Production Costs in Southern Bareroot Nurseries

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Seedling production costs are reported for 10 southern forest nurseries. The major cost components include administrative costs; seed costs; and cost of lifting, culling, and packing.

Southern forest nurseries produce a total of more than 1.3 billion seedlings annually. Of this number, loblolly pine (*Pinus taeda* L.) accounts for approximately 1 billion. In 1983, the selling price for 1,000 bareroot loblolly pine seedlings ranged from $14 to $40. (1). However, outside a few nursery-specific cases (2, 3, 4), there is little published information on the cost of bareroot seedling production in the South. For this reason, in the spring of 1983, a production cost questionnaire was sent to a selected number of bareroot nurseries operating in the South. Data from the questionnaire are reported in this paper. These data are presented to determine the relative cost of inputs for southern bareroot nurseries, to encourage cost analysis by nursery managers, and to provide references for determining future cost trends.

Methods

A production cost questionnaire was mailed to 35 of approximately 70 public and private forest nurseries in the South. The selection of nurseries was based on two criteria-that the nursery's soil texture was more than 75-percent sand and that private nurseries have a company policy of releasing cost production data. This sampling frame resulted in a slight bias toward nurseries established after 1970 when a higher sand content for nursery soils became the norm.

Results

Fourteen of the 35 nurseries responded to the questionnaire. However, only nine questionnaires reported individual cost components, and one provided seed and total cost per thousand. Of the 10 reporting cost figures, 6 were from private nurseries and 4 were from public nurseries.

Table 1 shows the percentage each component cost is of the nursery's total cost per thousand. Average seedling cost per thousand reported ranged from a low of $10.95 to a high of $26.61. The blank responses for particular cost components are difficult to interpret. In some cases, they mean that the nursery does not perform that particular task; and in others, the nursery was not able to compute a separate cost for the task. This would help explain the frequent use of the "other cost" categories.

The average reported seedling cost per thousand was $17.82. The numbers in the "average" column in table 1 are the average of the actual costs reported on the questionnaires. This number is the average of the entries in the corresponding row. Since the number of entries varies for each row, the sum of the row averages does not equal the average seedling cost of $17.82. These row averages could be used to estimate where a particular nursery operation stands in relationship to the other nurseries reporting this component cost.

Examination of the percentages reported in table 1 reveals that administrative costs are the most significant category, followed by lifting, culling, and packing costs. Since these costs range from 7 to 37 percent of total cost, the opportunity for cost savings in the lifting, culling and packing operation in some nurseries is large. However, seed cost is the individual component cost that, is the highest percentage of total cost. Depending on whether unimproved or improved seeds are used, the percentage of total cost varies from less than 5 to almost 30. As the use of improved seeds increases, the seed cost will become a larger percentage of total production cost for most nurseries. For example, assuming that seeds cost $100 for 12,000 pure, live seeds and that 9,000 plantable seedlings would be produced from these seeds, seed cost per 1,000 plantable seedlings would be $11.11.

Table 1—*Component cost as a percentage of total cost per 1,000 loblolly pine seedlings produced on 10 bareroot forest nurseries in the South*

Component	Nursery										Average[1]
	1	2	3	4	5	6	7	8	9	10	
	Production information										
Major species produced	Lob.[2]	Lob.	Lob.	Lob.	Lob.	Lob.	Lob.	Lob.	Lob.	Lob.	
Production (millions)	12	25	18.7	20	20.4	23	23.2	40	2	16	
Planting density/ft^2	26	35	31.1	28	27.5	24	28	30	25	26	
Crop rotation (pine/cover)	2/2	1/2	1/1	1/1	1/1	1/1	1/1	2/2	2/1	2/2	
	Cost information										
	% of total seedling cost per 1,000										*Dollars/1,000*
Seed	21.30	10.95	4.84	11.32	16.30	23.38	11.52	8.00	18.72	29.73	2.94
Stratification	—[3]	.09	.19	.12	—	.27	.08	.03	.24	—	.02
Fertilizer	.66	.34	.58	2.13	1.36	—	.28	.50	.34	—	.13
Seed treatment for pests	.05	.09	.13	.12	—	.09	—	.08	.53	—	.03
Land preparation	.20	1.38	1.10	.18	—	.55	1.27	.32	.48	—	.12
Sowing and mulching	2.91	4.22	.26	1.90	—	1.00	7.76	3.17	1.49	—	.55
Gasoline, oil, and grease	.20	.86	.26	.12	2.23	.18	—	.32	.48	—	.10
Other costs	2.04	.86	.98	—	—	.55	—	—	.48	—	.16
Subtotal for seeding	27.37	18.79	8.33	15.89	19.89	26.03	20.91	12.40	22.76	29.73	3.75
Soil fumigation	—	7.67	3.16	6.58	—	6.67	—	3.43	4.22	—	.76
Fungicides for rust	1.17	1.21	.65	1.42	.98	1.74	.24	2.14	.10	—	.16
Preemergence herbicides	.10	1.47	.19	.12	.82	.41	—	.93	.19	—	.07
Postemergence herbicides	.26	2.07	.26	.77	—	.41	2.22	3.85	.58	—	.21
Handweeding	1.53	5.43	1.61	—	—	.09	—	1.58	.48	—	.25
Gasoline, oil, and grease	.20	.95	.26	.89	—	—	—	.11	.48	—	.08
Other costs	—	.86	.39	—	—	—	—	.10	—	—	.06
Subtotal for weeding, disease, & insect control	3.27	19.66	6.52	9.78	1.79	9.32	2.46	12.14	6.05	—	1.03
Power for irrigation	1.23	1.81	1.03	—	—	.55	6.73	.54	.10	—	.35
Labor for irrigation	.26	2.16	.52	.30	13.04	.09	—	.70	.48	—	.38
Repairs for irrigation	.10	.43	.71	.12	—	.09	—	.91	.05	—	.05
Subtotal for irrigation	1.58	4.40	2.26	.41	13.04	.73	6.73	2.15	.62	—	.58
Lifting seedlings	6.38	8.28	9.68	—	23.48	—	21.54	14.64	8.07	—	2.43
Tractor lifting and nursery transportation	—	2.07	—	3.02	—	5.48	—	.79	.67	—	.32
Gasoline, oil, and grease	1.02	1.21	.26	.89	1.09	.37	—	.95	.29	—	.12
Other costs	—	.86	.77	2.67	1.20	—	—	.32	—	—	.19
Subtotal for lifting	7.45	12.41	10.72	6.58	25.76	5.84	21.54	16.70	9.03	—	2.05
Culling and counting	—	10.34	12.94	—	—	7.31	.71	.47	7.59	—	.97
Culling table receiving	—	2.76	.13	—	—	—	—	2.37	1.10	—	.22
Culling table workers	—	2.33	—	—	—	—	12.44	9.90	1.10	—	1.22
Other costs	—	.86	.65	—	—	—	—	.55	—	—	.09
Subtotal for culling	—	16.29	13.69	—	—	7.31	13.15	13.30	9.79	—	1.19

