The members met at 7:30 a.m. the next morning, August 20, 1964, and left Boise to view a planting site in Lower Mores Creek Drainage.

The meeting was again called to order at the Lucky Peak Nursery at 10:30 a.m.

X. James Dick, Weyerhaeuser Company, Forestry Research Center.
Subject: Progress Report on Grading System. Report of committee on planting stock description to the Western Forest Nurserymen's Association and to the Western Forestry and Conservation Association.

Discussion followed on proposed recommendations of the Committee and it was decided that these recommendations were inconclusive and should be studied further.

A motion was made by Carl Hawkes to maintain the Committee for another year to further this and maintain adopted recommendations given and try it out for two years. The motion was seconded by Ralph Van Wagner and carried by the majority.

REPORT OF COMMITTEE ON PLANTING STOCK DESCRIPTION

by
James Dick
Weyerhaeuser Research Center
Centralia, Washington

The Western Forest Nurserymen's Association in August 1962 appointed a committee to standardize, if possible, the descriptive nomenclature for forest tree planting stock. This was in keeping with the theme of that meeting -- "Varied Trees for Varied Uses." If nurserymen and planters are to work with trees of varied characteristics, there must be a common vocabulary.

The committee was composed of nurserymen, representing both the interior and coastal nurseries, and planters. John Pitcher, representing planters, served during the first year and then was replaced upon his transfer from the region. The diversity of viewpoints in the Association in 1962 has been reflected in the diversity of viewpoints held by the committeemen.

The region of applicability for this report was defined by the committee as shown in figure 1. Nurserymen within the region were requested to secure completed questionnaires from planters with which each deals and to measure and supply samples of planting stock. Nurserymen along the eastern edge of the area did not participate. This report includes summaries of the results of the surveys through your fine cooperation, the contributions of individual committeemen, and our recommendations.

The Planters' Questionnaire

A total of 44 replies were received concerning the optimum and minimum physical dimensions and other characteristics of planting stock desired by planters. They indicated a general need for sturdier stock as severity of planting sites increased. Inconsistent differences between the optimum and minimum were sometimes indicated as severity changed. The desired dimensions varied both between and within geographic areas, probably reflecting a range not only of severity of site but also of planting experience. A summary of data is shown in table 1. Planters generally stressed the desirability of dense, multibranched root systems and more foliage and buds (greater top branching potential) in stock destined for severe sites. The desired length of root often exceeded that for which standard planting tools were designed.

The Dimensions of Planting Stock

Data on individual seedlings of 78 lots in 1963 and of 98 lots in 1964 were submitted by a total of 17 nurserymen (table 2). The lots differ, substantiating the need for description better than that of species and age class alone. The lot means vary with species, nurseries, and lots. The relationships of one measure to another vary with lots so that it is impossible to make generalized assumptions. The variation of individual tree measurements is portrayed for 2-0 Douglas fir raised at Duncan, B.C. in 1963 (fig. 2). The range of individual trees in other lots is illustrated in fig. 3.

Although means varied widely, the variation within individual lots is rather constant within a species and age class. This variation is measured by the standard deviation which defines limits about the mean which will include two-thirds of the individual seedlings in the lot.

Recommendations of the Committee

A. The following recommendations concerning description of planting stock include items obvious at the moment that should be a matter of record for the future as well as items necessary to the immediate description.

Forest tree planting stock shall be identified by species, seed source, nursery at which raised, age class, average height, and average stem caliper.

1. Species: The use of scientific nomenclature is to be encouraged.

2. Seed source: The identification of seed source shall be that assigned by the individual or organization supplying the seed.

3. Nursery: The name and location of the nursery producing the stock shall be recorded.

4. Age class: A three-digit numerical code shall describe the period of growth in the seedbed, transplant bed, and the season of sowing. (see table 3.)

KEY TO NURSERIES

British Columbia

1. Telkwa
2. Quinsam, Campbell River
3. Duncan
4. Green Timbers, N. Surrey
5. E. Kootenai, Cranbrook

Washington

6. Webster, Olympia
7. Greeley, Olympia
8. Wind River, Carson

Idaho

9. Coeur d'Alene

Oregon

10. Canby
11. Corvallis
12. Elkton
13. Bend

California

14. Parlin Fork, Ft. Bragg
15. Magalia
16. Placerville
17. Ben Lomond, Santa Cruz

Figure 1. Region of inquiry and locations of nurseries participating.

