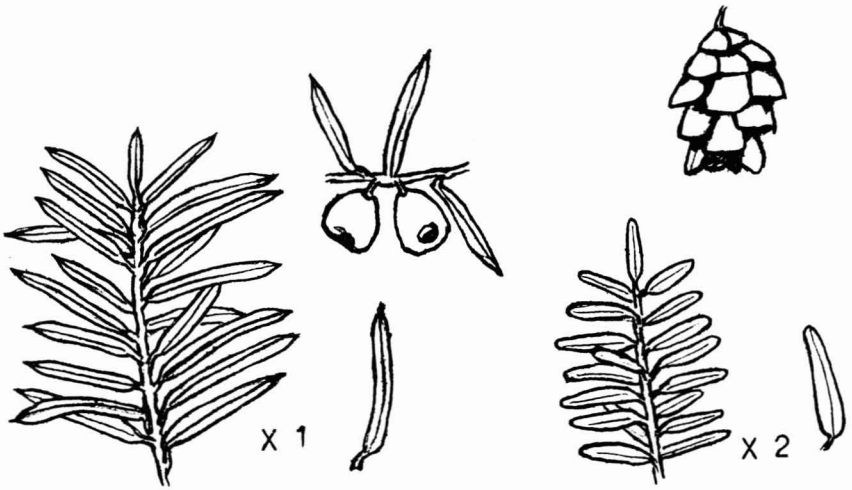
YEWS AND HEMLOCKS - - A Progress Report

An investigation which has been underway for several years at the Cedar-Sauk Field Station and the adjacent Cedarburg Bog is concerned with the American Yew or Ground Hemlock (*Taxus canadensis* Marsh.) and the Eastern Hemlock (*Tsuga canadensis* (1.) Carr.). The yew occurs naturally in small clumps in the upland maple-beech woods, on several islands in the bog and on the better drained ridges and knolls throughout the bog area. Nowhere is it very abundant. In contrast, the hemlock has not been reported in the vicinity of the Station; however, scattered trees of various sizes occur in some of the wooded ravines along Lake Michigan as far south as Grant Park in South Milwaukee and Petrifying Springs Park in Racine County. The purposes for studying these species in this area are: (1) to determine the survival and regeneration of the yew in protected and unprotected areas, (2) to establish hemlock trees as components of the upland forest, and (3) to determine the effects of deer browsing on these species and their chances of survival under natural and artificial environmental conditions.

Both species often occur together in the Northern Forest (Curtis, 1959) which is also referred to as the Hemlock-White Pine-Northern Hardwood Forest (Nichols, 1935) or the Lake Forest (Weaver and Clements, 1929). The natural geographic range of each is chiefly from the maritime provinces of Canada and the New England States to northern Minnesota, southward to central Wisconsin, Michigan, northern and eastern Ohio, and southward on the Appalachian uplands to eastern Kentucky and Virginia. The yew extends slightly farther northward and northwestward in Canada, while the hemlock occurs farther south into the Appalachian regions of Alabama and Georgia. Both species occur in isolated areas south of this general range into southern Wisconsin and west-central Indiana. The yew also has been reported in northeastern Iowa and northwestern and northcentral Illinois. The distribution patterns of these species in Wisconsin, shown on Maps 1 and 2 (according to Fassett, 1930), suggest that they reach their respective southeastern limits in the Field Station-Cedarburg Bog area and in the wooded ravines of Milwaukee and Racine Counties.

The yew is a low straggly shrub, rarely exceeding two meters in height, while the hemlock is a tall tree and considered one of the dominant species in the climax Northern Forest. Both species are evergreen with needle-shaped leaves that are arranged singly on the twigs. They may be readily distinguished from other Wisconsin conifers by their flattened needles which have short petioles. The yew has needles with abruptly-pointed tips and roundish cones which are fleshy and resemble orange-red berries, while the needles of the hemlock are blunt at the tips and the short cones have flat dry scales. A pictorial comparison of these plants is shown in Fig. 1.

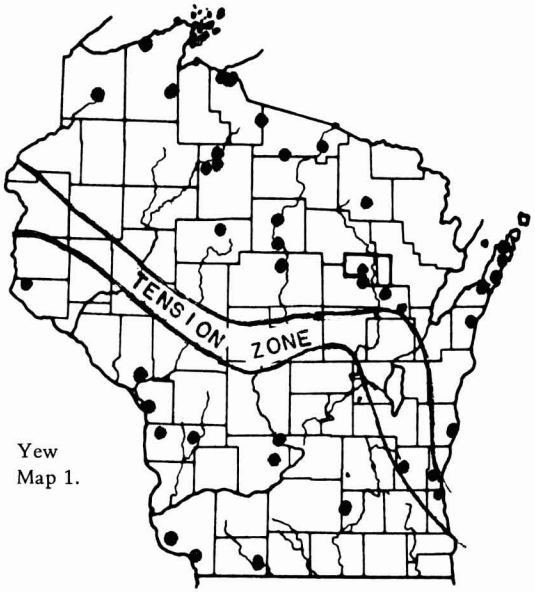


Yew
(taxus canadensis)

