

# Frequently Asked Questions

## Mediterranean oak borer

Dec. 4, 2023

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### 1. What is Mediterranean oak borer?

Mediterranean oak borer (*Xyleborus monographus*) is a brown “ambrosia” beetle about the size of pencil lead that has made its way into North America. 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 some other hardwoods. They carry fungi which start growing in tunnels the beetles make in the sapwood of trees. Some of these fungi can cause a vascular wilt in susceptible trees, eventually killing them.

### 2. Where is Mediterranean oak borer from?

Mediterranean oak borer (MOB) is native to Europe (including Russia), western Asia in Iran, Israel, and Turkey, and to Algeria and Morocco in northern Africa. It has spread long distance to Korea and has now been found in the United States in California and Oregon.

### 3. When was it first discovered in Oregon?

MOB has been detected in Oregon since 2018. That’s when a single beetle was captured in a trap at Chinook Landing near Troutdale. One beetle was also captured in a trap in 2021. In 2022 there were 21 beetle captures across seven sites. Fourteen of the 21 beetles were found in Troutdale. In May 2023, the first Oregon white oak tree (*Quercus garryana*) known to be infested with MOB was found near Troutdale. So far, MOB has also been confirmed in about 30 Oregon white oaks in Wilsonville in Clackamas County.

In California, reports of dying valley oak (*Quercus lobata*) came from Napa and Sonoma counties in 2019. Large populations of MOB have likely been present there and killing native oaks – valley, blue and a single California black – since at least the early 2010s. MOB infestations have now spread to adjacent Lake and nearby Sacramento counties.

#### 4. How did it get to Oregon?

We don't know exactly how MOB reached Oregon. The beetles can unknowingly be transported in infested wood, such as firewood, wooden containers, and other packing material made from wood.

#### 5. What trees does it prefer?

In its native habitat in Europe, North Africa and western Asia MOB has been documented to infest a wide range of oaks and trees in the oak family. Both white oaks and red oaks can become infested. In North America it has attacked Oregon white oak (*Q. garryana*), valley oak (*Q. lobata*), blue oak (*Q. douglasii*) and California black oak (*Q. kelloggii*).

Reports from Europe and Asia document infestations mostly in oak trees, notably in *Q. boissieri*; *Q. canariensis*; *Q. castaneifolia* var. *incana*; *Q. calliprinos*; *Q. cerris*; *Q. coccifera*; *Q. frainetto*; *Q. ilex*; *Q. lustanica*; *Q. petraea*; *Q. pontica*; *Q. pubescens*; *Q. pyrenaica*; *Q. robur*; *Q. rubra*; and *Q. suber*. Some of these, such as red oak (*Q. rubra*), Hungarian oak (*Q. frainetto*), and holly oak (*Q. ilex*) are approved street trees in many Northwest cities.

Uncommon hosts for MOB are beech (*Fagus sylvatica* and *F. orientalis*) and chestnut trees (*Castanea sativa*), which are members of Fagaceae – the same tree family as oaks.

There are even reports of MOB occasionally being found in trees that are not members of the oak family, such as hedge maple (*Acer campestre*), Norway maple (*A. plantanoides*), European hornbeam (*Carpinus betulus*), walnut (*Juglans regia*), sweet cherry (*Prunus avium*) and some European elms (*Ulmus campestris*, *U. montana* and *U. laevis*).

#### 6. On what trees has MOB been detected in Oregon and Northern California?

So far, MOB in Oregon has only been found infesting Oregon white oak (*Quercus garryana*). In northern California, MOB has been detected on different native species of oak, such as valley oak (*Quercus lobata*), blue oak (*Q. douglasii*) and a single California black oak (*Q. kelloggii*).

#### 7. Do we know what size of tree MOB tends to infest?

Mediterranean oak borer can attack young and mature tree of various sizes. Larger, older trees typically have more sapwood and therefore can support a larger population of this pest.

## 8. Do we know how far it has spread to date in Oregon?

Scientists from the Oregon Dept. of Agriculture and other state agencies are working to survey the state to determine exactly where MOB is located. To date, the insect has been found in Oregon white oak trees in the Troutdale area in Multnomah County and the Wilsonville area in Clackamas County, but it has also been caught in traps in Marion and Washington counties.

## 9. How exactly does it kill trees?

Female beetles of MOB carry the fungi *Raffaelea montetyi* and *Fusarium solani* in specialized body parts, called mycangia, near their mouths. They seed their tunnels with this fungi, and then lay their eggs. The larvae that hatch eat the fungi that grow in the insect galleries within the wood. However, these fungi, specifically *R. montetyi*, 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.

## 10. What signs and symptoms do infested trees show?

One sign of infestation with MOB is the bark *may* have abundant round entrance and exit holes about 1/16" (1.3-1.5 mm) in diameter. These can be hard to see without looking carefully as they can be hidden in bark crevices. Pale boring dust is pushed out and builds up in small piles along the trunk, on the ground around the base of the trunk, or trapped in moss and spider webbing.

Infested trees may have individual or multiple branches die (flagging). The leaves are initially wilted, but then turn red. Leaves eventually fall off leaving bare, dead branches. As beetles continue to reproduce and multiply, the main stem or trunk is attacked and weakened. Broken branches and fully dead canopies occur in advanced stages.

Beetles typically only venture into the sapwood layer of trees. Their tunnels, called galleries, are branched and stained black. Broken branches that have fallen from trees should be investigated for signs of these galleries.

There are many other pests, including other types of ambrosia beetles, that may be present in oaks. This guide can help differentiate between MOB and these other pests <https://www.oregon.gov/odf/Documents/forestbenefits/oak-pests.pdf>

**11. How long after infestation does a tree show decline and die?**

Trees may not show signs of decline immediately. As the fungal infection spreads through the tree and beetle populations increase, signs become more apparent. Infested trees may die within 3 to 5 years.

