ORAL QUESTIONNAIRE

FOR

BAREROOT NURSERY TECHNOLOGY WORKSHOP

Nursery Name _____

Address _____

_____

Phone # _____

Names of Persons Present at Interview:

Name	Position
_____	_____
_____	_____
_____	_____

10. Where are they stored?

    _____

11. Under what environmental conditions are they stored?

    Relative humidity _____ Temperature _____ Kind of ventilation _____

12. Do you caret and clean your own seed?

    1 Yes (skip to 14)
    2 No (go to 13)

13. Who extracts and cleans your seed?

    _____ (go to 17)

14. Where do you dry, extract and clean seed?

    _____

15. Row do you transport your sand to cold storage? (In what containers?)

    _____

16. What is the average purity of the seed of your major species?

    Species # 1 _____

    Species # 2 _____

17. Do you purchase any of your seed from seed companies?

    1 Yes (go to 18)
    2 No (skip to 20)

18. What percent (%) of your seed?

    _____ %

19. Where is it purchased? (Name and address of seed company)

    _____

    _____

Seed Testing

20. What seed taste do you do at your nursery? (e.g. purity, germination, weight of 1,000 seeds, moisture content, x-rays, etc.)

21. What seed tests are done at another location?

22. Where?

23. Do you set minimum purity standards for each species?

    1 Yes (go to 24)
    2 No (skip to 25)

24. What are they for your major species?

    Species #1 _____ _____

    Species #2 _____ _____

25. Under what conditions do you store your seed?

    Temperature _____

    Humidity _____

    Packaging _____

26. Do you retest seed after it has been in cold storage?

    1 Yes (go to 27)
    2 No (skip to 29)

27. What tests do you use?

28. How often do you retest a given batch of seed?

Stratification

29. Do you stratify your own seed?

    1 Yes (go to 31)
    2 No (go to 30)

30. Where is your seed stratified?

    _____ (go to 39)

31. How long do you soak your seed in water? And in what container?

32. Do you aerate the water?

    1 Yes
    2 No

33. At what temperature do you stratify seed? And in what container?

34. How long do you stratify each of your major species?

Species	Length of Stratification

35. What is the maximum time you store your seed before sowing?

    _____ weeks

    And in what container is it stored?

36. Have you experienced premature germination in stratification?

1 Yes (go to 37)
2 No (go to 39)

37. In which species did it occur?

_____

_____

38. What do you do when it occurs?

_____

39. What do you do if you have stratified too much seed?

_____

_____

_____

_____

Preparing the Seedbed and Sowing

40. Are your seedbeds raised?

1 Yes (go to 41)
2 No (skip to 43)

41. Now high above the original ground line do you raise them?

_____ in or cm

42. Why do you raise them?

_____

43. Now do you compute how much seed to sow? (What formula do you use?)

_____

_____

_____

_____

44. Describe the layout of your beds.

Bed width (row to row) _____ in or cm

Path width (outside row to outside row) _____ in or cm

Rows per bed _____

Number of beds between irrigation lines _____

Distance between irrigation lines _____ ft or m

Fumigation

45. Do you fumigate your soil?

1 Yes Do you contract or do your own fumigation?

Contract _____ Own _____

2 No (skip to 55)

46. What time of the year do you fumigate?

_____ Spring

_____ Fall

_____ Other _____

47. Why do you fumigate at this time?

_____

48. a. What fumigant do you use? b. At what rate is it applied?

_____ _____ lbs/acre

c. Why have you selected this fumigant? _____

d. Have you had problems with any other fumigants?

1 Yes (go to 48e)
2 No (go to 49)

e. What problems have you had?

_____

49. Under what soil conditions do you fumigate?

_____ Temperature

_____ Moisture

50. What is your minimum time length for tarping?

_____ days

51. Now often do you fumigate?

_____ every rotation

_____ other _____

52. a. Do you fumigate your transplant beds?

