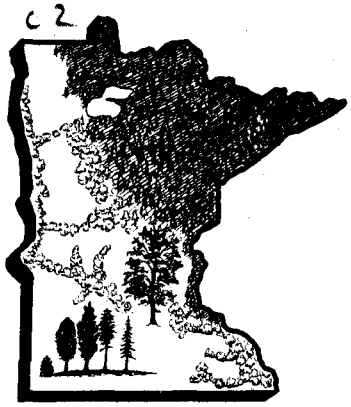

MINNESOTA FORESTRY NOTES

No. 14

February 15, 1953

SUPPRESSION EFFECTS IN TWENTY-FIVE-YEAR-OLD WINDBREAK PLANTINGS

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Spacing in shelterbelt and windbreak plantings is a subject of frequent disagreement among foresters. It is affected by ease of cultivation, arrangement and choice of species, and the growth habits of the various species used. The choice of spacing is especially critical where a row of conifers is to be adjacent to a row of hardwoods. In such situations, the faster growing hardwood with its wider spreading crown frequently overtops the adjacent conifer and by a combination of shading, root competition and whipping of the terminals, suppresses it. (See fig.)

An examination in 1948 of 119 farmstead windbreaks in 16 counties in western and westcentral Minnesota gave opportunity for a quantitative evaluation of the results of different spacings between adjacent rows of conifers and hardwoods. The windbreaks examined were part of those planted as a cooperative project by the School of Forestry and the Agricultural Extension Division of the University of Minnesota and the State Forest Service. These plantings were all about 25 years old when examined.

The most common combinations of conifer and hardwood rows were either pine and American elm (Ulmus americana) or pine and green ash (Fraxinus pennsylvanica lanceolata). Since the average heights after 25 years for the most commonly planted pines - jack (Pinus banksiana), red (Pinus resinosa), northern white (Pinus strobus)- were found to vary only two feet (see Table 1), and since field observations indicated that each reacted similarly to suppression by hardwoods, the three species have been considered in one category in spacing comparisons.

Table 1. Average Height Twenty-five Years After Planting

Species	Average height (feet)
American elm	30
Green ash	30
Jack pine	25
Red pine	24
Northern white pine	23

Each windbreak was examined to determine the extent to which the pine row was being suppressed by the adjacent hardwood row. The results of these examinations are summarized in Table 2.

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(1) Former graduate student, and Associate Professor, respectively, School of Forestry, University of Minnesota. Data are derived from an unpublished Master's thesis by the senior author.

Published by the School of Forestry, University of Minnesota, St. Paul 1, Minnesota, cooperating with the Division of Forestry, Minnesota Conservation Department, and Forest Industries of Minnesota

Table 2. The Suppression Effects of American Elm and Green Ash on Adjacent Pine Rows.

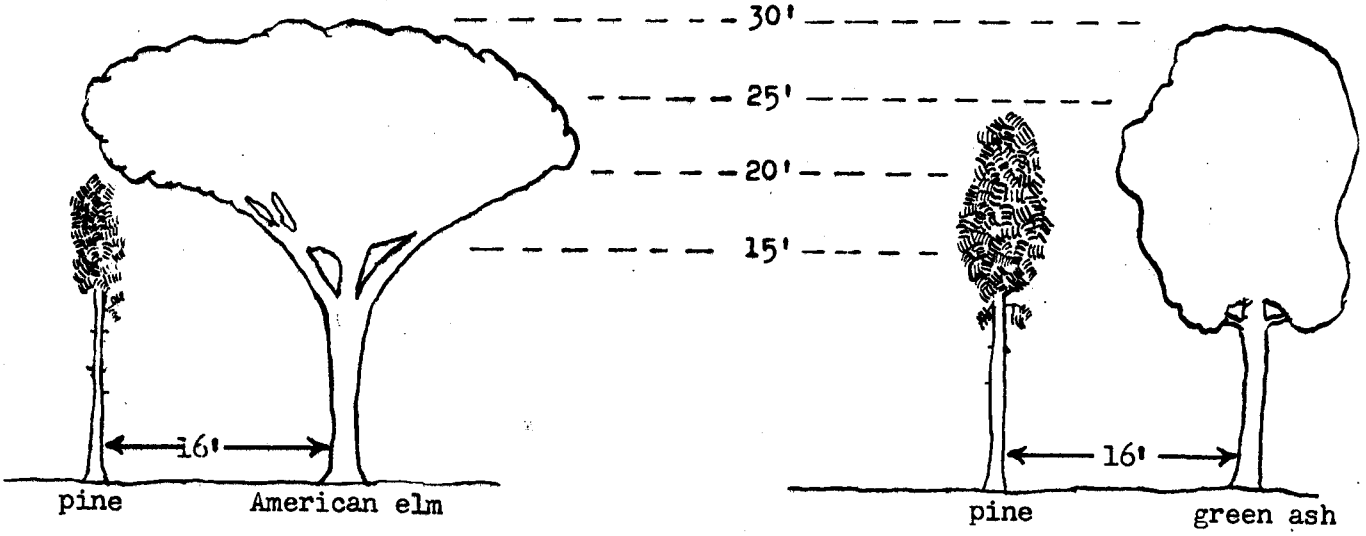
Spacing between pine and adjacent row of ash or elm (feet)	Percent of windbreaks having pine row seriously suppressed	
	By elm	By ash
8	no data	67
12	75	31
16	58	0
20	20	0

Conclusions:

1. American elm, because of its spreading growth habit, should never be planted adjacent to pine in windbreaks. Even when a spacing of twenty feet was used, considerable suppression was noted.

2. Green ash, because of its compact crown, can safely be planted next to pine in windbreaks if a spacing of approximately 16 feet is used between rows. At a 12-foot spacing between rows there was considerable suppression of adjacent pine by ash.

3. Green ash might be planted closer than 16 feet from an adjacent pine row only if thinning is done early enough to prevent suppression of the pine. In plantings where survival has been good, this usually would involve the removal of the entire row of ash well before 25 years.



The severe suppressing effect which elm has on an adjacent pine row 16 feet away is illustrated above. The wide spreading growth habit of the elm results in serious stunting of the pine while ash of approximately the same height has not yet shaded the pine to a serious degree. These drawings are scaled to the average heights of these species at 25 years of age in Minnesota farmstead plantings.

Published as Scientific Journal Series Paper No. 2970 of the Minnesota Agricultural Experiment Station.