

FIRST RECORDS OF BOUGAINVILLEA MEALYBUG (*Phenacoccus peruvianus* Granara de Willink, 2007) AND MADEIRA MEALYBUG (*Phenacoccus madeirensis* Green, 1923) (Hemiptera: Pseudococcidae) IN CROATIA

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ABSTRACT

Bougainvillea mealybug (*Phenacoccus peruvianus*) and Madeira mealybug (*Phenacoccus madeirensis*) are new scale insect species in Croatia. Bougainvillea mealybug was first recorded in Croatia in June 2014 on *Bougainvillea spectabilis* Willd. and *Lantana camara* L. on the island of Brač. Madeira mealybug was found for the first time in Croatia in October 2014 on *L. camara* in Dubrovnik. Both species cause damage on ornamentals via excretion of honeydew accompanied by sooty mould that decreases ornamental value of the plants. Bougainvillea mealybug originates from Southern America and was first described in 2007. Prior to being named, it had already been introduced to Europe and has spread throughout the Mediterranean. It is polyphagous, occurring on woody plants belonging to 9 families: Acanthaceae, Amaranthaceae, Asclepiadaceae, Asteraceae, Aucubaceae, Myoporaceae, Nyctaginaceae, Scrophulariaceae and Solanaceae. It feeds most frequently on bougainvillea. The mealybug can be recognised by the lack of marginal wax filaments, which are usually present in other mealybugs. Madeira mealybug is a Neotropical species that originates from Southern America. It is a polyphagous species recorded on 154 plant species belonging to 42 plant families. Today it is spread throughout the world. In Europe it has been recorded in Italy, France, Portugal, Spain, Greece and Turkey. Further investigations are needed for both species, in order to establish their current distribution and possibilities of their domestication in Croatian climate. 7 species from genus *Phenacoccus* are registered in Croatia.

Key words: first record, *Phenacoccus peruvianus*, *Phenacoccus madeirensis*, Croatia

1 INTRODUCTION

The genus *Phenacoccus* Cockerell, 1893 (fam. Pseudococcidae) comprises of 204 species worldwide, including 58 species in Europe (Ben-Dov *et al.*, 2014). 7 species from genus *Phenacoccus* are registered in Croatia. *Phenacoccus peruvianus* Granara de Willink, 2007 - bougainvillea mealybug and *Phenacoccus madeirensis* Green, 1923 - madeira mealybug were found for the first time in 2014 and they are new members for Croatian fauna (Masten Milek *et al.*, 2015). Both species are extremely polyphagous. They can cause damage on ornamentals via excretion of honeydew accompanied by sooty mould that decreases ornamental value of the plants.

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2 MATERIALS AND METHODS

The list of scale insect of genus *Phenacoccus* in Croatia is based on data from the literature on faunistic investigations and on data from our own faunistic investigation which was carried out between 2005-2014 in all 21 counties of the Republic of Croatia. We have used the complete faunistic data relevant for Croatia available to us, namely: Lindinger (1912), Radosavljevi (1923), Kova evi (1952), Schmidt (1956), Žak-Ogaza (1967), Masten Milek (2007), and Masten Milek & Šimala (2007).

Faunistic investigation - survey was carried out as follows:

- Visual inspection of potentially infested plant material with the help of a magnifying lens of 10x magnification.
- Collecting of host plant material infested with scale insects (leaves and stems) in plastic bags, labelling each sample with collection data (country, locality details, host plant, any damage symptoms, collectors name, samples number, date).
- Observation of field characters of collected specimens under the dissecting stereo microscope Olympus SZ 51. Taking photos of scales by digital camera Olympus 510 UZ.
- Slide mounting according to methods of Watson & Chandler (1999).
- Microscopic identification on the basis of morphological characteristics of adult females according to keys by Granara de Willink & Szumik (2007), and Williams & Granara de Willink (1992).
- Microscopic slide labelling with all data relevant for faunistic entry.

3 RESULTS AND DISCUSSION

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Up to Williams and Granara de Willink (1992), species of genus *Phenacoccus* have normally broadly oval body, anal lobes are usually at least moderately developed, each lobe often membranous, but sometimes with an anal lobe bar. Antennae are often 9-segmented, occasionally reduced to 7 or 8 segments. Legs are well developed, usually slender; denticle often present on claw; translucent pores are absent from hind coxae, but often present on hind tibiae and occasionally present on hind femora.

Circulus usually present between abdominal segments III and IV, varying in shape from narrowly oval to broadly oval with lateral projections, occasionally 2 or 3 circuli present. Cerarii are always present and each cerarius has 2 or numerous enlarged, conical to lanceolate setae. Sometimes dorsal cerarii are present. Dorsal setae are normally short and lanceolate, sometimes with trilocular pores around the setal collars. Ostioles are present. Multilocular pores are usually present on venter of abdomen, often present in rows on dorsum. Quinelocular pores, when present, are on venter only. Tubular ducts usually are elongated, present on venter, and sometimes present on dorsum.

With regard to the genus *Phenacoccus* in Croatia, the data from the literature on faunistic investigations of the scale insects of Croatia and this survey, confirmed the presence of *Phenacoccus aceris* (Signoret, 1875), *Phenacoccus avenae* Borchsenius, 1949, *Phenacoccus interruptus* Green, 1923, *Phenacoccus madeirensis* Green, 1923, *Phenacoccus parietariae* (Lichtenstein, 1881), *Phenacoccus peruvianus* Granara de Willink, 2007 and *Phenacoccus piceae* (Low, 1883) (table 1). Both species, *P. peruvianus* and *P. madeirensis*, have not yet been recorded in Croatia. Information on these species is reported below.