Table 1. Numerical description of age of forest tree planting stock.

Code	Season of Sowing	Period in Seed Bed	Period in Transplant Bed
		(yrs)	(yrs)
100	Spring	1	0
150	Fall	1	0
200	Spring	2	0
250	Fall	2	0
300	Spring	3	0
350	Fall	3	0
101	Spring	1	1
151	Fall	1	1
201	Spring	2	1
251	Fall	2	1
102	Spring	1	2
152	Fall	1	2
202	Spring	2	2
252	Fall	2	2

Table 2. Suggested maximum variation permitted within seedling lots.

Species	Standard Deviation for 1-0	2-0	3-0	2-1
Douglas fir	3	4	5	5
Sitka spruce	3	4	5	5
Ponderosa pine	2	3	3	3
Jeffrey pine	2	3	3	3
Sugar pine	2	3	3	
Noble fir		4	5	
Grand fir		4	5	
Shasta fir		4	5	

Table 1.

Enclosure 2. Optimum maximum and minimum dimensions--top height, root length, and stem caliper--of planting stock desired by planters.

Species	Locale		Planting Site: Easy T[a]	Easy R	Easy C	Average T	Average R	Average C	Tough T	Tough R	Tough C	Animal Damage T	Animal Damage R	Animal Damage C	Brush T	Brush R	Brush C
Douglas fir	B.C.-Wn. (Inland)	Max.	12	12	.12	10	12	.12	7	8	.12	5+	12	.50	18+	12	.50
		Min.	3½	3½	.12	3½	4	.12	3	5	.10	2	5	.12	3	4	.12
		Ave.	6	8	.12	5	8	.12	5	6	.11	4	8	.25	7	8	.25
	B.C.	Max.	11	8	.30	10	8	.30	10½	10	.33	13½	7	.30	15	10	.35
		Min.	7	4½	.15	7	4½	.20	8	5	.25	9	6	.22	10	6	.25
		Ave.	9	6	.22	8	6	.24	9	7	.28	11	6	.25	12	8	.34
	Wn-Ore.	Max.	20	9	.38	20	9	.44	18	10	.50	36	10	.62	30	10	.62
		Min.	8	8	.12	5	7	.12	8	6	.12	10	8	.15	15	8	.19
		Ave.	12	8	.22	11	8	.20	12	8	.20	20	9	.39	18	9	.38
	Calif.	Max.	12	10	.25	12	10	.25	17	10	.50	18	10	.50	20	12	.50
		Min.	6	5	.19	7	6	.19	8	7	.25	8	7	.25	8	7	.25
		Ave.	9	8	.23	9	8	.23	11	8	.33	12	9	.33	13	10	.35
Ponderosa pine	B.C.-Wn.	Max.	6	12	.20	8	15	.25	10	16	.40	6	15	.24	10	16	.40
		Min.	3½	6	.12	3½	8	.12	3½	6	.12	4	8	.12	5	6	.12
		Ave.	4	9	.16	5	9	.22	6	10	.23	5	11	.18	7	10	.22
	Ore.	Max.	8	9	.50	9	9	.25	10	12	.50	9	12	.38	9	12	.31
		Min.	4	6	.19	4	8	.19	6	7	.31	6	10	.31	7	10	.25
		Ave.	6	8	.25	6	9	.22	7	10	.38	8	11	.32	8	11	.29
	Calif.	Max.	10	10	.50	8	10	.50	6	10	.50	8	10	.31	10	10	.31
		Min.	3	8	.19	4	8	.19	6	6	.25	6	10	.31	2	8	.12
		Ave.	7	9	.30	7	9	.30	7	8	.33	7	10	.31	6	9	.19
Monterey pine	Calif.	Max.	18	9	.30	18	10	.30	18	10	.31	18	10	.30	18	9	.30
		Min.	8	7	.19	8	7	.25	10	7	.25	10	7	.25	14	7	.25
		Ave.	13	8	.24	13	9	.27	14	9	.28	14	9	.28	16	8	.28
White and Engelmann spruce	B.C.	Max.	6	7	.20	8	8	.20	8	8	.20	8	8	.30	6	8	.30
		Min.	4	6	.08	4	8	.10	6	7	.20	6	8	.20	6	8	.20
		Ave.	5	6	.14	6	8	.15	7	8	.20	7	8	.25	6	8	.25
Sitka spruce	B.C.		8	6	.20	9	7	.20	10	7	.20	-	-	-	12	8	.25

[a] T (Top length), R (Root length), and C (Stem caliper) in inches.

