The Pine-Feeding Sawflies

By Douglas C. Allen

Sawflies in the genus *Neodiprion (Neo-dip-ree-on)* feed on pines, larch, spruces, Douglas-fir, hemlocks, or true firs. Outbreaks result in reduced tree growth, loss of aesthetic quality and occasional tree death. The group that I wish to discuss here contains several species that commonly feed on our northeastern pines.

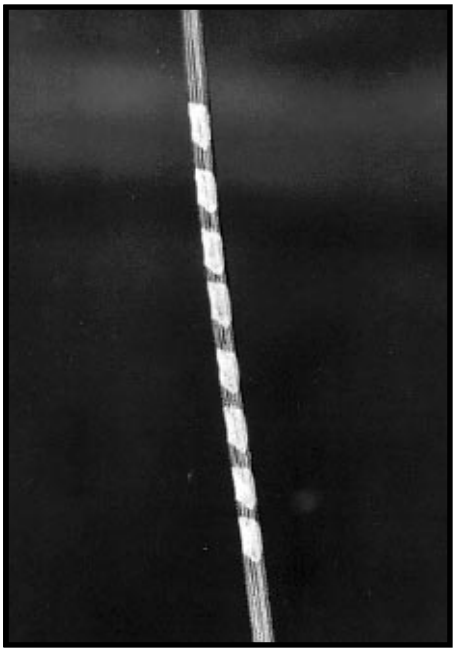

Fig. 1. Close up of sawfly egg niches.

Though their common name suggests otherwise, these defoliators are not "flies" but primitive wasps. The name "sawfly" is derived from a peculiar egg laying device (ovipositor) located at the posterior of the adult female. This needle-like projection has a series of saw-like notches at the tip. The wasp uses it to puncture needles. An egg is deposited in the resulting hole or slit, which is referred to as a niche (pronounced "nitch").

The major primitive character that separates sawflies from other groups of wasps is the manner in which the posterior half of the adult is broadly joined to the front half that bears the legs, wings and head. The more highly evolved wasps, such as yellow jackets or hornets, are narrow- or thread-waisted, because the abdomen is joined to the body by a stem or petiole.

Life History

Pine feeding sawflies have two distinct types of life cycles. One group, the spring feeders, overwinters in the egg stage and larvae feed in the spring, usually on foliage of the previous year. The latter is a consequence of the fact that larval activity usually occurs early in the growing season, before the current year's foliage develops. Summer feeders, on the other hand, overwinter as full grown larvae in silken cocoons in the litter or attached to the bark of the host. Adults develop in late spring or early summer and larvae feed in mid-summer, usually on new foliage.

Fig. 2. Typical egg cluster of a pine feeding sawfly.

The most important pine-feeding species in the northeast are gregarious; that is, eggs are laid in a cluster that encompasses several needles (Fig. 2) and larvae feed in colonies. Generally, they have a single generation each year.

The pine false webworm, a defoliator currently causing severe damage to Scots and white pines in St. Lawrence and Franklin Counties, belongs to a related family known as the webspinning sawflies. The latter also are colonial, but the caterpillars live in conspicuous nests of silk, needle fragments and fecal pellets. Pine feeding sawflies (i.e., species of *Neodiprion*) do not build a nest.

Fig. 3. Damage to red pine caused by the redheaded pine sawfly.

Outbreaks

Population increases are associated with an abundance of young pine (usually in plantations) and the occurrence of favorable weather during critical phases of the life history. Experience suggests that population buildup is most likely to occur in open grown stands less than 20' tall, in stands that are stressed, and during warm, dry summers that favor rapid larval development and high survival.

Description and Behavior

Each egg is deposited in a hole that the female wasp cuts in the edge of a needle. This physical injury creates a discolored spot (Fig. 1). A collection of these niches, a few to several per needle in each of several adjacent needles, is referred to as the egg cluster (Fig. 2). Following egg

(Cont'd)

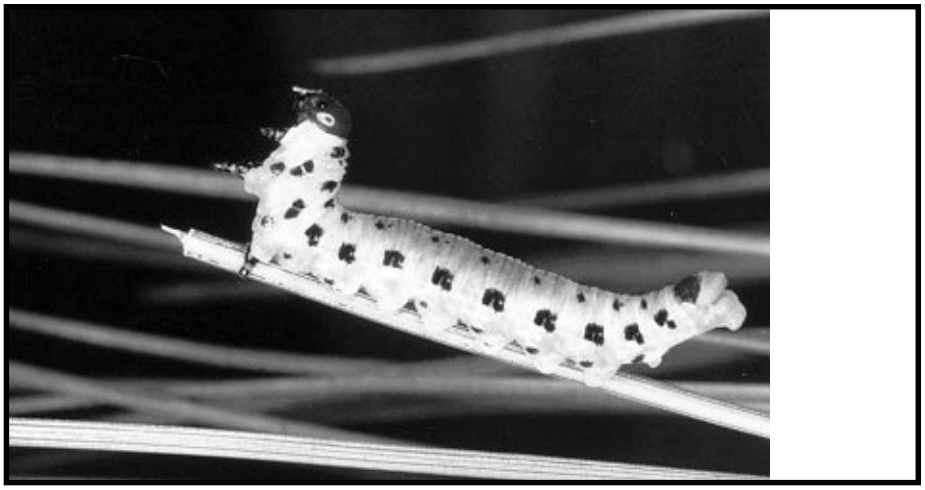

Fig. 4. Larva of redheaded pine sawfly.

hatch, larvae feed in colonies and completely defoliate a branch (Fig. 3) before moving en masse to another. Larvae are .75" - 1.0" long, caterpillar-like, hairless, and distinctly marked with spots and (or) strips (Fig. 4). Many species have bodies that taper gradually towards the rear. If a colony is disturbed, individuals often lift their front and back ends in unison and wave them back and forth (Fig. 4). This reaction is startling and is thought to be a defensive behavior that the exposed larvae use to discourage predation.

When larvae complete feeding, they spin a brown to reddish-brown oblong cocoon. It is within this structure that the larva transforms into a wasp. Adults are 0.2" to 0.5" long and yellowish brown to black with yellowish legs.

Natural Enemies

Various species of parasitic and predaceous insects attack all sawfly life stages. One of the most important mortality factors is a virus that often decimates larval populations. Generally, however, virus epidemics occur only at very high sawfly densities. Many birds and small mammals prey on the larvae and cocooned stages.

Management

At this point in time, the only recourse that a landowner has is to apply a chemical spray when sawfly infestations threaten management objectives. The bacterium *Bacillus thuringiensis,* a popular choice for controlling many other types of defoliators, is not registered for use against sawflies. Similarly, even though naturally occurring viral diseases commonly knock down sawfly outbreaks, and some have been produced for experimental use, none are available commercially.

Outbreaks of many species have been associated with pine stands that are i) under stress from competition with hardwoods or dense herbaceous vegetation, ii) stressed due to poor site conditions such as frost pockets, soil that is low in nutrients or excessively wet or dry soils and iii) open grown. Pine sawfly problems can be minimized by promoting pine on good sites, avoiding sites that are likely to provide stiff plant competition and encouraging early crown closure. ▲

Douglas C. Allen is Professor of Forest Entomology in the Faculty of Forestry at the State University of New York, College of Environmental Science and Forestry (SUNY/ESF); 146 Illick Hall, One Forestry Drive, Syracuse, NY 13210. All photos are by Professor Allen unless acknowledged otherwise.