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Alien hemipterous insects brought to Polish greenhouses with potted plants

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ABSTRACT

Such exotic insect species as: a croton scale – *Lepidosaphes tokionis* (Kuwana, 1902), a white peach scale – *Pseudaulacaspis pentagona* (Targioni-Tozzetti, 1886), a striped mealybug – *Ferrisia virgata* (Cockerell, 1893) and a croton whitefly – *Orchamoplatus mammaeferus* (Quaintance & Baker, 1917) were accidentally transferred on the cuttings of a garden croton – *Codiaeum variegatum* (L.) A. Juss. imported to Poland from Sri Lanka in years 2009-2011. Another species: a red wax scale – *Ceroplastes rubens* Maskell, 1893 was accidentally transferred on young plants imported to Poland from Costa Rica in 2010.

KEY WORDS: alien species, hemipterous insects, greenhouses

INTRODUCTION

The effect import of potted ornamental plants import from all over the world to greenhouses in Poland, often via the Netherlands is the introduction of new pests. Hemipterous insects, mainly scale insects, are commonly transported together with young plans. The first information on mites and insects brought to Polish greenhouses was given earlier by Łabanowski (2009).

The aim of this paper is to provide further information on the alien hemipterous insects that have been introducted to Poland as a result of ornamental plants trade.

MATERIAL AND METHODS

The insect samples were collected from potted plants in years 2009-2011 from greenhouses located in Skierniewice (central Poland). In the laboratory the specimens were mounted on glass slides with Hoyer liquid. The species were identified according to keys and illustrations prepared by Anonymous (2010), Gimpel *et al*. (1974); Rusell (1958); Watson (2010).

RESULTS AND DISCUSSION

Family: Diaspididae

***Lepidosaphes tokionis* (Kuwana, 1902)** syn. *Mytilaspis auriculata* Green, 1907

Females and larvae of this scale were observed on the lower leaf surface near the main vein of *Codiaeum variegatum* (L.) A. Juss..

Collected material: cuttings of *Codiaeum variegatum* imported from Sri Lanka to Poland, Skierniewice, 4.09.2009 (females), 10.12.2009 (females, larvae).

Distribution and host plants: this species was originally described from a croton in Tokyo. It was later recorded as a croton-feeder from various localities in the world. In 1907, Green described it under the name *auriculata* from the Seychelles and later recorded its presence in Ceylon, India, Hawaii, Singapore, Barbados and Australia. It was recorded under the name *crotonis* or *lisianthi* from Hawaii, the Philippines and North America. Other records of this species include localities in Taiwan, Cuba, Mexico, Micronesia, Madagascar, and Reunion Island (Takagi, 1970). Generally, this scale is distributed in the following regions: Afrotropical, Australasian, Nearctic, Neotropical, Oriental and Palaearctic. Up to this time this species has not been recorded from Europe (Drake, 2009). *L. tokionis* has been recorded from plants belonging to families: Agavaceae, Araceae, Euphorbiaceae, Malvaceae, Rutaceae and Solanaceae, but *Codiaeum* spp. and *Anthurium* spp. are favoured hosts (Anonymous, 2009). It has been classified as a croton pest by Miller & Davidson (1990), because haevy infestations can cause drying of plant tissues (Watson, 2010).

Field characters: body of females is elongated, slender, mussel-shaped, characterised by a slightly convex, long, brown scale cover and brown terminal exuviae. The scale cover of larvae is similar to that of females, but smaller and narrower. These features are in agreement with Watson's (2010) description.

Slide-mounted characters: adult female slender, more than 1.8x as long as wide, with the lateral sides almost parallel; head with lateral tubercles on each side; pygidium broad, median lobes prominent, slightly divergent with a pair of gland spines between them; each lobe as long as wide, strongly convex apically, serrate on the inner side, with a single notch on the outer side with the inner apical margin longer than the outer. Antennae with two long setae. Perivulvar pores: four in the median group, six in the anterolateral and four in the posterolateral groups (Takagi, 1970; Watson, 2010).

