The Bronze Bug

Another New Threat to Eucalypts in California

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Figure 1. *Corymbia* (formerly *Eucalyptus*) *citriodora* is a widespread landscape tree in southern California and susceptible to the bronze bug. South St., Lakewood, CA. (D. R. Hodel).

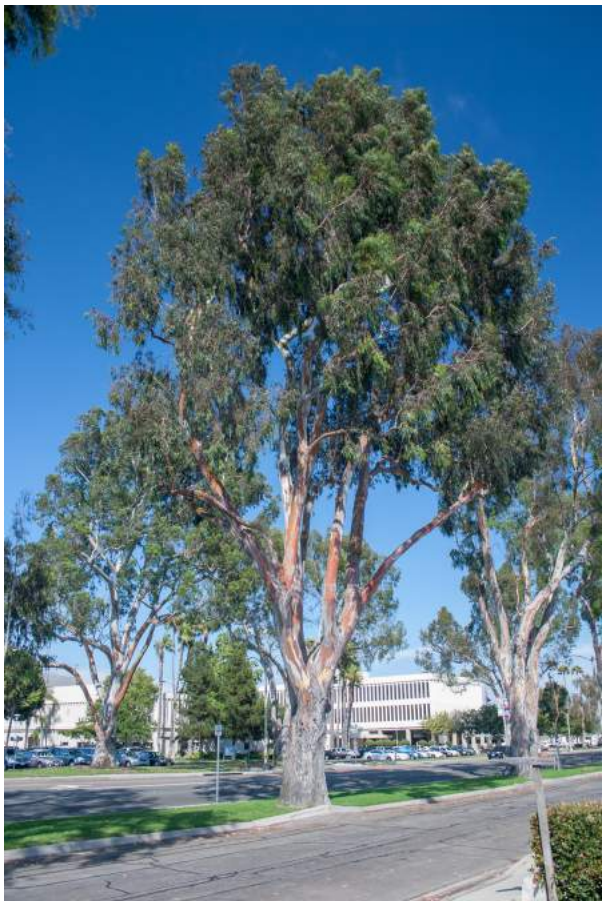

Figure 2. *Eucalyptus camaldulensis* is one of the most common landscape trees in southern California and very susceptible to the bronze bug. Torrance Blvd., Torrance, CA. (D. R. Hodel).

The bronze bug (*Thaumastocoris peregrinus*), a serious and potentially damaging, sap-sucking insect pest of eucalypts [genera *Corymbia* (**Fig. 1**) and *Eucalyptus* (**Figs. 2-3**)], has very recently been detected in southern California. This pest is reported to destroy extensive areas of leaf tissue, often giving it a bronze tint (hence, the common name), turning it yellow, red, and then brown to tan, eventually causing leaf loss, canopy thinning, branch die back, and even tree death (FAO 2012). A wide host

Figure 3. The majestic *Eucalyptus grandis* is perhaps our most stately euc but it highly susceptible to the bronze bug. Rynerson Park, Lakewood, CA. (D. R. Hodel).

Figure 4. Adult bronze bugs have a flattened, strongly dorso-ventrally compressed, elongate body 2 to 3 mm long. *Eucalyptus grandis*, Lakewood, CA. (G. Arakelian).

range and its ability to survive in a variety of climate zones have made this small pest especially invasive (CABI 2016).

Here we provide information on its history, identification, biology, distribution, symptoms, hosts, and possible management strategies.

History

Native to Australia, little was known about the bronze bug prior to 2002 when rather suddenly significant and large populations of the pest occurred on ornamental landscape plantings in Sydney (CABI 2016). It quickly spread to Africa in 2003, South America in 2005, and Italy in southern Europe in 2011 (FAO 2012). Climate modeling predictions indicate that the bronze bug could become established in most of the world's warm temperate, Mediterranean climate, and subtropical areas where *Eucalyptus* is plantation grown or occurs as a landscape ornamental (Saavedra et al. 2015).

The bronze bug was first detected in California in the greater Los Angeles area in early June, 2016, on *Eucalyptus* in North Hollywood in the San Fernando Valley (Bugguide 2016a). It was found again in July in Heartwell Park, Long Beach in the southeast area of Los Angeles County on *E. globulus* (blue gum) (Bugguide 2016b). These sightings are apparently new records for North America. It is now likely much more widely spread in eucalypt-rich southern California.

Figure 5. The bronze bug lays eggs in clusters, which appear as black, tar-like marks on leaves and twigs. *Eucalyptus grandis*, Lakewood, CA. (D. R. Hodel).

Figure 6. Eggs of the bronze bug are dark, oval, 0.5 mm long, 0.2 mm wide. *Eucalyptus grandis*, Lakewood, CA. (G. Arakelian).

