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EFFECT OF FIELD SHELTERBELT COMPOSITION ON SNOW DISTRIBUTION

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The primary function of field shelterbelts is to reduce wind velocity. As a result of this reduction, a greater proportion of each snowfall remains on the cropland within the protected area. This tends to increase the soil moisture available for crops planted the following spring.^{2/} The pattern of snow distribution near the shelterbelt and within the protected area is influenced by the composition of tree and/or shrub species used in the shelterbelt planting. For greatest benefit to crop land, snow should seep through the belt rather than accumulate within the belt or too close to the trees.^{3/}

To determine various snow distribution patterns, snow depth measurements were made on five shelterbelts having three different types of species composition. These patterns, which represent the accumulation of two major snowfalls in the winter of 1962, are illustrated in Figures 1, 2, and 3. All belts have a north-south orientation and are located in the vicinity of Hastings and Newport, Minnesota.

The two-row green ash shelterbelt bordered on either side by plum (Fig. 1) shows an accumulation of snow within the belt of two and one half times the normal depth. The bordering shrub rows reduce wind velocity to the extent that snow can seep into the belt but not through the belt, resulting in an accumulation of snow within the belt. A belt of this type conserves moisture primarily for the benefit of the trees and shrubs and to a lesser extent for crops to a distance of 4H (4 tree heights) to the leeward.

The three-row green ash shelterbelt (Fig. 2) shows a maximum snow accumulation twice that of normal at a distance of 4H to the leeward. Snow depth is slightly greater than normal immediately adjacent to the belt on either side and slightly less than normal within the belt itself. This would indicate that the wind velocity at the ground line, where tree branching is sparse, is not reduced and may, in fact, be slightly increased as the wind is funneled through the belt at this point. A belt of this type conserves moisture primarily for the benefit of crops in an area from 2H to 9H to the leeward.

The three-row red pine shelterbelt (Fig. 3) shows a mass accumulation of snow adjacent to the belt on either side. The dense, live lower branches greatly reduce the wind velocity and the amount of snow which seeps into the belt, resulting in a normal accumulation of snow within the belt. A belt of this type conserves moisture for the benefit of both the trees and of the crops extending a distance of about 4H to the windward and 6H to the leeward.

From the standpoint of moisture conservation through snow accumulation, both the red pine and the green ash shelterbelts (without shrubs adjacent) benefit approximately an equal area of crop land in terms of tree heights. The red pine belt, however, performs the added function of conserving moisture for the trees. The green ash belt bordered by shrubs conserves moisture primarily for trees and is of little benefit to crops insofar as snow accumulation is concerned.

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^{2/} Bates, C. G. 1948. Farm Crops Benefit From Field Shelterbelts. Minn. Farm and Home Sci. V (3): 6.

^{3/} Bates, C. G. 1948. How Shelterbelts Benefit Crops. Lake States For. Exp. Sta. Tech. Note 299. 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

