

DIAGNOSING SHOOT-BORING INSECTS OF PINES

Deborah G. McCullough
Assistant Professor and Extension Forest Entomologist
Department of Entomology and Department of Forestry
Michigan State University



**North Central
Regional
Extension
Publication
No. 528**

Many different kinds of insects feed in the shoots of pine trees. Some insects, such as the white pine weevil, can severely damage the growth, form or appearance of trees. Other insects, such as the pitch nodule maker, rarely cause serious damage. Still other insects, like the pine shoot beetle, may cause infested trees to be regulated by state or federal restrictions on shipping.

This flow chart is intended to help Christmas tree growers, landscapers and foresters determine what insect has caused damage to shoots of pine trees. Regular scouting of trees and plantations during the growing season will help you detect shoot borers before damaging populations can buildup. Although it is always best to actually collect the insect causing the damage, occasionally this may not be possible. Growers who learn to

recognize the "clues" that shoot-boring insects leave behind will be better able to plan future scouting



Photo courtesy of USDA Forest Service

Scotch pine shoot exuding pitch, a common symptom of trees attacked by pine shoot beetle (*Tomicus piniperda*).

and pest management activities. Some helpful clues include the location of damage on the tree, the species and age of the damaged tree, and the time of year that specific life stages of the insect are present.

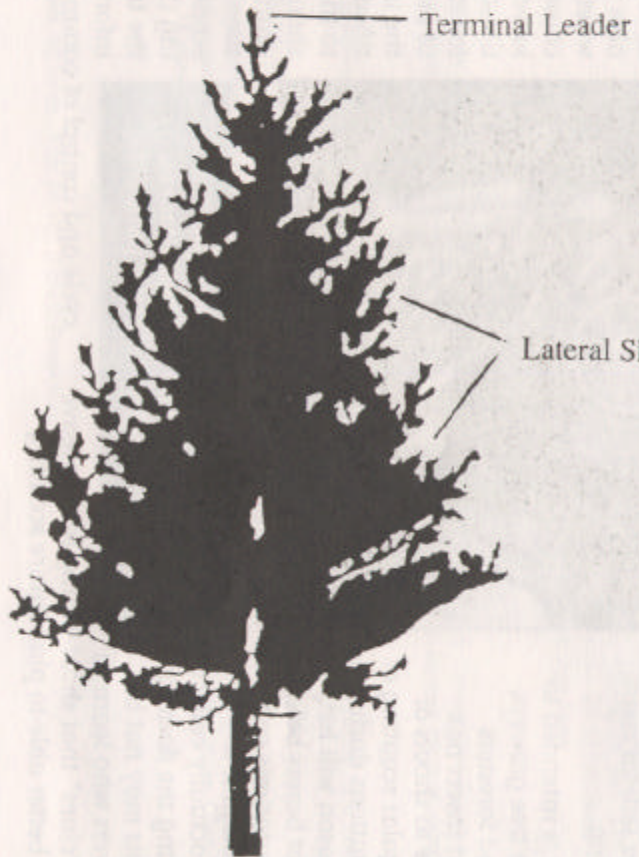
To use the flow chart, begin by determining whether the terminal leader or lateral shoots are damaged. It is also very helpful to know whether the damage was caused by a caterpillar (moth larva) or a beetle. See the illustrations in this bulletin for examples of the life stages of moths and beetles. Once the insect pest has been identified, the amount of damage to the tree, field or stand should be assessed. An integrated management plan can then be developed to prevent economic loss while protecting the environment. Refer to the table in this bulletin for information on the hosts, life cycle and control of common shoot-boring insects.

