# Guidelines for Western White Pine Management in the Vancouver Forest Region

by:

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# GUIDELINES FOR WESTERN WHITE PINE MANAGEMENT IN THE VANCOUVER FOREST REGION

## I. MANAGEMENT OF WESTERN WHITE PINE

### A. Rationale

The Vancouver Forest Region recommends increasing the use of western white pine, (Pinus monticola), in forest management for a number of reasons:

1. Western white pine has excellent productivity in a broad spectrum of ecosystems.

2. The species is highly resistant to laminated root rot, (Phellinus weirii), and is thus an ideal species for the silvicultural control of this disease.

3. The effectiveness of the low-branch pruning method for controlling white pine blister rust, (Cronartium ribicola), substantially increases the species crop reliability.

4. The white pine blister rust hazard is low in B.C. compared to most parts of western North America.

5. An apparent genetic resistance to blister rust is evolving in B.C.'s natural western white pine populations. This phenomenon combined with the successes experienced in the USFS rust resistance programs, has spawned a joint CFS-BCFS rust resistance program here in B.C.

### B. Management Philosophy

Until enhanced rust resistant stock is available from the resistance program the emphasis for natural western white pine management will be as follows:

1. Manage naturally occurring western white pine for rust free production.

2. Manage planted western white pine on sites affected by Phellinus weirii, as a silvicultural disease control method.

3. Manage planted western white pine throughout the region, as recommended[1,2], as a species with good crop reliability given blister rust disease controls are undertaken.

4. Assist the joint CFS-BCFS rust resistance program, as required.

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1 Site Diagnosis, Tree Species Selection, and Slashburning Guidelines for the Vancouver Forest Region, Land Management Handbook Number 8, R.N. Green et al. 1984.

2 Interpretive Units for Root Disease Management Using Western White Pine. See Appendix B.

## II. MANAGEMENT PROTOCOL FOR WESTERN WHITE PINE

In order to optimize the management of this species in its complexity of silvicultural and pest protection factors, the following protocol is being established in the Vancouver Region, that at least for the forseeable future, requires all white pine plantations to be "registered" as operational trials. Registration of operational trials shall be under either of the following two categories, (a) Silviculture and Productivity Trials or (b) Laminated Root Rot Control Trials.

The following management protocol provides a framework for continuous monitoring and analyses of tree responses to silvicultural regimes, blister rust controls and root disease susceptibility. In addition, the monitoring and analyses of response data will provide a basis for stand modelling in a variety of conditions, from plantation establishment to maturity.

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### Management Protocol

A. Silviculture and Productivity Trials (Sx Trials)

Establish and manage western white pine where the species is considered a preferred or acceptable species as defined by the site treatment units described in the Vancouver Tree Species Selection Handbook, R.N. Green et al. 1984.

B. Laminated Root Rot Control Trials (Px Trials)

Establish and manage western white pine where the species is considered to be:

1. An acceptably resistant species for the objectives of root disease control (Appendix A), Tree Species Susceptibility to Infection by Phellinus weirii and Disease Control Values, and;

2. An acceptable species as defined by the Interpretive Units for Root Disease Management Using Western White Pine (Appendix B).

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## III. CONE COLLECTION

Western white pine cone collections may be made from local seed sources or from established seed production areas with few restrictions.

To minimize blister rust infection in native stock progeny (or in other words, to maximize the evolved natural resistance to blister rust in the native stock progeny), specific parent tree selection criteria are recommended for use in white pine management. The selection criteria are necessarily restrictive for parent trees selected for the resistance program, while the selection criteria are variable for seed production areas and local seed sources.

A. Cone Collection

1. Cones may be collected from any seed zone, though lower to middle elevation stands are preferable.

2. Non-destructive cone collection is preferred.

3. Particular information on timing and methods for cone collection are available in the joint BCFS-CFS Report No. 3, Guidelines to Collecting Cones of B.C. Conifers, March 1976.

B. Selection Criteria for White Pine Parent Trees

1. Stand Criteria:

   a. Stands preferably not in a 5 year development plan area.

   b. Stand must be in age class 2 or 3 (21-60 yrs), which indicates establishment during the presence of white pine blister rust.

   c. White pine species composition (sph), should be greater than 10%, to increase the likelihood of out breeding and for collection efficiency.

   d. Stocking should be medium to open, with live or recently-dead branching to the ground being preferred.

   e. Stand vigour should be good except for the mortality due to blister rust.

   f. Blister rust must be present and active in the stand, with most trees having cankers, dying or dead from blister rust.