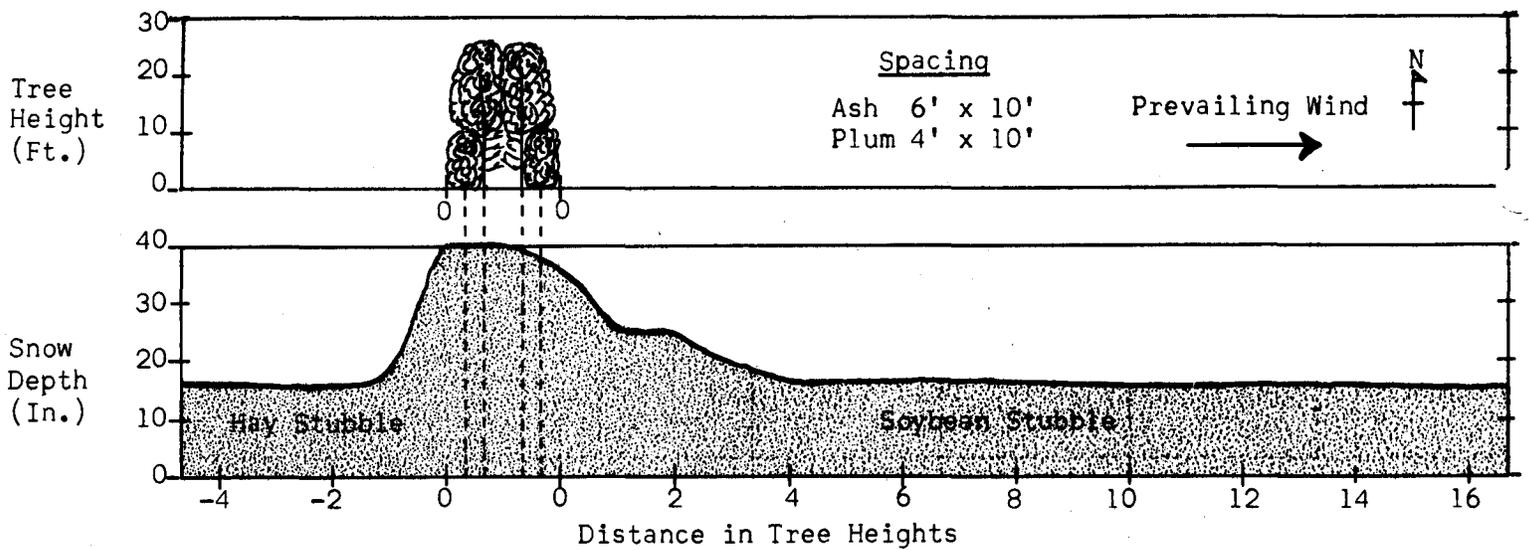


Fig. 1. Snow distribution pattern formed by two-row green ash shelterbelt bordered on either side by a shrub row of plum.

