

Connecticut Agricultural Experiment Station
New Haven

THE EUROPEAN PINE SHOOT MOTH

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Since 1926 the European pine shoot moth has become distributed over practically all of western Connecticut, and in New Haven, Fairfield and southern Litchfield Counties, has increased in intensity in some plantations to a point where control is very difficult if not impossible. The insect was introduced into this country some twenty years ago. It was reported in Connecticut in 1915, but until 1926 had spread very little.

The shoot moth will infest a large number of species of pine, which enhances the probability of spread. Of the species used for forest and ornamental planting in southern New England, the red, Scotch, Mugho, Japanese red, and jack pines are all susceptible. Of these, the red pine is the most seriously damaged. White pine seems to be practically free from serious injury, although it may become infested.

Life History

The adult insect is a small moth about two-thirds of an inch in length with russet brown wings traced with silver. It is a night flier and can be found in infested plantations between June 1 and July 15. Mating takes place during the flight period. The eggs are laid on or near the bud clusters, and the tiny larvae on hatching bore into the bases of one or more pairs of needles, which die and then turn brown. Later the larvae burrow into the buds. The feeding in the needles and buds is accompanied by a flow of pitch that later hardens and turns white, clotting the buds together. By September 1 the larva has attained a length of one-fourth of an inch and there is no further increase in size until feeding is resumed the following spring, approximately coincident with the beginning of plant growth.

The larva over-winters under the pitch mass or inside a mined bud. After resumption of feeding in the spring, the larva increases

in size very rapidly, becoming nearly three-fourths of an inch in length by about May 15, when it goes into the pupal stage, which lasts for eighteen days. About June 1 the adult moths begin to emerge to start a new life cycle. Spring feeding is confined to the new growth developing from the buds, and may be (1) external, in which case the stem may be deformed, but not killed, or (2) internal, which usually causes the entire new growth to die and turn brown. It is at this time that the injury is most conspicuous and easily detected.

Damage

The damage caused by the insect varies with the number of larvae present. During the first year or two after infestation takes place, the number of larvae on the trees is usually small and the total amount of damage so inconspicuous that it often escapes notice. As the intensity of the infestation increases, larvae become so numerous that a large proportion of the buds are infested. As a consequence the tree ceases to grow and may die within a few years.

Control

The type of control will necessarily vary with the nature of the planting and the intensity of the infestation. For a year or two after the pine shoot moth enters a new locality the spread is quite slow. Therefore, the owner's best insurance is, by frequent inspections, to detect the presence of the insect before it becomes abundant. Control is then relatively easy.

For ornamental plantings with trees planted singly or in small groups, a spray treatment will probably give satisfactory results. The following mixture appears promising as an insecticide:

Light, highly refined miscible oil (summer oil).....	2 gals.
Lead arsenate.....	3 lbs.
Water.....	95 gals.

Applications should be made three times at ten-day intervals beginning about June 10th. It is essential to spray the tips of the branches *thoroughly*.

Forest plantings present a special problem. It will usually be impracticable to spray them, and the only other feasible method known at present is hand-picking the infested buds in the spring. Whether this method of control is used or not will depend upon individual circumstances. On account of the relatively small margin of profit over expenses in forest plantings, costly operations of any kind cannot be used without confiscating the investment.

In plantations under eight feet in height where the infestation is light, the hand picking method may be used. The work should be done in May and the infested buds and shoots cut off and burned.

In heavy infestations in older plantations, the cost of hand picking buds becomes excessive. In such cases it will probably be better for the owner to spend his money in making over his plantation, by the removal of a portion of the red pines and the introduction of not to exceed 300 trees to the acre of a non-susceptible species.

Plantations more than fifteen years old can usually be salvaged for enough to pay for the cost of the operation. The wood of both red and Scotch pine may be used for posts if given preservative treatment. It absorbs creosote readily, and when treated, posts of either species should last as long as, or longer than, untreated chestnut.

Future Planting of Pine

In future plantings, red and Scotch pine should not be used in south-western Connecticut, at least for a number of years. In other parts of the state, especially east of the Connecticut River, they may be planted, but should never form more than 25 per cent of the stand.

Conclusions

It is evident that the European pine shoot moth is now distributed over a considerable portion of Connecticut and other New England States. Owing to the limited time it has been under observation it is not yet possible to determine how serious it may become. In a few localities it has become so firmly established that control will be very difficult if not impossible.

Early detection is essential to control. Owners are urged to cooperate with this Station by reporting all bud injury found on pines in order to determine whether or not the damage is caused by the European pine shoot moth. The Station will be glad to answer inquiries regarding methods of control and the handling of infested plantations.

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