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FIRST REPORT OF THE OCCURRENCE OF WEEVILS (INSECTA: COLEOPTERA) IN PLANTATIONS OF GREEN TEA IN BRAZIL

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The plant *Camellia sinensis* (L.) O. Kunze (Ericales: Theaceae) serves as the main source of tea, which is an important beverage consumed worldwide. Tea products generally consist of *C. sinensis* leaves and can be classified into 3 main types: black, oolong, and green tea (Hicks 2001; Hernández Figueroa et al. 2004; Owour et al. 2010).

C. sinensis is grown in Asia, Africa, Latin America, and Oceania. In 2006, Brazil produced approximately 8.4 thousand tons of this plant, of which 3,400 tons were exported (Hicks 2001, 2009; Kovalyova 2012). The main Brazilian producing area is located in the Vale do Ribeira region in the state of São Paulo, and in particular the cities of Cajati, Pariquera-Açú, and Registro. The importance of performing research to encourage and facilitate the expansion in the cultivation and production of high-quality tea cannot be understated (Lima et al. 2009).

Insects and mites are considered the main factors that limit tea productivity, causing a drop of 11-55% in production, resulting in economic losses ranging from 500 million to 1.0 billion dollars (Hazarika et al. 2009).

All parts of the tea plant, such as leaves, stems, flowers, roots, and seeds, each are damaged by at least one pest species (Chen & Chen 1989 cited by Hazarika et al. 2009). According to Hamasaki et al. (2008) and Hazarika et al. (2009), these tea pests include mites, hemipterans, lepidopterans, and coleopterans. In China, *Myllocerinus aurolineatus* (Voss) (Coleoptera, Curculionidae) feeds on the young leaves and tender plants of *C. sinensis*. This species exhibits an aggregation behavior and can severely reduce the yield and quality of tea (Sun et al. 2010).In Brazil, weevils(Curculionidae) infest pineapple, cotton, rice, banana, fig, maize, and palm tree cultivations; however, to date, no reports of their association with tea crops have been published.

The present study reports the occurrence of 4 species of weevils on plants of *C. sinensis*, "Yabukita" variety, located on the Agro Chá São Miguel Arcanjo Farm (S 23° 52' 50" W 48° 00' 38"), São Miguel Arcanjo, Sao Paulo, Brazil. At the time of occurrence of the curculionids, the neighboring farms were growing corn (*Zea mays* L.; Poales: Poaceae), beans (*Phaseolis* spp.; Fabales: Fabaceae) potato (*Solanum tuberosum* L.; Solanales: Solanaceae), and eucalyptus (*Eucalyptus* spp.; Myrtales: Myrtaceae).

The weevils were collected in Mar 2010 and identified as *Compsus niveus* (Fabr. 1787), *Compsus* sp., *Platyomus cultricollis* (Germ. 1824), and *Rembus auricinctus* (Germ. 1824), with a predominance of *Compsus niveus* (Fig. 1), being over 99% of the weevils collected.

In Brazil, *C. niveus*, and *Platyomus prasinus* Boheman, 1833 were associated with citrus (Rutaceae) crops and vines thriving in the southeastern region (Lima 1956). Weevils (*Compsus* spp.) were reported by Lunz et al. (2011) to be defoliating veludo (or velame) plants (*Sclerolobium paniculatum* Vogel; Fabales: Fabaceae) in the municipality of Almeirim, Pará. In Colombia, *C. obliquatus* and *C. viridivittatus* were listed as insect pests of citrus crops (O'brien & Peña 2012). However, there are no reports of the host plants of *R. auricinctus*.

This is the first report on the occurrence of weevils in tea crops in Brazil. The weevils were observed during the entire harvest, causing defoliation on plants of *C. sinensis* from September to April, with higher infestations occurring from September to December. The weevils were found predominantly on the lower leaves. A similar observation was noted by Lunz et al. (2011), who observed that the curculionid *C. azureipes* were sighted more often on the ventral surface of the *S. paniculatum* leaflets.

In this study, we observed that in the early morning, weevils moved up to the apex of the plant, reaching the leaves that are collected for the production of tea (Figs. 2A and 2B). However, the presence of these insects at these sites decreased with increasing ambient temperature.

