



Black Turpentine Beetle and Its Role in Pine Mortality

The black turpentine beetle, *Dendroctonus terebrans* has been known to cause considerable damage to pines on Long Island. This small, black bark beetle (about 1/5 to 3/8-inch long) is capable of causing the death of apparently healthy pines. Infestations have been found on the Japanese black pine (*Pinus thunbergii*), pitch pine (*Pinus rigida*), Scots pine (*Pinus sylvestris*). There have been reports of turpentine beetles on other pine species and spruce species. This pest is normally a secondary invader that attacks only those hosts, which have been initially weakened or stressed by other agents. On Long Island it has assumed the role of a primary invader in what appear to be healthy Japanese black pines. Black turpentine beetle (BTB) has also been observed to be a primary invader on Japanese black pine on Cape Cod, Massachusetts.

LIFE HISTORY

The black turpentine beetle adult (**Fig. 1**) bores through the thick bark plates and phloem to the sapwood. The primary feeding site is the lower 6 feet of the main trunk, but boring has been seen in buttress roots also, where there was no obvious trunk injury. Injury to the trunk causes resin to flow, resulting in the formation of a pitch tube (**Fig. 4, 5, & 6**) as the resin hardens. An egg gallery is excavated on the inner face of the bark and scars, usually in a downward direction; and a row of eggs is deposited in this gallery. Hatching occurs in about two weeks. The white, leg less larvae (**Fig. 2. & Fig. 3**) feed gregariously on the inner bark and several gallery colonies may completely girdle the tree. When the larva matures, it constructs a pupal cell between the bark and the sapwood. The pupation period, during which the larvae are transforming to adult beetles, is about 10-14 days in duration. The adults then emerge through the bark and the cycle is repeated. The length of the cycle is determined by the prevailing temperatures, and usually takes from 3 to 4 months to complete. Development is slowed during the cooler months. In the Long Island area, emergence of beetles can be expected from mid-April and will occur throughout the summer because of the overlapping of broods.

HABITS

Beetles are attracted to freshly cut stumps or stands of unthrifty pines. When insect populations are high, healthy trees may be attacked. The site of attack is usually the lower 6 feet of the trunk (**Fig. 7**), but as stated earlier, main roots are sites also. Initial boring is generally close to the ground. Pitch is exuded when the beetle reaches the wood, and the yellowish-white to pinkish tube, made up of bark borings, frass and resin, is usually the first observed evidence of beetle attack. In cases where a large number of invasions take place, accumulations of hardened, granular pitch may be noticed on the ground at the base of the tree. Under the bark, large cavities excavated by the larvae may extend from the egg galleries downward into the larger roots. As these inner tissues are destroyed, the



Fig. 1. Adult black turpentine beetle. (David T. Almquist, University of Florida , www.Bugwood.org)



Fig. 2. BTB larva on bottom (pupa on top) (Gerald J. Lenhard, Louisiana State Univ, www.Bugwood.org)

tree begins to decline in vigor and the foliage becomes chlorotic and soon takes on a reddish-brown cast. During the final stages of decline, all of the needles will be shed. The length of the process leading to the death of the tree depends on a number of factors, but mortality may occur as early as 2 or 3 months after the initial attack.

Trees are killed most rapidly when the beetles carry a fungus, *Leptographium* sp., (a "blue-stain" fungus), which can infect the tree through the wound made by the beetles. The girdling effect of the feeding larvae is intensified by the killing of the cambium by the fungus. Only a few points of beetle entry are necessary to bring about the death of the tree when the *Leptographium* sp. fungus is present. This fungus causes a bluish-black staining of the wood that is evident when dead trees are felled.

HOST SUSCEPTIBILITY

Old, slow growing or weakened trees are most susceptible to invasion, as beetles are attracted to volatile substances emitted by such hosts. Pines may be weakened by deleterious climatic factors such as drought, hurricanes, windstorms, and excessive precipitation in areas of poor drainage (root suffocation). In addition physical factor such as excavations, grade changes, soil compaction, lawn mower damage and other mechanical damage, competition for moisture with lawns surrounding the pines, and heavy damage to the foliage due to the feeding of other insects can make pines susceptible to attack. Japanese black pines grown in Long Island's seashore environments have been very susceptible to infestations. The harshness of this environment appears to cause these trees to decline and thus become susceptible to attack. The beetles are able to recognize these weakened hosts before the condition is apparent to people. It is important for the tree owner to realize the effect tree stress has on making a tree susceptible to beetle attack.

