



## COLORADO STATE PARKS STEWARDSHIP PRESCRIPTION



**Date Created:** September 9, 2001

**Revised:** April 1, 2005

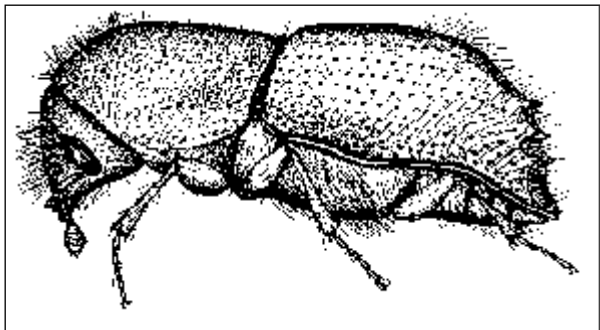
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**Parks Affected:** Most parks

# Ips Beetle (Engraver beetle) Management



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Source: CSFS, 2004.

### Introduction

The Ips beetle (aka Engraver Beetle) is a serious pest of pine and spruce with twenty-five species currently recognized in the Western United States. In the Tri River Area of Western Colorado Pinon pine (*Pinus edulis*) is the favored host of one of these Ips species (*Ips confusus*). This 5 mm long (3.0 to 6.5 mm) beetle is identified to species by the number and character of the spines located on the back end of the insect.

### Habits

Attracted to stressed trees, invasion by the Ips often results in the production of a pitch tube at the point of entry. This exuding pitch and boring dust is about the length and diameter of your thumb. The center of the tube contains the hole through which the adult beetle enters the inner bark. Vigorous trees attacked by a few adults often produce enough pitch to either drown the beetles in the inner bark or push them back out of their entrance tunnels. Many trees, however, may be attacked by several hundred or thousands of Ips beetles at the same time, overcoming the vigor of the tree. During hot weather the pitch tubes soften and run down the side of the infested tree.

Up to four female beetles follow each male into the tree where they construct an egg gallery. Eggs are laid in niches along the sides of the galleries.

The development of the insect from egg to adult is temperature controlled with development occurring whenever temperatures are above 59 ° Fahrenheit (14 ° Centigrade). With temperatures near 70 ° F, the egg to adult development may require as few as 21 days (*Ips confusus*); with the cooler 59 ° F temperature it may take 40 days for this development to be completed. Development from egg to adult takes much longer during the winter months.

### Impacts

Stressed trees lacking adequate internal sap pressure (i.e. newly dug and/or transplanted trees) are often unable to respond to the beetles' attack by the production of pitch. In those instances the presence of small holes with resulting sawdust will be found on the trunk of attack trees. Sawdust will also be found in branch crotches and on the ground under the trees.

Trees attacked by the Ips must contend with the feeding of the adult and resulting larval stages of the beetle within the tree's cambial layer but also with the 'Blue Stain' fungus that plugs the woody vascular system of the tree. Spores of this fungus are carried on the body of the beetle from the previous tree to the newly attacked tree. Various species of Ips are known to attack all species of pine and spruce in the South West area of the United States.

The 'Blue Stain' fungus blocks the water and nutrient conducting tissue of the tree. The development of the fungus within the tree is controlled in part by temperature, with the warmer summer temperatures resulting in faster development while cold winter temperature results in slower development. Needles start changing color within two weeks if the tree is attacked during the spring or early summer months. If attacked in late fall, trees do not start changing color for several months.

The color change of the needles is from green to yellow, sorrel and reddish brown. Upon removal of infested bark, the tunnels of the beetle will be found in inner bark surface and outer sapwood layer.



Source: CSFS, 2004.

This group of pinons is totally dead due to Ips. The trees were injured (stressed) by porcupines eating the bark off the trunk. The trees died later as a result of an attack by Ips.

The male Ips beetle is attracted to stressed trees due to chemical signals given off by such trees. The beetle will fly up to two (2) miles to reach its intended host tree. Once the beetles have invaded an area, emerging beetles are likely to attack neighboring pinons even if the trees are relatively healthy (non-stressed).

