

**Colorado State Forest Service**  
**Summary of Products for Preventive Use Against Mountain Pine Beetle**



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A number of chemical (i.e. insecticides, pheromones) and natural (i.e. biopesticides, organic disease control) products are available to protect trees against mountain pine beetle (MPB). When selecting products to protect trees against MPB, the Colorado State Forest Service advises choosing those that best meet individual management objectives and are part of an integrated pest management program. Making informed choices and following all label instructions and warnings offers trees the best chance to resist mountain pine beetle attack. This document provides an overview of several products currently on the market for use against mountain pine beetle. This document does not provide a comprehensive list of all preventive products. The products are divided into several categories, and the appropriate uses are described for each product. The products are only discussed relative to their use in preventing mountain pine beetle attack.

Chemical and natural products are most effective when the correct dosage is applied at the appropriate time using appropriate application mechanisms that provide adequate coverage. The efficacy of all products will vary on individual trees versus stand or landscape-level treatments, and will be impacted by the surrounding forested landscape, mountain pine beetle population pressure and other pest management practices.

### **Chemical Products**

Currently, almost 100 chemical products are registered for use against bark beetles in Colorado. Chemical products used in the state require registration with the EPA and Colorado Department of Agricultural (CDA). The EPA requires extensive product testing and labeling of active and inert ingredients, and a clear statement of potential health hazards. Chemical products are available in a variety of forms and are delivered or applied by different mechanisms, including sprays and ground application of granules or powders. No stem-injection measures are approved by the EPA for treatment of bark beetles.

When using chemical products, it is important to closely follow all label instructions and safety recommendations. Some chemical products should only be applied by licensed pesticide applicators or with appropriate protective gear. The application of many chemical products is restricted near water, and some are known to have negative impacts on non-target species.

### ***Preventive Sprays***

When applied appropriately, preventive sprays can reduce the risk of individual tree loss to mountain pine beetle. Preventive sprays require annual application prior to bark beetle flights. These

sprays will not impact bark beetles already present in a tree, and will not protect untreated portions of trees.

#### Carbaryl (Sevin<sup>®</sup>), Permethrine (Astro<sup>®</sup>) and Bifenthrin (Onyx<sup>®</sup>)

- Applied as a preventive spray on the outer bark of susceptible trees.
- Neurotoxins that deter mountain pine beetle from host trees.
- May be up to 97-percent effective in lodgepole pine compared to untreated trees.
- Not appropriate for use near riparian areas.
- Protective gear should be worn during application.

#### *Soil Treatments*

Soil treatments or drenches are applied directly to the soil surrounding susceptible trees. The chemical product is absorbed through a tree's root system and is transferred through the xylem (the living tissue that transports organic nutrients) to the foliage. Soil treatments are known to be very effective against foliage feeding insects. Product efficacy for deterring mountain pine beetle depends on the level of product present in the tree phloem when bark beetles are feeding. The product will only be encountered by beetles currently present in the tree and they may have done significant damage to the tree prior to encountering toxic levels of the product. Product presence is highly variable based on tree respiration rates, and multiple applications may be required.

#### Dinotefuran (Safari<sup>®</sup>), Imidacloprid (Marathon<sup>®</sup>)

- Applied as a soil treatment at the base of the tree.
- A contact and ingestive toxin that causes a cessation of feeding, followed by paralysis and death.
- Has demonstrated toxicity to numerous insects in laboratory feeding assays.
- Has not been directly tested for use on mountain pine beetle.
- Longevity of product efficacy (product presence in the phloem) in lodgepole pines has not been determined.
- Impact on bark beetle feeding and fungal inoculation has not been determined.
- May not be approved for use on some conifers.

#### *Pheromones*

Pheromones are chemicals produced by plants and animals that play various roles in chemical communication. Mountain pine beetles produce pheromones. Introducing manufactured pheromones to a group of trees can deter mountain pine beetle by interfering with communication. Pheromones can be applied in capsule pouches, flakes and suspended solution. Manufactured pheromone efficacy is impacted by stand conditions and bark beetle population pressure. Pheromones must be used annually.

#### Verbenone (Synergy Beetle Block<sup>®</sup>,Contech Disrupt Micro-Flake<sup>®</sup>, VBN Pine Beetle Repellant<sup>®</sup>)

- Applied as a time-release capsule pouch or flakes to a stand of trees or individual tree.
- Pheromone is emitted into the stand and sends a message that trees are not available to mountain pine beetles.
- Has demonstrated success under low bark beetle population pressure in lodgepole pine.

- Has demonstrated poor success under high bark beetle population pressure in lodgepole pine.

### **Natural/Organic Products**

Natural or organic products are alternatives to chemical products. Most natural or organic products have not undergone extensive testing procedures, and may not be registered with the EPA or CDA for use and distribution in Colorado. Natural products include organic disease controls (ODCs), microbial sprays and many others. Natural products are available in a variety of forms and are delivered or applied by different mechanisms, including sprays and ground/foliar application of granules, flakes or powders. Some natural products have not undergone rigorous field trials, and when used have shown variable efficacy.

#### *Organic Disease Control*

Organic disease control (ODC) products may improve tree vigor and health of susceptible host trees. Measures of tree vigor and health include increased growth and improved defense. Increased vigor and health, as expressed by improved defense, may assist trees in repelling attack from mountain pine beetles. Resin production is only one part of a tree's defense against MPB. ODCs may require multiple product applications.

#### **AgriHouse ODC and others**

- Applied as a soil treatment at the base of the tree.
- Has demonstrated an increase in tree resin flow on treated trees, predominately loblolly pine.
- Has not been tested in lodgepole or ponderosa pine.
- May support overall tree vigor.
- Has not been directly tested for impacts on adult or developing mountain pine beetles.

#### *Microbial Sprays*

Microbial sprays are microorganism-based sprays that may repel mountain pine beetle from susceptible host trees. Minimal product evaluation has been performed. Recommended application frequency is unknown. The Colorado State Forest Service is unaware of any testing of microbial spray products.

#### **Nationwide Organics and others**

- Applied as a preventive spray on the outer bark of susceptible trees.
- Product ingredients have not been disclosed.
- Has not been tested for toxicity to mountain pine beetle.
- Has not been tested directly for impacts on adult or developing mountain pine beetles.

### **Additional Information**

For additional information, please contact your local Colorado State Forest Service district office or Sky Stephens, CSFS entomologist, at [sky.stephens@colostate.edu](mailto:sky.stephens@colostate.edu)