2. Parent Tree Criteria:

   a. Form must be good, with stem unforked, straight and of low taper.

   b. The growth rate must be equal to or better than that of nearby healthy trees, or that of other species.

   c. The tree must be CANKER FREE on both stem and branches. The lower branches must be present at time of selection; bark on lower branches should be present to examine for evidence of past cankering.

   d. Parent trees selected from sites infected with Phellinus weirii are valuable for their demonstrated root disease resistance, and should be noted as such.

C. Seed Production Areas (SPA)

Depending upon projected white pine sowing requirements, SPA should be developed to meet varying standards of parent tree selection criteria. Seed production areas will be of particular advantage

where high selection standards are required or desired. White pine not meeting the selection criteria should be rogued out with a precaution to maintain minimum inter-tree distances for cross-pollination. Seed production areas will also provide increased cone collection efficiencies and greater continuity in seedling stock quality. For SPA management details refer to Meagher et al. (1987).

Seed production areas should be designed in conjunction with Regional Silviculture and Protection staff. Approval by the Regional Forest Pathologist, as outlined in Vancouver Circular VR88-521, is required.

D. Marking and Recording Seed Sources

Marking and recording of scattered individuals or groups of selected parent trees are recommended for relocation efficiency and collection of data on tree characteristics. Marking and recording of individual tree data is not mandatory, but the seed production area's characteristics and locations should be on file. Parent tree records should be registered with the Seed Tree Centre, Duncan, B.C. Procedures are found in the Guidelines to Selecting Parent Trees in British Columbia, BCFS, Silviculture Branch.

## IV. PLANTATION ESTABLISHMENT

A. Plantation Records

A record of white pine operational trials should be made on the Silviculture History Record System, with prunings scheduled and budgeted for, see also Vancouver Circular VR88-521.

B. Blister Rust Management Considerations

The following management considerations are aimed at reducing the risk of blister rust infection during plantation establishment:

1. Risk of blister rust infection increases with increasing slope. It is recommended that native white pine not be planted on slopes greater than 60%, particularly on lower and mid-slope positions.

2. When native white pine is managed on steep slopes occurrence of stem cankering and top-kill can be expected with few trees reaching larger than 35-45 cm d.b.h.

3. When native white pine is managed on gentle slopes, low levels of stem cankering should permit harvesting of larger piece sizes than on steep slope sites.

4. Risk of blister rust infection increases sharply within 40 m of creeks. Risk reduction is best done through planting of non-host species within 40 m of creeks and water bodies.

5. Risk of blister rust infection decreases in well stocked denser stands, which reduces niches favourable to Ribes spp. growth.

C. Laminated Root Rot Management Considerations

When western white pine is established in and around Phellinus weirii infection centers it should be planted only as a pure component or as a mix with other less susceptible species. Western white pine should not be mixed with highly susceptible species Douglas-fir, grand fir, and amabilis fir in root disease situations; see Appendix A, and the Vancouver Region Phellinus Root Disease Management Guidelines, Internal Report PM-V-6.

D. Stocking Standards

Stocking standards for western white pine should follow those outlined for Douglas-fir by subzone variants and ecological classifications; see MOF&L Silvilculture Manual - Basic Silviculture Sect. 009, pages 18-26 and accompanying grids.

## V. STAND TENDING

In addition to normal stand tending procedures, low-branch pruning for white pine blister rust control is required to be done in accordance with rigorous standards and schedules. These are:

A. Low-branch Pruning Standards

1. All white pine will be pruned to one-third residual live-crown length, or up to 2.5 - 3.0 m, whichever comes first.

2. All branch cankers visible above 2.5 m, will be pruned where possible.

3. All branches will be pruned flush to the stem, while ensuring bark is not wounded.

4. All stem canker infected white pine will be felled except under conditions set below, see (5).

5. Excising of stem cankers may be considered on trees larger than 10 cm d.b.h. where no more than one-third of the tree circumference is removed or circumscribed.

