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INSECT PESTS ON *Bougainvillea glabra* WITH DESCRIPTION OF *Phenacoccus peruvianus* Granara De Willink – A NEW SPECIES IN BULGARIAN GREENHOUSES

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Abstract

Bougainvillea is a genus of flowering plants native to South America (Brazil). The most common species from this genus is *Bougainvillea glabra*. It is popular for its papery and showy purple bracts, which outshine its small white flowers. *Bougainvillea* is attacked by several pests – mealybugs, aphids, whiteflies, thrips and mites. The aim of the present study was to determine the pest complex on *Bougainvillea* plants grown in ornamental nurseries, garden centers and botanical gardens in our country. Fifteen greenhouses with *Bougainvillea* plants were periodically surveyed from March 2008 to September 2011. The results indicated that up to date *B. glabra* is attacked by 5 sap sucking pests: *Aphis craccivora, Aphis fabae, Myzus persicae, Pseudococcus longispinus* and *Phenacoccus peruvianus.* The first four species are polyphagous pests and are common for Bulgarian greenhouses. *P. peruvianus* is an invasive mealybug of Neotropical origin and it has been introduced in Europe in 1999. Since then it has established itself as a key pest of the *Bougainvillea* genus in nurseries and urban landscapes of Mediterranean region and under glass in England. The presence of *P. peruvianus* in Bulgaria is reported for the first time in the present study. Detailed descriptions of its morphology, biology and distribution are presented.

Key words: aphids, *Bougainvillea glabra*, Bulgaria, invasive species, mealybugs, *Phenacoccus peruvianus*

Bougainvillea (fam. Nyctaginaceae) is a genus of flowering plants native to South America (Brazil). The most common species from this genus is *Bougainvillea glabra* Choisy. It is famous for its papery and showy purple bracts, which outshine its small white flowers. In the temperate zones this species is grown in containers outdoors in the summer and are brought into cool interiors in the winter. It is also used to create flowering bonsai specimens. *B. glabra* has become increasingly popular among Bulgarian gardeners in the recent years. Although Bougainvillea plants are almost pest free and disease resistant when grown outdoors, many authors have reported that they are attacked by several pests – mealybugs, scale insects, aphids, whiteflies, thrips, moths and mites (Burke et al., 1994; Holman, 2009; Beltrá et al., 2013; Cranshaw, 2004).

The aim of the present study was to identify various insect pests of *Bougainvillea* plants grown in ornamental greenhouses, garden centers and botanical gardens in our country.

MATERIAL AND METHODS

Fifteen greenhouses in different locations (Figure 1) growing *Bougainvillea* plants were periodically surveyed from March 2008 to September 2011. Parts of the infested plant (twigs, leaves or flowers) together with pest insects were collected and placed separately into plastic bags for further examination in laboratory conditions of the University of Forestry. The aphid species identification was carried out using permanent microscope slides, following the traditional method of Hille Ris Lambers (1950). Identification key included Blackman and Eastop (2012).

Mealybug specimens were prepared for light microscopy according to the procedure, detailed by Kosztarab and Kozár (1988). New species were identified using the keys of Granara de Willink and Szumick (2007). Identification was confirmed by J. F. Germain from Plant Health Laboratory, Montpellier.

RESULTS AND DISCUSSION

The results indicated that currently *B. glabra* is attacked by 5 sap sucking pests – 3 aphid species (*Aphis craccivora*, *A. fabae* and *Myzus persicae*) and 2 mealybugs – *Pseudococcus longispinus* and *Phenacoccus peruvianus* (Table 1). The established aphid species have cosmopolitan distribution and they are common for Bulgarian greenhouses (Yovkova et al., 2013). These aphids are polyphagous and infest many ornamental plants. They all are virus vectors

Table 1. List of species identified on *B. glabra* in Bulgarian greenhouses with date of the first pest's detection

№	Species	Family	Locations	Date
1.	*Aphis craccivora* Koch, 1854	Aphididae	Evksinograd	*27. V. 2009*
2.	*Aphis fabae* Scopoli, 1763	Aphididae	Evksinograd	*13. VII. 2009*
3.	*Myzus persicae* (Sulzer, 1776)	Aphididae	Sofia Ravda	*28. IV. 2010* *4. VIII. 2010*
4.	*Pseudococcus longispinus* Tag.	Pseudococcidae	Burgas Sofia	*3. V. 2011* *2. VI. 2011*
5.	*Phenacoccus peruvianus* Granara de Willink	Pseudococcidae	Burgas Ravda	*3. V. 2011* *5. V. 2010*

Fig. 1. Map of surveyed locations in Bulgaria

and cause economic important damages on their hosts. *A. craccivora* infests particularly hosts from Fabaceae, but in dry season it also infests plants from other families. The primary host of this pest is *Robinia pseudoacacia* but almost everywhere it is anholocyclic species (Tashev, 1981; Blackman and Eastop, 2006; Holman, 2009). The primary hosts of *Aphis fabae* are *Euonymus europaeus, Philadelphus coronarius* and *Viburnum opulus*. The secondary hosts of this pest are plants from many different families (Blackman and Eastop, 2000; Holman, 2009). *Myzus persicae* is a heteroecious holocyclic species. Its primary host is *Prunus persica*, but it feeds on many host plants in over 40 different plant families (Blackman and Eastop, 2006; Holman, 2009).

