Information for pest management professionals and pesticide applicators

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Erythrina Stem or Twig Borer:

A new and potentially devastating pest of coral trees in California

The Erythrina stem borer (ESB) (sometimes also known as the Erythrina twig borer), *Terastia meticulosalis*, a potentially devastating moth pest of *Erythrina* spp. (coral trees), has been sighted numerous times in southern California in the latter half of 2015, from San Diego to Ventura.

Erythrina, a member of the Fabaceae (bean family) encompasses about 112 species and includes some of our most useful, valuable, well adapted, and spectacular flowering trees, adorning landscapes along the coast and adjacent plains and valleys in southern California.

The ESB is of special concern because so little is known about its management. It appears to be especially destructive on coral trees, infesting seeds, destroying branch tips, and even killing whole plants. In Florida where it is native, ESB is a serious pest of naturally-occurring and exotic coral trees, which are valued for agriculture, medicine, and landscape ornament. Indeed, the cultivation of exotic coral trees in Florida is difficult because of the ESB; the only coral tree that can be cultivated reliably there is the native *Erythrina herbacea*, which likely co-evolved with

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Figure 1 (above). Erythrina caffra, *a handsome spring-flowering tree.*

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Figure 2 (right). The adult Erythrina stem borer.

and is found over most of the range of the ESB.

In California, the ESB has been observed so far on *E.* × *bidwillii, E. chiapasana, E. coralloides, E. crista-galli,* and *E. falcata;* other species will likely be added in the future. Although much remains unknown about the ESB in California, at least at this early stage, the ESB seems to prefer species of coral trees with more slender stems and slender regrowth of larger-stemmed species.

Fortunately, another serious pest of coral trees that is sympatric and co-evolved with the ESB, the Erythrina leaf roller (*Agathodes designalis*), has not yet been detected in California. The Erythrina leaf roller and the ESB are in closely related genera that have tended to niche-partition the coral tree resource to reduce inter-species competition.

The summary provided here of ESB taxonomy, identification, distribution, life cycle, and damage is from the scientific literature and our observations of infested coral trees here.

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Erythrina Stem Borer

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Taxonomy

The ESB is one of five species in the largely tropical moth genus *Terastia*, which ranges from the Americas to Africa, Asia, and the western Pacific. The ESB is the only species of the genus native to the Americas. The other four species are *T. africana, T. egialealis* (Africa), *T. margaritis* (India), and *T. subjectalis* (Asia and western Pacific).

Identification

The adult ESB is a small-sized, brownish moth with mottled forewings, and whitish hindwings with dark margins. Varying in size, adult forewing wingspans range from 2.5 to 4.6 cm, and the mottled body from 1.5 to 2.5 cm long, the latter with conspicuous knobs toward the posterior. In Florida the ESB varies greatly in size, which largely depends on the seasonal generation and diet.

The spring generation, which feeds mostly on seeds, is larger than the fall and summer generation that feeds inside stems. For example, wingspans of the spring generation average about 3.7 cm while those of the summer and fall generations average about 3cm and 2.5 cm respectively. When at rest, the mottled- or marble-brown forewings are effective at camouflaging the ESB but when the wings are spread, the white hind wings are conspicuous. Males and females are similar but the latter has more beige-brown forewing markings.

In live specimens, the knobby abdomen is held in a curved, upright position, mimicking a praying mantis head, which is possibly a deterrent to predators.

Eggs of the ESB, typically laid singly in the axils of leaves near stem tips, are translucent, white, delicate, dome-shaped with a reticulated surface, and about 0.8 mm long. Young larvae are minute, about 0.5 mm long, and probably burrow directly into the flower, stem, or sometimes even a leaf petiole and then follow it to the stem.

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Figure 3. Larvae of the Erythrina stem borer have cream-colored bodies and a black head.

Larvae of the ESB are translucent and brownish-white or cream-colored, with a hardened black head and a dark prothoracic plate that becomes lighter as the larva matures. Mature larvae are about 4 cm long. Larvae turn pinkish before pupation, especially when they complete their development on seeds. Pupae are cigar-shaped, light brown, and enclosed in a loose, double-layered cocoon.

Distribution

Endemic to the Americas, the ESB occurs from South Carolina to Florida and west to Arizona (and now California) in the United States, and south to Argentina. Although recorded from Hawaii, this report is now thought to be a misidentification. Numerous publications list it as part of African or Asian faunas, but that misconception has been recently clarified, and it seems to be a strictly New World species with superficially similar but genetically distant relatives in other tropical regions.

