Black Turpentine Beetle

R. H. Smith[1] and R. E. Lee III[2]

The black turpentine beetle, *Dendroctonus terebrans (Oliv.),* has caused extensive losses throughout the pine belt in the Southern States. It has been found aggressively killing trees from Texas to Virginia and southward through Florida. The beetle most commonly kills less than 10 percent of the stand during a single season, but on several occasions in north Florida and south Georgia it has killed more than 25 percent of the stand in a single season. It appears that these wide-spaced activities of the beetle may be associated with low tree vigor resulting from drought, flooding or severe stand disturbances caused by mechanized logging.

All southern pines are attacked, but the most severe infestations have occurred in stands of slash pine *(Pinus elliottii)* and loblolly pine (*P. taeda)* and, to a lesser degree, longleaf pine (*P. palustris).* Freshly cut stumps are usually preferred for breeding, whereas freshly cut logs are rarely attacked. The beetle also shows a preference for weakened trees, such as those damaged by fire, worked for naval stores, or infested by other bark beetles; but it is capable of severely attacking apparently normal, healthy trees.

Evidence of Infestation

The beetle confines its attacks to the base of the tree, and initial infestations are almost always located in the lowest 18 inches. The attack is characterized by large pitch tubes which appear on the bark surface (fig. 1). These tubes are a mixture of pitch, frass, and bark borings and thus have a reddish to white color which quickly ages to a gray hue. Heavily infested trees are almost always secondarily attacked by ambrosia beetles. These attacks also are at the base of the tree and are characterized by a fine white sawdust which accumulates around the trunk (fig. 2).

Attacks of the beetle do not always prove fatal. In trees that are killed, the needles begin to lose their normal healthy green color and fade, first to a yellowish green and finally to a reddish

[1]Entomologist, Pacific Southwest Forest and Range Experiment Station, USDA Forest Service.

[2]Formerly entomologist, East Texas Research, Southern Forest Experiment Station, USDA Forest Service. Currently manager of woodlands development, Union Camp Corp., Savannah, Ga.

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Figure 1.—Beetle-attacked pine showing concentration of pitch tubes on lower trunk of tree.

brown. Fading usually begins 4 to 8 months after the initial attacks, but sometimes it is 12 months or longer before fading starts. The fading tree takes about 1 month to change to fully red foliage, and about 2 months later most of the foliage will fall off.

Life History

The black, robust adult (fig. 3), which is 1/5 inch to 3/8 inch long, bores through the bark and phloem to the face of the sapwood, causing resin to flow and the pitch tube to be formed (fig. 4). From the entrance hole an egg gallery up to 1 inch wide and 1 to 12 inches or more long is made on the face of the sapwood, usually in a downward direction. Eggs are laid in a long group at one side of the gallery

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Figure 2.—Fine white boring dust from ambrosia beetle boring in base of pine tree attacked by black turpentine beetles.

(fig. 5). Eggs hatch in 10 to 14 days and the white, grublike, legless larvae feed away from the egg gallery in the phloem on the face of the sapwood. They feed gregariously, killing large patches of inner bark. Thus a large cave-type gallery, usually somewhat fanshaped, is made. The gallery may be as much as 12 inches across.

When the larvae near maturity, they construct pupal cells between the bark and the wood, often by "back-tracking" into the area of consumed phloem. These cells may be completely within the corky bark, but are usually between the bark and the wood, often forming a slight depression in the face of the sapwood (fig. 6). Larvae then change to the pupal or resting stage in the cells; pupae are white in color. In 10 to 14 days the pupae change to typical beetles. These beetles, which are at first light tan in color, in a few days change to a deep black or mahogany red, and then bore out through the bark and fly to stumps or trees to start a new generation.

The length of a life cycle is 3 to 4 months, depending on temperature. The insect is active all year long in the milder climates; during the cooler months it slows down in its development but does not go into a dormant stage.