SHOOT-BORING INSECTS OF PINE

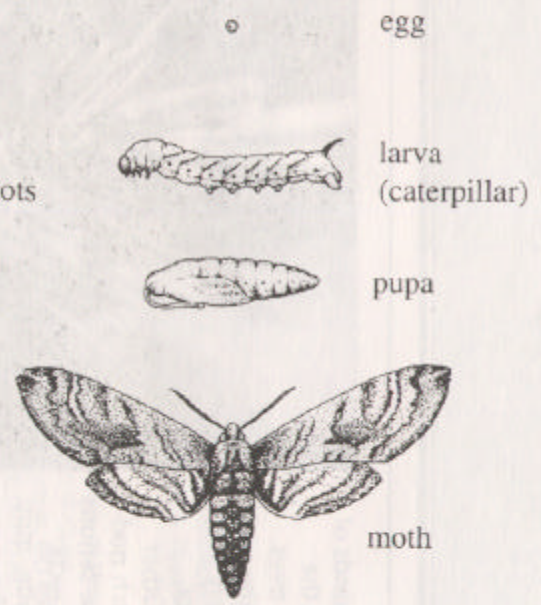
INSECT	HOSTS	DAMAGE	LARVA PRESENT	PUPA PRESENT	OVER-WINTERS	DISTINGUISHING FEATURES	CONTROL
Eastern pine shoot borer (<i>Eucosma gloriota</i>)	Pines, Douglas-fir, White spruce.	Attacks terminal leaders or laterals.	Caterpillar is present in shoots late May/early June to late June/mid-July.	On ground, late summer to following spring.	Overwinters as pupa on the ground.	Tunnel 10-30 cm long bored down pith of shoot lots of sawdust-like frass; a round or oblong exit hole can be seen on outside of shoot; terminal leader and sometimes lateral shoots break off cleanly, leaving a short stub.	Usually normal damage removed during shearing; corrective pruning needed if terminal killed; use insecticide only if damage very heavy; correct timing of application very difficult to achieve; try to spray trees in early May to kill recently hatched larvae before they bore into shoot.
White pine weevil (<i>Pissodes strobi</i>)	Pines, Spruces, rarely firs.	Attacks terminal leaders and bores down through 2-3 years of growth.	Grubs present late May/early June to late July.	In chip cocoon (oblong chamber made of fine slivers of wood) under bark on terminal; late July to August.	As an adult weevil in litter below trees.	Several larvae form a "ring" and feed on cambium of terminal leader; damage occurs around the circumference of the leader and not in the shoot; pith: feeding damage may go down as far as the second and third whorl of branches; damaged terminals form "shepherds' crook"; chip cocoons under bark of leader; feeding on circumference of leader and not pith; a few to several grub-like larvae feeding in a ring just under bark.	Prune off and destroy infested or damaged terminal leader below the point where feeding stops; use corrective pruning to restore form by cutting back all but one upper lateral of the leader and not in the shoot; treat tops of trees in late April/early May with registered insecticide if needed.
European pine shoot moth (<i>Rhyacionia buoliana</i>)	Pines.	Attacks lateral shoots.	Caterpillars mine needles in late June or July; by mid/late summer older larvae move into buds and remain there until the following spring.	In late May or June inside burrow-like tunnels in ends of shoots.	As larva in feeding tunnel in or near a bud.	Brown needles mixed with green needles on ends of shoots in midsummer; small webs coated with yellow-white pitch which turns hard around new bud clusters in late summer; stunted shoots, bushy or deformed tops; attacked shoots bend over and die in spring or grow crookedly.	Prune off damaged shoots; basal pruning to remove lowest whorl of branches will decrease winter survival of larvae; treat new shoots in late June or early July with registered insecticide to kill newly hatched larvae if needed.
Adana pine shoot moth (<i>Rhyacionia adana</i>)	Pines; usually seedlings or young trees.	Attacks lateral shoots on trees or seedlings.	Caterpillars present late April/early May to mid-summer.	Late summer to following spring.	As a pupa inside a cocoon attached to root collar just below soil surface.	Presence of cocoons (containing pupae) on root collar just below soil surface; usually seedlings and small trees affected; small hole at base of dead shoot in mid/late summer; shoots die before needles <u>fully expand</u> .	Shear off damage and corrective prune; consider registered insecticide in mid/late April if needed.

Shoot-Boring Insects of Pine (continued)

