FOREST PEST LEAFLET 153

The Redhumped Oakworm

Imants Millers and William E. Wallner

The redhumped oakworm, *Symmerista canicosta* Franclemont (formerly *S. albifrons,* or *S. albicosta)* is a native insect of northern oak forests. Historically, outbreaks of the oakworm have occurred at 10- to 15-year intervals and have lasted 1 to 3 years. The redhumped oakworm usually occurs in association with several other oak defoliators, but occasionally nearly pure populations are reported. The outbreaks may cover from a few square miles to several hundred. In Michigan more than 600 square miles were defoliated in 1972.

Hosts

In the north central region of the United States, redhumped oakworm outbreaks occur in forests where oaks (*Quercus* spp.) predominate. Although there are some reports of oakworms feeding on non-oak hardwoods, Michigan studies failed to confirm them. Oakworms were observed feeding on the following species: *Quercus alba* L., white oak; *Q. ellipsoidalis* E.J. Hill, northern pin oak; *Q. macrocarpa* Michx., burr oak; *Q. rubra* L., red oak; and *Q. vellutina* Lamb., black oak. Other species of oak may be attacked by the redhumped oakworm, but there are no available records on occurrence.

Injury

Trees of all sizes are susceptible to attack. However, oakworm outbreaks seem to develop in predominantly mature white oak areas. Early larval feeding causes leaf tips to turn brown. Larger larvae skeletonize leaves until only the midribs remain. Complete tree defoliation occurs from mid-August to late September (fig. 1).

[1]Entolmologist, Forest Service, Northeastern Area State and Private Forestry, St. Paul Field Office, and Extension Entomologist, Department of Entomology, Michigan State University, respectively.

U.S. DEPARTMENT OF AGRICULTURE

Forest Service August 1975

F-522895

Figure 1.—Wintery appearance of oaks in August caused by redhumped oakworm defoliation.

Tree mortality has not been reported from past outbreaks. However, an unusual combination of events—such as a foliage-killing late spring frost, followed by early summer defoliation from another insect pest, a dry summer, and finally, redhumped oakworm defoliation—could cause tree mortality.

The greatest impact of redhumped oakworm on humans occurs in recreation areas, and to businesses associated with them. Falling insect frass and caterpillars contaminate food, dirty equipment, and annoy people camping and picnicking in oak forests. When all the leaves are consumed, the larvae wander into and on houses, where their rotting bodies discolor paint and cause an objectionable odor. The wet frass and dead caterpillars on sidewalks and steps of houses are slippery and become hazardous. Many people are annoyed by the sight of masses of caterpillars. The tourist industry in Michigan reports a business decline in outbreak areas.

Description

The eggs are deposited in clusters of about 50 on the underside of oak leaves. The average egg mass is about 3/8 inch in diameter, single-layered, with the eggs arranged in irregular rows (fig. 2B). Each egg is the size of a pinhead, creamy white at first,

but darkening with age. Shortly before hatching, the dark head of the larva is visible through the shell. The empty egg masses are silvery white. Parasitized and infertile eggs are brown to black.

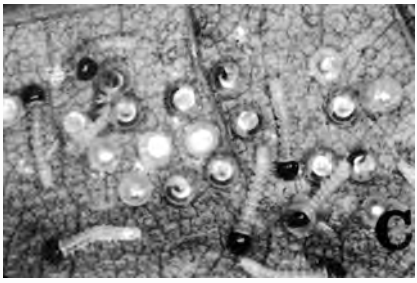

Figure 2.—Life stages of the redhumped oakworm. *A*. Adult. (1.3x); *B*. Eggs. (4x); *C*. First instar larvae, eggs ready to hatch and egg shells. (7x); *D*. Mature larva (1x).

The small caterpillar is about 1/8 inch long, light green with a black head (fig. 2C). The second and third instar larva is more yellowish green, and has a black stripe down its back; the head varies from light to dark orange. At this time, an orange hump near the hind end of the body becomes noticeable. The fourth instar larva is more colorful, with black, orange and yellow markings. The black stripe down the back now appears as three black lines. At this stage it may be confused with the three-striped orange-humped mapleworm (*S. leucitys* Franc.).

The head and the hind hump are now bright orange. The fifth and sixth instar larvae are nearly 2 inches long with five black stripes on the backs of most segments and with bright orange heads and humps (fig. 2D).