Life Cycle and Damage

Larvae of the ESB likely emerge through the ventral surface of the egg and tunnel directly into the plant. The downward-boring larvae feed on stem tissues as they go, hollowing out the stem and causing a characteristic dying-off of stem tips, which turn black and sometimes collapse. The

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Figure 4. Dying-off of stem tips, which turn black and sometimes collapse, is characteristic of the ESB.

entire upper and lateral sides of the plant canopy can be killed. This damage acts like pruning, forcing out new lateral shoots below the damaged area; these, in turn, can become infested and killed. Entire plants can be killed although this can take up to several years.

In Florida after killing off stem tips in the spring, the last-instar larvae move into seed pods, a condition which appears to be less common in California so far. Feeding on the red seeds typically causes larvae to accumulate

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Downy Mildew on Ice Plants

A downy mildew caused by the fungus *Peronospora mesembryanthemi* has recently been confirmed by the USDA-APHIS from a red apple ice plant (*Aptenia cordifolia*) sample collected in San Diego. Since this first finding in San Diego County in summer 2015, the disease has spread to Orange, San Bernardino, and Ventura counties and is now found in the Goleta area in Santa Barbara County.

Peronospora mesembryanthemi was first reported from South Africa and later in the United Kingdom and New Zealand, but has never before been reported in North America. The host range of *P. mesembryanthem*i is thought to be limited to ice plants, and in California it is currently found infecting the red apple ice plant, trailing ice plant or pink carpet *(Delosperma [= Mesembryanthemum] cooperi)*, and *Lampranthus* spp. These ice plant species are all native to southern Africa.

Because of their environmental hardiness, ease of growing, and bright, colorful flowers, ice plants are grown as ornamental plants or as ground covers. However, the red apple ice plant, which is sometimes considered a weed, is also listed as an invasive plant by the California Exotic Pest Plant Council.

Pathogen

Downy mildew appears as a mat of grey, blue, or brown fungal growth on the undersides or sometimes on both sides of leaves and other infected plant parts. Fungal growth consists of the asexual fruiting structures known as sporangia that are produced on sporangiophores, which are specialized hyphae.

Downy mildew fungi cause systemic infection and grow internally in all plant parts. Infection rapidly spreads under cool and wet conditions. Windblown rain or sprinkler splashing help disperse sporangia and aid in the disease spread. Downy mildew fungi are obligate parasites of plants and most of them have a narrow host range of one or just a few hosts.

Damage

The rapid spread of *P. mesembryanthemi* through southern California could be from accidental movement of infected nursery stock. Severe damage with heavy or total loss of plantings is becoming common in southern California counties where the disease is currently found.

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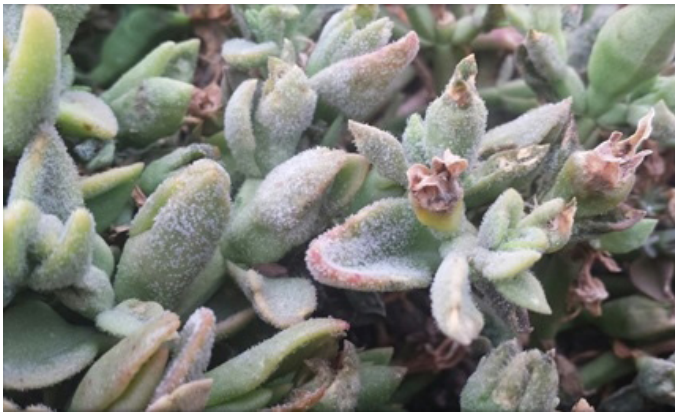

J. RODRIGUEZ, SOIL & PLANT LABORATORY, INC.

Figure 1. Greyish sporulation of Peronospora mesembryanthemi *on an ice plant.*

H. SCHECK

Figure 2. Downy mildew-infected red apple ice plant.

H. SCHECK

Figure 3. Severe downy mildew damage to an ice plant.

Pests in the Urban Landscape ucanr.edu/blogs/UCIPMurbanpests

The **Pests in the Urban Landscape** blog provides a one-stop site for UC IPM news related to pests of homes, gardens, landscapes, and structures. We post articles from our newsletters as well as announce new and revised Pest Notes and other new educational materials or activities of interest to urban and residential audiences.

Erythrina Stem Borer

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reddish pigments, changing their color to pink before they pupate. In contrast, summer and fall generations feed inside the stem and do not feed on the hardened seeds; thus, they are typically paler in color and do not take on the pinkish hue.

Larvae typically purge the hollowed-out stem of frass by crawling backwards to the entry hole to defecate. Full-grown larvae descend from a silk thread to the ground and construct their cocoons in leaf litter to pupate. They have also been found in cocoons in old dead flowers at the ends of dead stems or inside folded up living leaves on the plant.

