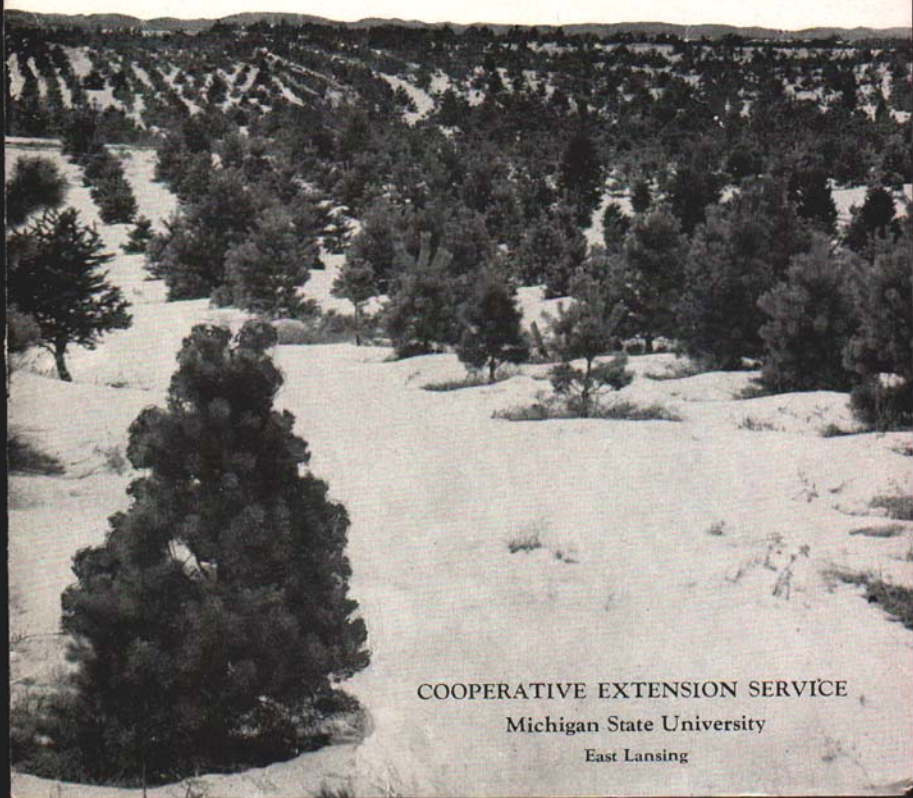


Selecting Species
of Christmas Trees
for Planting in Michigan



COOPERATIVE EXTENSION SERVICE
Michigan State University
East Lansing

CONTENTS

Factors Affecting Choice	3, 4
Requirements of Salable Tree	4, 5
Scotch Pine	6
Red Pine	7
Austrian Pine	8
White Pine	9
White Spruce	10
Black Spruce	11
Blue Spruce	12
Norway Spruce	13
Balsam Fir	14
Douglas-Fir	15
White Fir	16
Fraser Fir	17
Veitch Fir	18
Summary	19
Publications	19

Selecting Species of Christmas Trees for Planting in Michigan

By LESTER E. BELL, Registered Forester¹

What species of Christmas tree shall I grow? The choice will depend on several things: Salability, soil requirements, climatic requirements, rate of growth, availability of planting stock, and the insect and disease hazards of any given species.

The tree to choose is the one that fits best in all categories.

A word of caution to all commercial Christmas tree growers regarding the number of trees being planted for Christmas tree harvest; Michigan growers are harvesting approximately 2 million Christmas trees per year. At the same time, they are planting them at the rate of about 30 million per year. This means that unless we materially increase our sales, many of the trees being planted for Christmas trees will never be harvested for this purpose.

Some of the trees being planted will grow for pulpwood and saw-logs and, of course, will be needed in our economy, but it is felt that Christmas tree growers should know of this situation.

CHOICE OF SPECIES

Salability

Long-needled pines have become popular in recent years. In sales, they rank in this order: Scotch pine, Austrian pine, red pine, and white pine.

