Costs of Establishing and Operating Container- and Field-Production Nurseries, Differentiated by Size of Firm, Zone 7

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To make more informed decisions as to whether to enter, leave or expand container- or field-production, nursery producers require production, marketing and financial information. Complete cost models for production of container-grown nursery crops representing five categories of container-grown production schemes and two sizes of container nurseries (20-acre and 40-acre operations) were developed, as appropriate for climatic zone 7. Enterprise budgets were also developed for five categories of field-grown production schemes and two sizes of field nurseries (50-acre and 200-acre firms), as appropriate for climatic zone 7. Information was derived so as to provide a basis for decision-making for those evaluating the profitability of establishing a new nursery, expanding an existing nursery, or shifting from one production regime to the other (field to container, or vice-versa).

USDA reports floriculture and nursery crop production is experiencing a decline in the number of growers and average sales per acre of production area. USDA also cites the addition of more open-field and container production area to existing farm acreage, while keeping greenhouse and covered acreage unchanged. Despite the advantages offered by year-round greenhouse production, greenhouses are expensive to build and operate, particularly with respect to higher fuel and energy costs for heating and cooling. In addition, as overall demand for ornamental crops has weakened, growers have increasingly resorted to container and open-field production, apparently in a quest for larger market share.

Container Production

Methodology: Container production of nursery crops allows greater flexibility in production and marketing, and at least in some cases container production is less expensive than field production. Consequently, escalating competition and narrowing profit margins make it imperative that nursery growers systematically determine production costs, including fixed, variable, and overhead costs.

Several Southern Cooperative Series Bulletins dating from the 1980s were published by members of the S-103 research technical committee (currently known as S-290). Procedures and data developed by these earlier comprehensive studies have proved useful as a template and as complementary to this analysis. In this economic analysis, two model firms were synthesized using the economic engineering conceptual framework wherein the best management practices were included in each model. The complete model included developing appropriate production cycles for representative species of five plant categories, identifying the resources (land, buildings and structures, machinery and equipment, labor and capital) necessary to accomplish the production, and developing fixed and variable cost budgets to determine the annualized cost per salable plant for each of the five plant groups.

A model facility was developed for both a small (20-acre) and large (40-acre) nursery with 10- and 20-acre growing areas, respectfully. The five plant groups for whom production cycles were modeled for a representative species included azaleas, narrow-leaf evergreens (*Juniperus*), broadleaf evergreens (*Ilex*), deciduous shrubs (crapemyrtle), and deciduous ornamental trees (*Acer rubrum*). The marketing assumptions were that approximately ⅓ of the azaleas, ¼ of the evergreens, and ½ of the deciduous shrubs and trees are sold during the fall after each crop reaches marketable size. The remaining plants in each plant group were sold the following spring. The costs of holding plants were estimated and included in the budgets for each plant group and each size of nursery.

Results and Discussion: Fixed costs for all plant categories accounted for a greater proportion of total costs in the smaller, 20-acre nursery than the larger, 40-acre nursery, averaging 68-percent in the small nursery and 30-percent in the large container production nursery. This is attributed to more efficient use of buildings and structures, and machinery and equipment in the larger facility. As for the representative species selected for the five groups of container grown nursery plants, cost differences were caused primarily by container-spacing requirements (azaleas, hollies, junipers, and crapemyrtles were produced in standard 1-gallon nursery pots, while the red maples were produced in 3-gallon containers), over-wintering costs, and labor requirements (hours). Calculations were based on 2003 inputs prices and data obtained from wholesale nurseries and nursery suppliers, primarily in Georgia.

