

Selecting Coniferous Planting Stock for Michigan Soil Management Groups

By Lester E. Bell, Extension Specialist in Forestry

Soils are one of the most important considerations in selecting forest species for reforestation. Table I lists the major soil management groups in Michigan. Used in combination with Table II, planting guides for conifers are given for all soil areas of the state.

If the series and management groups are not known, recommendations can be determined from the texture of the soil profile and the drainage condition in the field.

Fine-textured or imperfectly and poorly drained soils are not normally planted with conifers. On such

soils, herbaceous competition and/or drainage are not favorable for their growth. Better drained, sandy-textured soils are better adapted for most conifers.

Planting may be desirable under partial overstory, such as underplanting, or interplanting small openings in fairly well-stocked timber stands. Species of trees recommended for such situations are white pine 2-0, white spruce 2-1, or Norway spruce 2-1. It is not recommended that underplanting be done unless plans are made for a liberation cutting, depending upon the species of trees in the overstory.

Table I—Soil Management Group Identification Chart

Soil Management Group Numbers	Texture of Upper Three Feet of the Soil Profile	Natural Drainage & Surface Color		
		Imperfectly		
		Well Drained Light Colored a	Drained - Mod. Dark Colored b	Poorly Drained Dark Colored c
0	Clays (over 55%)	—	—	0c
1	Clay to silty clay	1a	1b	1c
1.5	Clay loams	1.5a	1.5b	1.5c
2*	(This is a combination of the 1.5 and 2.5 groups)	2a	2b	2c
2.5	Loams	2.5a	2.5b	2.5c
3	Sandy loams and stratified silts and very fine sands	3a	3b	3c
3/1	Sandy loams over clay to silty clay at 15-42"	3/1a	3/1b	3/1c
3/2	Sandy loams over loams or clay loams at 18-42"	3/2a	3/2b	3/2c
4	Loamy sands	4a	4b	4c
4/1	Sands or loamy sands over clay to silty clay at 18-42"	—	4/1b	4/1c
4/2	Sands or loamy sands over loams or clay loams at 18-42"	4/2a	4/2b	4/2c
5/2	Sands or loamy sands over loams to clays at 42-66"	5/2a	5/2b	5c
5.0	Sands with moderate or deep subsoil development	5a	5b	5c
5.3	Sands with little subsoil development	5.3a	5b	5c
5.7	Coarse sands with little or no subsoil development	5.7a	5b	5c
G	Gravelly loamy sand or sandy loams	Ga	Gc	Gc
L	Alluvial or overflow area (lowlands)	3a-L	3c-L	3c-L
M	Mucks or peats	—	—	Mc

* The (2) group listed in EB-159 has been sub-divided into Clay Loams (1.5) and Loams (2.5) since both would be undrained for forestry purposes.

Selecting Species for Planting

Table II gives the recommendations for species and minimum age class of planting stock for soil groups. The first figure following the species is the number of years as a seedling, the second represents the number of years as a transplant. Thus a tree

designated 2-2 is a four-year old tree. One designated 2-0 is a two-year seedling.

Soil management groups were developed by the Soil Science Department at MSU and the Soil Conservation Service. Only a few soils are listed as examples for each group.

Table II—A Guide to the Selection of Coniferous Planting Stock for Various Sites in Michigan