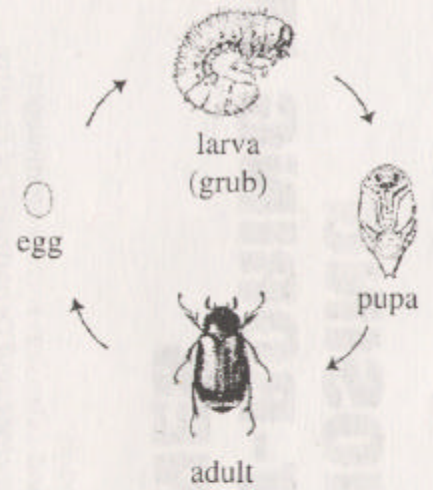
INSECT	HOSTS	DAMAGE	LARVA PRESENT	PUPA PRESENT	OVER-WINTERS	DISTINGUISHING FEATURES	CONTROL
Nantucket pine tip moth (<i>Rhyacionia frustrana</i>)	Pines (except eastern white pine) less than 4.5 m in height.	Attacks lateral shoots on seedlings or trees.	Caterpillars present late April/early May to late May/early June; may have two generations in some areas; second generation larvae present mid-July to late August.	Mid- or late June to following spring if one generation: mid-June to early July and late summer to following spring if two generations.	As pupa within injured tips of	Usually minor importance in Michigan. Prune and destroy damaged shoots;	Prune and destroy infested or registered insecticide application to shoot tips in mid-May/mid-June and again in mid-July/late August if two generations.
Northern pitch twig moth (<i>Petrova albicapitana</i>)	Scotch and jack pine-	Attacks lateral shoots, usually at crotch of two or more shoots.	Caterpillars can be present year round because the insect requires two years to complete its life cycle.	Can be present year round.	As larva or pupa under pitch mass (nodule).	Hollow, thin-walled blister or nodule of pitch usually located at crotch of two or more shoots; larvae or pupae may be found inside pitch blister.	Prune off damage; can dig larva out of pitch blister and kill it directly; insecticides not needed.
Jack pine tip beetle (<i>Conopthorus banksianae</i>)	Pines.	Kills top 1 inch of lateral or terminal shoot.	Grubs may be present all summer; two generations per year.	May be present all summer.	As adults.	Very small dark beetle or several very small white beetle grubs feeding in outer 1 inch of shoot; small pitch tube about 1 inch below bud where beetle bored in; yellow or red shoot tips.	Prune off damage; no insecticide needed.
Pine shoot beetle (<i>Tomicus piniperda</i>)	Pines.	Attacks lateral shoots.	Grubs present in brood material such as logs, stumps and recently killed trees from late March to mid/late June.	Not seen in shoots; pupates in brood material.	As adult beetle in bark niches at base of living pine tree.	Dark adult beetle feeding in tunnel in pith of shoot; tunnel hollow with no frass; pitch tube often visible on shoot where beetle bored in; two or more pitch tubes, boring holes and tunnels may be present in single shoot; tunnels vary from 1 inch to 10 inches in length.	Best management is to destroy available brood material by late April; contact Extension agent for additional information.
Shoot boring bark beetles (<i>Pityophthorus</i> spp.)	Pines; one species known to attack red pine in Michigan.	Attacks lateral shoots.	Tiny grubs present probably early to mid-summer.	In shoots; probably late summer, maybe until following spring.	Probably as adult in litter or in shoots.	Pitch tube where adult beetles bore into shoot; egg gallery cut into pith of shoot; 1-3 larvae feed on pith, wood and inner bark and pupate in shoot; damaged shoots often occur in bunches on tree, probably because adults attack several nearby shoots; very little known about life cycle in this region.	None needed; beetle apparently rare in this region.