Shortly before pupation the larvae become sluggish, bulge in the middle, drop to the ground, and form a pupal cell by tying several leaves together. They molt into a chestnut brown, shiny pupa 1/2 to 3/4 inch long. The head end is rounded, but the hind end is

sharply pointed.

The moth is ashen gray, mottled with white, and with a distinct whitish border on the front edge of the forewing (fig. 2A). The wing expanse is 1 to 1-1/2 inches across; the moth is about 1 to 1-1/4 inches long when the wings are folded at rest. On the tree, the moth with its wings closely appressed to the body appears as a broken branch stub on the trunk.

Life History and Habits

The oakworm has one generation a year. The insect overwinters as a pupa, or occasionally as a prepupa, in the duff above the mineral soil, usually webbed between leaves or pieces of litter. Sometimes pupae are found exposed in the duff. Moths emerge from early June to mid-August and live about 2 weeks. A small number of pupae may remain in the ground through the second winter before the moths emerge. The average female deposits about 300 eggs on the undersides of oak leaves.

Eggs hatch in about 10 days and the small caterpillars feed in a colony on the upper surface of the leaf, but rest on the underside. When disturbed, the larvae spin down on silken threads. Then, as the wind twirls the larvae around, most of the threads become in-

F-522897

Figure 3.—Masses of caterpillars in search of food after the host is stripped. Most of these caterpillars will starve to death and their bodies will accumulate at the bases of trees, causing an obnoxious odor.

tertwined and the larvae may return to the leaf. For about a month the larvae feed in colonies of from 10 to 200 caterpillars. Mixing of larvae from different colonies is common. As the larvae mature they consume greater portions of the leaf. The major part of tree defoliation (see fig. 3) is caused by larvae in the fourth to sixth instars when they consume about 10 leaves per caterpillar. Most larvae mature by the end of September and pupate.

Associated Caterpillars

The redhumped oakworm may occur in nearly pure populations, or in association with several other species of the family Notodontidae. The orange-humped mapleworm, *Symmerista leucitys* Franc., is nearly identical to the oakworm except that it has three black stripes instead of five when full grown. It prefers basswood, elm, and maple, but may feed on oak. The variable oak leaf caterpillar, *Heterocampa manteo* (Dbldy.) has reddish-brown markings on its back and a black stripe on each side of the head. It feeds on oak and many other hardwoods. The orange-striped oakworm, *Anisota senatoria* (J.E. Smith), is a large, black caterpillar with orange stripes on its sides and a pair of black soft horns on its back near the head. This Anisota feeds on a variety of hardwoods. A number of *Datana* caterpillars, usually black with white or yellow stripes and light scattering of hairs, are found in association with the oakworm.

Natural Control

A host of organisms attack the oakworm during its various life stages. Several egg wasps have been collected, but their identity is not clear. Stink bugs (Pentatomidae), clerid beetles, and spiders attack the eggs and larvae. A large, green beetle, *Calosoma* sp., feeds on the large larvae and pupae. Mice and parasitic wasps destroy pupae. All of these biological agents may be important control factors when the oakworm numbers are low. In outbreak situations, however, their role appears insignificant. Diseases have been reported as a cause of outbreak collapse but studies suggest that a stress factor such as adverse weather or starvation is needed before disease becomes effective. Usually, redhumped oakworms become so numerous in the second or third year of the outbreak that "they eat themselves out of house and home", i.e., they may starve by the fifth instar, and die before reaching the pupal state. Dead larvae are found in great numbers, infected with various disease organisms. These diseases appear to be secondary to starvation in controlling oakworm numbers.

Direct Control

Direct control measures are not used in the forest for the

redhumped oakworm because the outbreaks usually cover several thousands of acres and would require spraying on such a large scale as to be impractical. Since most of the defoliation occurs late in the tourist season, visitors do not see most of it. Defoliation is a problem mainly in high use areas, such as around residences and campgrounds and along lake shore and highways, where direct control measures may be needed.

The use of pesticides is regulated by the Environmental Protection Agency of the Federal Government, and by state regulations. Consult your county extension agent, state forester, or pest control specialists at your state university for the current recommendations.

References

Baker, W.L.
1972. Eastern Forest Insects. U.S. Dep. Agric. Misc. Publ. No. 1175, p. 314.

Franclemont, J.G.
1946. A revision of the species of *Symmerista* Hubner known to occur north of the Mexican border (Lepidoptera, Notodontidae). Can. Entomol. 65: 1560-62.

Wallner, W.E.
1971. Habits and control of the redhumped oakworm. Mich. State Univ. Ext. Bull. 709, 2 p.