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Species and variety of conifers for Christmas tree production in Iowa

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Species and variety of conifers for Christmas tree production in Iowa

Abstract
According to the National Christmas Tree Growers Association, Christmas tree production has expanded greatly in the last five years. More than 35.4 million trees were sold in the United States in 1987, a 25.5% increase over the previous year. Even so, nationwide the industry is beginning to suffer from overexpansion, especially in the retail lot markets. Small choose-and-cut operations are still doing well, however, and in most localities, there is a shortage of this type of tree-purchasing option.

Keywords
Forestry, Agroforestry, Farmer profitability, enterprise budgets

Disciplines
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Lead Investigators

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Background

According to the National Christmas Tree Growers Association, Christmas tree production has expanded greatly in the last five years. More than 35.4 million trees were sold in the United States in 1987, a 25.5% increase over the previous year. Even so, nationwide the industry is beginning to suffer from over-expansion, especially in the retail lot markets. Small choose-and-cut operations are still doing well, however, and in most localities, there is a shortage of this type of tree-purchasing option.

The number of Christmas tree growers in Iowa is also increasing. From 1986 to 1988, sales of Christmas trees by member of the Iowa Christmas Tree Growers Association (ICTGA) increased from 16,614 to 21,616. In addition, because of the greater number of individuals beginning to grow Christmas trees and because of the seven-year time lag from planting to harvest, almost half of the 213 members of the association have not yet harvested any trees.

Much of this increased planting is due to (1) the potential income from Christmas trees; (2) the fact that Iowa produces less than 40% of the natural trees sold each year in the state; (3) the excellent market outlook for the typical small, choose-and-cut operation; and (4) consumers who are willing to pay premium prices for fresh, locally produced, high-quality Christmas trees. In addition, some of the increased interest in Christmas tree farming is attributable to landowners seeking alternative land uses along with opportunities to supplement their incomes. As the number of growers increases in Iowa, competition for both price and quality of trees will increase as well. Iowa growers must become more competitive with non-Iowa producers in offering a range of species and types of high-quality trees.

Scotch pine is currently the most common tree produced in Iowa (constituting 83.1% of ICTGA trees in 1988). In recent years, white pine has become more popular with both the producer and the consumer, accounting for 8.3% of sales in 1988. While there are other conifer species and/or varieties that can be grown at present, these account for less than 10% of total production in Iowa. Current information suggesting suitable varieties and species for Christmas tree production in Iowa is based on either subjective descriptions from growers in the state or on research done in other states where growing conditions are quite different (e.g., Michigan, Wisconsin, and Minnesota). This research information is not very useful for Iowa conditions because tree characteristics such as needle color, growth rates, bud production, straightness of stem, and insect and disease resistance depend largely on site conditions. Information based on Iowa research, including testing of species/varieties under Iowa conditions, is necessary for Iowa growers to become more competitive.

Thus the investigators established the following objectives:

(1) to develop a list of recommended species/varieties of conifers adaptable for Christmas tree production in Iowa;

(2) to evaluate each tested species/variet for characteristics relevant to Christmas tree production; and

(3) to determine the average length of time required to grow a tree to harvestable size for each species/variet tested.
Approach and methods

This project consisted of two components: a growers’ survey and field trials. First, all identified Iowa Christmas tree growers were asked to respond to a comprehensive survey. Their responses will constitute base information about the species/varieties currently used as Christmas trees in Iowa. Growers were asked to provide data on species/varieties planted (such as number of years they have been planted, the number planted during each of the last five years, source of planting stock, survival data, and average growth rate). In addition, each grower was asked to evaluate each species/variety with respect to other Christmas tree characteristics including needle and branching characteristics, color, winter hardiness and/or damage, specific insect and disease susceptibility and resistance, specific site requirements for individual species and varieties, and any additional comments they had.

The results of this initial survey provided data about the current production of Iowa Christmas trees, which species/varieties appear to be best suited to Iowa’s growing environment, and which may have some limitations for use in Iowa. In addition, the survey provided base information for investigators to use in selecting the species/varieties for the extensive field trials now in progress. Species and varieties were limited to those available from commercial nurseries.

In the field trials, 15 tree producers were selected to cooperate. These growers planted two replications of the study in their plantations each year for the three years of the project. Each replication consisted of five individuals of 14 different species/varieties of Christmas trees. Growers planted the replications according to a plantation layout developed by the project investigators (see Fig. 1), providing the necessary care—including weed control, pruning, and shearing to produce salable trees. (Receipts from the sale of the trees will be retained by the cooperating grower.) Investigators also provided each cooperating grower with trees for establishment of the research plots and forms for evaluating each replication of the study. In addition, investigators assisted cooperating growers with on-site evaluation of the species/varieties planted.

Fig. 1. Investigators provided cooperating growers with this planting scheme.
All plantings will continue to be measured and evaluated until the trees are marketed by the producer. Research plots were replicated each of the three years to reduce variability due to climatic factors. Although the complete study will span approximately 11 years, preliminary results and data will be made available each year (see Fig. 2).

