Pest Alert

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Forest Service
State and Private Forestry
Pacific Southwest Region

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Mediterranean Pine Engraver

In May 2004, a new exotic bark beetle for North America was discovered in baited flight traps in Fresno, California during an annual bark beetle and woodborer survey by the California Department of Food and Agriculture. This bark beetle was identified as *Orthotomicus erosus* (Wollaston), the Mediterranean pine engraver (Fig. 1), a well-documented pest of pines in the Mediterranean region, the Middle East, Central Asia, and China. This beetle has been intercepted many times in the past at U.S. ports in association with solid wood packing material. Since the initial detection, the beetle has been found in flight traps in five counties in California's southern Central Valley (Fig. 2). Furthermore, in Fresno, Tulare and Kern counties, abundant overwintering populations of larvae, pupae, and adults have been found in cut logs of Aleppo pine and Italian stone pine. The Mediterranean pine engraver beetle has so far been detected in urban and peri-urban locations, particularly parks, golf courses, and green waste recycling facilities.

Figure 1. Adult male actual size

Figure 2. California counties where the Mediterranean pine engraver has been detected as of May 2005 (Merced, Madera, Fresno, Tulare, and Kern Counties).

Identification

Adult beetles are approx. 1/10 inch (2.7-3.5 mm) in length and reddish-brown (Fig. 1). Mediterranean pine engraver adults can be distinguished from other small bark beetles by a moderately concave declivity on the end of the abdomen bearing four pairs of spines on each side. The second spine is the broadest of the four (Fig. 3). For further details on identification, refer to the web-based "Screening Aid" in sources. Adult males have more pronounced spines than females. Larvae are white to cream-colored, legless grubs and up to 1/10 inch long. They can be found in the galleries on the underside of bark (Fig. 4). Parent galleries often have two branches, sometimes three. These egg galleries comprise the central tunnel; each is approximately ½ to 5 inches long with numerous larval tunnels extending outwards (Fig. 5).

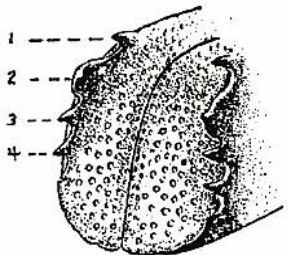

Figure 3. Spines on posterior declivity of male (Wood 1982).

Biology

Mediterranean pine engraver adults generally behave as secondary pests. They are most likely to infest recently fallen trees, standing trees that are under stress, logging debris, and broken branches with rough bark that are at least two inches in diameter. Healthy trees have rarely been attacked. In Israel, beetles are often found on the main stem and larger branches of stressed trees that are over 5 years old. In California, this species, or evidence of its past activity, has been found in cut logs from 6 inches to 3 feet in diameter, on stumps from 4 inches to 3 feet in diameter, on declining

branches of live standing trees, and on the main stem of dead standing trees. This species has two generations per year in Turkey, France and Morocco; 3-4 generations in Tunisia and South Africa; and 3-5 generations in Israel where adults are active from March to October. In California, the number of generations per year is not yet known.

Males first colonize trees and construct a nuptial chamber and then are typically joined by two females. Each female mates and constructs an egg gallery in opposite directions. Females lay 26-75 eggs and may leave the gallery to lay eggs in a second gallery. The eggs hatch and the larvae feed in the phloem causing a distinctive "engraving" pattern (Fig. 5). Larvae develop through three instars expanding the tunnels as they feed. As the tunnels expand, they may overlap with one another. When larvae are ready to pupate, they tunnel towards the bark, especially in cases where the phloem is thick. Observations in the Central Valley of California indicate that this species overwinters as larvae, pupae and adults beneath the bark surface. Overwintered adult beetles start flying in late February and establish brood galleries by mid-March. Flight of parent and new adults continues until October or November. In Israel, adults start brood production in early March and require a period of feeding before reaching sexual maturation. When beetles complete their development, the adults emerge, leaving a small round exit hole in the outer bark, approx. 1/16 inch in diameter (Fig. 6). New adults may re-infest the same host material that they emerged from or may attack new material.