Short-needled species of spruce and fir rank as follows: Douglas-fir, white fir, white spruce, balsam fir, blue spruce, black spruce, and Norway spruce.

Soil Requirements

All trees have rather definite soil requirements. Some need acid conditions, others prefer alkaline; some will grow well in moist soils, others need good drainage; some prefer heavy loams, others need sandy soils; some will grow well on shallow soils, others need deep soils. Specific soil requirements for each species will be given later in this publication.

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Climatic Requirements

Species such as Scotch pine, Austrian pine, red pine, white pine, black spruce, Norway spruce, white spruce, and balsam fir, all grow well in Michigan. Black spruce and balsam fir grow better in the northern part of the state than in southern Michigan.

Douglas-fir is susceptible to serious damage by late spring frosts after new growth starts; therefore, this species should be planted only on sites having good air drainage and preferably on north- and east-facing slopes. Get Douglas-fir seed from the Rocky Mountain area rather than from the Pacific Northwest, for the Rocky Mountain strains are more winter-hardy here.

With all species, it is best to avoid low frosty pockets when establishing a plantation.

Rate of Growth

The pines usually grow more rapidly than spruces and firs. This means that they will reach Christmas tree marketing sizes in fewer years than the spruces and firs. However, they require more shearing and shaping to produce high quality trees. The expected number of years in the rotation, or from time of field planting until harvest, is listed below for individual species.

Availability of Planting Stock

Planting stock for Christmas tree plantations cannot be purchased from the State or University nurseries. Numerous private nurseries produce seedling and transplant stock for Christmas tree growers. Lists of these nurseries can be obtained from county extension offices, district foresters, soil conservation district offices, or from the Michigan Department of Agriculture.

Insects and Disease Hazards

None of our species are completely free of insect or disease hazards. Some appear to have more enemies than others. Information on susceptibility is listed with each species.

REQUIREMENTS OF A GOOD CHRISTMAS TREE

- **Foliage** - Dark green to blue-green; twigs stiff enough to hold decorations; yet soft enough to pack without breakage at shipping time. Ability to hold needles well in rooms with high temperature and low humidity. Fragrant foliage.

- **Growth habits**—A species that develops a dense compact crown to a height of 6 to 8 feet in a short rotation with a minimum need for shaping and shearing, a straight single stem.
- **Insects and disease resistance**—Some species seem to have a greater number of insect enemies than others; none are completely free from insect damage. Except for rusts and needle blight, young stands seldom suffer much from disease.

TABLE 1—Quality Characteristics of Christmas Tree Species

Species	Fragrance	Color	Stiffness of Twig	Shipping Qualities	Freedom from Pests	Needle Retention
Scotch Pine	Good	Excellent to very poor	Excellent	Good	Very poor	Excellent
Austrian Pine	Good	Very good	Excellent	Very poor	Fair	Excellent
Red Pine	Very good	Good	Very good	Good	Poor	Excellent
White Pine	Excellent	Very good	Good	Good	Fair	Excellent
White Spruce	Poor	Very good	Very good	Very good	Good	Fair
Black Spruce	Good	Good	Good	Excellent	Good	Poor
Blue Spruce	Good	Good	Excellent	Fair	Fair	Poor
Norway Spruce	Good	Good	Good	Very Good	Fair	Poor
Douglas-Fir	Very good	Excellent	Fair	Excellent	Very good	Very good
Balsam Fir	Very good	Very good	Fair	Excellent	Very good	Very good
White Fir	Very good	Very good	Good	Excellent	Very good	Very good
Fraser Fir	Very good	Excellent	Fair	Excellent	Very good	Very good
Veitch Fir	Very good	Excellent	Fair	Excellent	Very good	Very good

TABLE 2—Species Adapted to Michigan Conditions and Suitable for Christmas Tree Production