1 Yes (go to 52b)
2 No (skip to 53)

b. What fumigant? _____

c. At what rate? _____ d. When? _____

53. Why do you fumigate? (rank in order)

_____ Weeds

_____ Pests

_____ Other

54. Do you fumigate as a preventative?

1 Yes
2 No

55. Do you consider fumigation an economic practice?

1 Yes
2 No

56. Do you use a bioassay, for determining pest populations?

1 Yes
2 No

57. Have you tested to sae if fumigants are effective?

1 Yes (go to 58)
2 No (skip to 59)

58. What ware the results of your tests?

_____

Seedling and Soil Analysis

59. Do you have your soil analyzed?

1 Yes (go to 60)
2 No (skip to 66)

60. Where is it analyzed?

_____

61. How often is it analyzed?

_____

62. At what time of the year, stage in your seedbed preparation or growing regime?

_____

63. How many samples are collected and what area do they represent?

_____

64. At what depth are your samples collected?

_____ in or cm

65. For what soil characteristics is your soil analyzed?

Yes	No	
1	2	pH
1	2	Organic Matter
1	2	Cation Exchange Capacity (CEC)
1	2	Soluble Salts
1	2	Lime Requirement
1	2	Total Nitrogen (N)
1	2	Phosphorous (P)
1	2	Potassium (K)
1	2	Calcium (Ca)
1	2	Hagnesium (Ng)
1	2	Boron (B)
1	2	Zinc (Zn)
1	2	Other _____

66. Do you have a map of your various moil types?

1 Yes

2 No

67. Do you have a soil management plan?

1 Yes

2 No

68. Do you have your seedlings analyzed?

1 Yes (go to 69)

2 No (skip to 73)

69. Where are they analyzed?

_____

70. At what stage in seedling growth?

_____

71. How often are they analyzed?

_____

72. For what nutrients?

Yes	No	
1	2	N
1	2	P
1	2	K
1	2	S
1	2	Ca
1	2	Mg
1	2	B
1	2	Mn
1	2	Mo
1	2	Zn
1	2	Cu
1	2	Fe
1	2	Other _____

Fertilization

73. How do you determine what levels of fertilizer to apply?

_____

_____

74. How do you coordinate fertilizer applications to harden-off seedlings?

_____

_____

75. Do you have optima soil nutrient levels established for each soil type?

1 Yes (go to 76)

2 No (skip to 77)

76. Describe the optimum nutrient levels for your major soil type.

_____ pH
_____ ppm P
_____ ppm K
_____ me/100 g Ca
_____ me/100 g Mg
_____ total N (%)

Organic Matter

77. What was the percent (%) organic matter is your major soil type at time of your last analysis?

_____ %
_____ date

78. What percent (%) would you like it to be?

_____ %

79. Why?

_____
_____
_____
_____

80. Do you add organic amendments to your soil?

1 Yes (skip to 82)
2 No (go to 81)

81. What are your reasons for not adding organic materials? (skip to 89)

_____

82. What materials do you add, when are they added and at what rates?

What Material?	When Added?	At What Rate?

83. Do you compost your organic matter sources?

1 Yes (go to 84)
2 No (skip to 86)

84. Do You add fertilizer, lime, fungal inoculant or other additives to the composting material?

1 Yes (go to 85)
2 No (skip to 86)

85. List additives.

_____ _____

86. Why do you choose these specific organic materials

_____
_____
_____
_____

87. Do you see a shortage of supply or high prohibitive costs for this material in the future?

1 Yes (go to 88)
2 No (skip to 89)

88. Explain.

_____
_____
_____

89. Do you sow a cover crop?

1 Yes (go to 90)
2 No (skip to 95)

90. Is this a:

_____ summer cover crop or a
_____ winter cover crop or
_____ both

91. How often do you sow a cover crop?

_____ every rotation

_____ every other rotation

_____ other _____

92. Describe when you sow: Summer Winter

_____ _____

When you plow under:

_____ _____

93. What plants do you use?

_____ _____

94. Why do you cover crop?

_____ _____

_____ _____

Water

95. What equipment or methods do you use to generally determine when irrigation is needed? (First check which of the six methods you use, then give details only for those areas checked.)