The estimated capital requirements for the 20-acre container nursery totaled $881,670 – land and improvements, $211,568; buildings and structures, $300,000; and machinery and equipment, $370,102. The number of salable plants in the production cycle was 432,634, for an average capital investment per salable plant of $2.04. Total annual fixed costs for the 20-acre container nursery were estimated to be $279,198 – land and improvements, $21,677; buildings and structures, $42,000; machinery and equipment, $80,894; general overhead, $129,029; and interest on general overhead, insurance and taxes, $5,598 – for an average total annual fixed cost of $0.65 per salable plant. The estimated capital requirements for the 40-acre container nursery added to $1,557,990, of which $423,120 was for land and improvements, $483,875 for buildings and structures, and $650,995 for machinery and equipment, including irrigation. The average total capital investment per salable plant in the large nursery was $1.80, based upon 865,265 salable plants in the production cycle. Total annual fixed costs for the 40-acre container nursery were estimated to be $442,063 -- $50,121 for land and improvements, $67,743 for buildings and structures, $142,290 for machinery and equipment, $174,236 for general overhead, including owner-manager costs, and $7,673 for interest on overhead, insurance and taxes – for an average total annual fixed cost of $0.51 per salable plant.

Total production costs per salable plant by representative species in the 20-acre nursery with 10-acres of container production were $1.65 for 1-gallon junipers (98,011 salable plants) and hollies (103,455 salable plants), $1.71 for 1-gallon crapemyrtles (94,744 salable plants), $2.03 for 1-gallon azaleas (98,010 salable plants), and $11.20 for 3-gallon red maples (19,602 salable plants), or an average total cost per saleable plant for the 20-acre container nursery of $2.01. For the larger, 40-acre container nursery with 20 acres in container production, comparable figures were $1.45 for 1-gallon junipers (196,020 salable plants) and hollies (206,910 salable plants),

$1.54 for 1-gallon crapemyrtles (189,486 salable plants), $1.93 for 1-gallon azaleas (196,020 salable plants), and $10.05 for 3-gallon red maples (39,204 salable plants). The average total cost per salable plant from the larger nursery was $1.72.

Conclusions for Container Production: Due to the increasing interest in container production, the economic requirements for land, equipment and labor, the enterprise budgets for five representative container production schemes, and fixed and variable cost budgets for two different sized model nurseries were developed. For the larger, 40-acre container production nursery, the production costs were slightly less due to more efficient use of machinery, equipment, buildings, greenhouse structures, and similar overall inputs used over the entire nursery. Cost differences among crops varied mainly due to production time and production procedure differences.

Field Production

Methodology: Although container production allows greater flexibility in production and marketing, and may even be a less expensive form of production for some plants, risk is reduced when plants are grown in the field. Field-grown plants have greater buffering against variations in moisture, nutrients, and temperature. When subjected to conditions which would kill or severely damage container-grown plants with no over-wintering protection, field-grown plants will often survive with little damage. It is also easier to hold over field grown plants when market conditions are not favorable. However, changes and competition in the industry make it imperative that nursery producers continually and systematically determine production costs.

Procedures and data developed by the earlier comprehensive S-290 regional research technical committee studies have proved useful as a template and complementary to this analysis. In this report, two model firms were synthesized using the conceptual framework of economic engineering wherein the best management practices were included in each model. The complete model included developing appropriate production cycles for the specified plants, identifying the resources (land, buildings and structures, machinery and equipment, labor, and capital) needed to accomplish the production, and developing budgets for fixed and variable costs.

The model small nursery of 50 acres had 40 acres of growing space and 10 acres of production facilities, holding area, field bed area, retention pond, and roadways. The large nursery was 200 acres, with 175 acres of growing space and 25 acres of support facilities and areas – a size of firm necessary to use production facilities and equipment in an economically efficient manner. The five species of plants for whom production cycles were modeled included a slow-growing evergreen (*Ilex*), a rapid-growing evergreen (*Juniperus*), a deciduous shrub (*Viburnum*), a shade tree (*Acer rubrum*), and an ornamental tree (*Cornus*).

