










## *Tenuipalpus* Donnadieu, 1875 and *Brevipalpus* Donnadieu, 1775 in cultivation of orchid *Dendrobium phalaenopsis* Fitzg

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**ABSTRACT:** *The transit of infested plants may favor the introduction of herbivores into pest-free regions. In this study, we reported the occurrence of pest mites in Dendrobium phalaenopsis Fitzg. Mites were collected from orchid leaves with lesions. We identified Brevipalpus californicus (Banks, 1904) (sensu latu), Brevipalpus yothersi Baker, 1949 and Tenuipalpus orchidofilo Moraes & Freire, 2001 (Tenuipalpidae). These species had not been registered in D. phalaenopsis. This study reinforces the importance of adequate phytosanitary care for orchid cultivation, since these mites can infest other cultivated plants and damage orchids.*

**Key words:** *damage, flat mites, plant mites, Tenuipalpidae, Orchidaceae pest.*

## *Ácaros Tenuipalpus* Donnadieu, 1875 e *Brevipalpus* Donnadieu, 1775 em cultivo de orquídea *Dendrobium phalaenopsis* Fitzg

**RESUMO:** *O trânsito de plantas infestadas pode favorecer a introdução de herbívoros em regiões livres de pragas. Neste estudo, relata-se a presença de ácaros-praga em Dendrobium phalaenopsis Fitzg. Os ácaros foram coletados de folhas de orquídeas com danos. Identificou-se Brevipalpus californicus (BANKS, 1904) (sensu latu), Brevipalpus yothersi Baker, 1949 e Tenuipalpus orchidofilo Moraes & Freire, 2001 (Tenuipalpidae). Até o momento, essas espécies não haviam sido registradas em D. phalaenopsis. O estudo alerta sobre a importância de cuidados fitossanitários adequados para o cultivo e comercialização de orquídeas, uma vez que esses ácaros também podem infestar outras plantas cultivadas, além de danificar orquídeas.*

**Palavras-chave:** *danos, ácaros planos, ácaros de plantas, Tenuipalpidae, Praga de Orchidaceae.*

Orchids are ornamental plants of the class Liliopsida, Order Aparagales, and Family Orchidaceae (CHASE et al., 2015) and have relevant socioeconomic importance in the ornamental flower market through the sales of seedlings (JUNQUEIRA & PEETZ, 2014). However, several species of mites are orchid pests (SULZBACH et al., 2015).

Phytophagous mites of the family Tenuipalpidae are characterized as pests in ornamental plant crops (MIRANDA et al., 2007; KITAJIMA et al., 2010; SANTOS et al., 2010), associated to direct and indirect damage, also acting as virus vectors

(RODRIGUES & CHILDERS, 2013; HUANG et al., 2019). Damages reduce the commercial value of orchids, hindering their commercialization, since there is no specific control for all species of mites. The life cycle of Tenuipalpidae comprises egg, larva, protonymph, deutonymph, and adult, as well as chrysalis in which they do not move, but are physiologically active (KRANTZ & WALTER, 2009). Phytophagous mites play an important economic role in commercial crops; therefore, this study investigated the presence of pest mites in *Dendrobium phalaenopsis* Fitzg. in orchid cultivations in the state of Bahia, Brazil.

The study was carried out from May to July 2019 in an orchid nursery in the municipality of Cruz das Almas (12°40'47.3"S 39°05'42.9"W), Bahia State, Brazil. Leaves of *D. phalaenopsis* with damage characteristics (whitish spots) (Figure 1) were collected, packed in paper bags, and taken to the Insect Study Center (INSECTA) of the Universidade Federal da Bahia Recôncavo for specimen sorting and collection.

We removed the mites from the leaves using a stereoscopic microscope and placed them in containers containing 70% alcohol. Then, the mites were mounted on slides with Hoyer medium for identification (KRANTZ & WALTER, 2009). Adults were selected for identification using an optical microscope phase contrast and consultation with specific dichotomous keys for the group to confirm the specimens.

Three mites belonging to the family Tenuipalpidae were identified: *Brevipalpus californicus* (BANKS, 1904) (*sensu lato*), *Brevipalpus yothersi* BAKER, 1949 and *Tenuipalpus orchidiflo* MORAES & FREIRE, 2001 (Figures 2A, 2B, and 2C, respectively). The occurrence of these species had not been registered in *D. phalaenopsis* in the state of Bahia, Brazil.

These mite species were also reported on other species of ornamental plants (SANTOS

et al., 2010). The occurrence of these pests can be favored by factors, such as climatic variations, which can directly affect orchid cultivation, leading to a population decline of natural enemies and favoring the establishment of the pest mites (CASTEX et al., 2018). In addition, transportation of infested ornamental plants between regions can contribute to the spread of pests (MIRANDA et al., 2007; CHONG et al., 2015), which may have favored the occurrence of these species in the crops studied, since many of these plants originate from other regions in Brazil.

