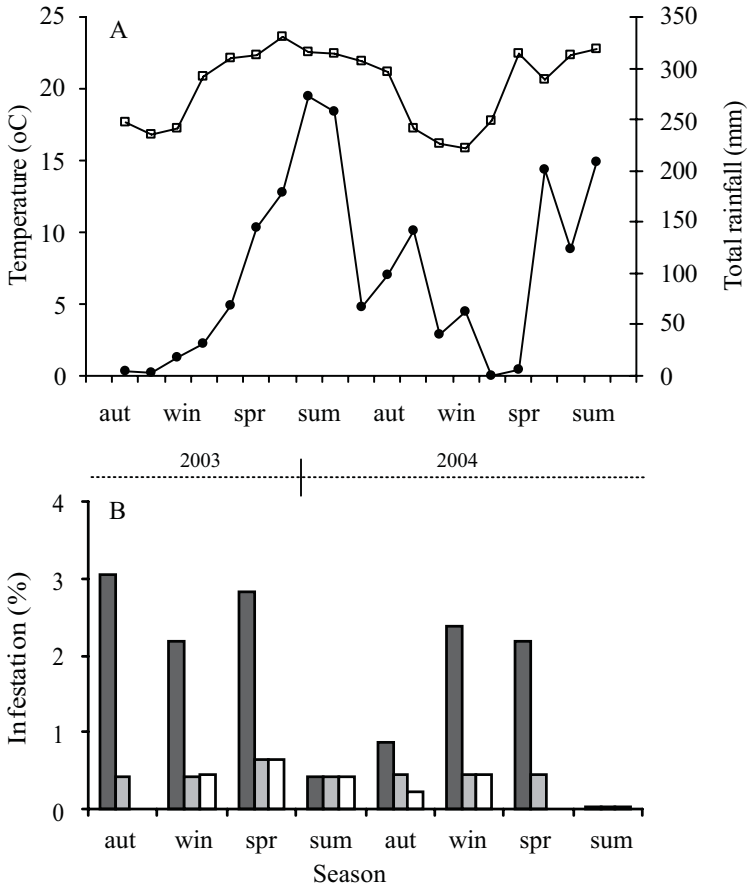

Fig. 2. A - Variations of mean temperature (□) and total rainfall (●) from June 2003 to December 2004 in the Reserva Biológica e Estação Experimental de Mogi-Guaçu, SP. B - Percentage of brazilwood trees infested by *P. mutatus* in the experimental plantation of Mogi-Guaçu, SP in diferent seasons. ■ = adult, ■ = larvae, and □ = adult and larval infestations.

in agreement with those reported for plantations of *Populus deltoides* March in the delta of Rio Paraná, and that caused severe loss of wood quality (Giménez 2003). The infestation of brazilwood by adults of *P. mutatus* was variable tending to decrease during the rainy season (Fig. 2A). The differences in infestation rate in autumn between 2003 and 2004 were correlated to the total rainfall ($r = -0.75784$, $P < 0.05$), which was higher in this season during 2004 (Fig. 2B), but not to the mean temperature. This behavior was distinct from that reported for *P. sulcatus* in Argentina, in which heavy infestation was observed in the rainy and warm season (Santoro 1963). These differences could be related to the temperature range and the distribution of the rainfall, which are different between Argentina and Southeastern Brazil. This could in turn affect the life cycle of *P. mutatus* (Santoro 1963), the growth of the ambrosia fungus, and also the chemistry of the plants.

C. echinata is a native species of the Atlantic Forest in the northern coast of Brazil, growing naturally from Rio de Janeiro to Rio Grande do Norte (Neiva 1978). In Mogi-Guaçu, it has been cultivated below the latitude of its natural occurrence and on savanna soils, which are poorer in nutrients (mainly N) and that possess higher aluminum content when compared to forest soils (Motta *et al.* 2002). These conditions, together with cultivation in an experimental plantation, may have contributed to the infestation of the trees by this ambrosia beetle, whose occurrence has been described mainly in the southern part of Brazil. This offers opportunities for further studies seeking for factors of occurrence according to the local environment. Although the tunnels of *P. mutatus* were preferentially located in the sapwood, dark stain was also observed in the heartwood of *C. echinata*. Therefore, in spite of the low impact of the infestation by *P. mutatus* in the brazilwood plantation detected so far, manage practices targeting this pest should be considered in southern/southeastern Brazil to assure wood quality.

