



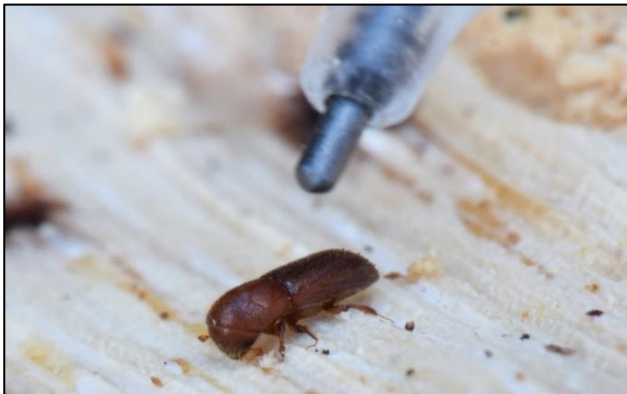
Forest Facts:

Mediterranean Oak Borer

Xyleborus monographus (Fabr.)

Authors: Karen Ripley (USFS Region 6 Forest Health Protection*) and Wyatt Williams (ODF)

The Mediterranean oak borer (MOB) is a pencil-lead-sized brown “ambrosia” beetle. Female beetles tunnel into thin-barked sites or bark cracks on the upper branches, broken branches or freshly cut firewood of oak trees, and probably other hardwoods. They carry fungi within specialized pits near their mouth parts, inoculate their tunnels or “galleries” with fungi such as *Raffaelea montetyii*



Female Beetle – Source: Curtis Ewing, CAL Fire

and *Fusarium solani*, and lay eggs. The larvae that hatch eat the fungus that grows in the insect galleries within the wood. However, these fungi, specifically *R. montetyii*, can act as pathogens that cause a wilting disease in susceptible trees. Over several years, the beetles infest and reinfest the trees, with subsequent generations moving toward the main trunk, until the host trees are killed.

Current distribution

MOB is native to Europe, western Asia (Iran, Israel, Russia, and Turkey), and northern Africa (Algeria and Morocco). It has spread long distance to Korea and the United States (California and Oregon). Generally, it infests weakened or dying trees of a variety of oak and beech species that are already suffering from drought, other pests, or disease. Although

specific temperature or climate limits have not been determined, it’s likely capable of surviving throughout much of western and southern Oregon, and especially thriving at the elevations $\leq 2,000$ feet above sea level where oak grows.

MOB has been detected in Oregon since 2018. One beetle was captured in a trap in 2018 at Chinook Landing near Troutdale. One beetle was captured in a trap near Woodburn in 2021. In 2022 across seven sites in four counties, there were 21 beetles captured, 14 of which were near Troutdale. In May 2023, the first Oregon white oak tree (*Quercus garryana*) was found to be positive for MOB near Troutdale.

Meanwhile in California, reports of dying valley oak (*Quercus lobata*) came from Napa and Sonoma counties in 2019. Large populations of MOB have



Male Beetle – Source: C. Ewing, CAL Fire

likely been present there and killing trees since at least the early 2010s. MOB infestations have spread to adjacent Lake and nearby Sacramento counties. Blue oak (*Q. douglasii*) is also a known host. A single, very limited attack was found in a severely distressed California black oak (*Q. kelloggii*). California officials determined that MOB is already established and too widespread to be eradicated from central California.

*Production of this fact sheet received financial support from the Urban & Community Forestry Program of the USDA Forest Service

Hosts

The major hosts of MOB are oak (*Quercus*) species.

Reported from California: Section *Quercus* (white oaks): *Q. lobata*; *Q. douglasii*. Section *Lobatae* (red oaks): *Q. kelloggii*.

Reported from Europe, Asia & literature records:

Section *Quercus* (white oaks): *Q. boissieri*; *Q. lustanica*; *Q. petraea*; *Q. pubescens*; *Q. robur*. Section *Lobatae* (red oaks): *Q. rubra*. Section *Mesobalanus*: *Q. canariensis*; *Q. frainetto*; *Q. pyrenaica*. Section *Cerris*: *Q. castaneifolia* var. *incana*; *Q. calliprinos*; *Q. cerris*; *Q. coccifera*; *Q. ilex*; *Q. suber*. Section *Ponticae*: *Q. pontica*

A. Transverse section



Galleries in valley oak infested with MOB. Source: C. Ewing, CAL FIRE

Pathway

Although the specific invasion pathway by which MOB came to Oregon and California is unknown, ambrosia beetles are commonly transported in untreated infested wood such as firewood, dunnage, and wood packing materials. Another pathway is through the plant nursery trade. For MOB, there could be an association with oak wine barrel staves imported from Europe.

Signs of infestation

At the forest stand level: mature oak trees may have signs of individual branch death (flagging) in the top third of the tree. The leaves are initially wilted, but then turn red. Leaves eventually fall off leaving bare, dead branches. The branch death advances down, toward the main trunk, and the

Uncommon hosts include: *Acer* sp.; *Acer campestre*; *A. plantanoides*; *Carpinus betulus*; *Castanea sativa*; *Fagus orientalis*; *F. sylvatica*; *F. sylvatica* ssp. *Orientalis*; *Juglans regia*; *Prunus avium*; *Ulmus campestris*; *U. montana*; *U. laevis*.

Unsuccessful attacks were observed on a sycamore (*Platanus* sp.) near heavily infested valley oaks in Napa County.

Note: Research trials at University of California-Davis indicate that Oregon white oak (*Q. garryana*) is vulnerable to the fungal pathogen, *R. montetyii*.

