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**BOTANY**

# Geographic Distribution of Jack Pine, *Pinus Banksiana,* in Minnesota and Some Observations on Genetic Variations

A valuable first step when initiating a program of basic genetic research and improvement in a tree species is a survey of the distribution and natural variation of the species in its native habitat. Jack pine (*Pinus banksiana*) is a species exhibiting wide variation in a number of characteristics which make it particularly suitable for genetic studies.

During the past year a preliminary survey of the distribution and variation in jack pine native to Minnesota was initiated, and a brief progress report has already appeared (Rudolph, *et al.* 1957). The primary objective of this observational and descriptive study was to locate trees and stands with unusual characteristics of possible usefulness in a tree improvement program now underway in the University's School of Forestry. Although major emphasis was placed on jack pine, individual trees and stands of other species displaying characters of genetic interest were also noted.

Since limitations of time prevented a complete survey of the entire distribution of jack pine in Minnesota by observation at first hand, federal, state, and industrial foresters and others working in or otherwise well acquainted with the areas visited were interviewed; also dried specimens on file in the Herbarium of the University of Minnesota were examined and the distribution map of Fig. 1 was prepared from these various sources. This map differs from the botanical range map appearing earlier (Rudolph *et al.* 1957) in that individual locations are plotted rather than the general range. Only stands with genetic interest and locations from which herbarium specimens are available are plotted and therefore a complete distribution of all stands in Minnesota is not intended. Whenever possible, the stands recommended by the field workers were visited for observation. Approximately 100 individual trees and stands with characteristics of

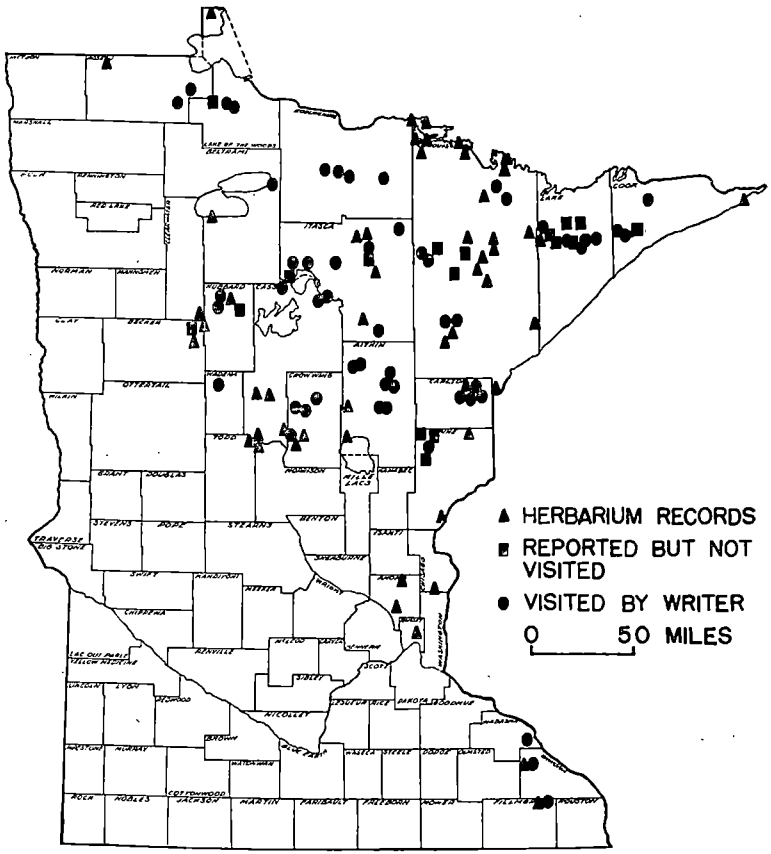


**Fig. 1.** Distribution of jack pine (**Pinus banksiana**) showing the locations from which specimens are available at the University of Minnesota herbarium and the locations of jack pine stands of genetic interest located in the preliminary survey.

genetic interest were located and described. One-fourth of these represented species other than jack pine. Photographs were taken of the most unusual trees and stands observed. These photographs as well as maps with the stand locations supplement a detailed report of this preliminary survey on file in the School of Forestry.

The major variations observed in jack pine were in the characteristics of the cones, branching habit, stem and crown form, apparent vigor, and disease and insect resistance.

Some evidence was found to support the hypothesis that the closed or "serotinous" cone character in this species shows a gradual or clinal change from predominantly closed-cone types in the northeast to open-cone types in the southern part of the range in Minnesota. Since delayed cone opening is very likely a character of positive selection value in repeatedly burned areas, the possibility is not discounted that the geographic distribution of closed-and open-cone types may have been influenced to a considerable extent by the state's forest-fire history.

The size and shape of cones, and the angle of inclination with the branch was found to vary within stands but was relatively uniform on individual trees.

Among the unusual branching habits observed was the fastigiate type found on a tree in a young stand in Crow Wing County. The angle of branching on this tree is as small as 10° from the vertical near the top of the tree.

A tree exhibiting a multi-stemmed character was located near Zim in St. Louis County. This tree has several stems rising jointly, apparently from the same root system. Further investigation is needed to ascertain whether this character is under strong genetic influence or is the result of injury earlier in the life of the tree.

Trees that remain relatively vigorous beyond their normal rotation age of 65 years are also of value in a tree improvement program. Several jack pine trees were found in Section 4, T159N, R34W, Lake of the Woods County, that were nearly three times the normal rotation age. Increment cores examined under a binocular microscope showed them to be at least 185 years of age. Some of the cores had little or no decay indicating that the trees were relatively sound at breast height. The trees range in diameter at breast height up to 20 inches and are over 100 feet in height.

Several cases of apparent resistance to the jack pine budworm (*Choristoneura pinus*) and to pine-oak rust (*Cronartium cerebrum*) were found.

Extensions of the range of a tree species in the form of outlier stands are of interest in studying the botanical distribution of the species. Two natural outlier stands in southeastern Minnesota have

been previously reported. The first of these, described by Rosendahl and Butters (1918), is found three miles west of Rushford in the Root River Valley, northeastern Fillmore County. The second is located in Section 14, T108N, R10W, on the Whitewater Game Refuge in Winona County. This stand first came to the attention of game management personnel working in this area a number of years ago. A third natural outlier stand was located during the past winter in connection with the present survey. The stand is located in Section 5, T109N, R9W, Wabasha County on an area locally referred to as a "sand prairie", about five miles southeast of Kellogg, Minnesota. The area of the stand is about five acres. The oldest trees are from 55 to 60 years and up to 50 feet tall.

Trees of genetic interest selected in the survey will be vegetatively propagated and introduced into uniform test gardens at the North Central School and Experiment Station, Grand Rapids, Minnesota, for further study. Tests of open and control pollinated progenies of selected trees and stands will also be established.

## LITERATURE CITED

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