**12. Should I report a suspected MOB infestation in a tree if I see it and, if so, where should I do that?**

If you observe signs or symptoms of possible MOB infestation, please do report it! Describe the location and your observations and submit photos and your contact information through the Oregon Invasive Species Council's website at <https://oregoninvasiveshotline.org/reports/create> or phone in your observation to Oregon's Invasive Species Hotline at 1-866- INVADER (1-866-468-2337).

**13. Can MOB be eradicated in Oregon?**

MOB is already so widespread in California that officials have no expectation of being able to eradicate this tiny insect. Oregon officials also doubt that the insect can be eradicated in Oregon.

**14. Do we know the death rate (mortality) from the fungal pathogen introduced into trees by MOB?**

The death rate in North American tree species from the fungal pathogen MOB spreads is not yet known. Researchers do know it can kill oaks, but they have had too little time to know what percentage of trees might be killed. In its native range, MOB mostly impacts trees that are already dead or dying.

**15. Is there a treatment to prevent infestation by MOB?**

That is still being looked into by forest health researchers.

**16. Can anything be done to treat the fungal infection introduced into trees by MOB?**

That is still being looked into by forest health researchers.

**17. Has anything been learned about their life cycle in North America?**

MOB requires 5 to 8 weeks to develop from an egg to an adult. They can have two or more generations per year (generally three in California). Males are flightless. In

California, mated females have been observed overwintering in their galleries and emerging in late winter or spring when temperatures warm. In Oregon, it's anticipated that adult females could emerge by March or even earlier, and continue emerging beyond October if temperatures are mild. Active adults have been observed on warm days during winter months. If the environment within a tree is still good for growth of their fungal food source, female beetles may opt to reinfest the same tree.

**18. Is there a quarantine in place? Why or why not?**

As of this date, no MOB-related quarantine of wood or plants is in place. In part this is because researchers are still trying to pinpoint all the locations where MOB may be in Oregon, a pre-requisite for establishing an effective quarantine zone. Even without a quarantine, it is recommended to not transport wood from trees known or suspected of being infested beyond the local area.

**19. What are state, federal and local agencies doing in response to MOB's arrival in Oregon?**

State officials with the Oregon Dept. of Agriculture and the Oregon Dept. of Forestry met in October with their California counterparts and officials from the U.S. Dept. of Agriculture, including the U.S. Forest Service and Animal Plant Health Inspection Service (APHIS), to assess what is known about this MOB infestation and what questions still need to be addressed. ODA and ODF are drawing up a response plan based on that meeting and the needs identified.

ODA staff have been setting traps for MOB in order to find out exactly where in Oregon this insect has spread. The traps are baited with lures that mimic chemical distress signals from trees.

Forest pest experts have also been visiting suspected trees to confirm infestation. They have sent trapped insects for DNA sequencing. Surprisingly, the DNA showed that the insects in Oregon appear to be most closely related to MOB populations found in Germany, while those in California appear most closely related to those living in Spain and Portugal. This suggests there may have been separate introductions of this pest into North America rather than a single arrival followed by a spread from one state to the other.

Forest pest experts are also closely watching oaks in infested areas to see if there are traits that make some trees more or less likely to be attacked by the beetles, or which resist the fungal disease better than others.

At the local level, some infested trees have been removed and others are slated for removal. Recommendations for effective ways to safely dispose of infested material are being reviewed. Chipping to 1 inch or burning infested wood on site is the most effective treatment method to date. Other methods, such as insecticide and fungicide treatments are being reviewed for effectiveness.

At this early stage, it's fair to say that there are still many questions to be answered and more research is needed to provide the answers landowners would like to have. One thing that is clear is that people can help slow the spread of MOB and other wood-boring pests like emerald ash borer by buying firewood in the local area where you plan to burn it rather than transporting it long distances. A good rule of thumb is to transport firewood no more than 10 miles from where it is cut, and to keep it within quarantined areas if a quarantine exists.

**20. In light of MOB's presence in Oregon, should cities and towns be taking any oak species off their approved street and yard tree planting lists?**

We don't yet have enough information to recommend removal of any oaks from approved street tree lists.

Information from the native range of Mediterranean oak borer in Europe, North Africa and the Middle East suggests that the insect can be found in a wide variety of oaks and even some other tree species (chestnut, elm and maple). However, the insect does not appear to be a major pest in those lands, with no widespread dieoff of healthy native oaks or other species reported due to MOB.

In Northern California, forestry officials have noted that native California oaks are being infested with MOB and it is transmitting a fungal disease that is proving fatal, at least in many cases. MOB has been identified as attacking valley oak (*Quercus lobata*), blue oak (*Q. douglasii*) and at least one California black oak (*Q. kelloggii*). In Oregon, so far MOB has only been found in Oregon white oak (*Quercus garryana*). In this initial outbreak, based on anecdotal observations, stressed Oregon white oaks that have experienced mechanical trauma or other injury appear to be more susceptible than otherwise healthy oaks nearby. More intense surveying is planned to see if the pest is infesting any other species, and whether any otherwise healthy Oregon white oaks are getting attacked and infected with the MOB-carried fungal disease.

At this stage too little is known to remove oaks from approved planting lists, especially given their importance to ecosystem restoration and for meeting urban forest canopy goals. Because of the risk from existing and new pests and diseases, as a general rule it is always advisable for cities to ensure a wide diversity of tree species, genera and families are planted to avoid catastrophic canopy losses. Where oaks – and Oregon white oaks in particular - represent a significant percentage of one's tree canopy, it is prudent to balance that with planting of trees from different genera and families.

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