The University of Arizona
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Using Insecticides to Prevent Bark Beetle Attacks on Conifers

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Introduction

Often property owners or land managers have several trees of significant value to the landscape. These trees may be prized for their size and/or aesthetic value. With the recent extreme drought conditions, the bark beetle has become a formidable pest. Therefore, it is important to understand methods and control strategies that minimize the impact of this pest.

It is critical in the management of these trees that lowering tree density through thinning gives the best long term benefit in reducing the risk of damage from bark beetles. In addition, these high value trees can be given additional care by supplemental irrigation and being sprayed with a preventive insecticide.

The application of fertilizers will not help protect trees from the effects of drought, and will not protect against bark beetle attacks. In fact, fertilizers may even hinder the trees ability to defend against bark beetles. Fertilizers often cause trees to put on extra growth; this growth will require higher levels of moisture to maintain healthy conditions. Fertilizers may also burn foliage if improperly applied. For additional information on irrigating trees refer to "Beyond the Ponderosa: Successful Landscape Trees for Higher Elevations in the Southwest".

Evidence of infestation

Trees should be checked for bark beetle infestation by physical inspections. Boring dust in the bark crevices and at the tree base is one of the first signs of bark beetle attack. Often, numerous small pitch tubes (globules of pitch ¾" to 1 ¼" in diameter [9 to 32 mm]) appear on the trunk of infested trees. The presence of one or two pitch tubes may not indicate that a beetle attack was successful. The pitch tubes of unsuccessfully attacked trees generally have a creamy appearance, much like crystallized honey (Figure 1). Clear sap that runs down the bole (trunk) or limbs is generally not from bark beetles. A pink or red tint may be present in a pitch tube (Figure 2) which generally indicates a successful attack. Once a mass attack is established the foliage begins to fade. The needles change from green to a light straw color within a few weeks to one year after attack and eventually become reddish-brown. Trees that have been successfully colonized in a mass-attack can not be saved from eventual death and die.

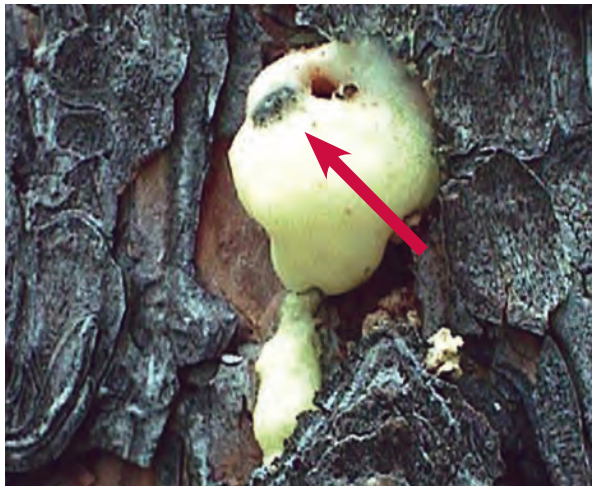

Figure 1. Lack of red coloration and the presence of the bark beetle stuck in the pitch indicate an unsuccessful attack. (Beetle indicated at arrow).

J. McMillin, USDA-FS

Figure 2. The red tint to this pitch indicates successful attack by a bark beetle. The red tint is from the inner bark that the beetle is consuming.

At a Glance

- *Detecting evidence of infestation.*
- *Insecticides registered for bark beetles and applied properly can be an effective preventative treatment.*
- *The best method of protecting trees from bark beetle attack is prevention through insecticide sprays, thinning, and/or irrigating.*
- *Injections or the use of systemics have not proven effective against bark beetles.*

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Insecticide use for protecting against bark beetles

Un-infested trees can be protected from beetle attacks by spraying with specified insecticides. When spraying, the entire trunk and large branches 4" or greater in diameter must be sprayed to the point of runoff (Figure 3). Spraying large trees is generally not recommended by homeowners. To locate a certified pesticide applicator, call the Arizona Structural Pesticide Control Commission at 800-223-0618.

Insecticides used for controlling the bark beetle are carbaryl, permethrin and bifenthrin. These products are especially formulated for bark beetles and consist of the following: Sevin SL® and Sevin XLR®; Dragnet, Masterline Plus C®, and Astro®; and Onyx® respectively (see Table 1 for detailed information on recommended insecticides). These products are designed to protect the tree and must be applied before the beetles attack. Typical home and garden products containing carbaryl, bifenthrin or permethrin are not formulated for bark beetles and will be ineffective. A critical component in the management of the bark beetle is to apply all insecticide sprays in the late winter or early spring but before April 1 to ensure protection. When timed correctly, liquid insecticides when applied properly can be effective for an entire season. However, if you spray after April 1, inspect the trees to make sure they have not been attacked. Trees can be checked for infestations by climbing, with a hydraulic lift, or with high-powered binoculars to inspect the entire trunk of the tree for pitch tubes and boring dust. Also check the bark crevices and the base of the tree for fresh boring dust. Remember spraying trees already infested is ineffective.

All of the recommended insecticides are available over-the-counter (non-restricted use) and have minimal safety concerns when used in accordance with the label instructions. Permethrin and bifenthrin should not be used near streams or lakes due to their high toxicity to fish. Note: Only use insecticides in accordance with the label instructions. Beneficial insects such as bees can be harmed by these pesticides.

Insecticide injections or systemics have not proven effective against Dendroctonus and Ips species of bark beetles in studies conducted by U.S. Forest Service, Canadian Forestry Service and University of Arizona researchers. Many supposed infected trees have been injected with what appears to be a successful result. However, what may have happened is that the treated tree successfully pitched out the attacking beetle with resin prior to the treatment or the tree was attacked by a non-killing bark beetle such as Dentroctonus valens (red turpentine beetle). In any case, what might have happened was either no beetles were actually in the tree or the offending beetle was a non-killing species.

In summary, the bark beetle is a significant pest but can be controlled. The key control component are thinning the stand, supplemental watering and preventive application of a liquid insecticide before April 1.

C. Davie, Univar

Figure 3. Commercial applicator spraying ponderosa pine trees with high pressure sprayer.

References

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Table 1. Selected insecticide formulations and host plant for bark beetle control.*

Insecticide	Ponderosa Pine			Piñon Pine	Arizona Cypress	Juniperus species
	Ips species**	Western pine beetle	Round-headed pine beetle	*Ips confusus*	*Phloeosinus cristatus*	*Phloeosinus scopulorum neomexicanus*
Sevin SL (carbaryl) (2.0% active ingredient or 4 gallons/100 gal. H_2O)	R***	R	R	R	R	R
Masterline Plus C, Astro, Dragnet (permethrin) (0.2% active ingredient or 0.5 gallons/100 gal. H_2O)	R	R	Not tested	Not tested	R	R
Onyx (bifenthrin) (0.06% active ingredient or 0.25 gallons/100 gal. H_2O)	R	R	R	R	R	R

* These recommendations are based upon field research conducted in conjunction with the West Wide Single Tree Initiative (FS-PIAP grant PSW-38, FHTET, and FMC Corp) and Western Bark Beetle Initiative (agreement 04-PA-11221615-160 between the Rocky Mountain Research Station and the University of Arizona, and Univar).

** Ips = *Ips pini, I. latidens, I. calligraphus,* and *I. lecontei.* Western pine beetle = *Dentroctonus brevicomis.* Round-headed pine beetle = *D. adjunctus.*

***R=Recommended