A survey carried out recently demonstrated that *Pseudococcus longispinus* is one of the most commonly pest species found in ornamental greenhouses in Bulgaria (Pencheva and Gerasimova, 2007). In contrast with this, the cosmopolitan mealybug *Phenacoccus peruvianus* Granara de Willink (Hemiptera: Pseudococcidae) have been established in Europe and in the USA in the beginning of XXI century. In Bulgaria it was collected from two greenhouses – in Burgas and in Ravda (near by Sunny beech). The presence of *P. peruvianus* in our country is reported for the first time in this study.

Description of new species: Adult females of *P. peruvianus* (Figure 2) are elongate oval, pale greyish and covered with a thin layer of white wax. They reach a length of up to 3 mm (Malumphy and Eyre, 2011). This mealybug may be distinguished from other commonly *Pseudococcus* species by the lack of marginal wax filaments, which are well developed in this genus (Figure 3). Females lay eggs within a waxy ovisac. At a high population density Bougainvillea mealybug ovisacs occur in conspicuous clusters on the foliage and stems.

P. peruvianus mainly feeds on the lower surfaces of the foliage or on the bracts, but it is also found on the growing shoots. Our results show that *P. peruvianus* abundance is high in May and July, declining to almost undetectable levels in the period between September and the onset of winter. No males were observed.

Studies on the natural enemies of *P. peruvianus*

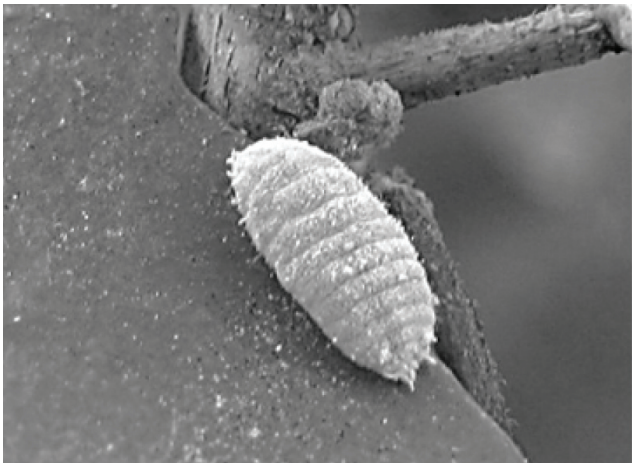

Fig. 2. Phenacoccus peruvianus – adult female

Fig. 3. Pseudococcus longispinus – adult females

in the Mediterranean region revealed high levels of parasitism by a species belonging to the *Acerophagus* genus, which is believed that it had been accidentally introduced to that area (Beltra et al., 2013).

Origin and distribution: P. peruvianus is an invasive mealybug of Neotropical origin (Argentina, Peru). It was introduced in Europe (Spain) in 1999, prior to be named by Granara de Willink in 2007. Since then Bougainvillea mealybug has been found in Sicily, Italy (2002), Corsica (2005), Portugal (2006), Monaco (2008), France (2008) and Greece (2012) (Beltra et al., 2010; Gkounti and Milonas, 2013). Infestations of this pest have also occurred in South East England on indoor plantings and on sheltered plants outdoors.

Hosts and damages: P. peruvianus feeds mainly on plant species of the *Bougainvillea* genus, but it is also recorded on *Alternanthera* sp., *Araujia sericifera*, *Aucuba japonica*, *Baccharis* sp., *Buddleja* sp., *Cestrum* sp., *Dicliptera suberecta*, *Dodonea viscosa*, *Eupatorium* sp., *Guava*, *Myoporum laetum*, *Solanum vespertilio*, *Solenostemon blumei,* Chili peppers and others (Beltra et al., 2010). Among its hosts it shows a preference to members of Solanaceae. Acording to recent study the mealybug can successfully complete its life cycle on *Solanum lycopersicum* and *Nicotiana tabacum*, which are major members of this family (Beltra et al., 2012; Benavent, 2012).

Large mealybug populations cause necrosis of the foliage, leaf loss, die back and molds grow on the excreted honeydew (Malumphy and Eyre, 2011).

P. peruvianus has established itself as a key pest of the *Bougainvillea* genus. These plants are widely grown in gardens in the Mediterranean region and are frequently traded as potted plants. The fast dispersal of this insect indicates that the ornamental trade might be involved (Beltra et al, 2012; Malumphy and Eyre, 2011). *P. peruvianus* is not recommended for regulation as a quarantine pest by EPPO.

CONCLUSIONS

B. glabra is attacked by 5 sap sucking pests in Bulgarian greenhouses. One of them – *Phenacoccus peruvianus* is an invasive species and causes significant damages on ornamental *Bougainvillea* plants, reducing their market value. Among its hosts it shows a preference to members of Solanaceae and it can be a major problem in tomato production.

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