Pines	Spruce	Firs
Scotch Pine (<i>Pinus sylvestris</i>)	White Spruce (<i>Picea glauca</i>)	Balsam Fir (<i>Abies balsamea</i>)
Red Pine (<i>Pinus resinosa</i>)	Black Spruce (<i>Picea mariana</i>)	Douglas-Fir (<i>Pseudotsuga menziesii</i>)
Austrian Pine (<i>Pinus nigra</i>)	Blue Spruce (<i>Picea pungens</i>)	White Fir (<i>Abies concolor</i>)
White Pine (<i>Pinus strobus</i>)	Norway Spruce (<i>Picea abies</i>)	Fraser Fir (<i>Abies fraseri</i>)
		Veitch Fir (<i>Abies veitchii</i>)

THE PINES

All pines listed have good needle retention and are easier to establish than the spruces and firs. The needles are borne in clusters of 2 or 5. Two or 3-year old seedlings should be used for planting all pines.



Fig. 1. Sheared Scotch pine tree 5 growing seasons after field planting.

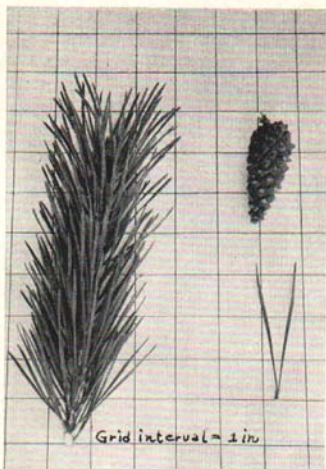


Fig. 2. Scotch pine twigs, needles and cone.

Scotch pine—A native of Europe, this species is widely planted as a Christmas tree in Michigan. Market-wise it is the most popular of the pines. Needle retention is excellent. It prefers well drained sandy soils but will grow on very poor dry sand. Hardy throughout state. Needs shearing and shaping to produce best quality trees. Very susceptible to insect injury (sawflies, shoot moth and white pine weevil).

Color of foliage varies greatly within this species as does needle length and straightness of twigs and stem. Definite information is not available yet as to the very best seed sources to assure Michigan growers of getting trees that will be of good color and fine texture, slow growing and straight stemmed. Southwestern European seed sources appear to produce the best trees for Michigan conditions.

Trees grown from the following seed sources are currently preferred by Michigan growers:

- Austria — (Austrian Hills)
- France — (French Green) (French Blue) (Auvergne)
- Scotland — (Scotch Highland)

Scotch pine grows to market size in 6 to 8 years.²

²Rotation years are from the time of field planting until harvest as 5- to 7-foot trees.

Red pine. — A long-needled native pine, rather coarse in appearance. Tends to grow open and leggy, requiring several shearings to produce acceptable trees. Holds needles well but is often light green to yellowish green.

This species is grown and sold extensively as a Christmas tree but cannot compete price-wise with Scotch pine. It is one of our best timber trees. This species suffers from damage by shoot moth and sawflies and occasionally goldenrod rust.³ Red pine grows well on well-drained sandy loam soils with a pH range of from 5.0 to 6.0. It does not grow well on highly alkaline or very heavy, poorly drained soils. Rotation: 6 to 9 years.

³Goldenrod rust, (*Coleosporium solidaginis*).



Fig. 3. Well shaped red pine.



Fig. 4. Red pine needles and cone.



Fig. 5. Austrian pine tree (note coarseness of foliage).

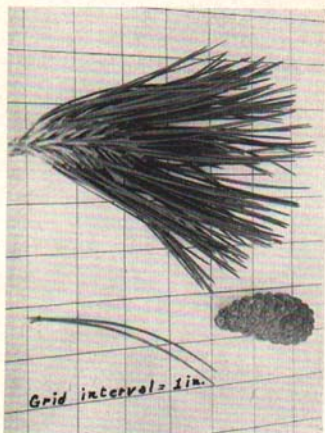


Fig. 6. Austrian pine twig, needles and cone.

Austrian Pine. — A native of Europe, this species holds its needles well and has dark green foliage at harvest time. The needles are long, stiff, and sharp, giving an appearance of rather coarse texture. They are borne in clusters of two. Because the branches are stiff but brittle, the tree is not easy to compress for long distance shipping.

