COSTS AND PLANNING OF DOUGLAS-FIR AND PONDEROSA PINE STOCK FOR A FOREST NURSERY OF THE PACIFIC COAST

by

Don B. Malmberg

A Thesis
Presented to the Faculty of the School of Forestry Oregon State College

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Approved:

Redacted for privacy
Professor of Forestry
OUTLINE

I. AREA AND SEED CHARTS:
   A. area in seed beds
   B. area in paths
   C. area of idle land
   D. Total areas

II. MAJOR PROJECT COSTS:
   A. seed collection and extraction
   B. seed bed preparation
   C. sowing of seed
   D. sand cover
   E. shade
   F. weeding costs
      1. Douglas-Fir
      2. Ponderosa Pine
   G. Watering costs
   H. insecticides
   I. transplanting
   J. Digging
   K. Packing
MAJOR PROJECT CHART

Totals showing:

1. major project costs
2. minor project costs
3. total cost
4. cost per M

III. MINOR PROJECT COSTS:

A. costs of nursery site per year
   1. land--interest--taxes
   2. improvements--depreciation
B. cost of maintenance of soil fertility
C. cost of tools and equipment
   per year and depreciation
D. cost of general maintenance and repairs
E. administration charges
F. cost of services and labor
   1. total minor project costs
   2. distributed project costs
G. cost of watering system
   1. material needed
   2. total cost of system
ACKNOWLEDGEMENTS

It is difficult to express adequately my appreciation of all the assistance that I have received in the preparation of this thesis. Only by reason of this generous cooperation has it been possible to provide the statistics and planning contained herein this report. My interest in Silvics and particularly Pacific Northwest nursery establishment was naturally aroused by my first instruction in it as accompanied with my personal observations.

For that initial inspiration, for continued encouragement, for the comments and valuable criticisms during the preparation, I am indebted to:

A. Elmer Lofgren (Assistant, Wind River Exp. Sta. Columbia National Forest)
B. Tom Brown (Dist. Ranger, Hemlock Rn. Sta., Columbia National Forest)
D. Jason L. Wandry (Graduate student Duke Univ.)
E. Truman Kimes and Lucas Kimes (Students Michigan State College)

To these men, some more than others, I say Thanks, with hopes of someday gaining their knowledge of both field and office procedures.

Pvt Malmberg, Don Bruor
39-330-157
U.S. Army
<table>
<thead>
<tr>
<th>SPECIES</th>
<th>SEEDLINGS</th>
<th>NUMBER SEED SEED</th>
<th>LBS BU(cones)</th>
<th>BED AREA SQ FT</th>
<th>BED AREA TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doug-F 2-0</td>
<td>650</td>
<td>1,387,320</td>
<td>32</td>
<td>41.5</td>
<td>5,925</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Doug-F 2-2</td>
<td>420</td>
<td>1,387,320</td>
<td>32</td>
<td>41.5</td>
<td>31,600</td>
</tr>
<tr>
<td>Pond-P 2-0</td>
<td>520</td>
<td>1,529,383</td>
<td>168</td>
<td>125.0</td>
<td>7,900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Pond-P 2-2</td>
<td>400</td>
<td>1,529,383</td>
<td>168</td>
<td>125.0</td>
<td>31,600</td>
</tr>
</tbody>
</table>

I.

Area in beds each year, 181,700 sq.ft.

114 beds 4'x400' seedlings 6"x6" apart

Area in paths each year, 69,000 sq.ft.

Area in beds plus idle land (qualifying land untouched)

171 beds 4'x400'

Total area in beds and paths and total idle land

367,050 sq.ft.

Total area 367,050 sq.ft. 8.6

Area in roads .4

Area in buildings

Total area of nursery 1.0 10.0
II. MAJOR PROJECT COSTS:

A. Seed collection and extraction;

Douglas-Fir

Collection 2,774,640 seeds or
83 bu cones, $1.00/bushel  83.00
Extraction 64 lbs 75c/lb  47.89
Total 130.89

2-0 stock 1/2 of $130.89  65.45
2-2 stock 1/2 of $130.89  65.45

Ponderosa Pine

Collection 250 bu at 66 2/3  166.66
Extraction 337 lbs at 50c  168.50
Total 335.16

