

NANTUCKET PINE TIP MOTH, *Rhyacionia frustrana* (Comstock)

(LEPIDOPTERA: TORTRICIDAE)¹

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INTRODUCTION: The Nantucket pine tip moth, *Rhyacionia frustrana* (Comstock), is a serious pest of young pine in plantations, wild pine seedlings in open areas, Christmas tree plantings, ornamental pines, and pine seed orchards in the United States. Growth loss and stem deformity, caused by larvae feeding inside growing shoots, buds, and conelets, can be considerable during the first five years when most damage occurs (Yates et al. 1981). The increasing population of a preferred host species, loblolly pine (*Pinus taeda* L.), in Florida poses an ever-increasing problem of Nantucket pine tip moth infestations.

DESCRIPTION: Adult female larger than male. Heads, bodies, and appendages covered with gray scales; mottled rusty-red forewing markings, dark basal patch bordered by a lighter crossband that is narrower than the basal patch; male forewing 4.0-7.0 mm long, female forewing 4.0-7.5 mm (Fig. 1) (Powell and Miller 1978). Egg slightly convex and 0.8 mm in diameter; opaque white at oviposition, turning yellow to medium green at maturation. Young larva cream-colored with black head; older larva light brown to orange; extra seta on abdominal segments 1-8 posterodorsal, posterior, or posteroventral to the spiracle, spatulate spinneret; ca. 9 mm long when mature (MacKay 1959, Yates et al. 1981). Pupa light to dark brown; area below tip of frontal horn extending between eyes convex and generally smooth; vertex of pupa not exceeding tip of frontal horn; ca. 4.6-7.5 mm long (Yates 1969). Yates (1969) and Powell and Miller (1978) provide characters to separate adults and pupae of *R. frustrana*, *Rhyacionia rigidana* (Fernald) (pitch pine tip moth), and *Rhyacionia subtropica* (Miller) (subtropical pine tip moth), three species with overlapping host and geographic ranges.

DISTRIBUTION: The second most widely distributed native North American member of the genus, *R. frustrana* occurs from Massachusetts south to Florida, Dominican Republic, Cuba, and Jamaica, and west to Missouri, Oklahoma, Texas, Oaxaca State, Mexico, Guatamala, Honduras, Nicaragua, and California (Powell and Miller 1978). The infestation of California was traced to shipment of infested seedlings from Georgia in 1967 (Yates et al. 1981).

HOSTS: Nearly 20 species of pine have been recorded as host trees for *R. frustrana*: Caribbean (*P. caribaea* Morelet), Cuban (*P. cubensis* Griseb.), jack (*P. banksiana* Lamb.), loblolly (*P. taeda* L.), lodgepole (*P. contorta* Dougl.), Monterey (*P. radiata* D. Don), oocarp (*P. oocarpa* Schiede), pitch (*P. rigida* Mill.), pond (*P. serotina* Michx.), ponderosa (*P. ponderosa* Laws.), red (*P. resinosa* Ait.), sand (*P. clausa* (Chapm.) Vasey), Scotch (*P. sylvestris* L.), shortleaf (*P. echinata* Mill.), slash (*P. elliotii* Englem. var. *elliotti*), sonderegger (X *sondereggeri* H. H. Chapm.), spruce (*P. glabra* Walt.), Table-Mountain (*P. pungens* Lamb.), and Virginia (*P. virginiana* Mill.) (Hedlin et al. 1981). Pine species with multinodal growth in a single season are especially favorable hosts (Yates et al. 1981).

BIOLOGY: *R. frustrana* overwinters as pupae inside damaged shoots, cones, or buds. Moths emerge in the early spring, sometimes as early as February in Florida, when warm days become common. The moths mate and females oviposit eggs on new pine

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shoots and conelets or last year's shoots. In cool weather (late winter or early spring), eggs may take 30 days to hatch, but require only 5 to 10 days to hatch in hot weather (late summer). After hatching from eggs, young larvae may feed on the outside of new growth for a short period of time. Later, larvae bore into shoot tips, conelets, and buds. Larval feeding within these tissues continues for 3 to 4 weeks. Pupation occurs in damaged tissues. There may be up to 4-5 generations per year in Florida depending on temperatures, with cool weather prolonging the time required for the life cycle, and warm weather quickening it (Yates et al. 1981).

SURVEY AND DETECTION: Foliage discoloration: needles turn from green to reddish-brown and will subsequently fall off the shoot; dead or dying branch tips, often curved or tipped; resin beads or flakes and fine silk webbing on branch tips; and damaged parts hollowed out. Larvae or pupae may be present (Fig. 2) (Yates et al. 1981, Hedlin et al. 1981).

CONTROL: Preventive: plant pine species appropriate to site to minimize stress and encourage thrifty growth; promote early crown closure within a plantation; allow weed growth in a plantation to promote populations of natural enemies; plant non-preferred species of pines. Remedial: hand-prune infested shoots and conelets if level of infestation is minor and branches are within reach; apply a registered insecticide (acephate, dimethoate, diflubenzuron, disulfoton, trichlorfon, phosalone, azinphos-methyl, and carbofuran). Employ pheromone traps, specific to *R. frustrana*, to optimize timing of insecticide application (Gargiullo et al. 1983).

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Fig. 1. Adult female Nantucket pine tip moth.



Fig. 2. Branch damaged by immature Nantucket pine tip moths.