MULTIPLE WITCHES BROOM - A NEW TYPE OF ABNORMALITY IN SCOTCH PINE (PINUS SYLVESTRIS)

Franklin C. Cech, Robert E. Adams, and Allan Miller [1]

Individual witches brooms have been found on most species of conifers, but multiple brooming is relatively uncommon. Generally, brooms develop from an enlarged area on a branch or stem where prolific branching occurs resulting in broom-like growth. These can be caused by insects, fungi, other parasitic plants, and, in some cases, occur for no apparent reason. Most witches brooms found on Scotch pine are apparently of the latter type and are usually single, more or less massive brooms. These occur infrequently on the tree, and rarely on the main stem. As a result, they are of little economic importance.

About four years ago, however, a number of small brooms of a different nature were noticed on a few isolated Scotch pines in a Christmas tree plantation in southern West Virginia (Fig. 1). These were on trees from East Anglican seed in a plantation which included trees from several other seed sources and were noted as a peculiarity, perhaps associated with East Anglican seed.

By December 1968, the brooming had appeared on trees from other sources. An alarming number of trees were affected, with from one to fifty brooms per tree. Many of the brooms had died and in so doing had terminated effective lateral growth of the affected branches causing unsightly holes in the closely sheared trees. This resulted in de-grade or lack of saleability of those individuals seriously affected. One grower estimated that he had lost between five and six thousand dollars because of unsaleable trees.

The brooms are small, tight rosettes of dwarf needles and proliferated buds which die at the end of the growing season. Occasionally a weak branch growing from the broom will survive (Fig. 1). Brooms collected in December were dissected and examined under the dissecting scope. No signs of insect infestation were found. Pathological investigation and isolations showed only fungi normally associated with dead or decaying tissue.

Since nematodes are known to cause metabolic disturbances leading to abnormal growth, extractions were made to determine whether any nematodes were present. Great numbers of Aphelencholdes sp. were recovered from all the brooms examined (Fig. 2).

Additional field examinations were made the following summer, to determine if shearing the trees might have been the cause of the brooming. Brooms were found on all plantations, at least three years old, in the local area of the first infestation. Brooms were finally found on unsheared seedlings that had been interplanted the previous year. While shearing may have accelerated the spread of brooming, it did not seem to be the primary cause.

[1] Pathology, West Virginia University, College of Agriculture and Forestry, and Entomologist, West Virginia Department of Agriculture.

Fig. 1.-- Witches broom on Scotch pine.

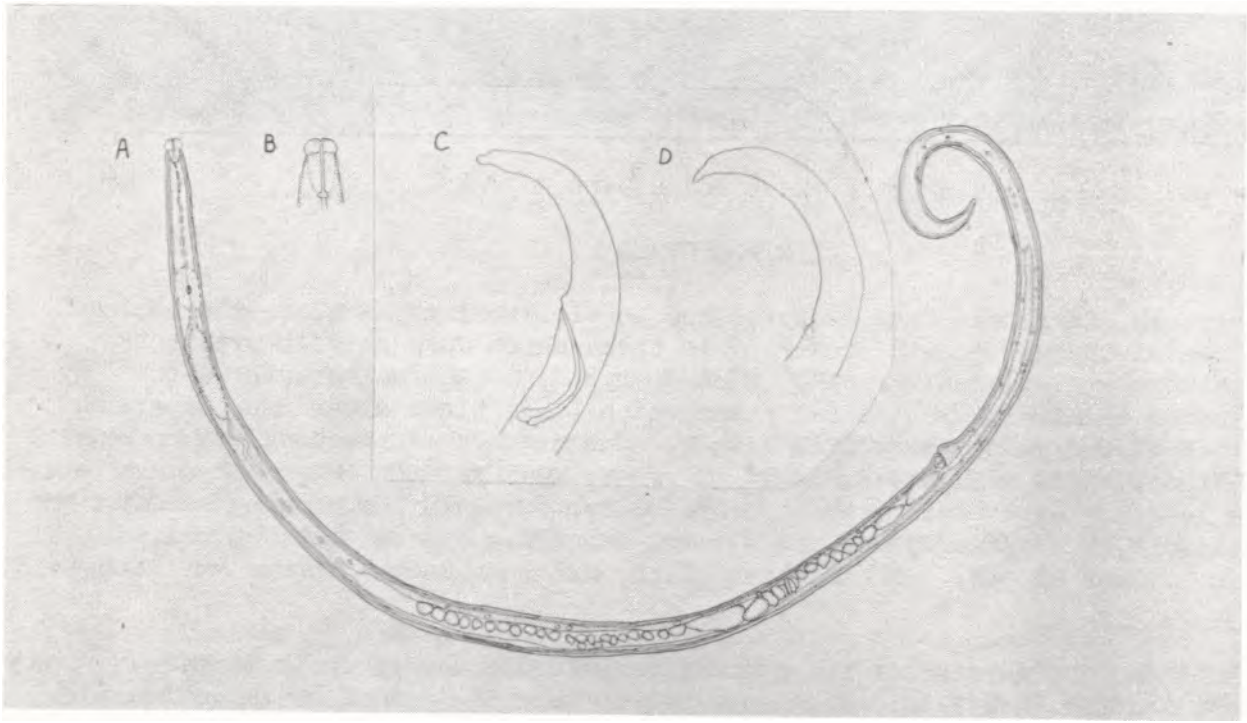

Fig. 2.--Aphelenchoides sp. Camera lucida drawing of nematode isolated from Scotch pine witches broom.
A. Lateral view (stylized drawing). B. Anterior portion.
C. Posterior, male. D. Posterior, female.

Fresh brooms were collected at this time and examined under high magnifications. Eriophyid mites were found in these brooms. These have been tentatively identified as Eriophies pini, the pine needle sheath mite. However, this damage has not been found previously in association with these mites. Eriophyid mites have been found on P. radiata, P. torreyana, and P. sabiniana, causing needle yellowing (Kiefer, 1937). Other conifers have also been affected, the mites causing both needle and bud damage, but apparently nothing similar to the damage reported here (Kiefer, 1959).

Since the first report to the West Virginia Christmas tree growers of this type of brooming on Scotch pine, it has been found on Mugho pine (P. mugho), and Virginia pine (P. virginiana).

Because this type damage has not been found previously, and both the mites and nematodes are consistently associated with the brooms, inoculations have been made with both the nematodes and eriophyid mites on two-year-old Scotch pine seedlings. There are no results to date to indicate the cause of the brooming. However, studies are continuing to determine the cause of the brooms so that proper control measures can be formulated.

LITERATURE CITED

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