2-0 stock 1/2 of $335.16  167.58
2-2 stock 1/2 of $335.16  167.58

B. Seed bed preparation;

Douglas-Fir 2-0 stock
5925 sq.ft. at 50c/1000 sq.ft.  2.96
Douglas-Fir 2-2 stock
5925 sq.ft. and 31,600 at
50c/1000 sq.ft.  18.76

Ponderosa Pine 2-0 stock
7900 sq.ft. at 50c/1000 sq.ft  3.95
Ponderosa Pine 2-2 stock
7900 sq.ft. and 31,600 at
50c/1000 sq.ft.  19.25
C. Sowing of Seed;

Douglas-Fir 2-0 or 2-2
5,925 sq.ft. x 2,500 ft at 50c $1.20
Ponderosa Pine 2-0 or 2-2
7,900 sq. ft. at 50c/2,500sqft. $1.60

D. Sand Cover:

Douglas-Fir 2-0 or 2-2 stock
5,925 sq ft at 875 sq ft./yard
of sand at 40c/cu.yd. $2.84
labor at 1000 sqft./hr. $2.97
Total for either 2-0 or 2-2 $5.81

Ponderosa Pine 2-0 or 2-2 stock
7,900 sq.ft. at 875 sqft/cu.yd. $3.62
labor at 1000 sqft./hr. at 50c $4.95
Total for either 2-0 or 2-2 $8.57

E. Shade

Douglas-Fir 2-0 or 2-2 stock
5,925 sq.ft. at $2.50/400sqft $37.02
labor at 4000 sqft per man hour
50c -- 5 down and 5 takeups/year $7.40
Total $44.42

Ponderosa Pin 2-0 or 2-2 stock
½x7,900 at 2.50/400 sqft/-- $24.70
5 downs and 5 takeups at
4000 sq.ft / man hour $4.94
Total $29.64
### F. Weeding Costs

<table>
<thead>
<tr>
<th>DF.</th>
<th>1-0</th>
<th>100 sqft at 50c X 4 times/yr</th>
<th>$118.56</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-0</td>
<td>400 sqft at 50c X 2 times/yr</td>
<td>$14.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total of DF 2-0</td>
<td>$133.38</td>
</tr>
<tr>
<td></td>
<td>2-1</td>
<td>2,000 ft at 50c X 1 time/yr</td>
<td>7.90</td>
</tr>
<tr>
<td></td>
<td>2-2</td>
<td>2,000 ft at 50c X 1 time/yr</td>
<td>7.90</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total of DF 2-2</td>
<td>$149.18</td>
</tr>
</tbody>
</table>

| P.P. | 1-0 | 100 sqft at 50c X 4 times/yr | $150.00 |
|      | 2-0 | 400 sqft at 50c X 2 times/yr | $19.75  |
|      |     | Total of PP 2-0              | $177.75 |
|      | 2-1 | 2,000 ft/hr at 50c X 1 time/yr| 7.90    |
|      | 2-2 | 2,000 ft/hr at 50c X 1 time/yr| 7.90    |
|      |     | Total of PP 2-2              | $193.55 |

### G. Watering Costs

<table>
<thead>
<tr>
<th>1-0</th>
<th>2 hrs X 30 days X 3 months times 50c/hour</th>
<th>$90.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-0</td>
<td>stock 1 1/2 hrs X 30 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X three months</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total DF &amp; PP 2-0 stock</td>
<td>$157.50</td>
</tr>
<tr>
<td></td>
<td>DF 2-0 1/2 X $157.50 or</td>
<td>78.75</td>
</tr>
<tr>
<td></td>
<td>PP 2-0 1/2 X $157.50 or</td>
<td>78.75</td>
</tr>
<tr>
<td></td>
<td>2-1 1/2 hrs X 15 days X 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>months X 50c/hr</td>
<td>7.50</td>
</tr>
<tr>
<td></td>
<td>2-2 1 1/2 hrs X 15 D X2mo X50c/hr</td>
<td>3.75</td>
</tr>
<tr>
<td></td>
<td>Total DF &amp; PP 2-2 stock</td>
<td>$11.25</td>
</tr>
<tr>
<td></td>
<td>DF 2-2 1/2 X $11.25 plus $78.75</td>
<td>$85.38</td>
</tr>
<tr>
<td></td>
<td>PP 2-2 1/2 X $11.25 plus $78.75</td>
<td>$85.38</td>
</tr>
</tbody>
</table>
H. Insecticides per year $5.00
Considering equal distribution on each stock or $1.25 for each PP or DF 2-0 or 2-2 $1.25