Management

Further work is needed on this pest that poses a serious threat to California's ornamental landscape coral trees. Unfortunately, very little is known about the management of the ESB. Nearly all attempts at post-infestation eradication in Florida have failed. Virtually nothing is known about potential resident natural enemies so it is unclear at this time what, if any, effect biological control will have.

Vigilant scouting followed by judicious and immediate removal, bagging, and disposal of infested shoot tips, perhaps coupled with ground and foliar treatments with systemic insecticides, might be effective and justified for rare, exceptional, noteworthy, and valuable coral tree specimens. Because the ESB pupates in leaf litter on the ground, thorough raking and disposal of fallen leaves might reduce regeneration and provide some control.

Although not yet tested for ESB, residual broad-spectrum insecticides might be effective against the ESB, as these materials have relatively long residual effects. However, they can also negatively affect beneficial insects and other nontarget invertebrates.

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Read the full article, originally published in the eJournal **PalmArbor** *at ucanr.edu/sites/HodelPalmsTrees/files/233984.pdf .*

Downy Mildew

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Management

There are relatively few fungicides effective against oomycetous fungi, and control can be very difficult. Since most of the fungicides available inhibit rather than kill the fungal growth, treatments against *P. mesembryanthemi* only suppress the fungus; systemic infections cannot be cured.

Downy mildew fungi evolve very quickly to form new races and can rapidly develop fungicide resistance.

Good cultural practices and sanitation can prevent or minimize downy mildew of ice plants.

Some management options include:

- Prune plants regularly and remove weeds to improve air circulation and reduce fungal growth.
- Avoid overhead irrigation during cool weather.
- Consider watering in the morning hours so that plants dry during the day.
- Do not over- or under-fertilize as it may increase the chances of infection.
- Monitor highly susceptible species like the red apple ice plant and remove and destroy plants with symptoms of infection.
- Consider other non-host plants as ground covers when replacing diseased ice plants.

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WHAT IS IPM? Integrated Pest Management (IPM) programs focus on long-term prevention of pests or their damage through a combination of techniques including resistant plant varieties, biological control, physical or mechanical control, and modification of gardening and home maintenance practices to reduce conditions favorable for pests. Pesticides are part of IPM programs but are used only when needed. Products are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.

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Additional features include:

- 575 high-quality, color photographs to help you recognize the causes of plant damage and identify pests and their natural enemies
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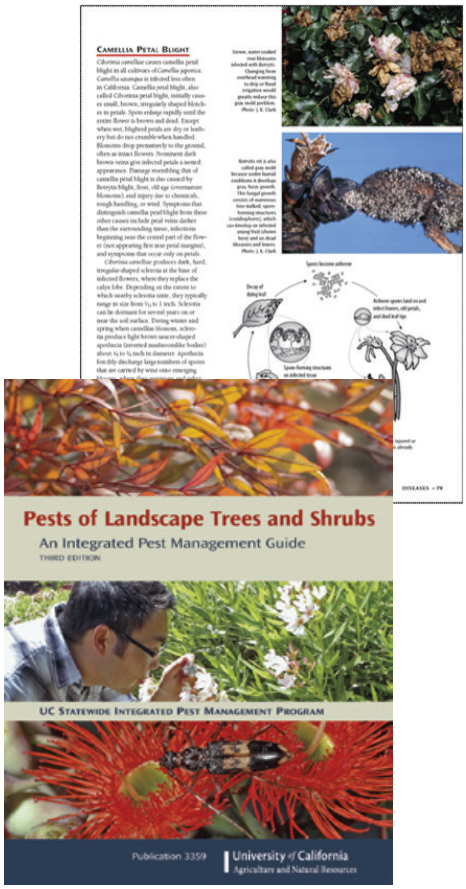
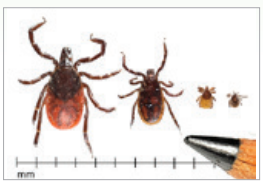


New & Revised Pest Notes

Mealybugs is a brand new Pest Note on these common honeydew-producing insects. It's available online at ipm.ucanr.edu/PMG/PESTNOTES/pn74174.html.

Weed Management in Lawns. Newly revised, this comprehensive guide covers common weeds, cultural control methods, and herbicides. ipm.ucanr.edu/PMG/PESTNOTES/pn74113.html.

Lyme Disease in California contains updated information about ticks that carry Lyme Disease, how to prevent tick bites, and what to do if bitten. ipm.ucanr.edu/PMG/PESTNOTES/pn7485.html.



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