Findings

The survey was sent to 285 growers identified by the ICTGA, Iowa Department of Agriculture and Land Stewardship, and Iowa Department of Natural Resources foresters. Response was 14%; some of the individuals identified were not currently growers. Feedback from this survey was used to help select the species/varieties for the field trials. The returned surveys represented a total of 452,510 trees planted for Christmas trees. Species included Scotch pine (77.6%), white pine (13.3%), red pine (2.9%), and blue spruce (1.7%); all other species represented less than 1% each. Scotch pine selections most commonly used included French (21.2%), Belgium (11.9%), Lake Superior Blue (9.8%), Pike Lake (9.8%), French Highland (6.3%), Austrian Hill (6.0%) and 15 other varieties constituting less than 5%.

The growers were asked to provide an overall suitability rating for each species/variety they have used for Christmas tree production. The ratings were from 1 (excellent) to 5 (not suitable). The results for species/varieties representing at least 10,000 trees are: all trees (2.14); all Scotch pine (1.96); and selections of Scotch pine including white pine (2.25), red pine (2.91), French Highland (1.7), Scotch Highland (1.37), Van’s 35 (1.75), East Anglia (1.80), Belgium (1.82), Lake Superior (2.17), Pike Lake (2.20), Austrian Hill (3.00), and Spanish (4.00).

Because results are preliminary, definitive conclusions cannot yet be drawn. The study will be considered complete as individual cooperators market their trees; data will continue to be collected and evaluated for at least the next seven years. Thus far, however, survival has been consistently better for the white and Scotch pine varieties, which appear to become well established during their first year of growth, while most of the other species/varieties continue to suffer mortality during their first three years. Red pine has consistently performed the worst; this observation is not supported by the cooperators, however; they indicate that other sources of red pine have performed much better than the source used in this study.

For that matter, first year height growth is probably not a good indicator of species/variety potential. Growth two to three years after planting will be a better indicator. Scotch and white pines are growing best after the third year of establishment. Red pine continues to lag behind most of the other species/varieties.

Fig. 2. The variables monitored are being recorded for each species/variety for each planting year and each subsequent growing year; shown above are combined 1993 data for trees planted during all three years of the study. Variables include (from left to right) species; code identification; number alive; percentage survival (150 of each planted each year); height at planting (in inches); total height (at end of first growing season, in inches); year one growth (in inches); needle length (first year, in inches); number of buds (0=1 to 3 bud, 2=4 to 8, 3=9 to 15, 4=more than 15); number of leaders (total); and number with damage (total). Total number sheared, and total number with poor color for Christmas tree use, were also recorded.
During year three, Frazer fir exhibited the greatest growth per year increase. For most tree growers, as terminal growth exceeds 12 to 14 inches, excess growth is removed as they shear the tree.

Needle length within a species was of primary interest among some growers. The white pines did not exhibit any differences between the North Carolina and Lake States pines. The Scotch pine varieties were fairly consistent in terms of relative needle length. Belgium Scotch pine has the longest needles, while the French Central Scotch pine has the shortest needles.

Trees that form insufficient buds or too many buds are difficult to shear and shape. Most growers prefer trees that form 4 to 8 buds on terminal leaders. The average number of buds increases as the plants become well established and grow beyond the influence of transplant shock. After three years, Concolor fir, Douglas firs, and red pine are not producing sufficient buds. The other species/varieties are in the acceptable range. The number of buds produced will increase with age and as the growers shear more of the trees.

Trees forming multiple leaders require correction; Scotch and white pines tended to produce more multiple leaders than the other species. This number is relatively low; as shearing begins on trees, the tendency to produce multiple leaders will increase. More Scotch and white pines have been sheared, primarily because of their faster growth rate.

Implications

Preliminary results support the continued use of Scotch pine and white pine varieties for Christmas tree production. Survival and growth are significantly greater than for firs and spruce selections. Final results (which will be available in five to seven years) should provide insight into which two or three varieties of Scotch pine are best adapted to Iowa’s conditions.

Iowa growers must expand the species available to the consumer. Many species/varieties of conifers are available from nurseries for Christmas tree production, but Iowa growers will not grow them because of risks associated with using species or varieties not adapted to Iowa’s environment. Through trial plantings, this project will increase the number of species that can be successfully used for Christmas tree production in Iowa.

The primary beneficiary of this study will ultimately be the consumer. The results of this study will also encourage additional landowners to engage in Christmas tree production to supply the local demand and provide an alternative use for land not suited for traditional production agriculture.

The ICTGA will continue as the primary cooperator in this study, providing the growers, all plantation establishment costs except the cost of planting stock, and the necessary care and maintenance during the life of the trials. In addition, the ICTGA will be asked to provide the funding necessary to complete years 4 through 11 of the study. Reports on this project will be presented at the winter annual meeting of the ICTGA until the study is completed. The attendance at this meeting over the last three years has averaged 90 growers. Final written results and conclusions will also be presented to this organization. Ultimately, results will be also incorporated into ISU Extension’s Christmas tree publications when they are revised. In addition, as results become available, they will also be incorporated into the Christmas tree production field days conducted each year by ISU Forestry Extension in cooperation with the Forestry Division of the Iowa DNR.