Table 1. cont'd

Enclosure 3. Optimum maximum and minimum dimensions--top height, root length, and stem caliper--of planting stock desired by planters.

Species	Locale		Planting Site: Easy T	Easy R	Easy C	Average T	Average R	Average C	Tough T	Tough R	Tough C	Animal Damage T	Animal Damage R	Animal Damage C	Brush T	Brush R	Brush C
Douglas fir	B.C.-Wn. (Inland)	Max.	6	7	.17	8	7	.17	10	8	.20	12	11	.20	12	11	.20
		Min.	2	3	.06	2	3½	.06	2	4	.06	3	4	.06	3	3	.06
		Ave.	4	6	.12	5	6	.12	6	6	.12	6	7	.17	7	7	.13
	B.C.	Max.	9	6	.25	8	6	.25	8	8	.31	10	5	.25	11½	8	.30
		Min.	5	4	.09	6	5	.12	7	4	.16	6½	5	.16	8	5	.22
		Ave.	6	5	.17	7	5	.19	7	6	.22	8	5	.21	10	6	.25
	Wn.-Ore.	Max.	12	8	.25	12	8	.38	18	9	.44	24	10	.50	24	10	.50
		Min.	6	6	.10	5	6	.09	5	5	.09	8	6	.10	12	6	.12
		Ave.	8	7	.12	9	7	.17	10	7	.17	14	8	.29	16	8	.30
	Calif.	Max.	9	8	.19	9	8	.19	12	10	.50	12	10	.50	16	10	.50
		Min.	4	4	.10	5	4	.12	6	4	.15	6	4	.19	8	4	.20
		Ave.	6	6	.15	7	6	.15	8	7	.28	9	7	.29	11	8	.29
Ponderosa pine	B.C.-Wn.	Max.	4	10	.15	4	12	.20	6	13	.25	4	12	.18	6	13	.25
		Min.	2	4	.10	2	6	.06	2	4	.06	2	6	.06	3½	4	.06
		Ave.	3	6	.12	3	7	.14	4	8	.16	3	9	.13	5	9	.15
	Ore.	Max.	5	8	.25	6	8	.19	8	10	.25	6	10	.25	6	8	.25
		Min.	4	5	.12	5	7	.12	4	5	.25	5	8	.25	5	8	.25
		Ave.	4	6	.19	5	7	.13	6	8	.25	6	8	.25	6	8	.25
	Calif.	Max.	4	8	.25	4	10	.25	6	10	.25						
		Min.	2	6	.12	4	6	.19	4	4	.19						
		Ave.	3	7	.19	4	7	.19	5	7	.21	4	6	.19	4	6	.19
Monterey pine	Calif.	Max.	10	8	.19	10	8	.19	14	10	.25	14	7	.25	14	7	.25
		Min.	6	5	.15	8	5	.15	8	5	.15	12	7	.19	12	7	.19
		Ave.	8	7	.17	9	7	.17	10	7	.20	13	7	.22	13	7	.22
White and Engelmann spruce	B.C.	Max.	4	5	.12	5	7	.15	5	7	.20	7	8	.20	8	8	.20
		Min.	2	2	.10	3	5	.10	3	5	.15	5	5	.20	4	5	.20
		Ave.	3	4	.11	4	6	.12	4	6	.17	6	7	.20	6	7	.20
Sitka spruce	B.C.		4	4	.15	5	4	.15	6	5	.15	-	-	-	8	6	.20

