



ELONGATE HEMLOCK SCALE

Fiorinia externa Ferris

The elongate hemlock scale, sometimes known as the fiorinia scale, is a serious armored scale insect pest of hemlock, *Tsuga* spp., on ornamental and forest trees in Pennsylvania. The principal host plants include Canadian or eastern hemlock, *T. canadensis*, Carolina hemlock, *T. caroliniana*, and northern Japanese hemlock, *T. diversifolia*, fir, *Abies* spp., and spruce, *Picea* spp. This key pest also feeds on cedar, *Cedrus* spp., Douglas-fir, *Pseudotsuga menziesii*, pine, *Pinus* spp., and yew, *Taxus* spp., but these are not preferred hosts. These less preferred host plants, if infested, are usually growing adjacent to infested hemlocks. It is believed that this armored scale insect was unintentionally introduced into the United States from Japan. It was first observed in Queens, New York in 1908. This pest occurs in Connecticut, Maryland, Massachusetts, New Jersey, New York, Ohio, Rhode Island, and Virginia.

DESCRIPTION

The waxy covers of this species can be observed on the lower needle surface as well as on new cones. The flattened, elongate, light yellow brown to brownish orange waxy cover of the adult female is about 1.5 mm long (Fig. 1). The adult female's body beneath the waxy cover, eggs, and crawler stage are yellow. The white, waxy cover of the male is smaller (Fig. 1). When closely examining infested hemlock needles, adult males may look like tiny wasp parasitoids as they crawl across the needles. Adult male scales only have one pair of wings. Sometimes waxy secretions from settled crawlers may build into a mass of tangled strands. These waxy strands may be so abundant that it gives the lower surface of infested needles a white appearance. When this condition is present, it may cause uninformed individuals to misdiagnose this as hemlock woolly adelgid.

LIFE HISTORY

This species overwinters as fertilized females or eggs. In early spring the females deposit eggs beneath their waxy covers and may continue to lay eggs through early summer. One female may produce a total of 20 eggs in a lifetime. In three to four weeks eggs hatch into first instar nymphs called crawlers that migrate to new needles on the same plant. Dispersal of crawlers over

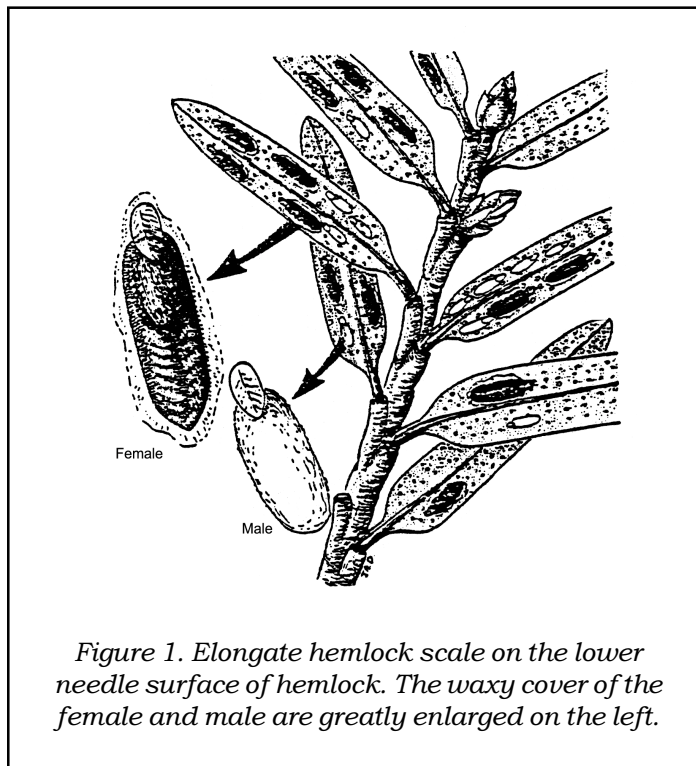


Figure 1. Elongate hemlock scale on the lower needle surface of hemlock. The waxy cover of the female and male are greatly enlarged on the left.

large distances usually occurs by wind currents or on the feet or plumage of birds. Crawlers settle on the underside of the needle, insert their mouthparts, feed for three to four weeks, and then molt into second instar nymphs. Another four weeks is required to reach maturity. Females have three developmental life stages after the egg, and males have five. When mature, males emerge as tiny winged insects, mate with the female, and then die. Mated females start to lay second-generation eggs six to eight weeks after mating. Individuals that develop from these eggs mature and overwinter. Adult females may live up to one year.

DAMAGE

Scales injure host plants by inserting their threadlike, piercing-sucking mouthparts into needles and withdraw vital nutrients necessary for plant growth from mesophyll cells. Armored scale insects do not feed on the contents of vascular cells. Excessive loss of plant fluid reduces the growth and health of the plant. Feeding injury causes needles to develop yellow banding on the top of infested needles. This injury causes

needles to drop prematurely giving the crown of an infested tree a thin appearance. Frequently, this key pest is found on the same hemlock tree with hemlock woolly adelgid, *Adelges tsugae*. There are several key insect and mite pest species that feed on hemlock foliage. It's important to accurately identify what pest species or causal organism is present when maintaining the health of hemlocks. An infestation of this armored scale weakens trees allowing successful attack by secondary organisms such as the hemlock borer, *Melanophila fulvoguttata*, or *Armillaria* root rot.

MANAGEMENT

Effective management of this key pest is extremely difficult since all stages of development may be present during the growing season. There is an abundance of crawlers from late May through early June. This is an ideal time to treat with a registered insecticide formulation applied according to label directions. A second spray should be applied in early July, if needed. Repeat applications may need to be made for effective crawler management until mid-September. Maintaining healthy trees may reduce the chances of an increase in the population of this pest. Research has demonstrated that nitrogen fertilization of hemlocks enhanced population increases of this armored scale. Soil-injected systemic insecticides used to manage hemlock woolly adelgid are not effective in managing this species of armored scale insect.

Two small wasp parasitoids, the lady beetle, *Chilocorus stigma*, and several species of lacewings are natural enemies of this scale insect that provide some population reduction.

WARNING

Pesticides are poisonous. Read and follow directions and safety precautions on labels. Handle carefully and store in original labeled containers out of the reach of children, pets, and livestock. Dispose of empty containers right away, in a safe manner and place. Do not contaminate forage, streams, or ponds.

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