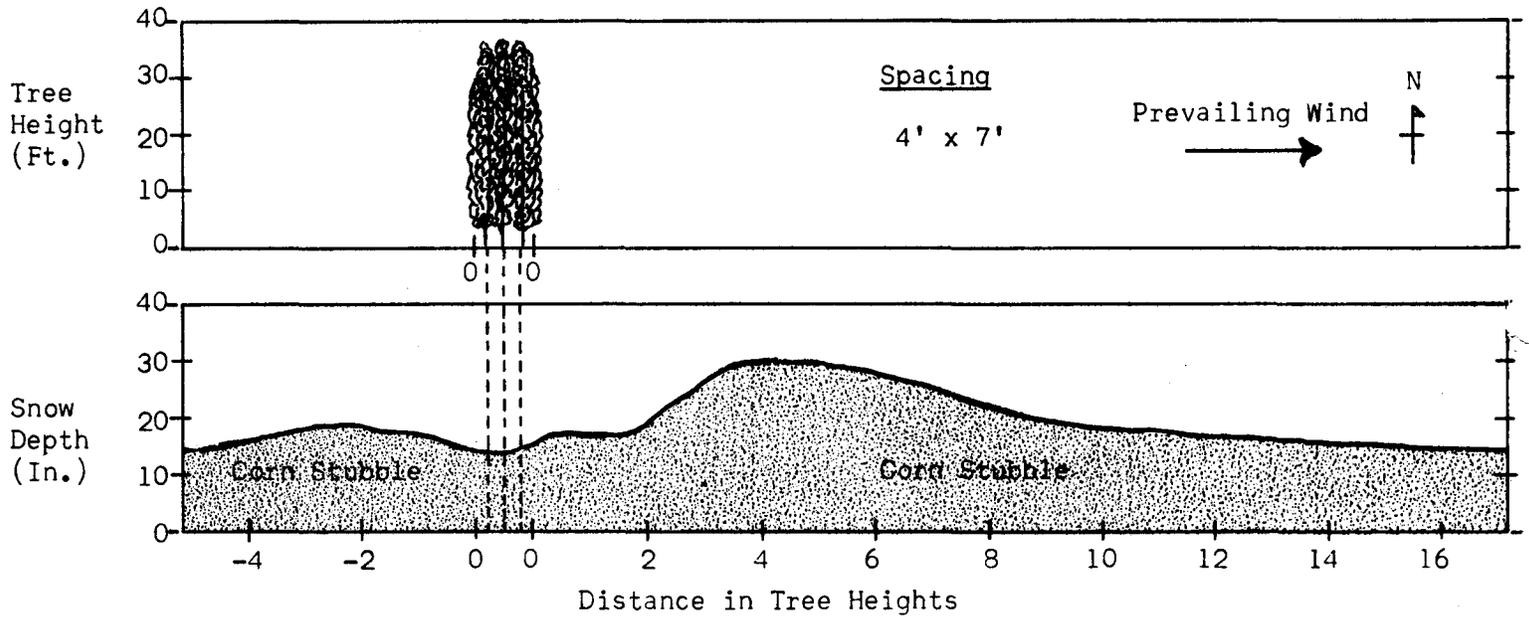


Fig. 2. Snow distribution pattern formed by three-row green ash shelterbelt.

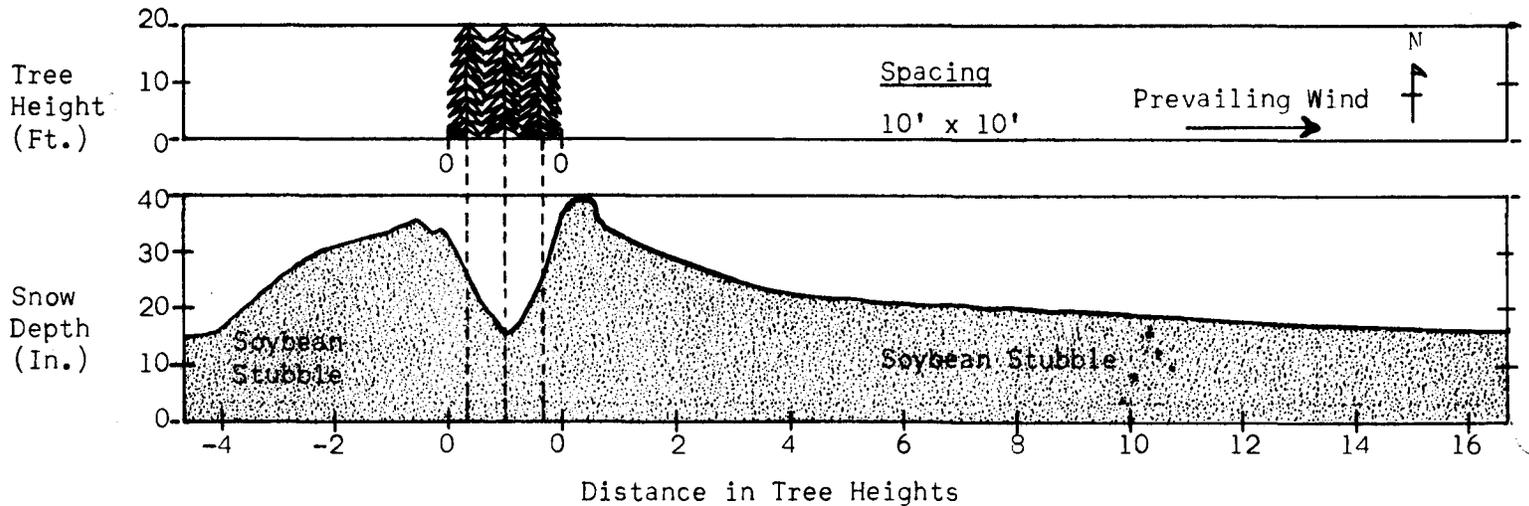


Fig. 3. Snow distribution pattern formed by three-row red pine shelterbelt.