MITIGATING OR PREVENTING ATTACK

Healthy, vigorously growing trees generally are not subject to beetle attack. The copious pitch produced by healthy pines serves to 'pitch out' the invading beetles. As previously mentioned (under HOST SUSCEPTIBILITY), do whatever possible to prevent the trees from being stressed or injured. Be particularly careful to provide adequate moisture during drought periods. Proper fertilization may be helpful in maintaining a healthy tree. Fertilizers in 3:1:1 or similar ratios are often suggested for tree fertilization. Improve soil conditions before trees are planted. Avoid excessive or unnecessary pruning since this may attract beetles to the tree. Trees, which are freshly killed, should be removed from the planting site, stump and all, or should be ground down well below the soil level and covered with soil.



Fig. 3. Larvae feeding beneath bark. (North Carolina State University Archive, North Carolina State University, www.Bugwood.org)



Fig. 4. Close-up of new pitch tubes. (Lacy L. Hyche, Auburn University, www.Bugwood.org)

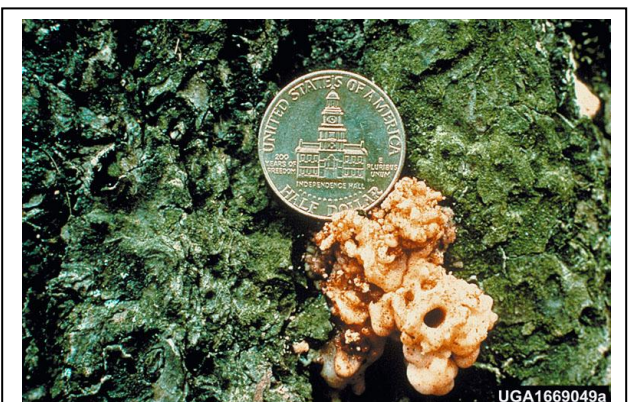


Fig. 5. Pitch tube size in relation to a nickel. (North Carolina State University Archive, North Carolina State University, www.Bugwood.org)

PROTECTING THE HOST

Those interested in protecting valuable trees from infestations should consider control options before trees are infested and/or infected with blue-stain fungus. The following insecticide formulations are suggested for use by a licensed certified pesticide applicator to control black turpentine beetle: ***bifenthrin (*OnyxPro*)**, ***chlorpyrifos**, ***oxydemeton-methyl** (**Harpoon*, pines only), or ***permethrin**. Thoroughly drench the lower 6 feet of the trunk and buttress roots with a forceful spray in mid-April and again in mid-May. Reapply in the summer if adults are still present. Cornell Cooperative Extension has no formal insecticide control recommendations for use by homeowners.

* = Restricted-use pesticide; may be purchased and used by certified applicators or used by individuals under the direct supervision of certified applicators.

Prepared by: Dr. M. Semel and Margery Daughtrey, L.I. Horticultural Research Laboratory, Riverhead, NY and Thomas Kowalsick, Cornell Cooperative Extension - Suffolk County, 2/84; revised by: Thomas Kowalsick, 9/2005.

Pesticide recommendations obtained from: *2012 PMG for Commercial Production and Maintenance of Trees and Shrubs (TS-12)*. Contact Cornell Cooperative Extension – Suffolk County for information on ordering copies.

The Pesticide Management Education Program (PMEP), in cooperation with the New York State Department of Environmental Conservation (NYSDEC), maintains a web site with a searchable database for pesticide products currently registered in New York State. Individuals who have Internet access can locate currently registered products containing the active ingredients suggested above at <http://pims.psur.cornell.edu/index.php> (NYS PIMS).

This publication contains pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are still possible. Some materials mentioned may no longer be available, and some uses may no longer be legal. All pesticides distributed, sold or applied in New York State must be registered with the New York State Department Of Environmental Conservation (DEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional DEC office. Read the label before applying any pesticide.

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Fig. 6. Old pitch tube that has become hard and white colored. (Wayne N. Dixon, Florida Department of Agriculture and Consumer Services, www.Bugwood.org)