Acknowledgments

We thank Francisco Santoro for insect identification, Dr. Marcos Mecca Pinto, M.Sc. João Del Giudice Neto and Paulo

Barbosa da Silva for the technical assistance, and Dr. Rita de Cássia L. Figueiredo-Ribeiro for the valuable suggestions. Thanks are due to FAPESP (Brazil) for the undergraduate fellowship to G. S. Girardi and for the grant to the project (FAPESP, 2000/06422-4, Brazil), and to CNPq for the research fellow grant to M. R. Braga.

References

Aguiar, F.F. 2001. Fenologia de pau-brasil (*Caesalpinia echinata* Lam.) em Mogi-Guaçu, SP. Ecossistema 26: 107-112.

Alfaro, R. 2003. El "taladrillo grande de los forestales" *Platypus mutatus* (= *sulcatus*): importante plaga de la populicultura Argentina. Un plan de acción. SAGPyA Forestal 28: 11-18.

Allegro, G. 1995. I parasitti del piopo e del salice in Argentina. Estr. Cellul. Carta 4: 19-21.

Bascialli, M.E., R.A. Giménez, A.E. Etiennot & H. Toscani. 1996. Manejo de la población de *Platypus sulcatus* Chapuis, durante tres años en la región del Delta del Rio Paraná mediante control químico. Invest. Agr: Sist Recur For. 5: 129-140.

Giménez, R.A. 2003. Incidencia del ataque del taladrillo grande de los forestales en la calidad de la madera de álamo. SAGPyA Forestal 27: 2-5.

Giménez, R.A. & A.E. Etiennot. 2003. Host range of *Platypus mutatus* (Chapuis, 1865) (Coleoptero: Platypodidae). Rev. Entomotropica 18: 89-94.

Giménez, R.A. & S.R. Panzardi. 2003. Ambrosia beetle, *Platypus mutatus*: review of their management in Argentina. IDESIA 21: 53-56.

Guerrero, R.T. 1966. Una nueva especies de hongo imperfecto asociado con el *Platypus sulcatus* Chapuis. Rev Inv. Agrop. 8: 97-103.

Matsunaga, M., K. Sakai, H. Kamitakahara, K. Minato & F. Nakatsubo. 2000. Vibrational property changes of spruce wood by impregnation with water-soluble extractives of Pernambuco (*Guilandina echinata* Spreng) II: Structural analysis of extractive components. J. Wood Sci. 46: 353-257.

Motta, P.E.F., N. Curi & D.P. Franzmeier. 2002. Relation of soils and geomorphic surfaces in the Brazilian Cerrado. In P.S. Oliveira & R.J. Marquis (eds.), The cerrados of Brazil - ecology and natural history of a Neotropical savanna. Columbia University Press, New York, 398p.

Neiva, A. 1978. O pau-brasil (*Caesalpinia echinata*, Lamarck 1789) em botânica. In B.J. Sousa (ed.), O pau-brasil na história nacional. Brasiliana 62, 155p.

Santana, D.L.Q. 2000. Ocorrência de *Platypus sulcatus* em acácia-negra (*Acacia mearnsii*). Revta. Floresta 30: 1-2.

Santoro, F.H. 1962. Fundamentos para el control manual de *Platypus sulcatus* Rev. Inv. For. 3: 17-23.

Santoro, F.H. 1963. Bioecologia de *Platypus sulcatus* Chapuis. (Col. Platypodidae). Rev. Inv. For. 4: 47-79.

Tremblay, E., B. Espinosa, D. Manzini & G. Caprio. 2000. Un coleottero proveniente dal Sudamérica minaccia i pioppi. L'Informatore Agrario 48: 89-90.

Wood, S.L. 1993. Revision of the genera Platypodidae (Col.). Gt. Basin Nat. 53: 259-281.

Wood, S.L. & D.E. Bright. 1992. A catalog of Scolytidae (Coleoptera), Part. 2; Taxonomy index. Gt. Basin Nat. Mem. 13: 1-1553.

Received 13/VI/05. Accepted 22/X/05.