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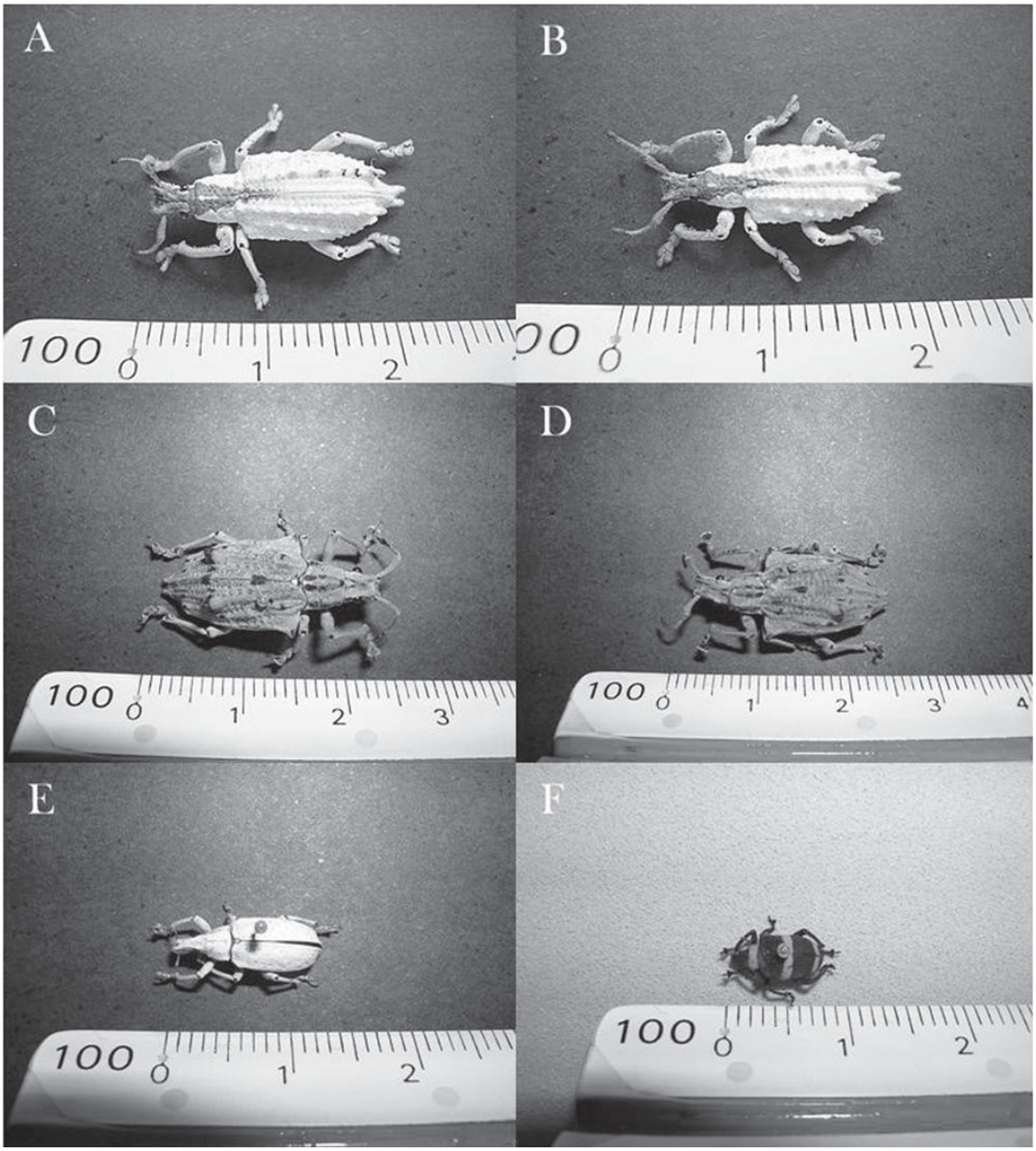

Fig. 1. A. *Compsus niveus* (Female); B. *Compsus niveus* (Male); C. *Platyomus cultricollis* (Female); D. *Platyomus cultricollis* (Male); E. *Compsus* sp.; and F. *Rembus auricinctus*.

Near noon, the weevils moved to the lower parts of the plants and returned to the topmost branches only at the end of the day, when the temperature was mild. Lunz et al. (2011) noted that the most intense periods of foraging of *C. azureipes* were the early morning or early evening hours.

The largest number of weevils was captured by leaf harvesters, particularly at the beginning and end of the day (Figs. 2C and 2D). The damage caused by these insects varied in intensity, depending on the time of yr and fluctuations in the population. During periods of high infestation, leaf damage was small; however, groups of the insects were found in batches of dry leaves after processing. Therefore, the largest problem is associated with the preparation of the material for packaging and commercialization (Fig. 2E). The high temperatures used in drying the product did not disintegrate the weevils, making it possible to find insect fragments, mostly white in

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Fig. 2. A. *Camellia sinensis* leaves; B. *Compsus niveus* on tea leaf; C. Collection of leaves; D. Withdrawal of leaves collected; E. Prepared product to be packaged; and F. Tea with fragments (white) of the curculionid's carapace, legs and wings.

color, together with the dehydrated leaves, thus devaluing the product and destroying its commercial value, and ultimately affecting the exportation of green tea (Fig. 2F).

Tea is considered one of the most widely consumed beverages worldwide, with increasing demand from consumers and importers for teas produced without contaminants. As a consequence, currently the standard for the use of insecticides in tea crop and the residue limits are more stringent. Implementation of integrated pest management (IPM) in tea crops can help to avoid the overuse of pesticides and subsequent residues in the final product (Hazarika et al. 2009). The correct identification of insect pests is the first step toward the development of IPM programs.

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Summary

We recorded the occurrence of *Compsus* sp., *Compsus niveus*, *Platyomus cultricollis*, and *Rembus auricinctus* (Coleoptera: Curculionidae) in tea plantations in the municipality of São Miguel Arcanjo, SP, Brazil. The damage caused by these insects is related mainly to the presence of insect fragments in dried tea leaves, hindering the marketing of the product. This is the first report of the occurrence of weevils in tea crops in Brazil.

Key Words: *Camellia sinensis*, *Compsus niveus*, *Compsus* sp., *Platyomus cultricollis*, *Rembus auricinctus.*

Resumo

Registrou-se a ocorrência de *Compsus* sp., *Compsus niveus, Platyomus cultricollis* e *Rembus auricinctus* (Coleoptera: Curculionidae) em plantações de chá no munícipio de São Miguel Arcanjo, SP, Brasil. O prejuízo ocasionado por esses insetos está principalmente relacionado à presença de fragmentos dos insetos nas folhas desidratadas do chá, prejudicando a comercialização do produto. Destaca-se ser esse o primeiro relato da ocorrência de curculionídeos na cultura do chá no Brasil.

Palavras-Chave: *Camellia sinensis*, *Compsus niveus*, *Compsus* sp., *Platyomus cultricollis, Rembus auricinctus*

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