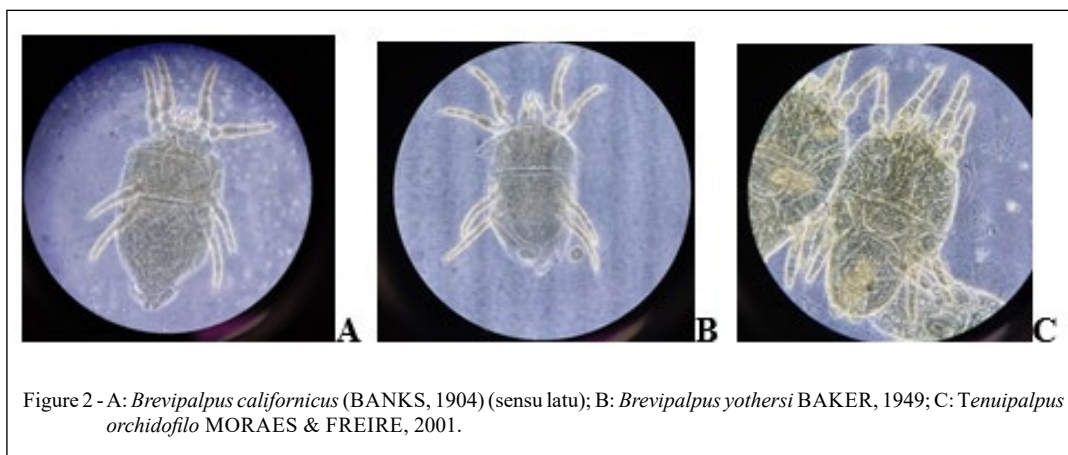
The direct damage caused by these mites can be identified by parts of the plant attacked with silvery-white areas and/or chlorotic spots on the leaves, which evolve into brown to dark brown discoloration, leading to death and premature leaf drop (MORAES & FLECHTMANN, 2008).

The main damage in orchids is the formation of whitish spots in the plant leaf structure, as well as damages associated to virus transmission (KITAJIMA et al., 2010). For instance, *B. californicus* is known as a vector for the orchid fleck virus (KONDO et al., 2003).

Representatives of these genera causing damage to *Phalaenopsis* hybrids grown in greenhouses have been recorded in Poland (ŁABANOWSKI & SOIKA, 2011). In the state



Figure 1 - *Dendrobium phalaenopsis* Fitzg. orchid leaves with damages caused by mites.



of São Paulo, Brazil, the genus *Brevipalpus* was associated to virus transmission in *Dendrobium* sp. (KUBO et al., 2009). In Distrito Federal (Brazil), MIRANDA et al. (2007) reported the occurrence of mites of the genus *Brevipalpus* sp. causing injuries to orchids (*Dendrobium* sp. and *Oncidium* sp.). Similar damages were observed in this study on leaves of orchid *D. phalaenopsis*.

Similarly, in Taiwan, HUANG et al. (2019) reported this same genus of mites infesting orchid *Dendrobium* sp. PIEDRA & GUEVARA (2020) reported the same mite genus causing damage to *Grammatophyllum scriptum* (Orchidaceae) in Costa Rica.

Orchids are ornamental plants of commercial interest worldwide and the introduction of specimens infested with phytophagous mites could cause irreversible loss of the culture. In addition, there is a risk of dispersing these mites to other ornamental plants, as observed in *Ixora* sp. *Camellia* sp. and *Alpinia* sp. (MIRANDA et al., 2007), *Gerbera* sp. (SULZBACH et al., 2015), *Thunbergia* sp., *Anthurium* sp., *Trachelospermum* sp. and *Pelargonium* sp. (KITAJIMA et al., 2010). Therefore, transportation of these plants may favor the dispersion of these hosts to other crops of economic importance in the state of Bahia, Brazil.

Target host plants of economic importance for these *B. californicus* mites are *Anacardium occidentale* L., *Mangifera indica* L., *Spondias pinnata* Kurz, *Annona muricata* L., *Benincasa cerifera* Savi, and *Cucumis melo* L. (CHILDERS et al., 2003). Moreover, *B. californicus* and *B. yothersi* have been associated to leprosis in *Citrus* sp. (GARCÍA-ESCAMILLA et al., 2018) and other plant species in

different regions in the world. Similarly, *T. orchidifilo* can also adapt to other host plants, damaging crops.

This is the first report of Tenuipalpidae mites, *B. californicus*, *B. yothersi*, and *T. orchidifilo* causing damage to *D. phalaenopsis* in the state of Bahia, Brazil, reinforcing the importance of phytosanitary care to crops. Monitoring, maintenance, suitable facilities for plant requirements, as well as avoiding the acquisition of infested orchid plants are measures that should be taken into account by producers and phytosanitary defense agencies to mitigate losses caused by pests.

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#### DECLARATION OF CONFLICT OF INTERESTS

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

#### AUTHORS' CONTRIBUTIONS

The authors contributed equally to the manuscript.

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