The interactions between Mediterranean pine engraver and other bark beetles are not well known. High population densities of Mediterranean pine engraver larvae and cerambycid woodboring larvae have been found in the same host material in California. In South Africa, this beetle has been found attacking the same tree along with other bark beetles and weevils, including the red-haired bark beetle, *Hylurgus ligniperda* (F.). Mediterranean pine engraver has several known natural enemies. The Syrian woodpecker (*Picoides syriacus*) has been observed feeding on the beetle in Israel. In South Africa, the larvae are parasitized by wasps (*Dendrosoter caenopachoides*, Braconidae; *Metacolus unifasciatus*, Pteromalidae) and fed upon by the several predatory beetles *Alulonium ruficorne* (Colydidae), *Corticeus pini* (Tenebrionidae), *Platysoma oblongum* (Histeridae) and the predatory bug *Lyctoris* sp. (Anthocoridae). Although natural enemies in California have not been identified yet, predatory adult colydiid beetles, *Lasconotus* sp., and trogossitid larvae, *Temnochila chlorodia* (Mannerheim), have been observed in a few Mediterranean pine engraver galleries.

Figure 4. Larva in gallery.

Figure 5. Brood gallery with nuptial chamber in center (indicated by arrow).

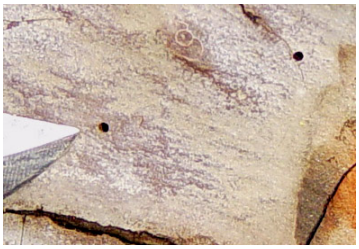

Figure 6. Exit holes in bark.

Distribution and Hosts

The native range of this beetle is the Mediterranean, the Middle East, Central Asia, and China. It has been introduced into Chile, England, Fiji, Finland, South Africa, Swaziland, and Sweden. The Mediterranean pine engraver is well-established in Chile and South Africa causing damage to trees in plantations, as evidenced by numerous publications on this species from those locations. The reports of this beetle in England and Scandinavia raise serious concerns given the similarities in climate to much of the northern U.S. However, careful examination of records from northern Europe suggest that this beetle is probably not established in the British Isles or Scandinavia. In

1921, a large number of beetle larvae, pupae and adults were found on a felled Scots pine in Gloucestershire, England. However, this initial infestation does not appear to have persisted. Since then, the only collections in the UK have been reported at ports or from cargo in the UK. Reports from Scandinavia also mainly consist of interception records or cases of misidentification.

In its native and introduced range, the beetle reproduces in a variety of pines that occur in native stands or ornamental plantings in the U.S. (Table 1). They have also been found in Douglas-fir (*Pseudotsuga menziesii*), spruce (*Picea* sp.), fir (*Abies* sp.), cypress (*Cupressus* sp.), and cedar (*Cedrus* sp.), but these non-pine hosts are thought to be used mainly for maturation feeding or overwintering sites for adults.

Potential Impacts

In California, evidence of the Mediterranean pine engraver has already been found in most of the ornamental and native pines listed as potential hosts from the western U.S. (Table 1). Although old galleries of the beetle have been observed on Monterey pine, the beetle does not yet occur in the far western areas of the state where this pine is more prevalent. Thus, the beetle is presently a pest of ornamentally planted pines in the Central Valley of California, but may spread to native stands of Coulter, Monterey, or other pines in adjacent areas of the state. The broad host range of the Mediterranean pine engraver may also facilitate its establishment in other warm pine-growing regions of the U.S., particularly the Southeast. In addition to southeastern pines listed in Table 1, a variety of other pine trees in that region are potentially suitable hosts (Table 2). Besides direct feeding on phloem, this beetle also may vector pathogenic fungi that further weaken pine trees. The beetle may carry spores of fungal pathogens already present in the U.S. or other unknown pathogens from other areas of its native or introduced range. In South Africa, the beetle has vectored the pathogenic bluestain fungus, *Ophiostoma ips* (Rumb.) Nanf., affecting Monterey and maritime pines (*Pinus pinaster*).