3.1. *Phenacoccus peruvianus* Granara de Willink, 2007

P. peruvianus originates from Southern America and was first described in 2007. Prior to being named, it had already been introduced to Europe and has spread throughout the

Mediterranean. It is polyphagous, occurring on woody plants belonging to 9 families: Acanthaceae, Amaranthaceae, Asclepiadaceae, Asteraceae, Aucubaceae, Myoporaceae, Nyctaginaceae, Scrophulariaceae and Solanaceae. It feeds most frequently on bougainvillea. In Europe it has been recorded in Italy, France, Portugal, Spain, Greece, Monaco and UK.

Table 1: List of the scale insects species from the genus *Phenacoccus* (fam. Pseudococcidae) in Croatia.

Fam. PSEUDOCOCCIDAE	AUTHOR	YEAR	HOST / DISTRIBUTION
<i>Phenacoccus aceris</i> (Signoret, 1875)	Radosavljevi	1922	<i>Castanea vesca</i> Miller / Šibenik
	Radosavljevi	1922	<i>Castanea vesca</i> Miller / Metkovi
	Radosavljevi	1922	<i>Castanea vesca</i> Miller / Križevci
	Kova evi	1952	<i>Castanea vesca</i> Miller / Zagreb
	Schmidt	1954	<i>Acer</i> sp. / Zagreb
	Masten Milek	2006	<i>Hedera helix</i> L. / Zag
	Masten Milek	2007	<i>Malus domestica</i> Borkh. / Vodnjan
	Masten Milek	2007	<i>Hedera helix</i> L. / Zagreb Maksimir
<i>Phenacoccus avenae</i> Borchsenius, 1949	Masten Milek	2007	<i>Conyza canadensis</i> (L.) Cronq. / Luke Murter
	Masten Milek	2008	<i>Conyza canadensis</i> (L.) Cronq. / Murter
	Masten Milek	2010	<i>Conyza canadensis</i> (L.) Cronq. / Vis
<i>Phenacoccus interruptus</i> Green, 1923	Žak-Ogaza	1965	Graminae / Rab
<i>Phenacoccus madeirensis</i> Green, 1923	Masten Milek	2014	<i>Lantana camara</i> L./ Dubrovnik
<i>Phenacoccus parietariae</i> (Lichtenstein, 1881)	Lindinger	1912	<i>Parietaria officinalis</i> L. / Lošinj
<i>Phenacoccus peruvianus</i> Granara de Willink, 2007	Masten Milek	2014	<i>Bougainvillea glabra</i> Choisy / Sutivan Bra
	Masten Milek	2014	<i>Lantana camara</i> L./ Bol Bra
<i>Phenacoccus piceae</i> (Low, 1883)	Masten Milek	2007	<i>Picea abies</i> L. (Karsten)/Zagreb Mirogoj
	Masten Milek	2007	<i>Picea abies</i> L. (Karsten)/Zagreb Maksimir
	Masten Milek	2011	<i>Picea abies</i> L. (Karsten)/Samobor
7 species	6 authors	19 records	10 hosts

Adult females are elongate oval, greyish with a green tinge, covered in a thin layer of mealy white wax, and attain length of 3 mm. This mealybug can be recognised by the lack of marginal wax filaments, which are usually present in other mealybugs.

Adult and nymph mainly feed on the lower surfaces of the foliage, but are also found on the growing shoots, bark and occasionally the upper leaf surfaces. Infestations of this mealybug are readily detected by the highly conspicuous white wax elongate ovisacs, that form dense groups on the undersides of the foliage and on the stems. The foliage is contaminated with honeydew excreted by mealybugs, which serves as a medium for the growth of sooty moulds, which can disfigure the plants (Malumphy & Eyre, 2011).

3.2. *Phenacoccus madeirensis* Green, 1923

P. madeirensis is a Neotropical species that originates from Southern America. It is a polyphagous species recorded on 154 plant species belonging to 42 plant families. Today it is spread throughout the world. In Europe it has been recorded in Italy, France, Portugal, Spain, Greece and Turkey.

Adult females have a grey oval body, covered by thin, white mealy wax, with red legs and dark dorsosubmedial bare spots on intersegmental areas of the thorax and abdomen. These areas form 1 pair of dark longitudinal lines on the dorsum. The ovisac covers the entire dorsum, with 18 pairs of lateral wax filaments, the posterior pairs being the longest. They are approximately the length of the body or a little shorter (Papadopoulou & Chryssoides, 2012).

4 CONCLUSIONS

In Croatia the genus *Phenacoccus* currently consists of seven species: *P. aceris*, *P. avenae*, *P. interruptus*, *P. madeirensis*, *P. parietariae*, *P. peruvianus* and *P. piceae*. *P. aceris* can be considered as a very polyphagous pest in all parts of Croatia. It can be found very often on *Acer* spp. and *Hedera* spp. *P. piceae* is the pest of the hosts from family Pinaceae, occasionally Taxaceae. *P. madeirensis* and *P. peruvianus* are new scale insect species for the fauna of Croatia. Further investigations are needed for both species, in order to establish their current distribution, hosts and possibilities of their domestication in Croatian climate.

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