I. Transplanting
DF 650 M at 75c/M $487.50
PP 520 M at 75c/M $390.00

J. Digging
DF 2-0 650 M at .15c/M 97.50
DF 2-2 420 M at .35c/M 146.00
PP 2-0 520 M at .15c/M 78.00
PP 2-2 400 M at .35c/M 140.00

K. Packing
DF 2-0 650 M at 2c/M 13.00
DF 2-2 420 M at 25c/M 105.00
PP 2-0 520 M at 2c/M 10.40
PP 2-2 400 M at 25c/M 100.00
## MAJOR PROJECT CHART

<table>
<thead>
<tr>
<th>Item</th>
<th>DF 2-0</th>
<th>DF 2-2</th>
<th>PP 2-0</th>
<th>PP 2-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Collection and EX</td>
<td>$65.45</td>
<td>$65.45</td>
<td>$167.58</td>
<td>$167.58</td>
</tr>
<tr>
<td>Preparing seed bed</td>
<td>2.96</td>
<td>18.76</td>
<td>3.95</td>
<td>19.25</td>
</tr>
<tr>
<td>Sowing</td>
<td>1.20</td>
<td>1.60</td>
<td>2.84</td>
<td>2.97</td>
</tr>
<tr>
<td>Sand Cover</td>
<td>5.81</td>
<td>5.81</td>
<td>8.57</td>
<td>8.57</td>
</tr>
<tr>
<td>Shade</td>
<td>44.42</td>
<td>44.42</td>
<td>29.64</td>
<td>29.64</td>
</tr>
<tr>
<td>Weeding</td>
<td>133.38</td>
<td>149.18</td>
<td>177.75</td>
<td>193.55</td>
</tr>
<tr>
<td>Watering</td>
<td>78.75</td>
<td>85.38</td>
<td>78.75</td>
<td>85.38</td>
</tr>
<tr>
<td>Insecticide</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>Transplanting</td>
<td></td>
<td>487.50</td>
<td></td>
<td>390.00</td>
</tr>
<tr>
<td>Digging</td>
<td>97.50</td>
<td>146.00</td>
<td>78.00</td>
<td>140.00</td>
</tr>
<tr>
<td>Packing</td>
<td>13.00</td>
<td>105.00</td>
<td>10.40</td>
<td>100.00</td>
</tr>
<tr>
<td>Total Major Project</td>
<td>$453.72</td>
<td>$1110.35</td>
<td>$568.73</td>
<td>$1128.19</td>
</tr>
<tr>
<td>Total Minor Project</td>
<td>$305.08</td>
<td>$1563.51</td>
<td>$381.34</td>
<td>$1563.51</td>
</tr>
<tr>
<td>Total Costs</td>
<td>$758.80</td>
<td>$2673.86</td>
<td>$950.07</td>
<td>$2691.70</td>
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<tr>
<td>Cost Per M.</td>
<td>$1.52</td>
<td>$5.43</td>
<td>$1.96</td>
<td>$5.72</td>
</tr>
</tbody>
</table>
III. MINOR PROJECT COSTS:

A. costs of nursery site per year.

1. Land-interest-taxes
   - Land—10 acres at $100/A (assumed) $1000
   - Interest at 4% $40.00
   - Taxes $5.00/Acre 50.00 90.00

2. Improvements 25 year depreciation
   - Superintendent's house $2500.00
   - Packing house 1000.00
   - Garage 200.00
   - Dam 1000.00
   - Sprinkling system 1693.00
   - Fencing 167.00
   - Total equals $5560.00

   - Depreciation of Improvements $252.40
   - Interest on investment 4% X $5560.00 131.20
   - Taxes on buildings 30 mills X $5560.00 55.50
   - Insurance 50.00
   - Total equals $499.10

