A NEW CONE MIDGE, CECIDOMYIA SPP. (DIPTERA: CECIDOMYIIDAE) AFFECTING SLASH PINE CONES

Isadore L. Williams and Carl W. Fatzinger[1/]

Abstract.--In 1976, first-year slash pine (Pinus elliottii Engelm. var. elliottii) cones in a northeast Florida seed orchard developed hypertrophied scales. The same symptoms appeared again in 1977. Dissection of the distorted cones revealed an infestation by cone midge larvae. The 1976 damage was found on both trees treated with carbofuran (Furadan®) and on untreated trees. In 1977, damage was observed on the same trees as well as Orthene®

necessity for control measures.

Additional keywords: Cecidomyiidae, Cecidomyia, midge, slash pine cone, seed orchard.

Very few midges have been identified as pests of pines in the South. Although adults of the gall midge family (Cecidomyiidae) partially damage or destroy first- and second-year cones of slash pine (Pinus elliottii Engelm. var. elliottii), they have not been significantly abundant in slash pine seed orchards to warrant intensive research (Ebel, 1963; Ebel et al., 1975). In 1976, hypertrophied cones appeared on trees in a slash pine seed orchard of Container Corporation of America near Callahan, Nassau County, Florida. The cone scales were grossly enlarged and protruded far beyond the normal surface of the cone.

METHODS

The first damage was observed[2/] on trees being sampled to evaluate the effectiveness of the carbamate insecticide, carbofuran (Furadan®. In 1976, the treatments were applied to four ramets of each of six of the largest clones in the orchard. Two ramets were treated with Furadan® and two ramets were left untreated as checks. Furadan® 10G was disced into the soil under the crown drip line at a rate of 178.6 g. A.I./cm. d.b.h. (1 lb. A.I./in. d.b.h.) during the first week of March 1976 and during December 1976. Hypertrophied cones were found on the Furadan®-treated trees and on the check trees. In 1977, two additional ramets of each of the same clones were treated with the systemic insecticide Orthene®. Orthene® (75 percent water soluble powder) was sprayed at the rate of 1 Kg. A.I./210 1. water R lb. A.I./100 gal. water) on the crowns of these trees until their foliage was dripping wet.

1/ Assistant Entomologist and Principal Insect Ecologist, respectively, USDA Forest Service, Southeastern Forest Experiment Station, Olustee, Florida, 32072.

2/ The damage was observed by Robert Mantle, Research Forester for Container Corporation of America, Callahan, Nassau County, Florida, while making monthly observations on trees in a carbofuran study.

The treatment was applied during the first week of January 1977 and the last week of February 1977. These trees were located about 73 m. (80 yards) from the carbofuran treatment. Like the previous year, both treated and check trees showed damage symptoms in 1977.

Hypertrophied first- and second-year cones were collected in 1976 and 1977 for determination of the cause of abnormality. Cones collected were either dissected, held in containers for future reference to observe emergence of adult insects, or preserved in 80 percent ethanol. All insect specimens dissected from the cones (larvae) and those collected from the emergence containers (adults) were sent to Dr. Raymond Gagne, United States Natural Museum, Beltsville, Maryland for identification. Damaged conelets and cones are currently being collected monthly to secure any other insects and to determine the number of generations per year.

RESULTS

Dissection of the cones revealed orange larvae about 3 mm in length and small feeding cavities below the surface of the scale. Larvae were observed feeding on the seed wing tissue and on the surface of the scales in the interior of the cone, but not on the ovules. As many as six larvae were found feeding in one cavity, and each scale above a feeding cavity was enlarged and protruded far beyond the normal surface of the cone.

The larvae were tentatively identified by Dr. Gagne as Cecidomyia spp., possibly resincola (O. S.). He currently believes them to be a new species which he plans to describe.

The infestation was first noted in May 1976 and new attacks continued to be observed on the first-year conelets until July 1976. During 1977, attacks occurred on the first-year conelets from March through June. A total of 200 conelets or 31.5 percent of the 634 sample conelets were attacked on the Furadan@-treated trees in 1976 and 25.5 percent of these conelets died (Table 1). In comparison, only 34 (6.1 percent) of the 557 sample conelets on the check trees were attacked in 1976 of which 23.5 percent died. During 1977, 18.2 percent of the 1222 sample conelets on Furadan®-treated trees were attacked of which 19.7 percent died, 8.5 percent of the 579 sample conelets on Orthene®-treated trees were attacked of which 40.8 percent died, and 5.8 percent of the 825 sample conelets on the check trees were attacked of which 18.8 percent died.

The insect does not appear to favor any side of the tree (cardinal direction)3/, and the damage usually cannot be seen from the ground. Some cones have only one enlarged scale and can easily be overlooked.

3/ Personal communication with Robert Mantie.

Table 1.--Numbers of first-year conelets sampled that were attacked by midges and numbers subsequently killed during 1976 and 1977 in a slash pine seed orchard in northeast Florida.

	1976				1977					
	Furadan®		Check		Furadan®		Orthene®		Check	
Month	No. attacked	No. killed	No. attacked	No. killed	No. attacked	No. killed	No. attacked	No. killed	No. attacked	No. killed
Mar.							38			
Apr.					119	15		5	15	3
May	174		23		76	24	5	12	19	6
June	22	6	8		28	5	6	3	14	
July	4	4	2	2						
Aug.		10		1						
Sept.		12		2						
Oct.		3		1						
Nov.			1							
Dec.										
Jan.										
Feb.										
Mar.		7								
Apr.		9		2						
Total	200	51	34	8	223	44	49	20	48	9

DISCUSSION

Feeding by larvae of the cone midge appeared to stimulate hypertrophy of cone scale tissues. Larvae were found in all of the hypertrophied cones dissected. The larvae do not appear to feed directly on seeds, but their feeding activity does cause cone mortality, thus reducing seed orchard yields.

Although the cone midge infestation appears to be severe in this orchard, it is not known to be widespread geographically. We are presently evaluating the impact of the cone midge on seed yields and seed quality to determine whether control methods will be required in the future.

LITERATURE CITED

Ebel, B. H.
1963. Insects affecting seed production of slash and longleaf pines--their identification and biological annotation. Southeast. For. Exp. Sta., USDA For. Serv. Res. Pap. SE-6, 24 pp.

Ebel, Bernard H., Raymond J. Gagné, and Edward P. Merkel.
1975. Cecidomyiidae from pine cones in Florida, with a generic key to larvae. Fla. Entomol. 58(3):193-197.