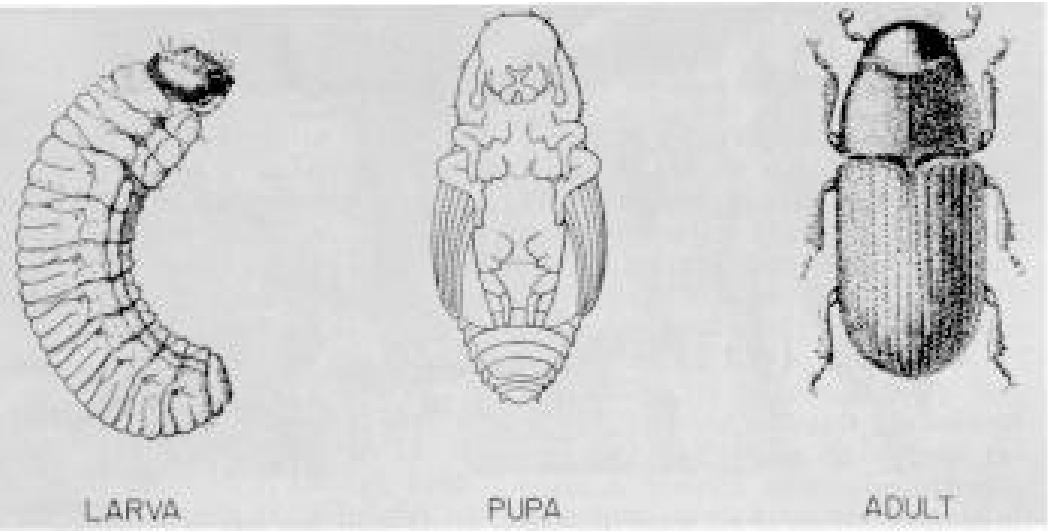

Figure 3.—Life stages of the black turpentine beetle.

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Figure 4.—Close-up view showing black turpentine beetle on pitch tube.

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Figure 5.—Eggs of the black turpentine beetle along one side of its gallery.

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Figure 6.—Pupal cells are located between the bark and the wood.

Habits

In their attack on trees, beetles usually confine their activity to the basal 36 inches, though scattered infestations to a height of 6 feet or so are common. The low basal attack is common to slash and longleaf pine in the Southeast, while in the western Gulf States infestations extend higher, especially in loblolly pine, which is rather commonly attacked to a height of 12 feet.

Attacks on a tree usually last 4 to 7 months, though periods of 12 months or more have been recorded. Shortly after the infestation has started on the trunk of the tree, attacks are made on the large lateral roots. These increase somewhat proportionately with the trunk attacks. Root infestations may eventually become numerous, hasten death of the tree, and may be a source of a considerable number of beetles to start the next generation.

Attacks are most frequent in stands disturbed by fire, logging, climatic conditions, outbreaks of other insects, or naval

stores operations. It is seldom that the beetle persists at a high population for more than a year or two under the first three conditions; however, where naval stores operations are taking place, attacks may continue for 3 to 5 years if not properly controlled.

The beetle has a tendency to work slowly and persistently through the year. Only rarely does the population build up quickly enough to cause areas of sudden high mortality. Since dying trees in the Southeast deteriorate rapidly, a casual observer can very easily be misled into minimizing the seriousness of the damage caused by the insect.

Natural Control

Since much of the beetle population lives within a foot of the ground, periods of high water cause heavy mortality. Occasionally, infested trees have been observed to "sour," a condition which apparently causes an unfavorable moisture environment for broods and results in heavy mortality of immature beetles. Woodpeckers do not exercise any appreciable degree of control during an epidemic; they have not been observed working on stumps, which are an important source of beetles. Nematodes and mites, although present, have not yet been determined to be effective natural control factors. At present, little is known about other parasites and predators. However, the feeding activity of other insects such as *Ips* engraver beetles, pine borers, weevils, and termites causes a considerable mortality of black turpentine beetle larvae, probably through competition for food.

Direct Control Measures

If activity appears, there are at least two courses of action: (1) All the infested trees may be salvaged and the stumps sprayed with oil solution of 1 percent lindane (gamma insomer of benzene hexachloride). This should be prepared by mixing diesel fuel with the lindane concentrate. Follow mixing and application instructions printed on the concentrate label.