Results and Discussion: Fixed costs for all plant categories accounted for a greater proportion of total costs in the 50-acre nursery than in the 200-acre nursery, averaging 54-percent in the small nursery and 35-percent in the large field production nursery. This is attributed to more efficient use of buildings, machinery, and equipment in the larger facility. As for the representative species selected for the five groups of field grown nursery plants, cost differences were caused primarily by space requirements, length of the production cycle, cost of liners (for

the trees, liners were purchased rather than propagation), and labor requirements (hours budgeted). Calculations were based on 2003 prices and data obtained from wholesale nurseries and nursery suppliers primarily in Georgia.

Total production costs per salable "B&B" plant by representative species in the 50-acre nursery were $24.94 for slow-growing evergreens, $17.76 for rapid-growing evergreens, $17.11 for deciduous shrubs, $73.63 for shade trees, and $50.74 for ornamental trees, for an average of $28.37 for the aggregate nursery. For the 200-acre field production nursery, comparable figures were $13.18 for slow growing evergreens, $9.99 for fast growing evergreens, $9.99 for deciduous shrubs, $50.41 for shade trees, and $35.49 for ornamental trees, with an average total cost per salable plant for the entire nursery of $17.62.

The estimated capital requirements for the 50-acre nursery totaled $867,800 – land and improvements, $450,000; buildings and structures, $125,400; and machinery and equipment, $292,400. Total annual fixed costs for the 50-acre field nursery were estimated to be $320,535 – land and improvements, $52,000; buildings and structures, $17,855; machinery and equipment, $52,630; general overhead, $190,000; and interest on general overhead, insurance and taxes, $8,050. The estimated capital requirements for the 200-acre field production nursery were nearly $2½ million -- $1,432,000 for land and improvements, $252,300 for buildings and structures, and $804,200 for machinery and equipment. Total annual fixed costs for the 200-acre nursery were $162,640 for land and improvements, $35,320 for buildings and structures, $144,755 for machinery and equipment, $203,500 for general overhead, and $21,850 for interest on general overhead, insurance and taxes.

As to the representative species of the five plant groups, on the 50-acre nursery the annualized costs were:

	Fixed Costs	Variable Costs	Total Costs	Salable Plants	Cost/Salable Plant
Ilex	$64,107	$39,120	$103,227	4,140	$24.94
Juniperus	64,107	39,083	103,190	5,810	17.76
Viburnum	64,107	42,085	106,192	6,208	17.11
Acer rubrum	64,107	73,509	137,616	1,869	73.63
Cornus	64,107	74,518	138,625	2,732	50.74

For the 200-acre nursery, the annualized costs were:

	Fixed Costs	Variable Costs	Total Costs	Salable Plants	Cost/Salable Plant
Ilex	$113,613	$125,701	$239,314	18,156	$13.18
Juniperus	113,613	140,265	253,878	25,418	9.99
Viburnum	113,613	157,825	271,438	27,162	9.99
Acer rubrum	113,613	298,613	412,226	8,177	50.41
Cornus	113,613	310,621	424,234	11,954	35.49

Conclusions for Field Production: Large scale commercial field production nurseries use facilities, machinery, and labor more efficiently than small-size field nurseries. As a result, larger nurseries have a lower cost per salable plant, primarily due to a lower proportion of total cost in fixed costs attributed to the use of assets and resources. Variable costs per salable plant,

while having wide variations among species, remain reasonably constant when comparisons were made between the two sizes of firms. As the size of nursery increased, costs for fixed items of production were spread over more salable units, thereby reducing the fixed cost per salable plant.

For the industry, selling nursery products below cost implies that well-established nurseries, operating essentially debt free, would have strong staying power, whereas those which have just started or are heavily in debt may not be able to survive, especially if they are relying on their field operations to meet all overhead expenses and marketing their nursery products at prevailing climatic zone 7 prices. At current prices for nursery products, the return on investment for establishing new, independently operating, 50-acre field nurseries in climatic zone 7 would be marginal, if not negative.

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