B. Scheduling, and Timing of Pruning

1. Scheduling Pruning:

A two-pass pruning system is required for optimum disease control:

1st Pass: Prune when average stand tree height is 2.0 to 2.5 m.
Prune to one-third residual live-crown length.

2nd Pass: Prune when average stand tree height is about 4 to 5 m.
Prune to 2.5 to 3.0 m.

Ideally the second pass will be combined with juvenile spacing operations. This may be possible on a site-specific basis but will be dependent on white pine survival, rate of disease intensification, and blister rust hazard.

2. Timing of Pruning:

   The optimum time for canker observation and pruning is April through May; look for orange-coloured aeciospore bark blisters on branches and boles. Pruning may be done throughout the year.

C. Pruning Recommendations for Naturally Regenerated and Unmanaged Stands

1. Prune to the standards outlined above.

2. Prune when white pine is considered to be an acceptable crop tree species for the site.

3. Prune only white pine where required to maintain minimum acceptable stocking standards.

4. Prune only well-spaced white pine where no other acceptable species occupies that area.

5. Prune the white pine component before the average tree height is 4 m.

6. Prune the second pass in conjunction with juvenile spacing.

D. Pruning Recommendations for Planted, Managed Stands

1. Prune as per the standards outlined above with the additional option of selectively pruning only well-spaced crop trees at the second stage of pruning.

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## VII. APPENDICES

Appendix A Tree Species Susceptibility to Phellinus weirii Infection and Disease Control Values

Appendix B Interpretive Units for Intensive Root Disease Management Using Western White Pine

APPENDIX A

Summary of Tree Species Susceptibility to Phellinus weirii Infection and Disease Control Values

| Species Susceptibility Class[1] | Disease Control Values[2] |
|---|---|
| 1. High Susceptibility<br>F, Bg, Ba, Hm | These species should not be planted within a treatable area, (i.e. with an infection center plus 10 m buffer). If these species are planted, losses will be at least as serious as in the previous stand. Reduction of *P. weirii* inoculum is unlikely to occur; it will probably increase. |
| 2. Intermediate Susceptibility<br>Bl, Lw, Se, Ss, Hw | These species may become infected, but usually they do not suffer serious damage unless they are growing in association with susceptible species. Butt decay rather than mortality is the most common damage to these species. If pure stands of intermediate species are planted on a site containing infected roots of susceptible species, some losses will occur; but it will probably be possible to grow them through to rotation without serious losses. Planting of intermediate species will allow the fungus to persist on a site since their roots can become infected. Their roots may also provide a disease pathway to adjacent susceptible species. |
| 3. Low Susceptibility<br>Pl, Pw, Py | These species can become infected if they are growing in close association with infected susceptible species. Even though they may become infected they usually are not seriously damaged. Where they are silviculturally and ecologically suitable to infested sites the low susceptibility species should receive preference over high and intermediately susceptible species. |
| 4. Very Low Susceptibility<br>Cw | Western red cedar is rarely damaged by *P. weirii*. If cedar is maintained in disease centers in coastal sites, *P. weirii* should die out over a normal rotation. |
| 5. Non-Susceptibility/Immune<br>Mb, D, Ac, A, Bi | Deciduous species are immune to infection, their value as a control is that a rotation of hardwoods can be grown while the disease centres die out. *P. weirii* inoculum sources may still be viable following short coastal hardwood rotation lengths (25-40 years), but only at low risk levels. |

[1] From Wallis 1976, and Hadfield 1985.

[2] From Hadfield 1985.

