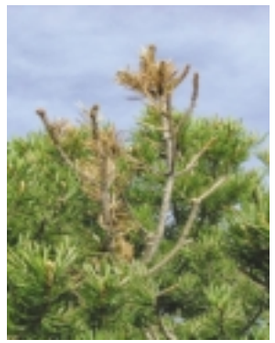

(Left) Construction damage, (Right) Twig beetle damage.

Most healthy trees are usually capable of fending off invaders through resin or sap flow. However, stressed trees often do not have the ability to produce enough sap to "pitch out" attacking insects. Tree stress may be caused by insufficient moisture, disease, soil compaction (including root injury), overcrowding or physical damage.

During periods of drought, trees must compete for scarce moisture, further increasing already high stress levels. Reducing the number of trees on a per-acre basis will free up water and allow trees to build up their natural defenses. Most drought-tolerant trees (i.e. piñon, juniper, ponderosa pine) are adapted to more open stands. The best way to help a tree defend itself is to provide it with water consistently.

In areas where tree cutting or pruning is necessary, schedule the cut or prune during fall and early winter. This will allow time for cuttings to dry appropriately without attracting bark beetles. Removal of the debris from the site will also aid in reducing the attraction of bark beetles.

If removal of infested trees is not an immediate option, it is recommended that cuttings be stacked in piles no larger than a cord and covered with heavy (6 ml) clear plastic for several weeks. This solarization process will heat the wood to a level that will kill any remaining beetles. Vigilance is necessary, as tears in the plastic must be patched and edges must be securely buried.

Disease exposes trees to twig and bark beetle attacks. Removing diseased trees can help control the spread of the disease and the beetles.

In residential yards, avoid planting high-water-use vegetation to reduce competition directly with a tree, such as grasses and shrubs. Create a buffer zone around trees using mulch that is less than 3 in. thick to help retain moisture. Do not increase the depth of the mulch next to the base of the tree.

Keep physical damage to trees at a minimum. Do not dig trenches near a tree where roots can be damaged. Remember that roots grow 2 to 3 times the width of the crown. Minimize road or lot grade changes to protect the roots. Do not lay asphalt close to tree trunks or over root systems.

Insecticides* are also available. They are not economical for large stands but could help protect valuable trees near a home. Carbaryl or permethrin are chemicals that have proven to be effective in providing protection against bark beetle attack. However, they are not a guarantee that your trees will not be infested. Remember, if bark beetles are already in a tree, the spray will not help and the tree will die.

*It is in violation of the law to use insecticides inconsistent with label instructions.

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Photographs courtesy of the USDA Forest Service and the author.

Facts on the Piñon Twig Beetle

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What's happening to the Piñon trees?

Piñon pine and juniper trees cover approximately 9 million acres of land in New Mexico.

In recent years, more than 800,000 acres of piñon pine have been affected due to insect infestation, disease and drought.

Years of above-average rainfall allowed piñon to grow abundantly and flourish in areas they historically did not grow. The combination of overly dense stands and current drought conditions have caused the piñon to become stressed. The large acreage of stressed trees has created prime habitat for bark beetles.

The combination of bark beetle (*Ips confusus*) and twig beetle (*Pityophthorus* spp. and *Pityogenes* spp.) has moved in waves across the landscape, reducing the amount of piñon as they go. The main differences among *Ips*, *Pityophthorus* and *Pityogenes* are the parts of the tree they attack. *Ips* bark beetles attack the bole, or trunk, and branches 3" in diameter and larger. *Pityophthorus* and *Pityogenes* twig beetles attack branches and twigs less than 3" in diameter. Twig beetles can be controlled by pruning infested branches. But since *Ips* bark beetles attack the bole of the tree nothing, can be done to save a successfully colonized tree.

Twig beetles are native to the Southwest and are in two of the largest genera of bark beetles, containing more than 120 species in North America. These tiny beetles are only about 2 mm long (~1/8 in), about half the size of *Ips confusus*. Their coloring is dark, usually reddish to dark brown.

(Top left) *Ips confusus* vs. twig beetle. Twig is smaller. (Top right) Blue stain fungus. (Bottom) Beetles on branch.

Twig beetles are a natural component of the ecosystem that usually attacks but not always kills stressed or damaged trees. These beetles attack several pines including piñon, ponderosa and Austrian. Outbreaks vary, but population increases may be encouraged by drought. Twig beetles normally attack the tips of branches causing minor branch dieback, but during periods of drought they are able to move further down the branch. Thus, they cause mortality by either killing the branches so the tree is unable to support itself or by attacking thin barked portions of the bole.

Life Cycle

Twig beetles have two or more generations per year depending on climate. In the spring, adults emerge from under the bark and fly to a suitable host. The male twig beetle acts as a pioneer beetle that bores into the host tree and releases aggregation pheromones to attract multiple females.

The male beetle generally mates with three to five females in a single nuptial chamber. The females then tunnel galleries encompassing the branch with several egg galleries radiating from it. Eggs are placed in niches along the side of the female gallery. The larvae feed on the cambium of the twig. Under the bark they transition from egg to larva to pupa to adults, as they feed moving way from each other. To overwinter they tunnel down the pith of the twig.

As twig beetles infest a branch or entire tree, they are usually accompanied by Piñon *Ips* beetles. Pinon *Ips* beetles spread a deadly fungus to trees. The blue stain fungus is carried by the *Ips* beetle to help overcome a tree's defenses. This fungus transfers from tree to tree with the bark beetle and works its way into the bole, cutting off the flow of water-based nutrients. The fungus leaves a blue discoloration within the wood.

Pitch mixed with boring dust on a branch.

Evidence

Evidence of twig beetles can vary. Single branches or twigs will have needles that fade from green to yellow and then reddish-brown. To detect the beetle before the needles fade, look for small spots of sap on the branches in combination with a fine sawdust. Also, infected branches may have the appearance of being wrinkled or sunken.

Prevention

Unlike trees colonized by the *Ips* beetle, trees infested with twig beetles have the possibility to survive the attack. To control twig beetles, prune off and dispose of infested branches to stop beetle spread. However, if the majority of the branches are infested, and such pruning will leave little healthy crown remaining, the tree cannot be saved. *Early prevention is the best way to protect or reduce the chance of tree loss to twig and bark beetles.*