CONTROL OF CONE INSECTS IN SOUTHERN PINE

by

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In years past, insect damage to tree seed in the South has been considered of relatively minor importance to the forester and entomologist alike. It was and still is largely taken for granted that there are good seed years and poor seed years, depending upon the whims of the individual tree species --dovetailed in with a variety of other ecological or climatalogical factors. The purpose of this brief paper is to illustrate that lacking the ability to do much about the cyclic habit of good seed years, we can, with the expense of some time, tender, and, no doubt, trouble make every seed year a better seed year than normally would be the case.

Under certain types of silvicultural management, insect damage to pine seed is of negligible importance. However, in some seasons insects destroy nearly all the seed of desirable pine species. With the arrival of accelerated planting programs such as may be experienced under the Soil Bank Act this loss of seed for nursery stock, especially seed from certain desired geographical areas, could prove very detrimental. Needless to say, companies engaged in the collecting, selling, or planting of seed from high quality trees are likewise adversely affected; finally, a tree genetics program of any type is capable of being retared immeasurably in increased costs and serious time loss by the feeding habits of the many species of insects found affecting the yield of pine seed.

At the Gulfport, Mississippi, Forest Insect Laboratory, 24 different species of destructive insects have been collected from the four major pines. There are perhaps more than this number in the collections of the Southeastern Laboratory at Asheville. No doubt, there are still other important species that have not yet been collected or identified.

The insects collected are of three main orders--the moths, the beetles and flies. Each order and sometimes each species within each order exhibits a variety of habits. For those in attendance at this meeting some familiarity with at least the more common types of injury may be well, in order that the time and dollars lost in caring for, collecting, and storing of infested seed or cones may be prevented.

In the South, perhaps the most troublesome are the larvae or caterpillars of certain species of moths which feed on the bracts or scales of the cones or on the seed itself. Such feeding deforms the young cones and often causes a great amount of cone mortality. Mining of the interior of mature cones by the caterpillars prevents the cones from opening and releasing their seed which, in many cases, is sound. This latter type of

injury is distinguished usually by an opening on the surface of the cone from which protrudes a mixture of frass and resin.

The adults of this group are mostly inconspicuously colored moths and are usually less than one inch in wing spread. They begin their flight period in early spring and deposit their eggs on or near the first or second year cones. In the southern part of the United States there are usually at least two generations and occasionally as high as four generations each year. Most of the species of this group feed also on the terminal shoots of the tree crowns. A conspicuous example of this occurred the past summer, when boring of the terminals of the pitch moth Dioryctria amatella caused the appearanc of red needle flags on slash and longleaf pine. This type of damage accounts for the girdling or cone-bearing twigs and in some areas caused nearly complete mortality of first year cones.

Another moth, not often thought of as a cone insect, is the common pine tipmoth Rhyacionia frustrana. In a tree-breeding program the feeding habits of this moth in destorying the primordial tissues on which young female flowers are subsequently borne makes it necessary to wait for a longer time than necessary to make desirable pollinations. Protecting young loblolly or shortleaf or other susceptible species from attack by this moth will usually result in cone formation by the trees at 3 to 5 years of age.

Pine cones that drop to the ground before they are full grown or remain attached to the tree as withered forms are usually found to be killed by one or more species of cone beetles.

These beetles are leas than 1/4 inch in length and dark brown or black in color. They construct galleries in the pitch of the base or stalk of the cones during the first or second year the cones are on the tree. The female beetles lay their eggs in the central part of the cones, and the small, legless, grub-like larvae which hatch out begin to feed on the scales and seeds of the developing or ripening cones. Two or three generations of these beetles are possible each year in the southern states.

Possibly the insects most frequently encountered by pine seed collectors and nurserymen are the flies and midges. The young white or pink maggotlike larvae are often found emerging from spread cones in drying sheds. The mosquito-like adults lay their eggs on green cones. The eggs soon hatch, and the issuing larvae attack the cone scales, bracts, and seed--usually within the cones. Some species make a gall-like swelling on the outside of the cones. A number of generations of these flies can be produced annually. During some years considerable damage is done to crops in local areas--in other years the damage is negligible.

At the Southern Institute of Forest Genetics, since 1954 tests conducted on slash and longleaf pine have shown that seed crops can be protected from insects by the application of an insecticide. Beginning in March, one-half of one percent benzene hexachloide in a water emulsion applied four times on a bimonthly schedule to selected parent trees has resulted in about a threefold increase in the yield of seed. With this formulation there is no phytotoxic effect on the foliage or cones of the

treated seed or in the germination ability of seed from treated trees,

The spray application in this instance was made with a hydraulic sprayer maintaining a pressure of about 120 pounds. Higher pressures wen found to break up the spray droplets so fine that they would be easily dispersed by the slightest breeze. A makeshift spray boom was devised by running a small-diameter hose up the inside of a 40 foot aluminum pruning pole and attaching a nozzle to the upper end. On days with little wind and with the boom being manipulated from a stand on the cab of a pickup truck, trees 65 feet in height can be treated. The average dosage per tree was about 3 gallons of the spray emulsion which allowed good coverage.

The effectiveness of this spraying can be summarized by saying that on unsprayed check trees the loss for the two years the cones are on the trees is about 74 percent. On sprayed trees the cone loss is about 30 percent. On a cost per tree basis, about $2.65 was spent in treating the trees in these tests four times each year. This cost is rather high, buth this instance, where high-value trees and high-value cones are involved, it is thought to be economical.

In inaccessible areas or on larger areas such as seed orchards, seed production areas, or where seed tree cuts have been made, it may be found economical to employ aerial application of the sprays. In California, preliminary tests have demonstrated that the aerial spraying of 2 pounds of DDT in diesel oil per acre was successful in getting a significantly higher seed yield from sugar pine seed trees. One aerial spraying gave good control for two or three years following treatment. This method may be found practical in southern forests as well. Some tests of this nature are now being proposed for areas in Northern Canada.

At the Gulfport laboratory, only about 16 species of insects predatory or parasitic on destructive cone insects have been collected from caged cones. Less than ten percent of the cones yielded any predatory forms at all. Because of the many species of destructive cone insects involved, the cultivation or introduction of parasites into forest stands with the object of controlling the depredations of cone-feeding insects is not considered to be practical at the present time.

In all liklihood, even with the great amount of seed loss accountable to cone and seed insects, natural stands of timber could maintain themselves indifinitely. However, we are expecting these trees to produce great amounts of seed in excdss of what it is naturally possible for them to do year after year. With the exception of occasional cone and seed destruction by climatic or pathological factors, insects are the main destructive agents. From our preliminary observations it appears that we can expect little assistance from natural control in keeping destructive cone and seed insects in check. As an alternative, serious consideration should be given to chemical control of these important insect pests if the harvest of pine seed of the quality and quantity desired is to be achieved.