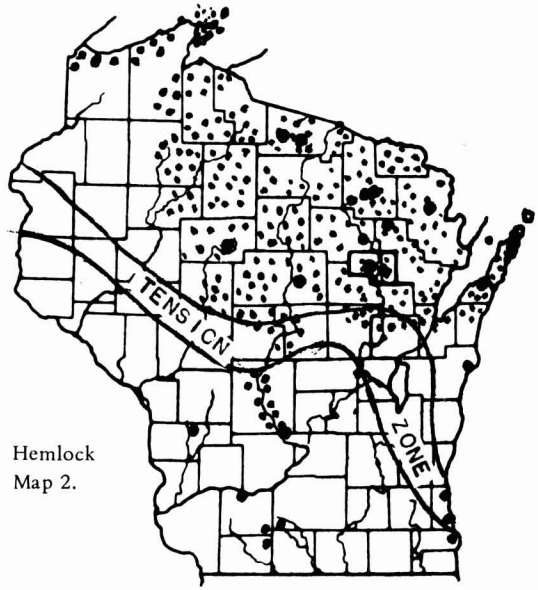
Hemlock
(Tsuga canadensis)

Fig. 1. Twigs, needles and cones of the yew (*Taxus canadensis*) on the left and the hemlock (*Tsuga canadensis*) on the right.

The stands of yew in the upland forest and on two of the islands in the large bog have been under surveillance since the Field Station was acquired in 1964. The general condition of these shrubs was excellent until they were heavily browsed by deer during the winters of 1965-66 and 1966-67. Because this browse pressure severely depleted some of the best concentrations of these shrubs, it was decided to erect several enclosures in an attempt to save some of them from total destruction and to note the degree of recovery while they were under protection. With the cooperation of the Wisconsin Department of Natural Resources, three wire-mesh enclosures varying in size from 15 feet by 15 feet to 15 feet by 30 feet (depending upon the size of the shrub clusters), were erected in the fall of 1967. One was placed on the island immediately east of the Field Station boundary and two were set up on the large island at the northeast end of Mud Lake. Observations for the two years showed little or no change during the first year of protection and only slight, but not measurable, improvement during the second year. Some of the shrubs outside of the enclosure also seemed to show some improvement during the second year, probably because of the high deer kill in this area during the 1968 hunting season. It is presumed that at least five to fifteen years of protection will be needed for significant recovery of the yews in these overbrowsed areas.



Map 1. Distribution of the Yew (*Taxus canadensis*) in Wisconsin based on herbarium records (Fassett, 1930).



Map 2. Distribution of the Hemlock (*Tsuga canadensis*) in Wisconsin. Small dots represent sight records (Fassett, 1930) and the large dots are UWM herbarium records.

The hemlock project is an attempt to establish this native species into a plant group with which it is typically associated in the Northern Forest of the Great Lakes Area, but absent in this immediate area. A second reason for this study is based on a premise that hemlock trees have been present in this area in pre-settlement time. If this was the situation, the disappearance of these trees was probably due to cutting by the early settlers as there was a ready market for the bark which was used in leather tanning. Furthermore, a lack of suitable seed beds (rotting stumps and logs) together with an increase in the deer population may have prevented any reproduction to replace the parent plants. Why some of these trees survived in the ravines along Lake Michigan is not understood, but the steepness of the slopes in these locales may have deterred both loggers and deer.

In northern Wisconsin and elsewhere in the Lake states, the hemlock occurs with Sugar Maple (*Acer saccharum* Marsh.), Basswood (*Tilia americana* L.), Beech (*Fagus grandifolia* Ehrh.) and Yellow Birch (*Betula lutea* Michx. f.). All of these species are present on the Field Station property. The first three species are the predominant ones in the upland woods, while the yellow birch is present chiefly along the margins of the boggy areas. The northeast edge of the upland woods adjoins a small bog, containing yellow birch. At this commissure, where the four species are proximate to each other, it was decided to plant the hemlocks.

In 1965, twenty young seedlings (approximately one to two feet tall) were obtained from the forest of the Menominee Enterprises (Menominee County, Wisconsin) and planted randomly in this site. Unfortunately, they were given no protection during the first winter and only two survived. A second planting of 55 trees, from the same source, was made in the fall of 1966. During the winter of 1966-67, they were protected by a persisting blanket of snow which had drifted about them, and all but six survived. In the fall of 1967, a protective screen was placed about each of the remaining seedlings and all of them survived the 1967-68 winter. An early freezing of the ground, limited snow cover and the overturning of several of the screens resulted in a high mortality in the 1968-69 winter. A total of 29 plants was lost due to browsing and dessication. Of the remaining 22 trees, three appear in excellent condition, with growth on the branches which averaged four to five inches during the past two years; 14 are rated in fair to good condition, averaging one to three inches of growth; and five are considered in poor condition, with less than one inch of average growth and having many browse-damaged branches. Although no new plantings are contemplated, these remaining hemlocks will be given protection until they extend to heights beyond the reach of deer, hopefully in about ten years.

The survival of the yew shrubs and hemlock trees at the Cedar-Sauk Station and in the Cedarburg Bog will depend upon protection from the browsing pressure of deer. Lintereur (1969) considers these species and the cedar (probably the White Cedar, *Thuja occidentalis* L.) as "endangered species" because it is the animals which determine if they will grow. His view seems applicable to the yews and

hemlocks in this area, and probably for the cedars. It is hoped that some investigator will consider the cedars of this area for a near-future study.

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