the trunk and large branches should be treated. Attacking beetles die as they attempt to chew through the bark. This treatment can be effective when trees are weakened or threatened by a temporary beetle outbreak. Preventive bark sprays are not recommended for trees already attacked or affected by serious disease problems or severe injuries.

Control

Several control methods are available if a potentially serious infestation is detected in pine debris and some type of control is necessary. Infested material may be burned or buried within 30 days of initial attack. If burning is unsafe or if material is desired as firewood, trunk and limb sections can be piled in a sunny opening and covered with heavy, clear plastic sheeting. All protruding branches should be trimmed and the edges of the plastic buried. The plastic will act as a greenhouse and the high temperatures will kill most of the developing brood under the bark. The plastic should be left on for 4 to 6 weeks. Removing the bark from infested trees also will kill most stages of the insect, but is not recommended when many adult beetles are present, especially in late spring.

Homeowners should avoid collecting firewood infested with engraver beetles, which can emerge from the firewood and kill live ornamental pines. Firewood can be treated by covering piles with clear plastic as previously described.

Pesticides used improperly can be injurious to humans, animals, and plants. Follow the directions and heed all precautions on labels.

Store pesticides in original containers—out of the reach of children and pets—and away from foodstuffs.

Apply pesticides selectively and carefully. Do not apply a pesticide when there is danger of drift to other areas. Avoid prolonged inhalation of a pesticide spray or dust. When applying a pesticide it is advisable that you be fully clothed.

After handling a pesticide, do not eat, drink, or smoke until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If the pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Dispose of empty pesticide containers by wrapping them in several layers of newspaper and placing them in your trash can.

It is difficult to remove all traces of an herbicide (weed killer) from equipment. Therefore, to prevent injury to desirable plants, do not use the same equipment for insecticides and fungicides that you use for an herbicide.

NOTE: Registrations of pesticides are under constant review by the Federal Environmental Protection Agency. Use only pesticides that bear the EPA registration number and carry directions for home and garden use.

For more information about engraver beetles, contact:

State and Private Lands

Arizona

Arizona Forest Health Specialist
University of Arizona Cooperative Extension
School of Forestry, Box 15018
Northern Arizona University
Flagstaff, AZ 86011
Phone: (928) 523-8385
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New Mexico

NMSU Extension Forest Entomologist
EMNRD Forestry Division
P.O. Box 1948
Santa Fe, NM 87504
Phone: (505) 476-3351
Website: http://www.emnrd.state.nm.us/forestry/index.cfm

Federal Lands

Arizona

USDA Forest Service
Arizona Zone Forest Health
2500 South Pine Knoll Drive
Flagstaff, AZ 86001
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USDA Forest Service
New Mexico Zone Forest Health
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Albuquerque, NM 87102
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Printed on recycled paper • May 2003

Engraver Beetles in Southwestern Pines

United States Department of Agriculture

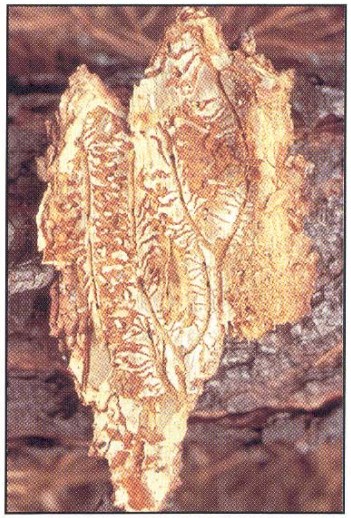
PREPARED BY Forest Service

Southwestern Region

Pine engraver beetles are among the most important tree killing agents in southwestern pine forests. In some years, these insects kill thousands of piñon pines and small ponderosa pines in Arizona and New Mexico. Tops of larger ponderosa pines can also be attacked and killed, predisposing them to mortality by other agents. Large outbreaks are often associated with drought and with human activities that create large amounts of fresh pine debris. The loss of valuable trees at homesites or in recreation areas often causes the greatest concern.