Appendix B

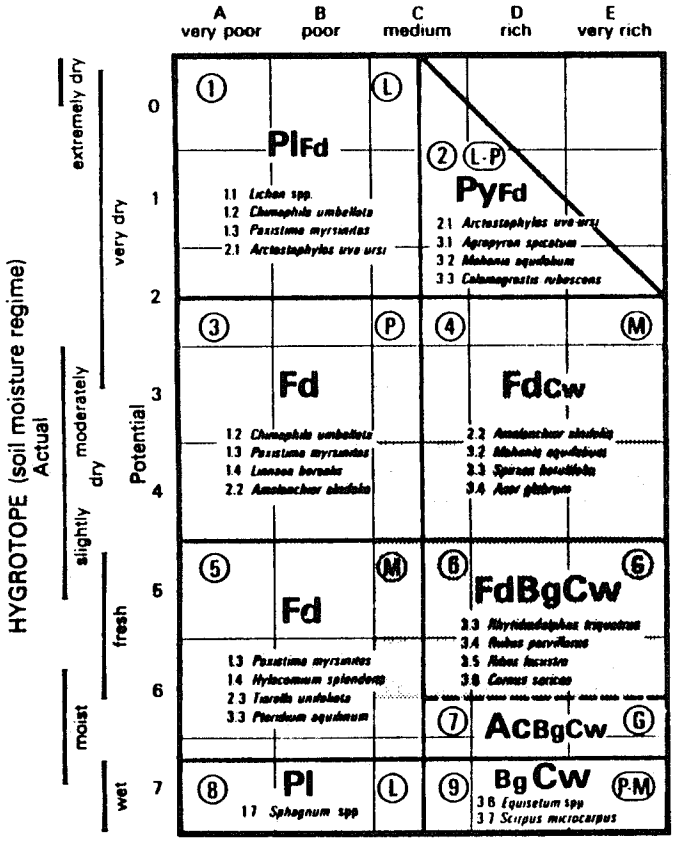
# Interpretive Units for Root Disease Management using Western White Pine

**Grid No. 4**

Recommended tree species for the:

| IDFe1 | SOUTHERN SUBCONTINENTAL IDF VARIANT AND RELATED UNITS |
|---|---|

TROPHOTOPE (soil nutrient regime)

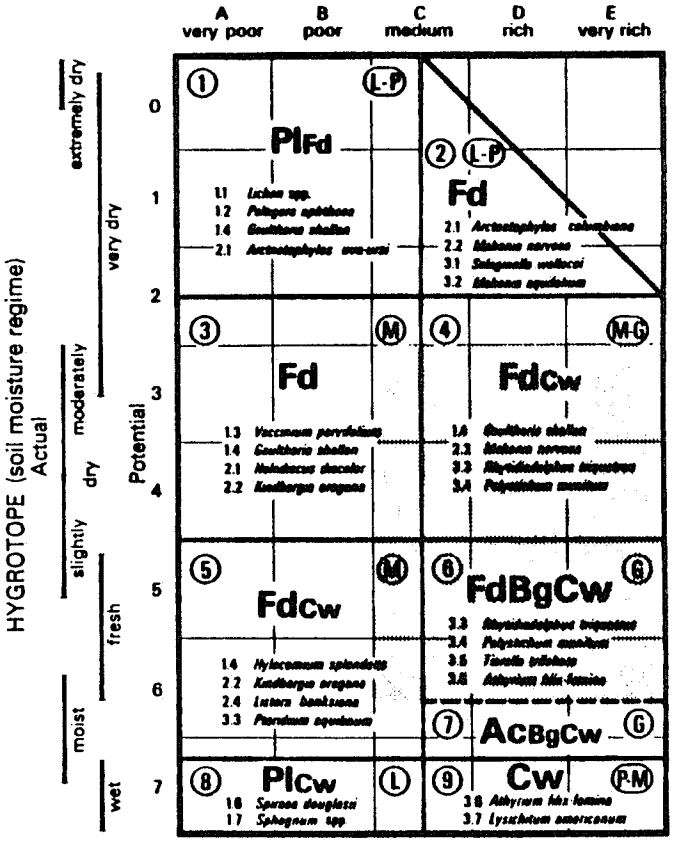



**Grid No. 6**

Recommended tree species for the:

| CDF | CDF ZONE |
|---|---|

TROPHOTOPE (soil nutrient regime)




