MCH for Douglas-fir beetle

October 2023

Place caps 6-8 feet high on the trunk, facing inward on the north side of the trunk to avoid rapid drying. *Christine Buhl, ODF*

MCH (3-methylcyclohex-2-en-1-one) is an anti-aggregation pheromone used to prevent Douglas-fir beetle (a primary bark beetle pest of Douglas-fir) from entering trees. This product is most commonly applied as a 'bubble cap' stapled to individual trees or to trees at spaced intervals to create a repellant 'pheromone cloud' over a larger area. MCH is an inexpensive and effective method to prevent Douglas-fir beetle outbreak especially if paired with an appropriate slash management plan. Landowners may find distributors of MCH online. It is important to consult with a forest health professional for guidance on effectively utilizing MCH.

What is MCH and how does it work?

MCH is a pheromonal repellant produced by Douglas-fir beetles that communicates to individuals of the same species that a tree is fully occupied and resources are limited. Incoming beetles picking up this scent then continue their search for an available tree within which to develop their brood. Continuous searching for a non-repellant (unprotected) tree exhausts beetle fat stores to the point of mortality or redistributes them on the landscape, reducing pressure (or number of attacks) from Douglas-fir beetles in individual trees.

MCH will not work against other bark beetle species (except spruce beetle which will not be covered here)**.** MCH does not work on already infested trees, although, it will protect neighboring, uninfested trees when bark beetles emerge from infested trees the next spring, after their year-long developmental period.

Evidence of Douglas-fir beetle infestation includes small piles of brown boring dust

Brown boring dust / frass (left) and single streams of pitch (right). *Christine Buhl, ODF*

(frass) in bark crevices and sometimes single individual narrow streams of pitch down the trunk. Larger pitch flows or masses are not a result of Douglas-fir beetles. Trees over >10" diameter are susceptible to Douglas-fir beetle attack. This beetle tends to build up in trees that have been felled or blown down by storms in the past year. The next year the following second population can spread to adjacent standing trees. Other stress to trees such as drought, root disease, and wildfire damage also attracts these beetles to a stand.

When should I use MCH?

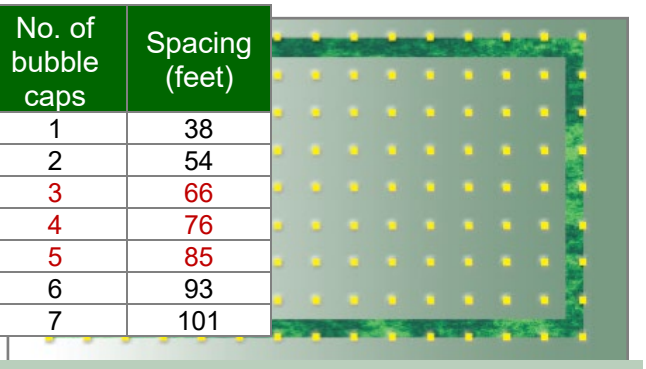
Application of MCH must be completed immediately before Douglas-fir beetle starts flying generally around the start of April. If MCH is applied (or blowdown is removed) before April, Douglas-fir beetle attacks can be averted. If done before the second April, beetles emerging from downed material can still be repelled and dispersed away from the site.

How do I apply MCH?

The formulation of MCH most commonly used is a single or double "bubble cap". Bubble caps are ideally stapled at a height of 6-8 feet on the north-facing side of the tree with the bubble facing inward to prevent them from drying out too quickly. However caps can also be placed on downed trees, stumps, and dead trees to ensure adequate coverage.

MCH is also available in flake and bead formulations that can be applied by hand from the ground, or aerially over larger stands. Each formulation is designed to slowly release volatiles for the duration of bark beetle flights in one season. Another treatment later in the summer can provide added protection from the second, smaller beetle flight in July but is not necessary.

No. of bubble caps	Spacing (feet)
1	38
2	54
3	66
4	76
5	85
6	93
7	101



MCH application grid and number of caps with spacing. Higher efficacy is possible for the application rates shown in red. *Using MCH to Protect Trees and Stands from Douglas-fir Beetle Infestation*

How much do I use?

For protection of a few trees, each tree may be treated with 1-7 bubble caps, depending on trunk diameter. Over larger areas, single bubble caps may be applied in a various patterns to suit the site. These patterns include a grid, parallel lines or a perimeter treatment. Application of single caps at a spacing of 40 feet equals about 30 caps/acre. A tighter perimeter treatment may ensure additional protection. Grid spacing requirements may vary due to wind flow patterns through a stand (e.g., less dense stands are less effective at trapping the volatiles). Studies have also indicated that higher application rates per tree with wider spacing can be equally if not more effective than single cap application (see table).

Management highlights

- MCH is available online
- Apply MCH immediately before Douglas-fir beetle flight in April
- Apply to individual trees, or apply single or multiple caps in a grid layout (see table for number of caps and spacing)
- Staple bubble caps at a height of 6-8 feet on the trunk, north facing side with bubble facing inward
- Cost: $2-5 per bubble cap

The cost of bubble caps is about $2-5 each and they may be obtained from multiple distributors online. MCH is currently classified as a general use pesticide. Bubble caps should be stored in a freezer or refrigerator to prevent drying out. MCH emits a strong smell and should be kept separate from food. Pheromone-based repellants for other bark beetle species, such as verbenone for mountain pine beetle in lodgepole pine has yielded mixed results.

Landowners interested in MCH are strongly advised to discuss treatment strategies with a forest health professional. Application of MCH requires filing a notification in FERNs for lands that fall under Forest Practices Act rules. Research indicates no negative non-target impacts of MCH application on pollinators.

When using pesticides, always read and follow the label.

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