Each year some trees of this species are marketed but it is not as popular as the Scotch Pine. Trees grow rather slowly in early life. They usually benefit from being sheared but do not need shearing as much as do the other pines. Austrian Pine is considered by some to be free from insect pests but it is attacked by shoot moth and sawflies.

This species grows well on loamy to heavy soils and is more tolerant of alkalinity than most pines. Rotation: 7 to 10 years.

Jack Pine. — Sometimes used but not recommended for planting as a Christmas tree.

White pine. — Native white pine is not often used as a Christmas tree, but if properly shaped and sheared can be very satisfactory. Holds its needles well, good blue-green foliage, and imparts a very fragrant aroma. The needles are borne in clusters of 5 making the species easy to identify. It suffers from attacks by white pine weevil and blister rust. White pine needs a rather fertile, well-drained loamy soil to do well. It will grow on organic soils and is tolerant of rather wet as well as alkaline soils, (pH of 7.5). Rotation: 7 to 10 years.



Fig. 7. Sheared White pine tree.

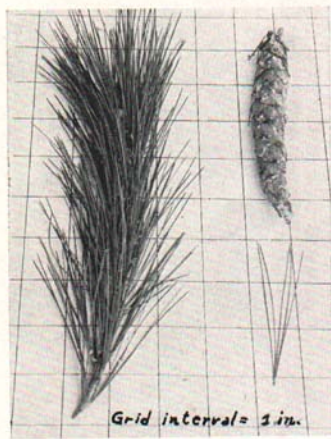


Fig. 8. White pine twig, needles and cone (our only native 5-needle pine).

THE SPRUCES

The commonly grown spruces have single needles, 4-sided in cross section, and are harsh to the touch. Three to 4-year transplant stock is usually best for planting; however, strong 3-year old seedlings may be satisfactory.



Fig. 9. White spruce tree.

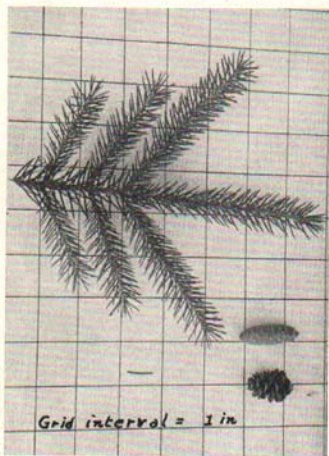


Fig. 10. White spruce twig, cones, seed and needle.

White Spruce.—Native to Michigan. This species has good shape and growth habits, good color, and short sharp needles. None of the spruces hold their needles well but this species is probably better in this respect than Blue, Black, or Norway. The foliage has a rather strong odor distasteful to some persons. Grows best on well-drained loam soils, but will grow on sandy soils if clay is present in the subsoil. It is subject to damage by late spring frosts on low frosty sites. Also is damaged by gall aphids and mites. This is probably the best spruce species for the plantation growing of Christmas trees. Rotation: 10 to 15 years.

Black Spruce.—Native to northern Michigan. The needles are very short, $\frac{1}{4}$ to $\frac{3}{8}$ inches long. Needle retention is very poor, probably poorest of our commonly grown species. Tree form is usually very good, for this species tends to grow slowly. Most serious insect enemies are mites and aphids. The black spruce grows on our cold wet sites in sphagnum bogs and on the shores of swampy lakes; however, it may be found on rather high, sandy sites.

It prefers light soils with good moisture. This species is not easy to establish, starts slowly, and usually grows slowly in early life. Color of foliage is usually good except on droughty, infertile sites where it may develop a yellowish cast. Rotation: 11 to 16 years.



Fig. 11. Black spruce tree.



Fig. 12. Black spruce twig and cone (note shortness of needles and very small cone).



Fig. 13. Blue spruce tree.

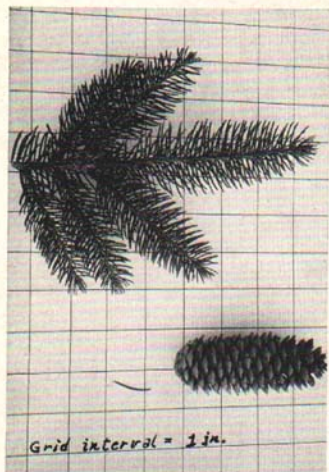


Fig. 14. Blue spruce twig, cone, and needle.

