

Using Insecticides to Protect Individual Pine Trees from Bark Beetle Attack in California

Insecticides registered for bark beetles are used as preventive treatments and must be applied before trees are attacked. No registered insecticide prevents tree mortality once a tree has been successfully attacked.

Signs of successful bark beetle attacks may include pitch tubes on the bole, boring dust in bark crevices and around the base of the tree, and/or needles turning yellow to red throughout the crown. Boring dust encircling the base of the tree and fading needles are symptomatic of tree mortality. Do not treat trees if any of these symptoms are visible.

The most common method of protecting individual trees from bark beetle attack is to spray the tree bole with insecticides registered for this use (e.g., carbaryl, or the pyrethroids bifenthrin or permethrin). If applied properly, carbaryl treatments generally provide two years of protection for most pine species; pyrethroid treatments generally provide one year of protection.

Research trials are ongoing using the active ingredient emamectin benzoate and a fungicide to determine their efficacy for preventing tree mortality caused by mountain pine beetle and western pine beetles.

Many pesticides are RESTRICTED USE in California including carbaryl. Restricted use pesticides can only be purchased and applied by professionals licensed by the California Department of Pesticide Regulation. The applicator or business owner must also have a state Pest Control Business license and should be familiar with tree bole applications and have the correct application equipment. ALL INSECTICIDE LABELS MUST BE FOLLOWED REGARDING PERSONAL PROTECTIVE EQUIPMENT AND ENVIRONMENTAL PROTECTION.

Technical assistance can be obtained from State licensed Pest Control Advisors, USDA Forest Service, Forest Health Protection entomologists (<http://go.usa.gov/x2DfB>), and State Forest Health specialists.



Bole application of insecticide to prevent successful attacks by bark beetles.



Pitch tubes and boring dust indicate successful attack by bark beetles



USDA Forest Service
Forest Health Protection
Pacific Southwest Region



To improve treatment success of bole applications the following steps should be taken...

- Trees should be flagged or spot painted before treatment with flagging removed or the spot repainted with a different color to indicate the tree was successfully treated.
- Trees must be checked before application to ensure no successfully attacked trees are treated.
- Trees with multiple branches on the lower bole may need to be pruned to facilitate access and ensure thorough coverage of the bole.

Properly Apply Insecticide

- Contact a Pest Control Advisor licensed with the California Department of Pesticide Regulation.
- Only liquid flowable formulations should be used.
- All treatments must be formulated according to label directions. For carbaryl, use only the prescribed 2% active ingredient (e.g., most labels require ~4-4.5 gallons of product mixed into 100 gallons of water). Water pH should be ≤ 7 . At higher pH levels, degradation of carbaryl may occur, reducing treatment effectiveness.
- All mixtures should be used shortly after mixing. Avoid overnight storage as this may decrease treatment effectiveness.
- Hydraulic sprayers capable of maintaining pressures of 325- 450+ pounds per square inch (PSI) are necessary to reach the appropriate spray height on most trees.
- For trees ≥ 16 inches diameter breast height (dbh), a #10 or #12 nozzle (0.396-0.475 mm orifice) should be used with a sustained PSI of 400+ to reach 45-50 feet on the tree bole.
- For trees < 16 inches dbh, a #8 orifice (0.318 mm) is recommended with a sustained PSI of 325+ to reach 35-40 feet on the tree bole.
- All bole surfaces must be treated, including the root collar and exposed surface roots, to the point of runoff to ensure all bark crevices are treated with insecticide.
- Treatments should not be applied if tree boles are wet; or if rain is anticipated within 4 hours.
- To treat very large trees (> 25 inches dbh) higher pump pressures or a bucket truck may be required.

Insecticide treatment failures are often associated with:

Inadequate / improper coverage or treatment

- Limited spray height – pump pressure is inadequate and/or the orifice size is incorrect.
- Light coverage – insecticide is not applied to the point of runoff.
- Limited coverage – one or more bole faces, the root collar and/ or large exposed root surfaces are not treated.
- Trees targeted for treatment are missed during the application.
- Treating trees that are already successfully attacked by bark beetles.

Improper mixing

- Errors in calculations resulting in reduced concentrations of the recommended active ingredient.
- Intentional use of a reduced rate of active ingredient.



Cover facilities with plastic or wash after treatment application

Research indicates 97% of all spray deposition occurs within 50 feet of the tree bole when properly applied. Read and follow all label directions for protecting surface water.

To reduce human exposure to insecticides, personal protective equipment must be worn. Read and follow all label directions with respect to proper personal protective equipment. Tables, water faucets, etc. should be covered with plastic before the insecticide application or cleaned with detergent and water after application.

This publication mentions pesticides. It does not endorse particular products, nor does it imply that the uses discussed have been registered. All pesticides must be registered in the United States by the appropriate State and/or Federal agencies.

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