Insecticide treatment failures are often associated with:

Inadequate / improper coverage

- 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

- Use of improperly stored insecticide (e.g. insecticide exposed to freezing temperatures). If the insecticide is not viscous as it is poured from the container and flows out as lumps, it has probably been improperly stored.
- Errors in calculations resulting in reduced concentrations of the recommended active ingredient.
- Intentional use of a reduced rate of the active ingredient.

Research indicates 97% of all spray deposition occurs within 50 feet of the tree bole. Near surface water a no-treatment buffer of 50 feet is generally recommended. A spray buffer of 75 feet would protect even the most sensitive aquatic insects when properly applied. To limit exposure to bees, treatments should occur early in the morning or during the fall when bee activity is low or absent.

Cover facilities with plastic or wash after treatment application

To reduce human exposure to the insecticide, personal protective equipment (see label) must be worn during application. A hard hat with a face shield, rubber gloves and disposable clothing are recommended. Picnic tables, water faucets, etc. should be covered with plastic before application or cleaned with detergent and water following the insecticide application.

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Individual Tree Protection Using Carbaryl Insecticide for Western Conifer-Infesting Bark Beetles

USDA Forest Service
Forest Health Protection
Intermountain and Northern Regions

Registered insecticides for bark beetles are used as preventative treatments and must be applied before trees are attacked. No registered insecticide formulations are available that successfully prevent tree mortality once a tree has been infested.

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, pitch streamers with boring dust in the pitch and/or needles turning yellow to red throughout the crown.

Pitch tubes and boring dust indicate successful attack by bark beetles

There are two classes of insecticide registered for bark beetles, including the organophosphate carbaryl, and the pyrethroids bifenthrin and permethrin. Typically these treatments are applied as bole sprays. If applied properly carbaryl treatments generally provide two years of protection; pyrethroid treatments generally provide one.

To improve treatment success of carbaryl spray the following steps should be taken. . .

Prepare trees for treatment

- Trees selected for treatment should be flagged or spot painted with the 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 portion of the bole may need to be pruned to ensure thorough coverage of the bole surface.

Cover Photo: Carbaryl can be used as a preventative spray against future bark beetle attack.

Properly Apply Insecticide

- Contract a licensed and insured applicator.
- Contractor must have a spill treatment kit.
- Insecticide applications should be monitored throughout application.
- Only liquid formulations [emulsifiable concentrates (EC)] should be used.
- Treatments must be formulated according to label directions. For carbaryl treatments, use only the prescribed 2% active ingredient (e.g. current label directions require approximately 4 gallons of product mixed into 100 gallons of water).
- Lake or stream water used in the tank mix should be filtered to avoid clogging nozzles.
- Water pH should not exceed 7. At higher levels, degradation of the active ingredient will 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 325-400+ pounds per square inch (PSI) as the material is applied are necessary to reach the appropriate spray height on the tree.
    - For trees >16 inches diameter breast height (dbh), a #10-12 nozzle orifice (0.396-0.475 mm) 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 the insecticide.
- Treatments should not be applied if wind exceeds 10 mph, if tree boles are wet, or if rain is anticipated within the next 4 hours.
- To treat very large diameter trees (>25 inches) in areas where outbreak bark beetle populations are occurring, higher pump pressures or a bucket truck may be required.

Technical assistance can be obtained from USDA Forest Service, Forest Health Protection entomologists (www.fs.fed.us/foresthealth/), state forest entomologists and/or county extension agents (www.csrees.usda.gov/extension/index.html).