Blue Spruce.—Native to the State of Colorado but widely planted in Michigan as an ornamental. Needles are green to bluish green, $\frac{3}{4}$ to $1\frac{1}{4}$ inches in length, very sharp. It suffers from attacks of aphids and mites. This species grows slowly and seldom needs much shearing.

Blue spruce prefers well drained sandy loam to loam soils but will grow on heavier soils very well. Very susceptible to aphid and mite damage. Although this species has good color and form, it is bulky to ship and also slow growing, and in general, not as good a plantation tree as other spruces. Rotation: 12 to 18 years.

Norway spruce. — A native of Europe, widely planted and well adapted to Michigan. The needles are dark green to yellow green, $\frac{3}{4}$ to 1 inch in length. Twigs are orange to yellow brown. This species is as easy to establish as any of the spruces. It grows well on rich moist soils but will grow on rather dry sandy soils if the water table is favorable throughout most of the year.

This species tends to grow rather slowly for the first 3 to 4 years after field planting and then to suddenly start growing rapidly. Usually some shaping and shearing is necessary to produce dense compact trees. The main stem or terminal tends to be coarse and heavy. Mites and aphids infest this species. Rotation: 10 to 13 years.



Fig. 15. Norway spruce tree (note coarse stem).



Fig. 16. Norway spruce twig, cone and needle (very large cone).

The Firs

All firs have single, flattened needles, soft to the touch. Needle retention is better than spruce but not as good as the pines. In general the firs are difficult to establish, and grow at an irregular rate.



Fig. 17. Sheared balsam fir tree.

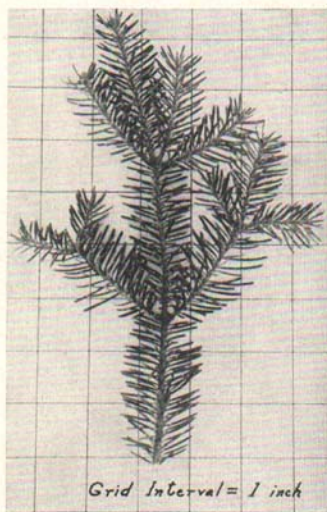


Fig. 18. Twig of balsam fir.

Balsam Fir. — A native of northern Michigan. Needles single, flattened, $\frac{1}{2}$ to $1\frac{1}{4}$ inches long, dark green on top, pale green with light lines beneath. The buds are rounded, light green, and covered with resin. Grows best on well-drained sandy soils to moist cool sites. Good quality balsam sells well as a Christmas tree.

This species is difficult to establish in plantations especially in southern Michigan south of its native range. It usually grows at irregular rates, thus a plantation will be harvested over a period of 5 to 7 years. Few insects infest this species in plantations. Four-year old transplant stock should be used. Rotation: 10 to 16 years.

Douglas-fir. — A native of the Pacific Coast forests and of the Rocky Mountain regions. To be winter-hardy in Michigan, Rocky Mountain seed sources must be used. Needles are single, flattened, soft to the touch and about $\frac{3}{4}$ to $1\frac{1}{4}$ inches long; dark green and grooved above, paler below. This species can be quickly identified in the field by its cylindrical, pointed red-brown bud.

This species produces excellent Christmas trees that bring premium prices, but suffers from late spring frost damage. It prefers sandy loam to loam soils, neutral to medium acid, and reasonably well drained. It should be planted on north or east-facing slopes where the soil will be cool and where good air drainage prevails. Four-year transplant stock should be used. Rotation: 10 to 15 years.



Fig. 19. Douglas-fir tree (Rocky Mountain origin).



Fig. 20. Douglas-fir twig, cone and needle.



Fig. 21. White fir tree.