Table 2. Dimensions of tree planting stock produced in 1963 and 1964 by 17 western forest nurseries.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d
P. menziesii Douglas-fir	1-0	Wash.	Webster	1963	M-9-F	12.1	2.2	15.6	2.4	2.1	0.4
		Calif.	Perlin Fork	1963	XIII 1244	14.8	3.9	7.7	1.6	2.1	0.6
					XII 1665-1985	18.6	3.5	8.3	2.1	2.5	0.6
			Placerville	1963	XI	15.6	3.6	21.9	3.9	2.7	0.6
				1964	II	11.2	2.8	25.1	3.3	3.2	0.9
					III	9.2	2.1	25.2	3.7	2.9	0.8
			Ben Lomond	1963	1408	13.4	1.9	26.8	3.7	2.5	0.7
					1243	16.8	3.1	27.5	4.0	2.5	0.4
					1660	13.6	2.1	24.5	2.4	2.7	0.5
	2-0	B. C.	Telkwa	1964	B2-377-59	9.9	3.4	13.4	2.9	2.1	0.5
			Quinsam	1963	B2-469-59	25.3	4.2	13.8	3.2	3.3	0.8
					B2-480-59	29.7	4.7	13.5	2.3	3.5	0.8
					B3-60-57	27.3	4.1	13.1	2.9	3.5	0.8
				1964	B2-409-0.2	29.8	4.0	22.2	3.4	3.8	0.7
					B2-470-1.4	28.0	6.4	24.2	3.9	4.2	0.6
					B2-475-1.2	31.6	4.1	22.2	3.4	5.3	1.2
					B2-490-59	38.5	4.7	22.1	5.0	5.1	0.8
					B2-492-0.1	34.4	5.4	21.0	3.3	4.6	0.8
					B3-414-3.5	24.2	3.3	20.7	3.3	4.4	0.5
			Duncan	1963	B3-437-1.7	26.3	5.3	15.5	2.4	3.8	0.9
					B2-466-1.9	21.8	3.8	17.0	2.8	3.6	0.7
					B2-467-2.5	22.4	3.8	16.4	2.6	3.8	0.8
				1964	B2-468-1.5	26.8	3.3	20.5	2.9	3.7	0.7
					92C16-B2-476-0.7	27.6	2.5	20.8	2.6	3.6	0.6
					92F1-B3-684-2.6	26.0	2.7	20.8	2.4	3.5	0.4

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
P. menziesii Douglas-fir	2-0		Green Timbers	1963	B3-313-59	19.8	4.1	12.9	2.2	3.1	0.7
					B2-527-59	22.6	4.1	16.2	2.9	3.4	0.8
					B2-513-59	22.0	3.8	12.9	1.9	3.2	0.6
				1964	B2-432-1.8	24.4	2.9	18.2	3.0	3.2	0.5
					B2-466-1.9	28.5	3.7	17.6	2.7	3.4	0.6
					B2-467-2.5	26.5	3.2	17.8	4.2	3.4	0.5
		Wash.	Greeley	1963	411-2-59	28.5	7.0	12.5	2.5	4.5	1.2
			Webster	1963	M-8	13.8	2.5	16.9	2.8	2.0	0.3
			Wind River	1964	03-01-01-3.0-2-0(59)	22.4	3.9	18.1	2.7	3.1	0.9
					03-01-35-4.0-2-0(59)	14.5	2.7	20.4	1.8	3.0	0.8
					03-02-01-3.0-2.0(59)	15.2	3.4	20.0	2.3	2.5	1.0
					03-04-01-3.5-2.0(59)	19.2	4.7	20.3	2.4	4.4	1.6
					15-00-01-4.0-2.0(61)	14.8	3.4	21.0	0.8	3.7	1.0
					15-03-01-4.5-2.0(61)	24.0	5.1	21.0	1.1	4.8	0.7
					15-06-01-3.5-2.0(61)	16.5	3.4	20.4	1.4	3.4	0.6
					17-01-01-2.0-2-0(59)	16.7	3.2	21.6	0.5	4.7	0.8
					17-01-01-2.5-2-0(59)	17.0	4.6	21.7	1.9	3.6	1.0
					17-01-01-3.0-2-0(58)	14.5	4.3	21.7	1.5	3.2	1.0
					18-03-01-4.5-2-0(59)	19.0	4.0	20.3	1.6	3.2	0.8
					18-07-01-4.0-2-0(59)	16.2	3.7	19.8	1.5	2.7	0.7
					18-10-01-5.0-2-0(59)	18.6	2.5	21.1	1.4	3.2	0.8
		Idaho	Coeur d'Alene	1964	3-1-4	13.9	3.2	16.6	4.1	2.8	0.8
		Ore.	Corvallis	1963	Tillamock(St)	20.1	3.5	18.6	2.7	3.3	0.9
			Elkton	1963	Lo elev.(0-1000')	22.0	5.4	19.8	2.2	4.0	0.9
				1964	" " "	20.6	4.6	17.6	2.9	4.4	1.1
				1963	Med. elev.(2000')	19.6	3.2	19.5	3.1	3.5	0.7