***Pseudaulacaspis pentagona* (Targioni-Tozzetti, 1886)**

Numerous male scales and single female scales were observed on stumps of *Codiaeum variegatum*.

Collected material: cuttings of *Codiaeum variegatum* 'Aucubaefolia' and 'Picta' imported from Sri Lanka to Poland, Skierniewice, 21.02.2011 (male scales, females).

Distribution and host plants: native range is East Asia, it was recorded for the first time in Europe (Italy) in 1886. Nowadays, it is common in most countries of Southern and Central Europe and in the islands of the Atlantic Ocean. In central Europe it has colonized both cultivated and natural habitats, primarily occurring on bark and fruit of various trees and shrubs, occasionally on leaves. It has also been introduced to Africa, Australia, New Zealand, southern part of Central America and many Pacific Islands (Pellizzari & Germain, 2010; Trencheva, 2010). It has been reported from hosts belonging to 115 genera placed in 55 plant families, but in countries with colder climate it has been found only in green houses (Watson, 2010).

Field characters: single female specimens of this scale collected from the trunk and bottom leaves of *C. variegatum* are light yellow, covered by a more or less circular, slightly convex yellow-white scale with subcentral or submarginal yellowish or reddish brown excuviae. The scale cover of males, observed in great numbers on plant trunks is narrow, with parallel sides, sometimes with a median longitudinal ridge. These features are in agreement with Watson's (2010) description.

Slide-mounted characters: the body of a slide-mounted female is 0.9-1.1 mm long, turbinate (less than twice as long as wide), membranous; margins strongly lobed; dorsal ducts absent from median areas of the thorax. The pygidium with 3 pairs of well-developed lobes, each notched on the outer margin; median lobes zygotic, with a pair of marginal setae between them; orifices of dorsal macroducts have the shape of an elongated oval, each marginal duct with a long axis of the orifice perpendicular to the margin; a single gland spine present on each side of the pygidial segment VI; each pygidial gland spine containing several microducts and usually with a trifurcate tip (Watson, 2010).

Family: Coccidae

***Ceroplastes rubens* Maskell, 1893**

Single specimens of the larvae of this scale were observed on the upper leaf surface.

Collected material: cuttings of *Schefflera arbicola* 'Gold Capella' imported from Costa Rica to Poland, Skierniewice, 6.01.2010 (larvae), 20.01. 2010 (larvae) and *Polyscias fruticosa* – Skierniewice, 6.01.2010 (larvae).

Distribution and host plants: the type locality is Australia and type hosts are *Magnifera indica* L. and *Ficus macrophylla* Pers., but preferred hosts are *Citrus* spp., *Persea* spp., *Gardenia* spp. and *Palmae* spp. (Gimpel *et al.*, 1974). It was noted for the first time in Florida in November 1955 on the foliage and stem of a greenhouse-grown *Aglaonema pictum* var. tricolor and an *A. oblongifolium* 'Curtisii'(Dekle, 2008). Generally, this scale is distributed across Asia (China, Fiji, Japan, India, Indonesia, Philippines, Sri Lanka, Taiwan), Africa (Kenya, South Africa, the Seychelles, Vanuatu, Zanzibar), North America, Central & South America, Caribbean (Antigua, Bermuda, Cuba, Dominican Republic, Guam, Hawaii, Honduras, Mexico) and Oceania (Australia, Caroline Is., Cook Is., New Zealand, Solomon Is., Tahiti). In Europe, *C. rubens* was intercepted in France, Italy (Dekle, 2008) and in the Netherlands, in 1978, in consigments of *Acer buergerianum* Mig. from Japan, *Aglaonema* sp. from Sri Lanka and *Podocarpus* sp. from Taiwan (Jansen, 2004). *C. rubens* is a polyphagous insect, it has been recorded on over 100 host plants cultivated in the open field and in greenhouses, but as far as the plants often imported to Poland are concerned, it has been intercepted on: *Aglaonema commutatum* Schott, *Brassaia actinophylla* (*Schefflera*) (Endl.) Harms, *Cycas revoluta* Thunb., *Dieffenbachia* spp., *Dizygotheca elegantissima*, *Gardenia jasminoides* J. Ellis, *Hedera helix* L., *Medinilla* spp., *Nerium oleander* L., and *Peperomia* spp. (Dekle, 2008).