These insects are native to the Southwest and they normally play a beneficial role in pine ecosystems. They act as natural thinning agents preying upon widely scattered trees that have been weakened or recently killed by other factors. They are among the first organisms to attack pines damaged by fires, severe windstorms, or heavy snowstorms. They begin the lengthy decomposition process that returns this material back to the soil. Also, a variety of wildlife feed on these beetles, and beetle-killed trees are often used for nesting sites. Nevertheless, they are considered pests when they kill trees people want to preserve.

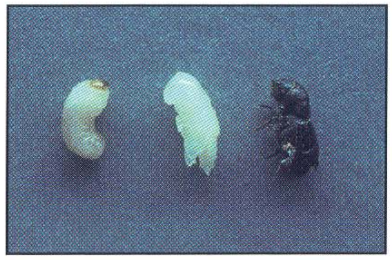
Life Cycle



Egg Gallery

Beetles produce two to four generations per year, depending on climate and elevation. In the spring, adult beetles emerge from material infested the previous fall and fly to attack new hosts. Beetles prefer fresh debris from logging, construction activity, or natural events. During outbreaks, live trees may be attacked, especially those located adjacent to fresh slash. Trees weakened by drought, disease, overcrowding, or mechanical damage are most vulnerable to attack. Males initiate attacks and release chemical messengers to attract females. Adult beetles create tunnels under the bark called "egg galleries."

Females lay eggs alongside their galleries. White, grublike larvae hatch and feed in their own larval tunnels for a few weeks before pupating. Pupae turn into adults that emerge again to complete the cycle, which can last a month or more depending upon temperature.



Life Stages

Several overlapping generations may occur through the summer and fall until colder temperatures return. The last generation of beetles overwinters as adults under the bark.

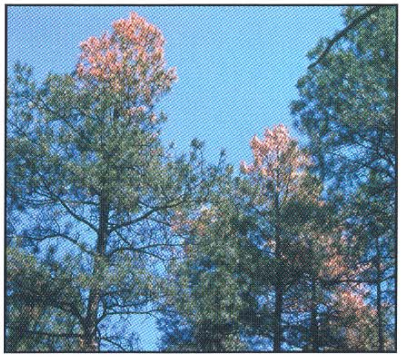
Beetles carry fungi on their bodies. These fungi, often called blue-stain fungi, grow in the wood and clog the tree's water conducting system. Tree death results from rapidly spreading fungi and beetles' girdling activity as they build their galleries.

Evidence of Infestation

Fading foliage high in the tree is often the first sign of a beetle attack.

Needles change from green to a light straw color within a few weeks after attack and eventually become yellowish-brown. Upon closer inspection, a fine boring dust can be seen in bark crevices and at the base of the tree.

Occasionally, small, pink popcorn-shaped resin deposits (pitch tubes) appear on the trunk of live trees that have been attacked. Removing the bark will reveal the characteristic galleries.



Dying Trees

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Prevention

Prevention is the best way to reduce losses due to engraver beetles. Healthy trees usually are not attacked, but trees stressed by disease and overcrowding are prone to attack. Treating stands or individual trees to reduce levels of dwarf mistletoe or relieve overcrowding can effectively reduce future losses.

When construction is planned in an area, there are several preventive measures that will reduce the risk for losses:

1. Avoid root damage by minimizing road or lot grade changes and place trenches for underground utilities away from tree roots.
2. Asphalt should not be laid close to tree trunks or over root systems.
3. Under existing pines, avoid planting vegetation that requires much water—such as lawns—because overwatering can harm the pines.

Boring Dust on Infested Tree

In areas where trees are being cut, schedule activities during late summer and fall. This allows debris to dry and become less suitable for beetles. Cutting debris (tree tops and large limbs) into shorter pieces and scattering them in sunny sites can speed drying. Destroying debris by chipping it or removing it from the forest can also prevent problems. Although beetles cannot reproduce in chipped debris, fresh chips may attract beetles to standing green trees. Allow chips to dry in a sunny location before placing near potential host trees. Tree cutting programs that create large amounts of debris should not be conducted for more than one year in the same area, especially when conditions favor beetle outbreaks, such as during droughts.

Valuable trees near homes or in recreation areas may be given a protective residual bark spray of carbaryl (Sevin) or permethrin to prevent successful attack. Both