SITES WHERE WESTERN WHITE PINE IS AN ACCEPTABLE ALTERNATIVE SPECIES

Appendix B

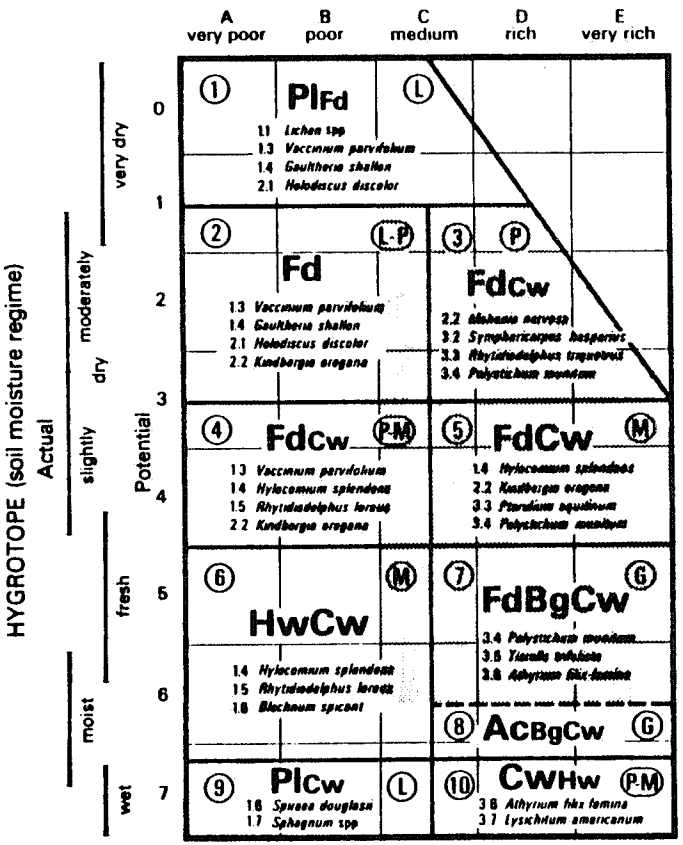
# Interpretive Units for Root Disease Management using Western White Pine

**Grid No. 7**

Recommended tree species for the:

| CWHa1 | VANCOUVER ISLAND DRIER MARITIME CWH VARIANT |
|---|---|

TROPHOTOPE (soil nutrient regime)

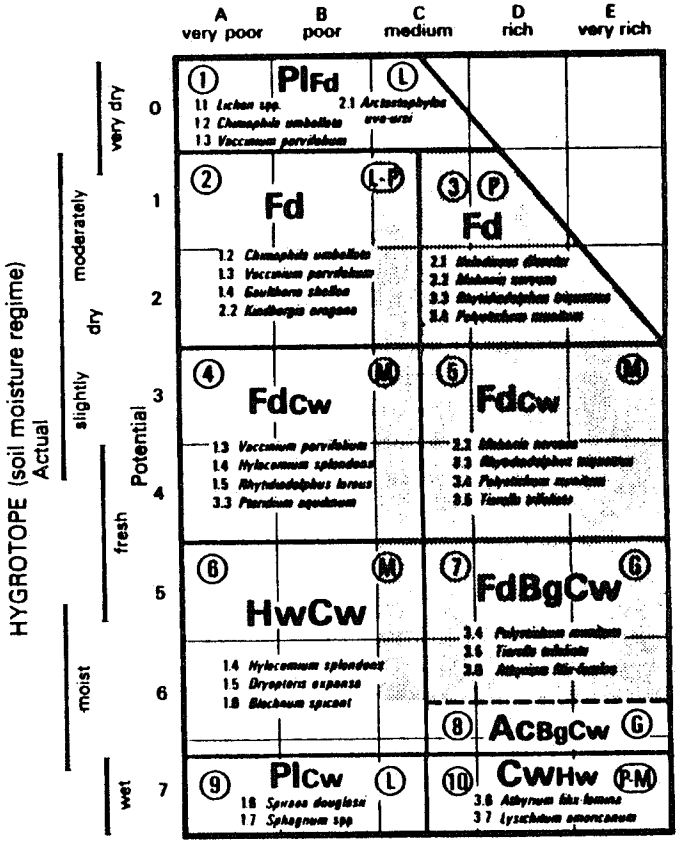



**Grid No. 8**

Recommended tree species for the:

| CWHa2 | PACIFIC RANGES DRIER MARITIME CWH VARIANT |
|---|---|

TROPHOTOPE (soil nutrient regime)




