MEGASTIGMUS SPECULARIS WALLEY INFESTS FIR SEED FROM CANADA TO NORTH CAROLINA

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The chalcids *(Megastigmus spp.)* are serious pests of various kinds of seed in many parts of the world. In some years, 95 percent of the seed crop of Douglas-fir and western true firs has been destroyed by these tiny parasites. Although entomologists in the South have been on the lookout for these pests while working with southern pine seed, none has ever been observed. A few years ago, because millions of fir trees were killed by the balsam woolly aphid in North Carolina, concern was expressed over the possible loss of a seed source for Fraser fir *(Abies fraseri* (Push) Poir.). When our investigations with Fraser fir seed began in 1964, the seed were found to be severely infested.[1] Insects, which emerged from the seed, were submitted to the Systematic Entomology Laboratory of the U.S. Department of Agriculture in 1965 and identified by B. D. Burks as *Megastigmus specularis* Walley. Burks reported that specimens from balsam fir *(Abies balsamea (L.)* Mill.) seed from Canada and New England south to Massachusetts were in the National Museum Collection. He believed it most desirable if we could determine the status of this insect in Pennsylvania, Virginia, and West Virginia.

An opportunity to make this determination occurred in 1967 when the Department of Forestry at the University of Tennessee, in cooperation with a project on Timber Related Crops of the Northeastern Forest Experiment Station at Berea, Ky., made collections of fir seed from several Eastern States. Some of the collections from Pennsylvania, Virginia, and West Virginia were x-rayed.[2] Examination of the films, which recorded seed collections by location, stand, individual tree, and seed lot, determined that *Megastigmus* was present in the seed at all locations sampled and that seed from 38 of 39 trees were infested in varying degrees (table 1). Because of the limited amount of seed available and the need for planting immediately following X-ray examination, it was impossible to retain the seed for adult emergence. We did retain

1 Speers, Charles F. Balsam fir chalcid causes loss of Fraser fir seed. USDA Tree Planters' Notes 19 (2) : 18-20. 1968.

2 X-ray work for this study was performed by H. 0. Yates III, Southeast. Forest Exp. Sta. at Athens, Ga.

TABLE 1.—*Megastigmus infestation of fir seed collected from Pennsylvania, Virginia, and West Virginia in 1967*

Location, cone crop, and tree species	Seeds examined per parent tree	Seeds infested
	No.	*Percent*
Gouldsboro, Pa.	1,000	3
Light cone crop of balsam fir	1,000	6
	1,000	5
	800	3
	800	Trace [1]
	1,000	1
Promised Land State Park, Pa.	1,000	2
Medium cone crop of balsam fir	1,000	2
	1,000	Trace [1]
	1,000	3
	1,000	6
	800	Trace [1]
	1,000	Trace [1]
	800	1
Tamarack, Pa.	1,000	0
Medium cone crop of balsam fir	1,200	Trace [1]
	1,000	Trace [1]
	1,000	Trace [1]
	1,200	2
Shenandoah National Park, Va.	1,000	2
Heavy cone crop of bracted balsam fir	1,000	14
	1,200	1
	1,000	5
	1,200	1
	1,000	Trace [1]
	800	1
	1,200	1
	500	2
	1,000	Trace [1]

See footnote end of table.

TABLE 1.—*Megastigmus infestation of fir seed collected from Pennsylvania, Virginia, and West Virginia in 1967—Continued*

Location, cone crop, and tree species	Seeds examined per parent tree	Seeds infested
Bartow, W. Va.	1,000	31
Heavy cone crop of bracted	1,200	7
balsam fir	1,000	5
	800	3
	800	2
	1,000	3
	1,200	6
	1,200	3
	1,200	3
	1,000	2

[1] Trace indicates less than .5 percent.

a small sample of infested seed from Bartow, W. Va. Following refrigeration for 2 months, adults that emerged from these bracted balsam fir *(A bies balsamea* var. *phanerolepis* Fern.) seeds were identified by B. D. Burks as *M. specularis.*

In the light to medium cone crops of balsam fir in Pennsylvania, the insect infestation ranged from 0 to 6 percent, with an average of 1.8 percent. In the areas of heavier cone crops in Virginia and West Virginia, loss of bracted balsam fir seed varied from a trace to 31 percent, with an average of 4.1 percent. Variation in insect attack among trees at all locations was considerable; it ranged from 2 to 31 percent in West Virginia alone.

An examination of Fraser fir seed collected in North Carolina was also made in 1967. The sample consisted of three cones from each of nine trees in the Richland Balsam Mountains, where a good cone crop occurred. X-ray examination of a composite lot of 400 seeds showed that 32 percent of the crop was infested.

These examinations have established that *Megastigmus specularis* infests fir seed along the entire Appalachian Mountain chain. This seed parasite attacks Fraser fir in North Carolina and Tennessee, bracted balsam fir in Virginia and West Virginia; and balsam fir from Pennsylvania through New England and Canada. A high rate of infestation may occur even in areas of heavy cone crops, with a wide variation in seed attack among individual trees at the same location. Personnel working with fir seed should be aware of these potential insect-caused losses.