_____ 1. Visual and tactile examination of the soil

Check one, stating where this is done:

_____ a. in the root zone

_____ b. in the surface layers

_____ c. both

Explain briefly how soil is examined (example: can't squeeze water out of soil, etc.).

_____

_____

_____ 2. Soil moisture tensionmeters

Check one, stating where these are located:

_____ a. above the main root zone

_____ b. in the root zone

_____ c. below the root zone

_____ d. two tensionmeters, one above and one below the main root zone area.

_____ e. other _____

Explain briefly how information is used to irrigate (example: start irrigation at "X" bars, stop at "Y", etc.)

_____

_____

_____ 3. Electrical (Bouyoucous) Resistance Blocks (soil moisture blocks)

Check one, stating where these are located:

_____ a. above the main root zone

_____ b. in the root zone

_____ c. below the root zone

_____ d. two blocks, one above and one below the main root zone

_____ e. other

_____ 4. Water Budget Method (calculation of evapotranspiration of the crop per day and a running balance sheet of accumulated deficit below field capacity. Irrigation takes place when ever the deficit exceeds a certain predetermined value.

What water deficit guides do you tolerate at:

a. initiation of irrigation: _____ (in or mm)

b. cessation of irrigation: _____ (in or mm)

How do you calculate evapotranspiration of your crop?

_____

_____

_____ 5. Pressure Bomb (direct measurement of internal plant water potential)

What plant moisture stress do you use for:

a. initiation of irrigation:

_____ bars (or other unit _____)

b. Do you employ this method routinely?

1 Yes
2 No

c. How often?

_____

_____ 6. Other method or guidelines used to signal need for irrigation (plant wilting, weather, etc.).

96. Do you change irrigation monitoring methods as the crop gets older or bigger?

1 Yes (go to 97)
2 No (skip to 96)

97. Explain how you change your monitoring.

1-0's: _____

2-0's and others: _____

98. Do you think there is a need for better equipment or guides to monitor nursery irrigation?

1 Yes
2 No

Why? _____

99. Do you have a moil moisture retention curve (percent soil moisture content by weight/soil metric potential) for your major wail types?

1 Yes
2 No

100. Do you irrigate during the day or night or at both times?

(circle one or both)

101. Do you irrigate for cooling of recently germinated seedlings?

1 Yes (go to 102)
2 No (skip to 103)

102. At what air and soil temperatures and for how many minutes do you irrigate for cooling?

_____ air temperature

_____ soil temperature

_____ minutes

103. Do you irrigate for frost protection?

1 Yes (go to 104)
2 No (skip to 105)

104. At what air temperature do you irrigate for frost protection?

_____ temperature

105. Do you reduce entering to harden seedlings in the fall?

1 Yes (go to 106)
2 No (skip to 107)

106. Describe the procedure for restricted watering for each stock type of your major species.

1-0 _____

2-0 1st year _____

2nd year _____

		Spring Transplant	Fall Transplant
2-1	1st year		
	2nd year		
	3rd year		

107. Have you done anything to improve the water drainage of your soil (e.g. tiling)?

1 Yes (go to 108)
2 No (skip to 109)

108. Describe what you have done to improve drainage.

_____

_____

109. Have you over bad your irrigation water tested

a. for nitrates, nitrites or pathogens?

1 Yes
2 No

b. for cation content and pH?

1 Yes
2 No

110. Describe the results of the test.

_____ _____

_____ _____

Cultural Regimes

111. Do you top prune?

1 Yes (go to 112)
2 No (skip to 117)

112. What stock types do you top prune?

_____ _____ _____

113. When do you top prune? (When in the seedlings' growing regime?)

_____

_____

114. Now often do you top prune?

_____

115. To what height?

_____

116. Why do you top prune?

_____

_____

117. Do you have a target or optimum morphology which you try to achieve for each stock type

1 Yes (go to 118)
2 No (skip to 119)

118. Describe the target morphology (height, root:shoot ratio, and caliper) for your two (2) major species.

	Species	Stock Type	Height	S:R or R:S	Caliper	Other
1.			in / cm		mm	
			in / cm		mm	
			in / cm		mm	
2.			in / cm		mm	
			in / cm		mm	
			in / cm		mm	

119. What stock type are you growing in greater quantity today than in 1975?

_____

In lesser quantity?