Field characters: larvae collected from the leaves of *Schefflera arbicola* (Hayata) Merr. are round in shape, convex with nine nodes around the body, amber in colour. An adult female was not observed, but it is known to have a body which is 3.5-4.5 mm long, covered with a thick pinkish to red wax, convex, longer than wide and with two conspicuous pairs of white bands that extend dorsally from the spiracular area (Dekle, 2008).

Slide-mounted characters: leg reduced, tibia and tarsus fused; stigmatic setae of 2 distinct sizes, large central seta conical with rounded apex, other setae dome-shaped; about 30 stigmatic setae lateral of each stigmatic furrow, arranged in 3 or 4 irregular rows; tubular ducts scattered over the dorsum, absent from the venter, the inner filament unexpanded. Other characters: dorsal setae cylindrical, the apex truncate or broadly rounded; multilocular pores restricted to the vulva area; marginal setae simple; 1 pair of prevulvar setae (often obscured by anal plates); multilocular pores restricted to the area around the vulva; multilocular pores of the

anterior spiracle, when present, predominantly with 5 loculi, about the same size as pores lateral to the anterior spiracle; tibio-tarsal sclerosis absent; a claw without a denticle; claw digitules unequal; antennae 6-segmented, rarely with 5 segments; the area around the anal region sclerotized, forming a protuberance; anal plates rounded, without distinct angles; each anal plate with 1 subapical seta, 3 or 4 apical setae, and 1 subdiscal seta; an anal fold with 6 fringe setae; preopercular pores inconspicous, restricted to the area anterior of anal plates; without submarginal tubercles (Gimpel *et al.*, 1974).

Family: Pseudococcidae

***Ferrisia virgata* (Cockerell, 1893)**

This mealybug was present on all parts of *Codiaeum variegatum* plants, usually on the lower leaf surface, but also moved onto the roots under dry climatic conditions.

Collected material: cuttings of *Codiaeum variegatum* 'Petra' imported from Sri Lanka to Poland; Skierniewice - 27.07.2010 (females, larvae); 16.08.2010 (females, larvae); 3.09.2010 (females); 7.09. 2010 (male pupae, males); 13.09.2010 (females, male pupae).

Distribution and host plants: this mealybug was described from Jamaica, on grass, under the name *Dactylopius virgatus*. The insect is found in nearly every area of the world characterized by a warm climate, and has been encountered in all zoogeographic areas: in the Pacific region and Asia (India, Iran, The Philippines, Taiwan, Yemen), Africa (Ghana, Nigeria, Republica of South Africa) and Central & South America (Brasil, Colombia, Cuba). In Europe it was intercepted in the United Kingdom on *Codiaeum variegatum* imported from Togo (Eppo Reporting Service, 1998). *F. virgata* has been recorded on a broad diversity of host plants (at least 68 plant families) and attacks a wide variety of hosts including: *Codiaeum variegatum*, *Acalypha welkesiana* Müll. Arg, *Gardenia jasmoinide*, *Jatropha* L., *Rosa* L., *Ipomea batatas* (L.) Lam., *Piper nigrum* L., *Manihot esculenta* Crantz, *Coffea* L., *Theobroma* L., *Citrus* L., *Psidium* L., *Corchorus* L., *Magnifera* L., *Lycopersicon* Mill., *Solanum melongena* L. (Anonymous, 2010; Martinez, 2001; Schreiner, 2000).

Field characters: females collected from leaves of *Codiaeum variegatum* are 4-5 mm long, gray, without lateral wax filaments; two thick wax filaments arising from the tip of the abdomen. The dorsum with two dark lengthwise stripes. Thin crystal-like filaments protruding from the sides and the top of the body. Ovisacs not present. These features are in agreement with Schreiner's (2000) description.