Moth Life Cycle

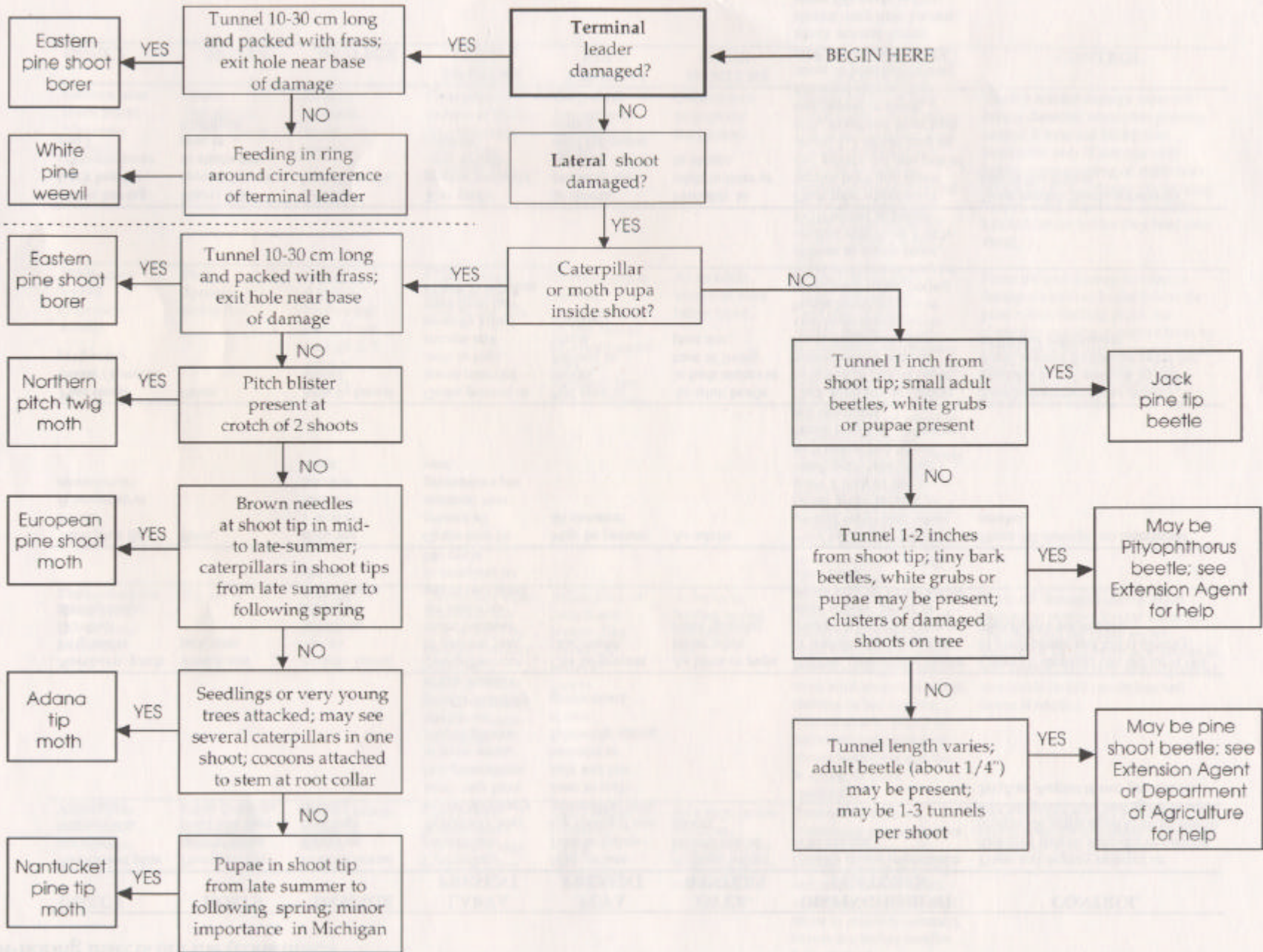


Beetle Life Cycle



From Insect Biology by Howard Evans.
Copyright 1984 by Addison-Wesley Publishing
Company. Reprinted by permission.

DIAGNOSING SHOOT-BORING INSECTS OF PINES



North Central Regional Extension Publications are subject to peer review and prepared as a part of the Cooperative Extension activities of the thirteen land-grant universities of the 12 North Central states, in cooperation with the Extension Service-U.S. Department of Agriculture, Washington, D.C. The following states cooperated in making this publication available.

University of Illinois
69 Mumford Hall
Urbana, IL 61801
(217) 333-2007
Purdue University
301 S. Second St.
Lafayette, IN 47905-1232
(317)494-6795

Kansas State University
Umberger Hall
Manhattan, KS 66506
(913) 532-5830
*Michigan State University
10B Agriculture Hall
East Lansing, MI 48824-1039
(517)355-0240

University of Missouri
2800 McGuire
Columbia, MO 65211-0001
(314) 882-2792
University of Wisconsin
30 N. Murray St., Rm. 245
Madison, WI 53715-2609

(608)262-3346

* Publishing state

For copies of this and other North Central Regional Extension publications, write to: Publications Office, Cooperative Extension Service, in care of the university listed above for your state. If they do not have copies or your state is not listed above, contact the publishing state as specified.

Programs and activities of the Cooperative Extension Service are available to all potential clientele without regard to race, color, sex, national origin, religion, age or disability.

In cooperation with NCR Educational Materials Project

Issued in furtherance of Cooperative Extension work, Acts of Congress of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture and Cooperative Extension Services of Illinois, Indiana, Iowa, Kansas, Minnesota, Nebraska, North Dakota, Ohio, South Dakota and Wisconsin, Gail Imig, Director, MSU Extension, East Lansing, Michigan 48824.

March 1994