B. Tangential section



Galleries in valley oak infested with MOB. Source: C. Ewing, CAL FIRE

local beetle populations increase. Broken branches and dead canopies occur in advanced stages.

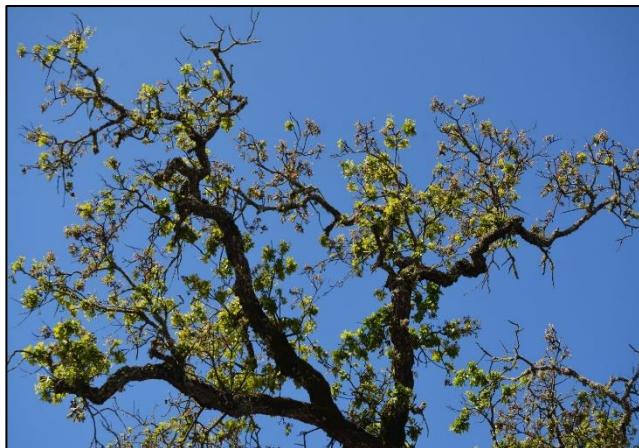


Canopy dieback of oak during early stages of infestation by MOB. Source: C. Ewing, CAL FIRE

Individual tree

Upper most limbs (6-8" diam) are preferred, with beetles working down to the trunk over period of ~ 3-5 years until the tree is girdled, wilts and dies.

The bark has abundant round entrance and exit holes about 1/16" (1.3-1.5 mm) in diameter.



Wilting and canopy dieback of oak infested with MOB. Source: C. Ewing, CAL FIRE

White (wood-colored) boring dust is pushed out and accumulated in mounds on horizontal surfaces, the ground, and in bark crevices, moss, or spider webbing.



White boring dust accumulated on bark of valley oak. Source: C. Ewing, CAL FIRE

Initial probing galleries are simple and up to 1 m long. Later the tunnels, or galleries, are branching, trellis-like and black stained. The tunnels are crowded, 1.2-1.5 mm in diameter, fan out in a plane, cross, fork, and may intersect. There are no egg niches or specialized larval tunnels.

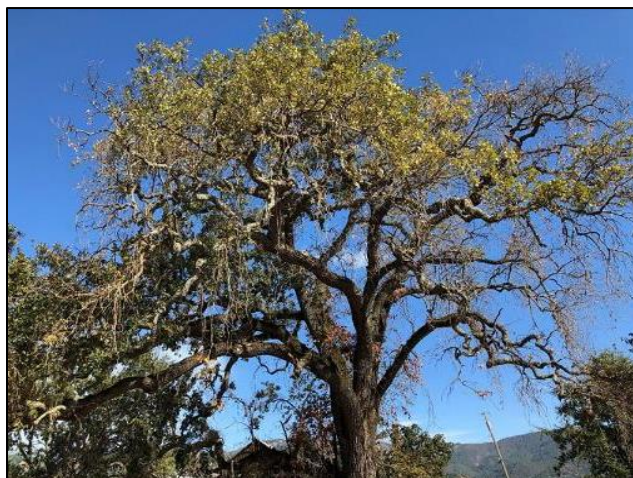


Later stages of MOB infestation when beetles have progressed down tree branches towards main bole of oak tree. Source: C. Ewing, CAL FIRE

Tiny brown beetles are within the tunnels or on the wood surfaces. Females average 3.1 mm long; males are 2.3 mm long, inhabiting the deepest areas of the gallery system. Females far outnumber males. Eggs and white larvae are inside the tunnels

Similar damage

Thinning crowns, stunted foliage growth and branch dieback in oaks can also be caused by other stressors, including drought and other bark and ambrosia beetles, such as *Pseudopityophthorus pubipennis*. Common native ambrosia beetles (*Monarthrum* sp.) in Oregon oaks have similar looking galleries but branch out from a single point. Additionally, native ambrosia beetles do not attack live, mature trees. Instead, native ambrosia beetles prefer dead or dying trees.



Infested valley oak in California with dieback. Source: C. Ewing CAL FIRE

Firewood

While globally ambrosia beetles are transported in solid wood packing material and plant nursery stock, at the regional level, ambrosia beetles like MOB and other forest insects and diseases are moved through firewood. Please adopt and support the Don't Move Firewood educational campaign.

Report an Invader!

If you observe signs or symptoms of possible MOB infestation, report it! Describe the location and your observations and submit photos and your contact information through the Oregon Invasive Species Council's website:

<https://www.oregoninvasivespeciescouncil.org/report-an-invader> or phone in your observation to Oregon's Invasive Species Hotline: **1-866-INVADER (1-866-468-2337)**.

Other Resources

- University of California Agriculture and Natural Resources website: <https://ucanr.edu/sites/mobpc/>
- University of California Agriculture and Natural Resources pest alert: <https://static1.squarespace.com/static/58740d57579fb3b4fa5ce66f/t/5f46ccb55bbec03869a9206e/1598475452109/MOBPC+Pest+Alert+Aug+2020.pdf>

- Mediterranean Oak Borer Detected in Lake, Napa, and Sonoma Counties. California Department of Food and Agriculture Press Release #20-103. August 4, 2020: https://www.cdfa.ca.gov/egov/Press_Releases/Press_Release.asp?PRnum=20-103
- Don't Move Firewood website: <https://www.dontmovefirewood.org/>



Galleries of native ambrosia beetles (Monarthrum sp.) in oak. Note that the galleries do not branch and have minimal crossing. Additionally, Monarthrum ambrosia beetles do not attack healthy, live trees. Source: C. Ewing, CAL FIRE