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
P. menziesii Douglas-fir	2-0	Ore.	Elkton	1964	Med. elev. (1500-2000')	21.9	4.6	16.7	2.0	3.5	0.6
				1963	BLM 2149 (hi elev.)	17.6	3.2	19.3	1.4	3.8	0.9
				1964	FS-12-03-01-0.5-61	24.2	6.0	17.6	2.0	4.7	1.1
					Rehab (S. FkCp)	21.8	3.2	16.5	2.1	4.8	1.1
					Fs-18-02-01-3.0-61	16.5	4.6	15.3	1.7	3.2	1.0
		Calif.	Parlin FK	1963	1771	27.4	5.3	15.0	4.0	3.5	1.1
				1964	1984	19.0	3.7	26.2	3.3	3.7	0.9
					1226-1227	21.6	4.0	25.2	3.6	3.7	0.5
					1225-1664	19.0	3.4	24.8	4.4	3.4	0.7
			Placerville	1963	XI (Six Rivers)	19.0	5.7	21.2	5.7	3.5	1.0
			Ben Lomond	1963	1223-1409	20.4	5.8	30.7	5.7	4.1	1.2
					1243-44	23.4	5.7	29.0	5.7	4.2	1.3
					1225-1408	21.8	4.7	35.2	5.8	4.5	1.1
				1964	1660 Zone XI	16.9	5.0	30.3	3.1	4.8	1.0
					1243 " XIII	22.1	3.2	26.0	5.4	3.4	0.6
					1408 " XII	23.6	4.0	28.4	4.6	4.8	1.1
	3-0	Wash.	Webster	1963	J-14	28.0	5.3	28.7	4.9	5.4	1.3
	2-1	Wash.	Webster	1963	J-8	23.2	4.7	24.6	3.7	5.9	1.0
					K-3	18.1	5.3	21.4	4.9	5.4	1.0
					J-13	28.8	5.5	24.2	3.2	7.9	1.2
					J-8	30.0	5.8	27.4	4.4	7.0	1.4
					J-10	28.5	5.7	24.0	3.6	6.0	1.0
		Idaho	Coeur d'Alene	1964	4-1-3	14.3	2.5	15.7	2.5	3.9	0.8
P. macrocarpa Bigcone Spruce	2-0	Calif.	Placerville	1964	IX	12.2	3.4	25.3	4.7	4.2	1.3