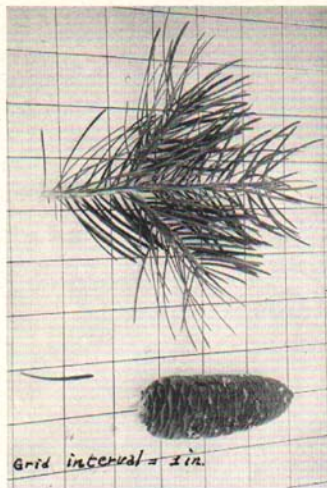


Fig. 22. White fir twig, cone and needle.

White fir. — A native of California and the central Rocky Mountain area. Planted in Michigan as an ornamental. The needles are a silvery blue to silvery green, flattened, rounded at the end, soft and about 2 to 2½ inches long. The twigs are rather stout, heavier than most firs, and yellow-green in color. This species develops into excellent Christmas trees, but tends to suffer from frost, grows slowly, and often irregularly.

Like most firs it is difficult to establish in plantations. This species prefers moist cool sites. Sandy loam to loamy sands are the best soils and like Douglas-Fir, north and east slopes with good air drainage should be selected. Little damage from insects has been encountered on this species. Rotation: 12 to 16 years.

Fraser fir. — A species native to southern Virginia, North Carolina, and eastern Tennessee. Very similar to balsam fir except the needles are darker green and waxy above with silvery lines beneath. This species has not been widely planted in Michigan but will grow well here. It is gaining popularity in the eastern states as a plantation Christmas tree. It prefers well-drained to moist sandy loam soils with a pH of 3.5 to 5.5. Four-year old transplant stock should be used for field planting. So far few insects have been found that feed on this species. Rotation: 12 to 15 years.



Fig. 23. Fraser fir tree.



Fig. 24. Fraser fir twigs and needle (note silvery underside).

Veitch fir. — This is a Japanese import, not widely planted in Michigan. It has been tested and seems to do very well in southern Michigan locations. It produces a very attractive dark green foliage with needles $\frac{3}{4}$ to $1\frac{1}{4}$ inches in length. It should grow well on cool, moist moderately well-drained soils. More tests are needed with this species before full evaluation can be made. Expected rotation: 12 to 15 years.



Fig. 25. Veitch fir tree.

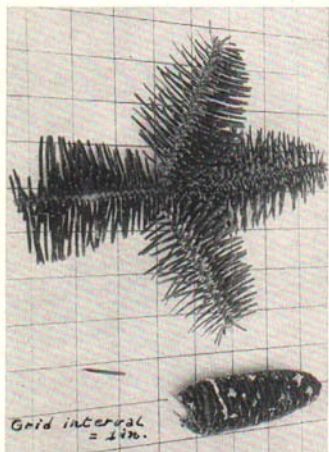


Fig. 26. Veitch fir twig, cone and needle.

SUMMARY

1. Michigan Christmas tree growers are planting more trees than are likely to be needed for the market.
2. Only the better species and the high quality individual trees will be salable.
3. The species of pine grow more rapidly and are easier to establish than the spruces and firs but they also need more shearing and suffer more from insect attack.
4. Douglas-fir and white fir will produce some high quality premium trees that will bring the highest prices on the market, but they may not be the best species to grow due to the long rotation, irregular growth habits, susceptibility to frost damage, and difficulty of establishment.
5. A general rule to follow on size of planting stock is to use 2-0 seedlings for the pines, 2-1 to 2-2 transplants for the spruces, and 2-2 transplants for the firs.
6. Due to the difficulty of establishing firs, a grower must use every precaution in the handling and planting of fir planting stock. Planting techniques must be of the best to insure success.

OTHER CHRISTMAS TREE PUBLICATIONS

1. Bell, Lester E., Shearing and Shaping Christmas Trees. Mich. State Univ. Ext. Bul. 359, Nov. 1958.
2. James, Lee M., Resurvey of Christmas Tree Marketing in Michigan. Mich. State Univ. Spec. Bul. 419, 1958.
3. Janes, Ray L., Butcher, James W., and Morofsky, Walter F., Christmas Tree Insect Control. Mich. State Univ. Ext. Bul. 353, Dec. 1958.

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