☐ SITES WHERE WESTERN WHITE PINE IS AN ACCEPTABLE ALTERNATIVE SPECIES

Appendix B

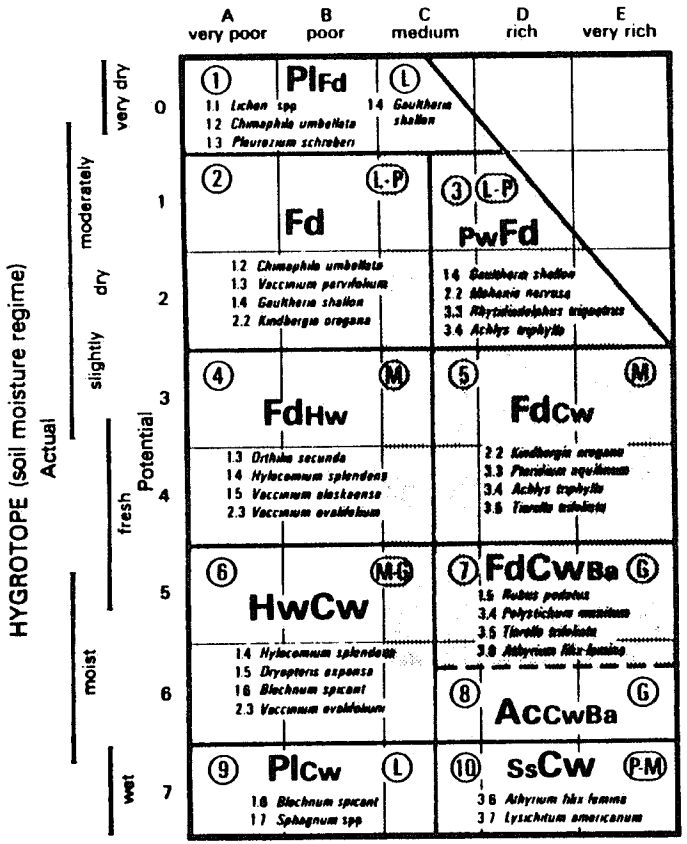
# Interpretive Units for Root Disease Management using Western White Pine

**Grid No. 11**

Recommended tree species for the:

**CWHb3** | LEEWARD SUBMONTANE MARITIME WETTER CWH VARIANT

TROPHOTOPE (soil nutrient regime)

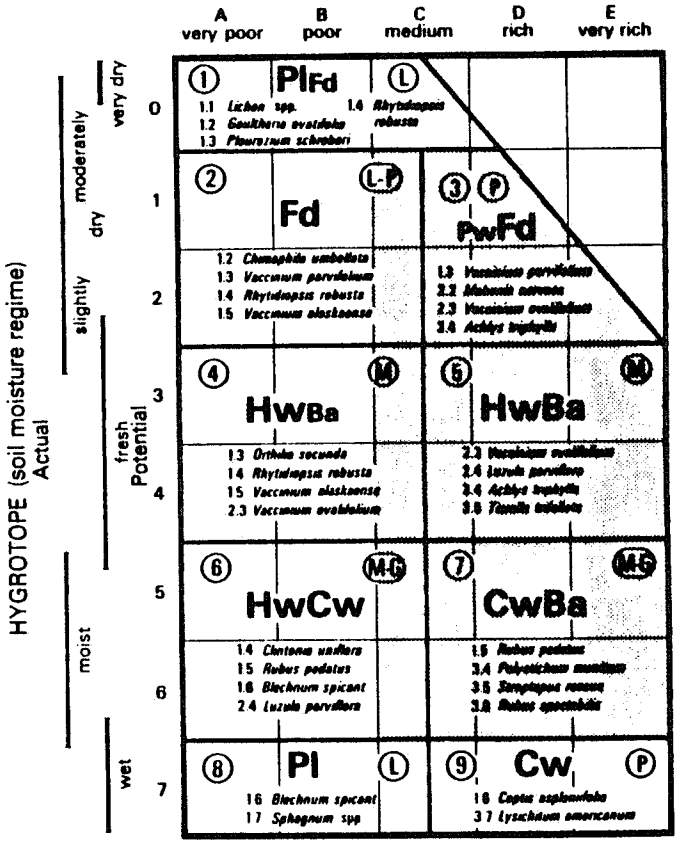



**Grid No. 12**

Recommended tree species for the:

**CWHb4** | LEEWARD MONTANE MARITIME WETTER CWH VARIANT

TROPHOTOPE (soil nutrient regime)