See footnotes at end of table.

Table 1—*Component cost as a percentage of total cost per 1,000 loblolly pine seedlings produced on 10 bareroot forest nurseries in the South—Continued*

Component	Nursery										Average[1]
	1	2	3	4	5	6	7	8	9	10	
	Cost information										
	% of total seedling cost per 1,000										*Dollars/1,000*
Wrapping paper/bags	2.96	1.38	.19	—[3]	5.38	1.55	1.23	2.30	2.88	—	.39
Root coating	.82	.26	.26	—	—	2.10	1.11	2.37	3.02	—	.24
Strapping/stitching	.05	.52	1.29	—	—	.64	.16	.55	.58	—	.08
Labor for packing	.51	3.10	2.19	—	—	1.83	—	.32	1.58	—	.23
Stacking	.51	.09	—	—	—	.64	—	.08	.53	—	.06
Other costs	—	.86	1.16	—	—	—	.59	1.27	.53	—	.14
Subtotal for packing	4.85	6.21	5.10	—	5.38	6.76	3.09	6.89	9.12	—	.77
Subtotal for lifting, culling, and packing	12.26	34.91	29.50	6.58	31.14	19.91	37.78	36.89	27.94	—	4.01
Seed for cover crop	.41	.43	—	.36	—	.09	1.43	.18	.29	—	.09
Fertilizer	2.15	.43	.26	.65	—	—	—	.43	.14	—	.12
Land preparation	.51	1.29	.32	.30	—	4.20	—	.05	.05	—	.12
Mowing	.20	1.29	.06	.06	—	—	—	.01	.14	—	.04
Irrigation	—	—	—	—	—	—	—	—	—	—	.00
Labor	1.84	.69	.19	—	—	.37	—	.29	.24	—	.10
Subtotal for cover crop	5.11	4.14	.84	1.36	—	4.66	1.43	.96	.86	—	.30
Sawdust	—	3.88	—	—	—	—	—	2.85	—	—	.41
Bark	—	—	1.16	1.07	—	—	2.57	—	—	—	.34
Other organic amendments	—	.34	—	—	—	—	—	—	—	—	.04
Subtotal for amendments	—	4.22	1.16	1.07	—	—	2.57	2.85	—	—	.19
Nursery supervisor, forestry aides, labor	17.01	9.05	11.75	24.78	19.24	21.83	16.04	20.03	26.36	—	3.15
Maintenance, utilities, depreciation	25.54	3.97	13.82	17.66	7.45	17.53	9.86	12.59	15.41	—	2.35
Workers' compensation	1.74	.86	—	—	—	—	.71	—	—	—	.21
Subtotal for administration	44.28	13.88	25.56	42.44	26.68	39.36	26.61	32.61	41.77	—	5.02
Other costs not listed	6.13	—	25.82	22.47	7.45	—	1.50	—	—	70.27	4.91
Total cost ($/thousand)	19.58	11.60	15.49	16.87	18.40	10.95	25.25	12.63	20.83	26.61	17.82

[1]Average of the entries in each row ($ per 1,000 seedlings).
[2]Lob. = loblolly pine.
[3]— = no cost estimate was reported for that category.

Conclusion

The data reported in this paper are an initial step in developing an understanding of the economics of bareroot seedling production. Future production studies will need to collect information on physical inputs for each operation (e.g., personhours, pounds of fertilizer) as well as costs. With this type of information, the relationship between inputs and quantity and quality of seedlings produced can be studied to optimize seedling production. Future studies could examine the economic relationship of lower planting density and precision planting to the output of high-quality seedlings.

The production of an adequate quantity of plantable seedlings to support industrial and public reforestation programs is of great importance. The investigation of nursery costs and the development of more efficient production of seedlings should be a concern of all forest nursery managers.

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