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
P. ponderosa Ponderosa	1-0	Calif.	Magalia	1963	690	15.4	2.7	17.5	2.4	3.1	0.4
					1376	16.1	3.0	18.7	2.7	3.1	0.8
					1094	8.5	1.6	13.2	2.4	2.9	0.4
			Placerville	1963	I	12.7	2.4	23.0	4.3	3.2	0.7
					II	8.9	1.5	25.6	3.2	3.3	0.4
				1964	II	12.0	2.3	26.3	2.1	4.2	0.8
					III	12.8	2.4	28.4	2.5	4.4	0.8
					IV	13.4	2.8	24.6	2.6	4.6	1.1
				1963	IV Sierra	11.7	2.2	22.3	3.2	3.7	0.6
					IV Sequoia	8.7	1.2	22.7	3.4	3.3	0.6
				1964	IV	12.2	2.3	24.9	4.1	4.3	1.0
		Ft.Bragg	Ben Lomond	1963	1778	10.9	4.1	23.5	2.1	3.1	0.8
					1879	10.5	0.9	22.0	2.6	2.9	0.6
	2-0	B. C.	E. Kootenai	1963		12.8	2.5	20.7	4.8	3.8	0.7
		Wash.	Webster	1963	Deer Park	14.9	2.6	21.1	2.1	4.0	0.9
		Idaho	Coeur d'Alene	1964	2-11-2	14.0	2.3	14.0	2.7	3.4	0.8
		Ore.	Elkton	1963	BLM-1 (Hi-elev.)	10.0	3.0	18.1	1.2	3.3	0.7
					BLM-2	11.1	3.0	19.1	1.4	4.2	0.6
					Regular (E. side)	8.2	2.7	19.7	1.4	4.8	1.1
				1964	Rehab (Klamath Co.)	11.8	4.9	18.8	3.5	4.8	1.1
					BLM D-475E (E side, hi)	14.3	3.2	16.5	1.7	4.6	0.7
					Rehab (W side, 2500')	7.2	3.0	15.1	1.9	3.7	0.8
					BLM D-5081 (Klamath hi)	13.5	4.8	15.4	1.8	4.9	0.9
			Bend	1963	01-00-11-50 (Deschutes)	9.6	2.5	21.0	3.6	4.5	0.8
					02-02-11-60 (Fremont)	8.8	2.1	16.1	1.9	3.9	0.7
					08-02-11-40 (Okanagan)	11.7	3.0	16.3	2.0	4.6	0.6

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
P. ponderosa Ponderosa	2-0	Ore.	Bend	1964	01-02-11-40(0512)	12.0	2.2	18.8	1.2	3.5	0.7
					07-00-11-4.5(0143)	11.2	2.8	18.9	2.0	4.2	0.6
					20-01-11-5.0 (1321)	11.2	1.2	20.0	2.7	3.8	0.5
		Calif.	Magalia	1963	1094	17.0	4.7	22.1	4.6	3.9	0.9
					1376	23.0	5.4	27.6	5.0	5.5	1.3
					690	20.2	3.4	23.1	4.2	5.9	0.9
			Placerville	1964	V	26.9	4.5	26.3	4.4	8.8	2.0
			Ben Lomond	1963	1650	12.3	2.7	21.3	5.6	4.3	0.8
					978	13.0	2.7	19.7	5.0	4.1	0.9
					1879	16.4	2.7	42.6	11.2	5.0	1.1
	3-0	Ore.	Bend	1964	01-02-11-4.0(0843)	13.0	2.4	20.5	2.8	3.9	0.8
	2-1	Wash.	Webster	1963	Ahtanum	14.8	3.0	23.7	2.9	6.6	1.1
		Ore.	Bend	1963	17-02-11-30(Wenat.#2)	8.1	1.6	20.4	3.6	4.7	0.9
					01-03-11-40(Deschutes)	7.3	1.7	19.5	2.8	3.9	0.6
					17-02-11-30(Wenat.#1)	10.6	3.1	18.1	2.7	4.6	0.8
				1964	20-01-11-6.0(0861)	14.8	2.3	21.0	2.8	5.4	0.8
					01-00-11-5.0(0429)	15.2	2.8	27.3	3.6	5.9	0.9
P. lambertiana Sugar Pine	1-0	Calif.	Placerville	1964	II	11.3	2.4	21.8	2.3	2.7	0.5
					III	9.0	1.4	21.3	2.5	2.6	0.6
					IV	12.2	2.6	23.9	2.4	3.9	0.7
				1963	IV Sierra	10.2	2.3	22.9	3.9	2.6	0.4
	2-0	Calif.	Placerville	1964	I	15.8	4.8	27.0	4.4	4.4	1.1
					II	14.2	2.9	26.3	4.0	4.6	0.9
					IV	11.4	3.1	27.1	5.1	5.0	1.0
					V	18.6	4.6	23.1	2.9	5.1	1.0
					X	19.8	4.7	24.6	2.8	4.9	1.2