Slide-mounted characters: setae associated with ferrisia-like tubular ducts incorporated in the rim; ventral multiloculars present on the 3 posterior abdominal segments, with more than 8 multilocular pores on segment VI; a ferrisia-like rim around large tubular ducts; one pair of cerarii (Anonymous, 2010). Description of

immature stages was given by Awadallah *et al*., (1979). They informed, that the 3rd and the 4th nymphal instars of a female and a male, respectively, can be easily distinguished by the number of antennal segments. The length of the 3rd, 4th and 5th segments differ greatly in the first and the second nymphal instars, while the number of segments differs between instars II, III and IV.

Slide-mounted characters: the body of observed males was 1.4-1.5 mm long with a single pair of transparent wings and two double filaments 3.7-4x shorter than the body, extending from the lateral areas of the abdomen end (a tail-forming pore cluster); pale in color with dark thorax, antennae and hairy legs; antennae 10-segmented with s long and numerou hairs; on the head there were observed 3-4 red eyes.

Family: Aleyrodidae

***Orchamoplatus mammaeferus* (Quaintance & Baker, 1917)**

Numerous pupae of this whitefly were observed on the lower leaf surface of *Codiaeum variegatum* plants.

Collected material: cuttings of *Codiaeum variegatum* 'Petra' imported from Sri Lanka to Poland, Skierniewice, June 25, 2010 (pupae).

Distribution and host plants: south Pacific area - Samoa, Rarotonga, Thaiti, Fiji (Dumbleton, 1961), and additionally: Japan, Indonesia (Java), Malaysia, Singapore, Sri Lanka, Iran, Australia, New Guinea, Sulawesi, Marques Islands, Hawaii, Bahamas (Suh *et al*., 2008). In 1976, nymphs were collected from *Codiaeum variegatum* in Hawaii and this was a new record for the United States (Daehler, 2005). In Europe it was intercepted in the United Kingdom on cuttings of *Croton* spp. imported from Sri Lanka (Eppo Reporting Service, 2004).

Field characters: the body of the collected pupae is oval, about 0.75 mm long, with the coat of transparent wax forming a thin layer around the margin. These features are in agreement with Russell's (1958) description.

Slide-mounted characters: the basic characters of the pupae are: cephalic setae absent; tracheal pore area teeth slender; caudal setae at lateral margin of the abdominal tracheal pore area and triple width of the posterior gland apart (Suh *et al*., 2008).

CONCLUSIONS

Four alien species of the Hemiptera: *Ferrisia virgata* (Cockerell, 1893), *Lepidosaphes tokionis* (Kuwana, 1902) *Pseudaulacaspis pentagona* (Targioni-Tozzetti, 1886) and *Orchamoplatus mammaeferus* (Quaintance & Baker, 1917) were intercepted on the cuttings of *Codiaeum variegatum* imported to Poland from Sri Lanka.

Ceroplastes rubens Maskell, 1893 was intercepted on a young plant of *Polyscias fruticosa* and *Schefflera arbicola* imported to Poland from Costa Rica.

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Pluskwiaki (Hemiptera) zawleczone na roślinach doniczkowych do polskich szklarni

STRESZCZENIE

Na sadzonkach krotona - *Codiaeum variegatum* (L.) A. Juss. importowanych do Polski ze Sri Lanki w latach 2009-2011 zawleczono egzotyczne owady: tarczniki – *Lepidosaphes tokionis* (Kuwana, 1902) i *Pseudaulacaspis pentagona* (Targioni-Tozzetti, 1886), wełnowca – *Ferrisia virgata* (Cockerell, 1893) i mączlika – *Orchamoplatus mammaeferus* (Quaintance & Baker, 1917). Na młodych roślinach importowanych do Polski z Kostaryki w roku 2010 zawleczono misecznika – *Ceroplastes rubens* Maskell, 1893.