SITES WHERE WESTERN WHITE PINE IS AN ACCEPTABLE ALTERNATIVE SPECIES

Appendix B

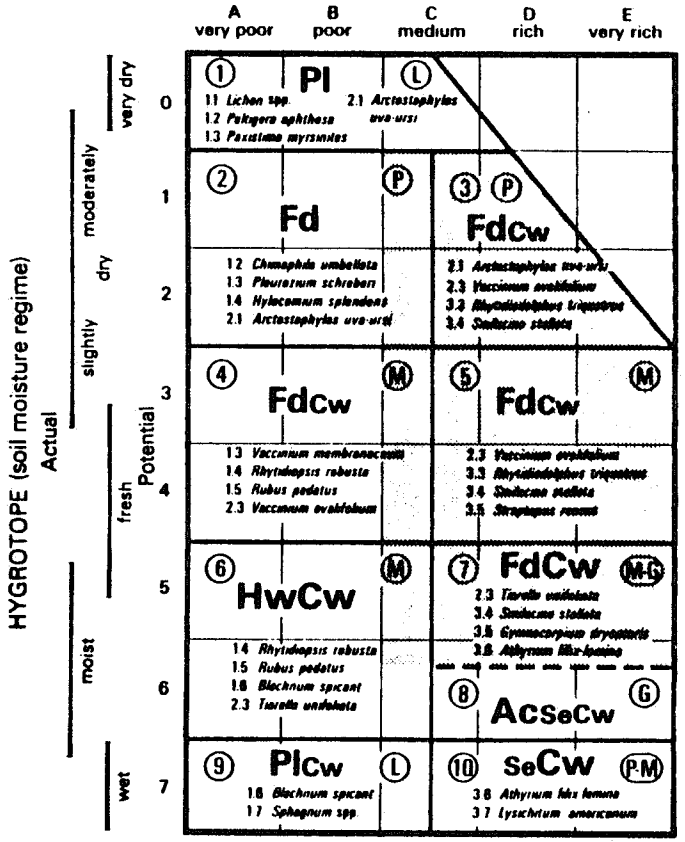
# Interpretive Units for Root Disease Management using Western White Pine

**Grid No. 13**

Recommended tree species for the:

| CWHb5 | SOUTHERN SUBMARITIME WETTER CWH VARIANT |
|---|---|

TROPHOTOPE (soil nutrient regime)

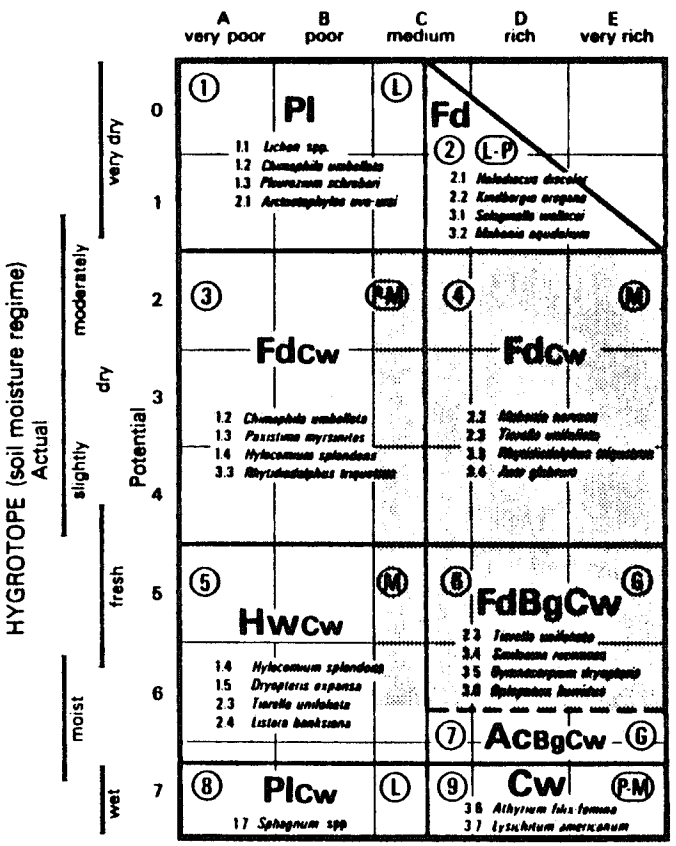



**Grid No. 16**

Recommended tree species for the:

| CWHc1 | SOUTHERN DRIER SUBMARITIME CWH VARIANT |
|---|---|

TROPHOTOPE (soil nutrient regime)




SITES WHERE WESTERN WHITE PINE IS AN ACCEPTABLE ALTERNATIVE SPECIES