Even with this procedure, however, new attacks may continue to appear in the residual stand. This course of action may not be desirable at times because salvage of the scattered attacked trees may be impractical. (2) The other choice is to spray the attacked trees up to the highest pitch tube with the diluted lindane mixture mentioned above (fig. 7). Many of the attacked trees will be saved and the subsequent action of the beetle reduced. Beetle activity will not be eliminated immediately, and thus the procedure should be continued as long as attacks appear in the stand. Most of these subsequently attacked trees can be detected and sprayed while there are only a few basal attacks; consequently, the infested tree has an excellent chance of recovery. This method is especially adapted to naval stores stands, where trees are under constant attention and a spray program can be easily integrated with the regular woods operations.

The latter recommendation has been applied very successfully in areas cut back to seed trees in stands having a recent history of beetle infestation. If the treatment is applied properly throughout an infested area and the beetle population

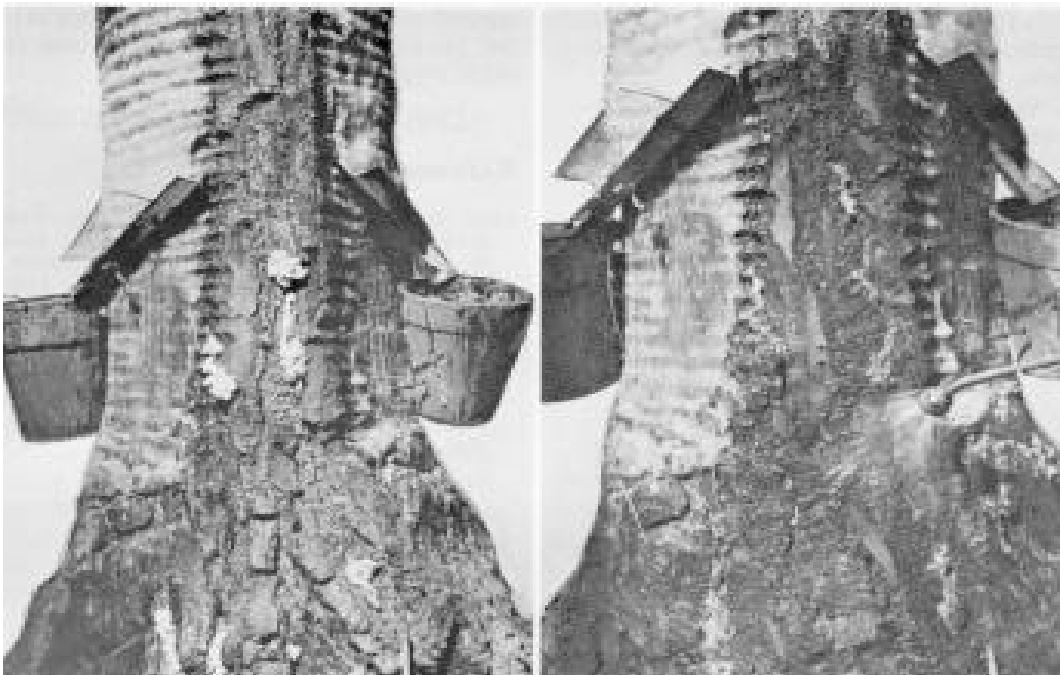

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Figure 7.—Infested tree: *Left,* Before treatment. *Right,* Treatment applied. It is sometimes necessary to slough off the outer bark scales of large slash pine to aid penetration of the insecticide. Spray is applied up to the highest attack.

is kept down, protection for at least 12 months may be obtained.

CAUTION: Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels. Store pesticides in original containers under lock and key-out of the reach of children and animals and away from food and feed. Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink 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 a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides. Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also,

because registrations of pesticides are under constant review by the Environmental Protection Agency, consult your county agricultural agent or State Extension specialist to be sure the intended use is still registered.

References

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