B. Cost of maintenance of soil fertility

   - Fertilizer at $22.00/year
   - Total equals $22.00
### C. Cost of tools and equipment/year, 10 yr Deprec.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pickup</td>
<td>$800.00</td>
</tr>
<tr>
<td>Shop tools</td>
<td>200.00</td>
</tr>
<tr>
<td>Seed drill</td>
<td>60.00</td>
</tr>
<tr>
<td>Lifter</td>
<td>25.00</td>
</tr>
<tr>
<td>Seed extractor</td>
<td>25.00</td>
</tr>
<tr>
<td>Tractor plow 2 bottom</td>
<td>97.00</td>
</tr>
<tr>
<td>Harrow spike tooth</td>
<td>24.95</td>
</tr>
<tr>
<td>Angling tractor disc</td>
<td>93.00</td>
</tr>
<tr>
<td>Shot gun</td>
<td>8.00</td>
</tr>
<tr>
<td>Hand cultivator Accessories</td>
<td>9.00</td>
</tr>
<tr>
<td>wheel barrows 3</td>
<td>18.00</td>
</tr>
<tr>
<td>Rakes, hoes, shovels, spades</td>
<td>38.30</td>
</tr>
<tr>
<td>Axes, saws, wedges, files, etc</td>
<td>45.74 $1444.49</td>
</tr>
</tbody>
</table>

**Depreciation on tools and equip (10 yrs)** $144.45

**Interest on investment 4% X \( \frac{3}{10} \)** $28.89

**Total cost/year of tools and Equip** $173.34

### D. Cost of general maintenance and repairs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Truck, fuel and repairs</td>
<td>$200.00</td>
</tr>
<tr>
<td>Building</td>
<td>375.00</td>
</tr>
<tr>
<td>Dam and Water system</td>
<td>200.00</td>
</tr>
<tr>
<td>Fence</td>
<td>9.00</td>
</tr>
<tr>
<td>Lights for building</td>
<td>36.00</td>
</tr>
</tbody>
</table>

**Total** $820.00
E. Administration Charges:

1. Superintendent's salary $2800.00
2. Fuel for Sup'ts house 5X12 60.00
3. Lights for Sup'ts house 2X12 24.00

Total $2884.00

G. Cost of services and labor:

1. Tractor rent $15/day x 5 days/yr $ 75.00
2. Truck Driver 500 hrs at 50c/hr 250.00

Total $ 325.00

3. Total Minor Project Costs
   a. Nursery site costs $ 589.10
   b. Tools and equipment 173.34
   c. Soil and fertility 22.00
   d. Maintenance 820.00
   e. Administration 2884.00
   f. Minor services and labor 325.00

4. Distributed project costs:
   a. Douglas-Fir 2-0 8% or $ 305.08
   b. Douglas-Fir 2-2 41% or 1563.51
   c. Ponderosa P 2-0 10% or 381.34
   d. Ponderosa P 2-2 41% or 1563.51

Totals 100% $3813.44
G. Cost of Watering System:

1. 4 inch pipe installed $500.00
2. 2 inch pipe 940 ft. $188.00
3. 1 inch pipe 5025 ft. $279.81
4. Risers 17X6 ft (102) $15.30
5. Standards and seats 17X27X7 ft. plus 6c per seat $147.50
6. Gates 22" at $2.89 $5.78
7. Gates 17 1\(\frac{1}{2}\)" of 1.99 $33.83
8. Reducing tees 3-2" at $1.75 $5.23
9. Reducing ells 18 1\(\frac{1}{2}\)" to 1" $2.85
10. Holes drilled and threaded 1010 yds at 5c per yard $50.50
11. Caps and coupling 1" plus 2" $11.00
12. Motors $35 times 6 $210.00
13. Hand unions 12 at $2.50 $30.00
14. Automatic flush valves 12 at $1.00 $12.00

Total Materials $1493.00
1. Cost of Fence:
   a. 7 spools hog barbed wire at $2.35 $16.45
   b. Steel posts at 33 1/3c 180 posts 60.00
   c. Labor at 2 rods per hour 40.20
   d. Corner posts 8 at 50c 4.00
   e. Gates materials and labor 6.00
   Total $126.75

2. Total Cost of System:
   a. Ditch at 6'/hr 157 hrs $78.50
   b. Covering ditch 10'/hr 94 hrs 47.00
   c. Laying pipe 149 hours 74.50
   Labor for installation
   and total cost for system $1693.00