Symptoms

Infestations of Mediterranean pine engraver can be difficult to detect until the tree has declined. On the bark surface, small entrance holes with frass pushed out and exit holes may be visible, especially on smoother bark surfaces. These entrance and exit holes may be difficult to find on very rough-barked regions of the tree. Inspection of the underside of the bark of dying pines (Fig. 7) may reveal a dense network of galleries (Fig. 8). Feeding activity of new adults may obliterate the characteristic gallery pattern in the phloem.

Management

Prevention is the key to managing Mediterranean pine engraver. This involves good sanitation, limiting movement of recently cut pine branches and stems, keeping standing trees healthy, and early detection of infestations. Populations can build up when freshly

Table 1. Pines common in the U.S. and known to be suitable hosts for Mediterranean pine engraver reproduction (Eglitis 2000).

Pines in western U.S.	
Afghan	*Pinus eldarica*
Aleppo	*P. halepensis*
Canary Island	*P. canariensis*
Coulter	*P. coulteri*
Italian stone	*P. pinea*
Monterey	*P. radiata*
Turkish	*P. brutia*
Pines in eastern U.S.	
Eastern white	*P. strobus*
Scots	*P. sylvestris*
Shortleaf	*P. echinata*
Slash	*P. elliottii*

Table 2. Potential pine hosts in the southeastern U.S.

Loblolly	*P. taeda*
Longleaf	*P. palustris*
Pitch	*P. rigida*
Virginia	*P. virginiana*

Figure 7. Dead Aleppo pine colonized by Mediterranean pine engraver. Cause of tree death unknown.

Figure 8. Inner bark from log colonized by Mediterranean pine engraver.

cut, broken, or dead logs/branches are available. The following good sanitation practices are recommended: 1) avoid piling any pine material next to live trees; 2) chip, burn or debark freshly cut pine material; or 3) for small quantities of pine material, completely cover material with thick, clear plastic sheeting in a sunny location. Beetle populations can spread quickly if infested pine logs are transported. Thus, moving firewood around is undesirable. Proper care and watering of standing trees can reduce the probability of an outbreak since beetles have been only observed to attack living trees under drought or fire stress. Early detection of the Mediterranean pine engraver will enable people in affected areas to become more cautious. Funnel traps baited with α-pinene, methylbutenol, ipsdienol, and ethanol are effective at catching flying adults. Research is proceeding to improve this attractant and to discover repellent semiochemicals to protect standing trees.

Arrival to U.S.

How the beetle entered the U.S. is unknown, but it may have arrived with solid wood packing material associated with imported goods. In a survey of records from the USDA APHIS Port Information Network (1985-2001), Mediterranean pine engraver was the second most frequently intercepted bark beetle species at U.S. ports with a total of 385 interceptions. Beetles were most frequently associated with imports from the following countries in descending order: Spain, Italy, China, Turkey, and Portugal. Based on remnants of old galleries observed in dead standing trees in Fresno and Kern Counties, and in cut pine logs in Fresno and Tulare Counties, this beetle was likely present in California for at least 3-5 years before its detection in 2004.

Sources

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Authors:

Jana C. Lee, Postdoctoral Associate, Department of Entomology, University of California Davis
Sheri L. Smith, Supervisory Entomologist, Forest Health Protection, Region 5, USDA Forest Service
Steven J. Seybold, Research Entomologist, Pacific Southwest Research Station, USDA Forest Service

Photo credits:

Jana C. Lee and Steven J. Seybold (Figs. 4-8), Peter Cranston (Fig. 1)

Prepared by:

USDA Forest Service	USDA Forest Service	Department of Entomology
Forest Health Protection	Pacific Southwest Research Station	University of California
Susanville, California	Davis, California	Davis, California