

## PIÑON PINE MORTALITY IN WESTERN COLORADO

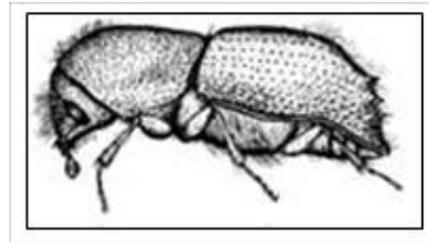
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### Introduction

We are currently experiencing extensive losses of piñon pine trees in the piñon-juniper woodlands of western Colorado. The primary agents responsible for this mortality are a small bark beetle - **piñon ips** (*Ips confusus*) and a pathogen - **black stain root disease** (*Leptographium wagneri*). Two species of juniper, often locally referred to as "cedars", occur locally in association with piñon pine but are not affected by either of these maladies. Junipers have their own set of biological enemies, but they are not significant problems in our area at this time.

**PIÑON IPS BEETLE:** An epidemic of piñon Ips beetles (also known as "engraver beetles") is the cause of most current piñon mortality. Ips are small, dark-colored bark beetles about the size of an uncooked rice grain. They are native to our forests, and frequently attack damaged or stressed trees. The ongoing drought is putting significant stress on trees and is considered the underlying reason for the major increase in Ips populations.



Ips kill piñon by mass-attacking a tree, where they tunnel beneath the bark. There they mate, lay eggs, and the resulting larvae tunnel in the cambium and phloem layers between the bark and wood. As the larvae feed, they girdle the tree while spreading bluestain fungi that disrupt the tree's natural defenses. Following successful attack, the needles of the infested tree quickly fade from green to straw-colored, later turning red, and eventually brown. By the time the tree appears to be dying, a new generation of beetles is already maturing beneath the bark that will eventually emerge to fly and infest new trees. Usually three generations of Ips are produced annually. From late fall through mid-spring, Ips activity is confined to the under-bark area. The first flight of emerging adults occurs in spring when daytime high temperatures begin averaging about 60 degrees. Ips may still infest new trees as late as October.

**Preventing Ips Beetle Attack** - In areas of heavy beetle infestation, prevention is probably the most effective use of time and effort. Important piñon trees around homes, businesses, recreation areas, and other key locations can be protected from Ips attack by preventive spraying with insecticides labeled for bark beetle prevention. These include varieties of carbaryl (trade name Sevin) and permethrin (trade name Astro, etc.). Landowners can purchase and apply preventive insecticides themselves, or hire an arborist or tree care company to do this job. Preventive spraying for Ips can be done anytime during the warmer months of the year (April through October). Ideally, spraying should be carried out in early April before the first beetles emerge to attack new trees. It is strongly recommended to spray again in mid-summer to restrengthen insecticidal protection. For even better protection, it is suggested landowners spray three times a year, the first time around April Fools Day, then around July 4th, and then again around Labor Day. Be sure to read all instructions on the product label. Spray each year there is a local risk of

Ips infestation. Preventive spraying will not save piñon already infested by Ips or those infected with black stain root disease.

**Ips Beetle Control** - Direct control, or treating currently infested trees to prevent a new generation of Ips from emerging to attack new trees, may not be practical where beetle populations are already excessive. Due to the sheer magnitude of the Ips problem in some areas, direct control would be a very formidable task and the rewards would probably be too limited to justify the effort and required expense. It is most worthwhile where infestations are in their initial phase or Ips are otherwise not well established. Direct control efforts are most effective when neighboring landowners are cooperating with each other (i.e., working in unison to locate and treat beetle-infested trees on each of their respective properties over a broad area).

Direct control measures usually involve identifying currently infested trees, then preparing them for treatment by felling, limbing, and cutting the trunks into lengths that can be more easily handled. Sections of branches exhibiting pitch tubes or blue stain should also be cut up and added to the material to be treated. Unfortunately, there are no longer any pesticides approved for treating beetle infested wood. Alternative methods of treatment include burning, chipping, debarking, floating/submerging (in water), burying, or hauling to a site at least a mile from piñon pine. Infested piñon should be treated as soon as possible while the beetles are still within the tree. Trees from which the beetles have already exited do not need to be treated, but can be cut and removed as time permits for use as firewood or to reduce wildfire hazard. Such trees show round, black exit holes peppering the bark. It is common to find woodborers (big white, segmented larvae and/or large beetles, some with very long antennae) and other insects in old Ips-killed trees, but these are generally not a threat to live trees.

Signs that a piñon is infested by Ips beetles include:

- **Pitch tubes** (multiple small, popcorn-shaped masses of pitch scattered up and down the trunk that oozed out where beetles entered the tree. These are usually rusty red in color but yellow with time. The pitch is mixed with boring dust, or frass (see below).
- **Frass**, or boring dust that resembles fine sawdust (usually rusty red in color but can be lighter) that collects in bark crevices, branch crotches, and on the ground around the base of the tree.
- **Fading of foliage** from green to straw-color, later turning red and then brown (Ips are probably no longer in the tree by this time).
- **Blue-gray staining of sapwood** under the bark by bluestain fungi introduced by the beetles (will not be evident on trees that were just recently attacked).
- **Woodpeckers chipping away the bark** to get at the beetles beneath - does not always occur.

- **Live Ips adults, larvae, and/or pupae and their galleries** (tunneling) between the bark and outer wood. Adults are black, callow (immature) adults are tan to brown, larvae are white w/brown heads, and pupae are white.

**BLACK STAIN ROOT DISEASE:** Black stain root disease is another cause of piñon mortality in our area, but it is greatly overshadowed by the current ips beetle epidemic. Once a tree is infected with black stain, the disease spreads to other piñon through root contacts beneath the ground. Pockets of older dead trees surrounded by more recently killed or dying trees are characteristic of this disease. Ips will often infest trees with root disease, killing them faster than the root disease would by itself. In such cases, Ips is secondary and black stain is the underlying problem. There are no pesticides that effectively control black stain. Control options include digging a trench (18" deep, if possible) encircling a pocket of root disease to break root contacts between infected and healthy trees. This is often impractical, especially where the ground is rocky or disease pockets are large. Ideally, some type of material should be placed in the trench to prevent soil from refilling the trench and allowing root growth to continue. A more practical means of treatment is to cut a band of healthy, green piñon immediately surrounding a disease pocket. This eliminates the live roots needed to spread the disease to piñon beyond those that were cut. Sacrificing a few piñon in this way can potentially save many more. Fortunately, black stain root disease does not infect juniper.

**THINNING:** Thinning piñon-juniper woodlands can have substantial benefits. Thinning reduces competition for sunlight, nutrients, and moisture, hence enhancing the vigor of the remaining trees and making them more resistant to bark beetle attack. Because thinning reduces the amount of live root contacts beneath the ground, it can be beneficial in slowing the spread of black stain root disease. Reducing tree density will also significantly lower wildfire hazard, especially if the resulting slash (branches and tops) is lopped and scattered, burned, chipped, or hauled away. When possible, thin or prune piñon during late fall, winter, and early spring, since cutting during the warmer months when Ips are active can actually attract beetles. If thinning or pruning must be done during the warmer months, high-value piñons nearby should be preventively sprayed as soon as possible.

**ADDITIONAL INFORMATION:** An informative fact sheet complete with color pictures illustrating symptoms of Ips beetle, black stain root disease, and other problems affecting piñon can be downloaded from the Colorado State University Extension Service website at <http://www.ext.colostate.edu/pubs/insect/05558.html> . For further information and assistance, please contact Tri River Cooperative Extension in Grand Junction.