_____

Why?

_____

_____

120. What stock type do you foresee as being grow in greater quantity by 1985?

_____

In lesser quantity?

_____

Why?

_____

_____

Weed Control

121. Is there an herbicide which you wuld rather not use because of health risk concerns?

1 Yes (go to 122)
2 No (skip to 123)

122. What herbicide and why would you rather not use it?

_____

_____

123. Have you observed any coniferous seedling damage from herbicides?

1 Yes (go to 124)
2 No (skip to 125)

124. Which herbicides and tree species? What type of damage was observed?

Herbicides	Tree Species	Type of Dame Observed

Disease and Insects

125. Where do you get help an insect and disease problems?

Consultants _____ Government Pest Specialists _____

Chemical Representatives _____ Other Nurseryman _____

In-House Specialists _____

126. What is your preferred way to control insects and diseases?

_____ Cultural Means (Varying Nursery Practices)

_____ Pesticides

_____ Biological Control

_____ Other

127. Whet kind of information would be valuable to you to manage these pests? (Rank in order of importance).

_____ Life History

_____ Identification

_____ Control Methods

_____ Storage and Disposal of Pesticides

_____ Other _____

128. Do you think your cover crops contribute to wed or other pest problems?

1 Yes Why? _____
2 No

Mycorrhizae

129. Do you notice an abundance of mycorrhizae on your seedling root systems when lifted? Or are there very few?

Abundance _____ Few
5 4 3 2 1

130. Have you noticed fungal fruiting bodies in your nursery?

1 Yes (go to 131)
2 No (skip to 132)

131. Are there many types or just one type of mushroom?

_____ Many types _____ One type

Describe these mushrooms.

_____

_____

Seedling Growth in Relation to Nursery Environment

132. What range of seed zones do you grow? (i.e., coastal, mountain, East side). (List areas for which trees are grown).

_____ _____

_____ _____

_____ _____

133. How many seed zones do you grow for each of your major species? (One seed zone includes one elevation zone).

Species	# of Seed Zones
_____	_____
_____	_____
_____	_____
_____	_____

134. Do you have separate growing regimes for different seed zones and/or elevations? (e.g. sowing dates, irrigation schedules, lifting dates, etc.)

1 Yes (go to 135)
2 No (skip to 136)

135. Describe these regimes.

Sowing dates: _____

Irrigation schedules: _____

Lifting dates: _____

Other: _____

Lifting

136. When do you lift your stock? State the normal range of dates for each major species.

Species	Lifting Dates
_____	_____ to _____
_____	_____ to _____
_____	_____ to _____

137. How is your choice of lifting dates arrived at?

_____

_____

138. What are your lifting and pre-sort handling procedures?

a. Is stock undercut before lifting?

1 Yes (go to 138b)
2 No (skip to 138c)

b. How long in advance is stock undercut? (maximum time)

_____ hours

c. When the soil moisture level is low, do you irrigate before lifting?

1 Yes
2 No

139. Do you cover or water-dam seedlings in field containers?

a. Cover?

1 Yes Type of Cover _____
2 No

b. Waterdown?

1 Yes
2 No

140. How long is lifted stock held before grading? State normal and maximum period.

Normal = _____ days

Maximum = _____ days

141. How is ungraded stock held?

a. In what container?

_____

b. At what temperature and relative humidity?

_____ temperature

_____ relative humidity

c. How is it protected from dessication?

_____

142. Do you shut down lifting operations if certain weather conditions arise?

1 Yes (go to 143)
2 No (skip to 144)

143. Under what conditions do you shut down lifting?

_____ temperature

_____ moisture

_____ wind speed

_____ wet soil

_____ high PMS

Grading

144. What culling standards do you use on the grading table?

caliper _____ height _____ root length _____

multiple tops _____ physical damage _____

145. Now, are your culling standards arrived at?

_____

146. What percent of your stock is root pruned?

_____ %

a. To what length?