<i>Michigan Soil Management Groups and Representative Soil Series</i>	<i>Planting by Species and Size</i>	<i>Exposed or Eroded Sites</i>	<i>Underplanting Recommendations</i>	<i>Ground Cover</i>
0—Over 55% Clay 0c—poorly drained Paulding	No field planting. Bed windbreak areas. Aus. pine 2-2 W. cedar 2-2	Windbreaks on exposed flats. Aus. pine 2-2 W. cedar 2-2	No underplanting.	Native cover is heavy. Plant only in scalps.**
1—Clay to Silty Clay 1a—well drained Huron Kent Ontonagon St. Clair	Normally not planted. N. spruce 2-1 W. spruce 2-2 W. pine 2-1 Aus. pine 2-1 D. fir 2-2	Very seldom planted. Aus. pine 2-1 R. cedar 2-1	No underplanting. Large openings. W. pine 2-1 W. spruce 2-2 N. spruce 2-1	Native cover is heavy. Plant only in scalps.
1b—imperfectly drained Nappanee Rudyard Selkirk	Normally not planted. N. spruce 2-1 W. spruce 2-2 W. pine 2-1 Aus. pine 2-1		No underplanting. Large openings. W. spruce 2-2 W. pine 2-1	Native cover is heavy. Plant only in scalps.
1c—poorly drained Bono Hoytville Pickford Toledo	Plant only drained sites. N. spruce 2-1 W. spruce 2-2 W. pine 2-1 Aus. pine 2-1		No underplanting. Openings are wet without drainage.	Native cover is heavy. Plant only drained areas in scalps.
1.5—Sandy Clay Loam to Silty Clay Loam 1.5a—well drained Isabella Morley Nester Watton	If pH less than 6.0. N. spruce 2-1 W. spruce 2-2 W. pine 2-1 W. cedar 2-2	If pH greater than 6.0. Aus. pine 2-1 R. cedar 2-2 Success is doubtful.	No underplanting. Large openings. W. pine 2-1 W. spruce 2-2	Native cover is heavy. Plant only in scalps.
1.5b—imperfectly drained Blount Kawkawlin	Normally do not plant. N. spruce 2-1 W. spruce 2-2 W. pine 2-1 W. cedar 2-2	If pH greater than 6.0. Aus. pine 2-1 R. cedar 2-2	Seldom planted. Plant only large openings. W. spruce 2-2 W. pine 2-1	Cover is heavy. Plant only in scalps.
1.5c—poorly drained Butternut Jeddo Lenawee Sims Wisner	Plant only drained sites. W. spruce 2-2 W. pine 2-1 W. cedar 2-2	Success of conifers is doubtful.	No underplanting.	Heavy cover. Plant only drained areas in scalps.
2.5—Loams 2.5a—well drained Celina Miami Onaway Trenary	If pH less than 6.0. N. spruce 2-1 W. spruce 2-1 W. pine 2-1 D. fir 2-1 If pH greater than 6.0. Aus. pine 2-0 R. cedar 2-1	Aus. pine 2-0 R. cedar 2-1	No underplanting. Plant large openings. W. pine 2-1 W. spruce 2-1	Heavy cover of grass and shrubs. Plant in scalps.
2.5b—imperfectly drained Capac Conover Mackinac	Normally not planted. N. spruce 2-1 W. spruce 2-1 W. pine 2-1 Aus. pine 2-0 W. cedar 2-1		No underplanting. Large openings if drained. W. pine 2-1 W. spruce 2-1	Native cover is heavy. Plant only drained areas in scalps.
2.5c—poorly drained Brookston Angelica	Plant only drained sites. W. pine 2-1 W. spruce 2-1 W. cedar 2-1		No underplanting on any sites.	Native cover is heavy. Open field planting on drained areas in scalps.