Freshly cut trees and logging slash will be attacked by Ips creating a possible point of activity from which the beetles will spread to living trees in the area. Thinning and pruning operations are best limited to the winter months, with proper disposal of cut trees and slash before the spring flight of the beetle.

### **Susceptible Trees**

The Ips is attracted to stressed trees. Drought stress as well as overwatering, wildfires that scorch needles or bark tissue, windstorms, and root or trunk injury can create a situation attractive to the beetle. Porcupines that strip bark from trunks and branches also creates stress problems for the tree. Black stain root disease (caused by *Leptographium wageneri* spp.) can stress trees increasing their attractiveness to beetles.

### **Prevention and Control of Beetle Infestations**

Road cuts, home sites, utility trenching and other construction can stress trees by damaging trunks and roots. Roots extend well beyond the drip line (furthest spread of the branches) of the tree. It is not unusual for the root spread of trees to be three to five times the height of the tree. Construction efforts should be limited by flagging and fencing whenever possible. Trees damaged during the construction process should be removed and properly taken care of to avoid the attraction of beetles to the site. Trees pushed over during the construction process should be removed and treated as slash as soon as possible. The longer the contractor or land owner waits to take care of these damaged trees, the greater the chance for beetles to invade the site.

Non-infested damaged trees and slash can be burned, chipped, the bark removed, or wood buried under two feet of soil. Several of these techniques also are effective on beetle infested wood.

Burning should be done with caution to avoid damage to neighboring trees and structures and must be done far enough away from other trees to avoid the buildup of salts in the soil causing damage to tree roots. Highly flammable and volatile compounds produced by the tree can result in a fireball even when burning small quantities of slash. Confirm whether burning is permitted in your area prior to burning and notify the proper authorities to avoid problems with the local fire department. If permitted, burning is best done while there is still snow on the ground.

Using a chipper to grind up debris will eliminate brood wood as well as kill any beetles under the bark. Debarking will eliminate the risk of beetle breeding in non-infested trees and slash. Debarking infested trees may, however, result in the escape of some beetles during the debarking operation.

Damaged trees and slash can be buried to prevent the beetles from reaching this available brood wood. Beetle infested trees and slash are best buried under two feet of soil to prevent the escape of the beetles. Do not damage the roots of neighboring trees during this burial operation.

The key to the effectiveness of these efforts is based on timing. Treatments must be made before beetles have emerged from damaged trees and slash.

During any sanitation operation, pay particular attention to neighboring trees to avoid injury.

The forest can be thinned to reduce competition between trees improving the vigor of remaining trees. Specific guidelines are available that explain this procedure. As with other forest management activities, thinning is best accomplished between November and March 15 in our area. Thinned trees should be treated as described previously to avoid the buildup of Ips beetles.

The major species of Ips attacking Pinon pine in the Tri River Area of Western Colorado is *Ips confusus*, identified by Dr. Steve Woods, BYU. This beetle lies dormant under the bark of infested trees from early November to sometime in March, depending on temperature. The winter is usually spent in the adult beetle stage, but occasionally eggs, larvae, and pupae are found.

There can be two to five generations of this beetle (*Ips confusus*) during the summer depending on temperature and length of summer.

Pinon considered of high value, such as those near homes or that frame a mountain vista, can be sprayed with an insecticide to help prevent attack by Ips. This is especially important for high value trees that are under stress. Sprays need to be applied before the spring flight of the beetle and occasionally during the summer to prevent summer flights from attacking the tree. While a spray in late March to early April with a second spray being applied from late July to early August may be sufficient, more frequent applications of an insecticide would provide more protection.

Ips beetles have a number of predaceous and parasitic enemies, but these apparently have little controlling effect on this pest.