Identification

Information about identification is taken from FAO (2012), Noack et al. (2011) and our observations in the field. Adult bronze bugs have a flattened, strongly dorso-ventrally compressed, elongate body 2 to 3 mm long (**Fig. 4**). They are light brown, often shiny, and have darker or reddish brown areas. The head is broad with bulging, pedicellate, red eyes and elongate, conspicuous mandibular plates. Antennae are light brown with black tips (Arakelian 2016). Male genital capsule is asymmetrical.

The bronze bug lays eggs in clusters on leaves and twigs (**Fig. 5**). Eggs are dark, oval, 0.5 mm long, 0.2 mm wide, with a sculptured chorion and round operculum

Figure 7. Eggs of the bronze bug have a sculptured chorion and round operculum. *Eucalyptus grandis*, Lakewood, CA. (G. Arakelian).

(**Figs. 6-7**). Crawlers and young nymphs are orange with dark brown spots on their thoraxes and some abdominal segments (**Fig. 8**). Eyes and the area around dorsal abdominal scent glands are red (Arakelian 2016).

Biology

The bronze bug is a gregarious insect, with adults and nymphs typically occurring together on the same leaf (**Fig. 9**). Developmental time is about 20 days at temperatures from 17 to 20 C with 5 instars (Noack and Rose 2007). Mean adult female life span is about 15 days and a female can lay up to 60 eggs (Noack and Rose 2007). Eggs are deposited in black capsules, which typically are in clusters and appear as black, tar-like marks on the leaf surface (Carpintero and Dellapé 2006, FAO 2012) (**Fig. 5**). Eggs hatch in 4 to 8 days and nymphal time is 17 to 25 days (FAO 2012).

The bronze bug is thought to have dispersed to new regions primarily on infested plant material (CABI 2016, FAO 2012, Nadel et al. 2009). Eggs can be borne externally on bark, flowers and inflorescences, and fruit; adults, eggs, and nymphs on leaves and seedlings; and eggs and nymphs on above-ground stems, shoots, trunks, and branches (CABI 2016). Within a region long-distance flight is thought to be the primary method of dispersal although wind and birds are also implicated (CABI 2016, FAO 2012, Nadel et al. 2009). It is also possible that this pest can hitchhike on travelers' clothes, aircraft, land vehicles, and luggage (FAO 2012, Nadel et al. 2009).

Distribution

The bronze bug is native to the states of New South Wales, Queensland, and South Australia in Australia but has spread rapidly to Africa (Kenya 2009, Malawi 2008, South Africa 2003, and Zimbabwe 2007), Europe

Figure 8. Crawlers and young nymphs of the bronze bug are orange with dark brown spots on their thoraxes and some abdominal segments. *Eucalyptus grandis*, Lakewood, CA. (G. Arakelian).

(Italy 2011, Portugal 2012), South America (Argentina 2005, Brazil 2008, Chile 2011, Uruguay 2008), New Zealand (2012), and now the United States. The South African and South American invasions were traced to Sydney, Australia (Nadel et al. 2009).

Symptoms and Damage

Because bronze bugs are gregarious and typically occur in substantial quantities with nymphs and adults together, the first indication of an infestation might be the pest itself and its black egg cases and black, shiny, varnish-like, tiny, pin-point fecal deposits (**Figs. 9-10**). Initially, leaves can be heavily infested yet show no discoloration or other symptoms; indeed, to date we have been unable conclusively to confirm or associate the typical leaf discoloration reported in the literature for the bronze bug. Nadal et al. (2009) reported that as bronze bug populations build and feeding intensifies, leaves typically have irregular reddish, reddish yellow, or yellow-brown areas that have a general bronzy tint from which the common name of this pest is derived. However, these leaf colors and other abnormal appearing growth patterns are fairly common on healthy and pest-free trees across the genera *Corymbia* and *Eucalyptus*, and can also be due to other factors, including cultivation, senescence, and unexplained, normal physiological responses (**Fig. 11**).

Advanced and or heavy infestations are reported eventually to lead to extensive areas of chlorotic and necrotic tissue that is tannish or silvery, as if chlorophyll has

Figure 9. The bronze bug is a gregarious insect, with adults and nymphs typically occurring together on the same leaf. Note the tiny, black, pin-point fecal deposits. *Eucalyptus grandis*, Lakewood, CA. (D. R. Hodel).

Figure 10. Because bronze bugs are gregarious and typically occur in substantial quantities with nymphs and adults together, the first indication of an infestation might be the pest itself and its black egg cases and black, shiny, varnish-like, tiny, pin-point fecal deposits. *Eucalyptus grandis*, Lakewood, CA. (D. R. Hodel).

Figure 11. While bronzing and other colors were reported to be associated with bronze bug infestations, these leaf colors and other abnormal appearing growth patterns are fairly common on healthy and pest-free trees across the genera *Corymbia* and *Eucalyptus*, and can also be due to cultivation, senescence, and unexplained but normal physiological responses. *Eucalyptus globulus*, Long Beach, CA. (D. R. Hodel).