** Scalps—sod removed by hand, plow or planting machine.

**Table II—A Guide to the Selection of Coniferous
Planting Stock for Various Sites in Michigan**

<i>Michigan Soil Management Groups and Representative Soil Series</i>	<i>Planting by Species and Size</i>	<i>Exposed or Eroded Sites</i>	<i>Underplanting Recommendations</i>	<i>Ground Cover</i>
3—Sandy Loams	W. pine 2-1	Aus. pine 2-1	Underplant thin to partial overstory.	Light to heavy ground cover. Increase size of stock by one year for heavy cover. Plant in scalps.
3a, 3/1a, 3/2a— well drained	W. spruce 2-1 N. spruce 2-1	R. cedar 2-1	W. pine 2-1 W. spruce 2-1	
***Bohemian 2a	Aus. pine 2-0		N. spruce 2-1	
Emmet 3a	R. cedar 2-1			
Fox 3a	D. fir 2-1			
Hillsdale 3a	R. pine 2-0			
Iron River 3a-a	Sc. pine 2-0			
Kalamazoo 3a	**** Austrian pine and red cedar on sites with high pH. Red cedar makes best growth on good loams, but is valuable for cover on alkaline sites.			
***Tuscola 2a	Scotch pine is used mostly for Christmas trees.			
Munising 3a-af	Red pine will not grow well on alkaline soils.			
	Douglas fir is a poor risk in the upper peninsula due to freezing back of spring growth.			
3b, 3/1b, 3/2b— imperfectly drained	Normally do not plant. N. spruce 2-1	Aus. pine 2-1	No underplanting. Large openings if drained.	Medium to heavy ground cover. Plant in scalps.
Brimley 3b	W. spruce 2-1		W. spruce 2-1	
Coldwater 3b	W. pine 2-1		W. pine 2-1	
Locke 3b	Aus. pine 2-0			
Metamore 3/2b				
Sanilac 3b-c Skanee 3b-a				
3c, 3/1c, 3/2c— poorly drained	Plant only on drained sites. N. spruce 2-1	Planting of conifers on exposed sites is of doubtful value on these soils.	Underplanting is generally not successful.	Ground cover is heavy. Plant drained areas in scalps.
Barry 3c	W. spruce 2-1			
Bruce 3c	W. pine 2-1			
Colwood 3c	W. cedar 2-1			
Lacota 3c				
Munuscong 3/1c				
Wauseon 3/1c				
4—Loamy Sands or Sands with Some Finer Textured Layers	R. pine 2-0 W. pine 3-0 J. pine 2-0 Aus. pine 2-0 Sc. pine 2-0	J. pine 2-0 R. pine 3-0 Sc. pine 2-0	Thin to partial overstory. Blow areas to be stabilized before planting.	Ground cover is light to medium. Competition is rather light. Increase stock by one year in exceptional cases.
4a, 4/2a, 4/1a— well drained	N. spruce 2-1 W. spruce 2-1			
Bronson 4a	D. fir 2-1			
Blue Lake 4a—Coloma 4a				
Leelanau 4a—Mancelona 4a				
Montcalm 4a—Menominee 4/2a—Oshtemo 4a				
4b, 4/2b, 4/1b— imperfectly drained	A poor planting site. If planted use: W. pine 2-1 W. spruce 2-1		No underplanting. Open areas of higher ground.	Ground cover is light to medium. Competition is light.
Allendale 4/1b			W. pine 2-1	
Brady 4b			W. spruce 2-1	
Iosco 4/2b				
Chesaning 4/2b				
Cladwin 4b				
4c, 4/2c, 4/1c— poorly drained	A poor planting site. Plant only drained areas. W. spruce 2-1	Planting of any exposed site on these poorly drained soils is not recommended.	Thin to partial overstory. If drained plant: W. spruce 2-1 N. spruce 2-1 W. pine 2-1	Ground cover is light to medium. Drainage is the big problem.
Bannister 4/2c	N. spruce 2-1			
Edmore 4c	W. pine 2-1			
Epoufette 4c				
Essexville 4/2c				
Gilford 4c				
Pinconning 4/1c				
5—Sands	R. pine 3-0	J. pine 2-0	Partial overstory.	Ground cover is not a big problem.
5.0a, 5/2a—well drained	J. pine 2-0 Sc. pine 2-0 W. pine 3-0	R. pine 3-0 Sc. pine 2-0	W. pine 3-0 R. pine 3-0 J. pine 2-0	
Berrien 5/2a		Blow areas to be stabilized before planting.		
Croswell 5.0a				
Echo 5.0a				
Hiawatha 5.0a—Kalkaska 5.0a				
Ottawa 5/2a—Plainfield 5.0a—Sparta 5.0a				
5.3a—well drained				
Bridgman 5/3a				
Roselawn 5/3a				
Rubicon 5/3a				
Vilas 5/3a				
5.7a—well drained	J. pine 2-0 R. pine 3-0	J. pine 2-0		
Grayling 5.7a				
Omega 5.7a				

*** These well-drained soils from stratified, very fine sand and silts have been shifted from the 2a to 3a group to simplify group relationships.