Carbaryl insectide, (i.e. Sevin), under various formulations with molasses or other stickers, applied as a 2% and 4% active ingredient spray, has been used in the past due to its effectiveness and residual activity. The 4% sevin and molasses spray was found to have a 15 month residual activity when tested on Ponderosa pine (*Pinus ponderosa* var. *scopulorum* Engelm.) against the Mountain Pine beetle (*Dendroctonus ponderosae* Hopkins), a bark beetle similar to the Ips. However, the carbaryl and molasses formulation (sevimol) is no longer manufactured by Drexel Chemical company or Rhone-Polunc. The formulation that replaces sevimol is reported by the companys' technical representatives as having a residual of only 10 to 14 days.

Sevimol may still be available but once the current supplies are exhausted, other insecticides will need to be used to protect high value trees from attack by the Ips beetle.

The recommended insecticidal preventative treatment at this time is chlorpyrifos. This product is available under the trade name of Dursban. The recommended rate for use of this insecticide is one pound of active ingredient (A.I.) per 100 gallons of water.

The wettable powder formulation should be used in lieu of the liquid concentrate formulations. The liquid concentrates commonly contain an emulsifying agent that helps keep the chemical in suspension but also can strip the protective wax layer off the needles, burning the needles thus creating additional stress for the tree. When using the wettable powder (WP) 50% formulation of Dursban, it will take two (2) pounds of pesticide in each 100 gallons of water to achieve the necessary one (1) pound active ingredient rate. To mix a smaller quantity of pesticide, refer to the chart provided.

The residual activity of Dursban is assumed to be approximately 45 days. Therefore additional sprays will likely be necessary during the summer to provide adequate protection to the trees against attack by Ips confusus.

Dursban is toxic to birds and wildlife so must be used with caution. Aerial applications of this material are not recommended. Property owners desiring a less toxic insecticide should consider applying carbaryl. More frequent applications of carbaryl would be necessary when compared with chlorpyrifos (Dursban). Adding two to three ounces of vinegar per gallon of spray helps reduce the pH of the spray solution increasing its effectiveness.

The timing of the spray is critical with sprays needed prior to the first flight of the beetle in the spring with additional sprays designed to prevent invasion by summer flights. The trunk and larger branches should be treated thoroughly including the underside of the branches where branch and trunk join (the armpit area).

Trees already infested with beetles can be sprayed to prevent the emergence and flight of this pest to other trees. Lindane is the recommended choice for this treatment. This may be the better option during the summer months, when time is of the essence. Treated trees could be removed during the winter or left to serve the needs of the forest as a wildlife tree. Only those trees that still have living beetles under the bark should be sprayed. Trees killed previously from which Ips

beetles have already escaped would not serve as brood wood for future generations of Ips. The presence of beetles is easily determined by stripping off a section of bark and checking for live adult beetles and larvae.

Lindane is also the preferred spray for beetle infested trees cut for firewood. Such trees should be cut, sprayed with Lindane, stacked and covered with plastic. The edges of the plastic should be covered with soil to prevent the escape of any beetles not killed by the Lindane spray when emerging from the wood.

Noninfested trees cut for firewood should also be covered with plastic to help keep beetles from reaching the fresh cut wood to use it as brood wood. Clear plastic would speed up the drying of the firewood reducing the chance of it being used as broodwood by Ips.

Some Lindane labels recommend the addition of diesel fuel to the spray mixture. This should not be done due to the increased potential of fire. Firewood treated with Lindane is safe to burn. If other insecticides are used, toxic fumes may be produced when the firewood is burned.

Pinon pine dug from known Ips infested areas for transplanting elsewhere should be checked prior to digging to ensure the trees collected are not already infested with Ips. Trees dug and moved during the growing season should be sprayed with carbaryl or Dursban (preferred) prior to digging to prevent attack by Ips. It is not unusual for Ips to attack a tree during the digging process or shortly thereafter. A rootball as large as possible should be dug to help maintain the health and vigor of the tree.

Water the tree thoroughly upon planting and provide shade if possible to avoid stressing the tree further. The transplanting process is a severe shock. Additional stress to the tree should be avoided. Be sure not to overwater.

Trees dug and placed in a nursery for sale later, should receive proper care to avoid additional stress.

Additional chemical applications will be needed during the growing season to prevent attack by Ips. Be sure to check these trees on occasion and properly dispose of any Ips infested trees.

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