Figure 12. Although no adults, nymphs, or eggs were found on these leaves of *Eucalyptus globulus*, infestations of the bronze bug are reported eventually to lead to extensive areas of chlorotic and necrotic tissue that is tannish or silvery, as if chlorophyll has cleared in irregular patches. Hartwell Park, Long Beach, CA. (D. R. Hodel).

cleared in irregular patches (**Figs. 12-13**). In these instances abundant adults, nymphs, and black egg cases are typically visible (FAO 2012, Nadel et al. 2009). Severe infestations can lead to leaf loss, canopy thinning, branch die back, and even tree death (Nadel et al. 2009, Wylie and Speight 2012). Severe symptoms are especially common on *Eucalyptus camaldulensis* (red gum), *E. grandis* (flooded or rose gum), and *E. viminalis* (manna or ribbon gum) while in other species symptoms are often less severe and include only silvering (Laudonia and Sasso 2012). In some instances the bronze bug has been reported to "sting" people and was considered a nuisance (Jacobs and Neser 2005).

Host Range

Over 30 species and hybrids of eucalypts in the genera *Eucalyptus* and *Corymbia* are recognized hosts of the bronze bug. Host eucalypts common in the southern California landscape include *Corymbia citriodora* (lemon-scented gum) (**Fig. 1**) *C. maculata* (spotted gum), *Eucalyptus camaldulensis* (**Fig. 2**), *E. globulus*, *E. grandis* (**Fig. 3**) *E. nicholii* (narrow-leaved black peppermint), *E. pulverulenta* (silver-leaved mountain gum), *E. rudis* (flooded gum), *E. saligna* (Sydney blue gum), *E. sideroxylon* (red ironbark), *E. tereticornis* (forest red gum), and *E. viminalis*. *Eucalyptus grandis* was especially susceptible and

typically showed severe damage in Italy (Laudonia and Sasso 2012). In Portugal, *E. camaldulenis* and *E. viminalis* appeared especially susceptible (Garcia et al. 2013).

Management

Because spread of the bronze bug over long distances among urban centers is primarily human mediated, a better understanding and appreciation of invasive pathways is critical for prevention (Nadel et al. 2009). Better monitoring and control at transportation hubs is critical to prevent spread of this pest.

Systemic pesticides like imidacloprid and similar materials appear to be effective in controlling the bronze bug. Noack et al. (2009) showed that imidacloprid microinjected into *Eucalyptus scoparia* (Wallangarra white gum)at 3 to 5 ml/10 cm effectively controlled the bronze bug for two to three years although this method might not always be practical and economical (CABI 2016). However, for especially important trees this treatment might be warranted.

Biological control might be the most feasible way to control the bronze bug. The wasps *Cleruchoides noackae* and *Stethynium* sp. (Hymenoptera: Mymaridae) have been established as egg parasitoids of the bronze bug in Australia (Lin et al. 2007) but their effectiveness has not been thoroughly assessed (FAO 2012, Nadel and Noack 2012, Nadel et al. 2012).

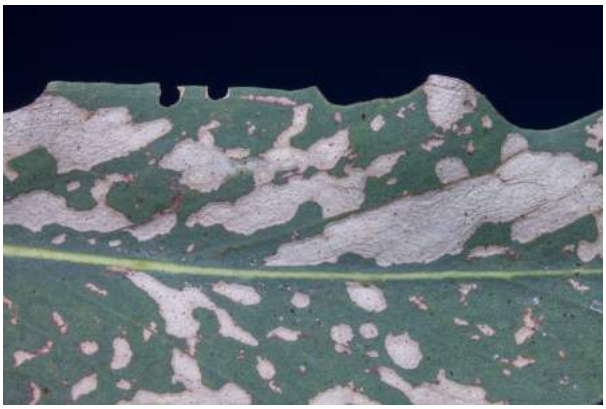

Figure 13. These irregular necrotic patches on leaves of *Eucalyptus globulus* might be due to the bronze bug but we were unable to find adults, nymphs, or eggs of the pest. Hartwell Park, Long Beach, CA. (D. R. Hodel).

Chrysoperla externa (Neuroptera: Chrysopidae) (green lacewing), *Atopozelus opsimus* (Hemiptera: Reduviidae) (assassin bug), and entomopathogenic fungi, like *Beauveria bassiana* and *Erynia radicans* (Entomophtorales), have been reported as natural enemies of the bronze bug in Brazil (Mascarin et al. 2012, Wilcken et al. 2010). Also in Brazil the predatory stink bug *Supputius cincticeps* (Hemiptera: Pentatomidae) was found preying on the bronze bug (Souza et al. 2012). In Portugal late instar larvae of the neotropical *Hemerobius bolivari* (Neuroptera: Hemerobiidae) were found preying on bronze bug nymphs (Garcia et al. 2013).

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