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
P. jeffreyi Jeffrey pine	1-0	Calif.	Magalia	1963	1983	11.2	1.9	17.4	2.0	3.0	0.4
					1486	14.6	2.3	18.8	2.5	3.9	0.4
			Placerville	1964	III	11.6	2.1	30.5	2.3	4.7	1.0
					IV	10.3	1.7	25.2	1.6	4.8	0.8
					V	11.0	2.2	28.2	2.6	4.8	1.0
					IX	8.6	1.3	28.6	1.9	3.7	0.7
	2-0	Calif.	Magalia	1963	1486	17.2	2.3	20.4	2.7	3.0	0.3
					1983	20.4	2.7	23.0	2.9	2.9	0.3
P. radiata Monterey pine	1-0	Calif.	Parlin Fork	1963	1784	32.7	7.9	24.0	4.9	4.2	1.1
				1964	123	26.5	4.2	21.7	4.6	3.1	0.9
			Ben Lomond	1963	1784	27.8	5.5	26.3	4.4	4.0	0.9
					1780	30.2	4.5	22.6	2.3	2.9	0.7
					123 XIII	21.2	3.6	22.2	3.3	3.4	0.7
					N. Zealand	25.3	5.6	22.3	3.1	4.2	1.0
P. monticola White pine	2-0	Wash.	Wind River	1964	03-03-14-4.0-2-0(61)	9.3	1.1	19.7	1.2	3.6	0.8
		Idaho	Coeur d'Alene	1964	3-14-5	9.7	2.5	14.8	2.3	2.9	0.5
	2-1	Idaho	Coeur d'Alene	1964	3-14-3	10.4	1.9	14.9	2.2	3.0	0.8
A. procera Noble fir	2-0	Wash.	Webster	1963	20-160-30-59-32	12.0	2.5	19.3	3.3	3.9	0.7
			Wind River	1964	03-02-35-3.5-2-0(59)	10.8	1.2	19.2	2.1	2.2	0.4
					03-01-35-50-2-0(59)	11.6	1.2	20.3	0.8	3.0	0.2
		Ore.	Elkton	1963	2500-3000'	10.0	3.4	19.8	2.8	4.5	0.9
	3-0	Wash.	Webster	1963	20-160-30-59-32	16.0	4.9	23.4	3.6	5.8	1.1

Table 2. cont'd.

Species	Age class	Locale	Nursery	Year	Seed lot	Height		Root length		Caliper	
						Mean	s.d.	Mean	s.d.	Mean	s.d.
A. grandis Grand fir	2-0	Wash.	Greeley	1963	462-53 CZ	17.0	4.1	16.2	2.2	4.2	1.0
			Webster	1963	CleElum	9.1	2.6	19.2	2.8	3.4	0.7
		Ore.	Elkton	1963	W. side, 1500-2000'	14.9	5.1	22.2	3.8	4.1	1.0
	3-0	Wash.	Webster	1963	12-120-23-59-08	18.4	6.5	38.5	9.8	6.4	1.6
A. magnifica var. shastensis Shasta fir	2-0	Ore.	Elkton	1963	4500-5000'	11.8	5.7	22.2	4.0	5.0	1.3
P. engelmanni Engelmann spruce	2-0	B. C.	Telkwa	1964	B3-357-59	13.9	4.3	13.6	2.4	2.0	0.4
					B3-357-59	9.9	3.6	12.2	2.2	2.0	0.2
			E. Kootenai	1963	B2-333-59	10.1	3.2	10.9	2.4	2.7	0.4
			Green Timbers	1964	B2-393-4.2	13.8	2.1	12.3	2.0	2.6	0.4
					B2-359-2.8	14.1	4.4	18.0	3.1	3.0	0.6
					B2-499-2.1	14.7	4.8	17.0	3.5	3.1	0.6
	3-0		Telkwa	1964	B3-357-59	18.4	5.5	12.9	3.3	2.3	0.6
	2-1				B3-357-59	13.4	3.5	16.5	2.0	3.3	0.7
		Idaho	Coeur d'Alene	1964	3-41-4	11.2	3.9	11.4	1.6	3.9	1.0
P. glauca White spruce	2-0	B. C.	Telkwa	1964	B3-42-56	11.1	4.4	13.0	4.8	2.1	0.4
	3-0				B3-42-56	14.6	7.6	16.8	4.6	2.8	1.4
	2-1				B3-42-56	14.5	5.5	17.6	2.1	3.9	0.8
P. sitchensis Sitka spruce	2-0	B. C.	Green Timbers	1964	B3-521-0.2	22.0	5.0	14.0	4.2	2.8	0.5
		Wash.	Greeley	1963	45-0.5 (Coos CO)	30.0	6.6	12.4	1.7	3.1	1.0
		Ore.	Elkton	1964	Rehab II	21.4	6.0	12.3	2.5	4.2	0.8
S. Sequoia Sequoia	1-0	Calif.	Placerville	1964	V	18.6	5.0	27.6	6.2	5.6	2.5

Table 3. Numerical description of age of forest tree planting stock.