_____ in cm (circle one)

147. Are the environmental conditions controlled in your packing shed?

1 Yes (go to 148)
2 No (skip to 149)

148. At what temperature and humidity is your patting shad controlled?

_____ temperature

_____ humidity

Packaging

149. What type and size of storage/shipping container do you use?

Waxed box ____ Unwaxed box ____ Polybag ____ Bundle(cloth) ____

Size of container _____

150. Are seedlings bundled when packaged?

1 Yes (go to 151)
2 No (skip to 152)

151. What is used to tie the bundles?

_____

152. Do you use a moisture-holding medium such a sphagnum was in your containers?

1 Yes (go to 153)
2 No (skip to 154)

153. What medium do you use?

_____

Storage

154. At what ambient temperature and relative humidity are your seedlings stored?

_____ temperature

_____ relative humidity

155. Do you monitor inside your containers?

1 Yes (go to 156)
2 No (skip to 151)

156. What do you monitor?

_____ temperature

_____ mold development

_____ seedling moisture stress

_____ root viability

157. What percent of your seedlings are shipped in refrigerated trucks?

_____ %

In non-refrigerated trucks?

_____ %

158. What are the normal and maximum time stock is in transit?

_____ normal

_____ maximum

159. Are stock temperatures monitored in transit?

1 Yes (go to 160)
2 No (skip to 161)

160. How warm does the stock get in transit?

_____ temperature

161. Are seedlings shipped directly to the planting site?

1 Yes (skip to 163)
2 No (go to 162)

162. If not planted immediately, how long and under what conditions are they held after being shipped from the nursery?

_____

_____

Seedling Evaluation

163. Which of the following tests do you use to assess seedling vigor or condition:

	Tests (check which tests are used)						
Operational Stage	Dormancy	Cold Hardiness	Water Status	Root Growth Potential	Stress	Foliage Nutrients	Other
During the Growing Regime?	____	____	____	____	____	____	____
Before Lifting?	____	____	____	____	____	____	____
During Lifting and Processing?	____	____	____	____	____	____	____
During Cold Storage?	____	____	____	____	____	____	____
After Cold Storage?	____	____	____	____	____	____	____

164. How often and when do you take size measurements on your 2-0 stock?

_____ _____

165. What measurements do you take?

____ Caliper ____ Height ____ R:S Ratio ____ New Root Tips ____ Other ____

166. Do you plot and follow growth curves for your stock each year?

1 Yes
2 No

167. What experimental trials have you done at your nursery? Are the results available?

Trial	Are the Results Available?
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No
_____	1 Yes 2 No

168. Do you have any experimental trials at your nursery at the present time?

1 Yes (go to 169)
2 No (skip to 170)

169. List types of trials.

_____ _____ _____

_____ _____ _____

170. Do you monitor field growth and survival of your stock?

1 Yes (go to 171)
2 No (skip to 172)

171. Describe tests.

_____

_____

_____

_____

General questions

172. In what areas of nursery technology do you feel more information is needed, i.e., further research is necessary? (List in order of importance)

1. _____
2. _____

173. In what areas of nursery technology do you feel the current level of technology is sufficient, i.e., no more research is necessary?

_____

_____

174. What is the best form in which you would like to receive results of new

_____

_____

175. Do you read:

	Often	Occasionally	Never
Tree Planter's Notes	_____	_____	_____
American Nurseryman	_____	_____	_____
Forestry Update	_____	_____	_____
Journal of Forestry	_____	_____	_____
Forest Science	_____	_____	_____
Canadian Journal of Forest Research	_____	_____	_____
Other _____	_____	_____	_____

176. Whom do you contact concerning specialized nursery problems?

Soil? _____

Insects? _____

Seedling Quality? _____

Diseases? _____

Herbicides? _____

Other? _____