**Table II—A Guide to the Selection of Coniferous
Planting Stock for Various Sites in Michigan**

<i>Michigan Soil Management Groups and Representative Soil Series</i>	<i>Planting by Species and Size</i>	<i>Exposed or Eroded Sites</i>	<i>Underplanting Recommendations</i>	<i>Ground Cover</i>
5b, 5/2b—im- perfectly drained	A poor site. Avoid areas with a hard cemented B. W. pine 3-0		Thin to partial over- story. W. pine 2-1 W. spruce 2-1	Ground cover is not a severe problem. Soil is the main problem.
AuGres 5b Arenac 5/2b Ottawa 5/2b Saugatuck 5b-h	N. spruce 2-1 W. spruce 2-1			
5c—poorly drained	A very poor plant- ing site. Confine all planting to slightly higher ground. W. spruce 2-1		Thin to partial over- story. W. pine 2-1 W. spruce 2-1 W. cedar 2-1	Ground cover is not a problem. Soil and drainage are impor- tant.
Granby 5c Maumee 5c Newton 5c Roscommon 5c	W. pine 2-1 W. cedar 2-1			
Ga, Gc—Stony, Cobbly, Gravelly	Difficult to plant. W. pine 2-1	Difficult to establish.	Larger openings. W. pine 2-1 W. spruce 2-1 W. cedar 2-1	Variable cover. Scalp before plant- ing.
Alpena Ga-c Waiska Ga	W. spruce 2-1 W. cedar 2-1 Aus. pine 2-0	Aus. pine 2-0		
L—Alluvial	Plant No Soils in This Group With Imperfect or Poor Drainage.			
Ewen 3a-L Genesee 3a-L Griffin 3c-L Pelkie 3c-L Washtenaw 3c-L	Overflow Soils. Do Not Plant Conifers.			
O—Organic	Reforestation is not recommended. For windbreaks use:			
Mucks & Peats	Aus. pine 2-2 W. pine 2-2 Sc. pine 2-2			

Aspect and Slope

Hilltops and south and west slopes are drier than valleys or north and east slopes. Moisture requirements of various species of trees must be considered when planting hilly ground. As a rule, jack and Scotch pine will grow on the driest sites; red pine and Austrian pine on dry but more favorable sites; white pine, white spruce and Norway spruce on the better sites.

Drainage

Drainage, depth of water table, and depth of hardpan are important factors in reforestation. Poorly-drained sites with heavy ground cover are the most difficult to plant successfully with trees. In most cases, they should be left unplanted, as potential wildlife food and cover areas.

A cemented layer of sand (ortstein), sometimes referred to as hardpan, occurs in some sandy soils, making them wet in the spring and dry in the summer. These extreme moisture conditions make it difficult to establish a stand of trees. Plowing furrows in the summer and planting trees on the furrow slice the following spring is one solution. Jack pine and white pine seedlings are recommended for reforestation of this site condition and Scotch pine for Christmas trees.

Unstable Soils

Unstable soils, dunes and inland blow holes are common throughout Michigan. They occur primarily along the shores of the Great Lakes and in dry, sandy plains of Lower Michigan. Many open areas, smaller than $\frac{1}{4}$ acre, or with existing thin cover of

dry-land moss, or scattered grasses, do not need site preparation prior to tree planting. In years of most favorable growing conditions, trees may be established successfully on larger sandblows with no advance soil stabilization. However, in most cases, trees will survive better if planted after primary stabilization is assured through the use of mulching materials, establishment of natural or planted vegetative cover, or windbreaks.

Planting beachgrass (*Amophila breviligulata*) is the cheapest method of stabilization. About 1,200 clumps of grass per acre are planted in various patterns such as squares, circles or bands, depending on the shape of the blow hole. On the windward side, close spacings of grass, 18 inches by 18 inches, is recommended, with the rest of the area planted in bands of 2 or 3 rows spaced 20 to 40 feet apart. Trees are planted after the sand movement has been stopped and before the grass grows thick.

Mulching materials will provide immediate but less permanent stabilization than beachgrass. Brush, straw, hay or gravel can be used, but vast quantities are required for large open areas. Brush should be used by laying the butts toward the prevailing wind, and placing the tops over the butts like shingling. The trees should be planted after the mulch has been placed.

Windbreaks have been used successfully in soil stabilization by planting bands of Jack or Scotch pine trees on the windward side at right angles to the prevailing wind, and at intervals of from 100 to 300 feet. The intervening spaces are planted after the windbreak trees reach an effective height.