Code	Season of Sowing	Period in Seed Bed	Period in Transplant Bed
		(yrs)	(yrs)
100	Spring	1	0
150	Fall	1	0
200	Spring	2	0
250	Fall	2	0
300	Spring	3	0
350	Fall	3	0
101	Spring	1	1
151	Fall	1	1
201	Spring	2	1
251	Fall	2	1
102	Spring	1	2
152	Fall	1	2
202	Spring	2	2
252	Fall	2	2

Table 4. Suggested maximum variation permitted within seedling lots.

Species	Standard Deviation for			
	1-0	2-0	3-0	2-1
Douglas fir	3	4	5	5
Sitka spruce	3	4	5	5
Ponderosa pine	2	3	3	3
Jeffrey pine	2	3	3	3
Sugar pine	2	3	3	
Noble fir		4	5	
Grand fir		4	5	
Shasta fir		4	5	

5. Average height: The average height of seedlings shall be expressed in 5-centimeter classes as follows:

Class	Range
05	2.6 - 7.5 cm
10	7.6 - 12.5
15	12.6 - 17.5
etc.	

The computed average shall be based upon not less than 25 seedling heights. Measurements in whole centimeters shall be made from the cotyledons (the first leaves) to the base of the bud for pines or to the tip of the bud for other species.

6. Average caliper: The average diameter of stem shall be expressed in one-millimeter classes as follows:

Class	Range
02	1.6-2.5
03	2.6-3.5
04	3.6-4.5
etc.	

The computed average shall be based upon those seedlings measured, in whole millimeters, in the area immediately below the point of cotyledons.

7. Average root length: No adequate and easily determined description of roots relating to survival and growth is available. However, root length is closely related to ease of planting. Therefore, average maximum root length shall be expressed in 5-centimeter classes as follows:

Class	Range
15	Less than 15 cm
20	16-20
25	21-25
etc.	

The computed average maximum shall be based upon measurements of those seedlings measured for height. Measurements in whole centimeters shall be made from the cotyledons to the tip of the mass of roots (ignoring the occasional long stringy root).

8. Descriptive item in addition to those basic elements above may be needed for specific cases.

9. Unusual circumstances shall be noted.

B. The use of a scale (fig. 4) to facilitate the collection of data on a seedling lot in the nursery is recommended.

C. The Nurserymen's Association should consider the establishment of limits for the permissible variation within seedling lots such as those set forth in Table 4. Limits provide a standard by which to gauge stock. Those lots with variation greater than the standard could be subdivided to bring the variation within the accepted tolerance. Adoption of standards is a first step towards controlling the uniformity of the product.

D. The following recommendations are to improve the mutual understanding of problems confronting nurserymen and planters.

1. The nurseryman should assist in isolating causes of planting failure by maintaining for one season a transplant bed of 100 trees each of sample lots set out at the time of shipment of major lots or lots of questionable condition.

2. The nurseryman should prepare a photographic record for his nursery to (1) demonstrate the dimensions of stock produced; (2) provide a record of change over time; and (3) educate the planter in seedling morphology.

3. Planters employing special planting stock should plant also 100 or more seedlings of standard 1•0 or 2-0 size in problem area plantations. By such tests in which detailed records of techniques are maintained, the planter can contribute substantially to our empirical knowledge of planting stock requirements.

4. Progress in developing planting stock to meet various silvicultural requirements can be speeded by basic studies in which the planting stock, its handling, and its planting are described in detail. Well•documented tests in the course of regular planting will help. Both nurseryman and planter should encourage basic study by research personnel of the problems of nursery production and plantation establishment.

Committee for description of planting stock,

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John Revel
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