

Costs of Establishing and Operating Field Nurseries  
Differentiated by Size of Firm and Species of  
Plant in USDA Plant Hardiness Zones 5 and 6

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## PREFACE

This report is one in a series of Southern Cooperative Bulletins. Under the cooperative publication procedure, it becomes in effect a separate publication for each of the cooperating stations. It is suggested that copies be requested from one source only, Dept. of Horticulture, University of Kentucky Lexington, KY 40546-0091.

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## ABSTRACT

The objective of this study was to identify the resources and costs associated with two model field nurseries differentiated by size. For each of the two nursery sizes, production systems representative of five groups of field-grown nursery plants differentiated by cultural requirements were delineated. One plant species from each of the five delineated systems was chosen as representative of the group for specific production analysis.

Total production costs per salable "B & B" plant by representative species in the 50-acre nursery were \$22.69 for slow-growing evergreens (*Taxus*), \$16.47 for rapid growing evergreens (*Juniperus*), \$15.84 for deciduous shrubs (*Viburnum*), \$68.14 for shade trees (*Acer rubrum*), and \$46.89 for ornamental trees (*Malus*), with \$26.18 as average of all species. For the 200-acre nursery, comparable figures were \$13.16 for slow-growing evergreens (*Taxus*), \$10.12 for rapid growing evergreens (*Juniperus*), \$10.31 for deciduous shrubs (*Viburnum*), \$50.88 for shade trees (*Acer rubrum*), and \$34.86 for ornamental trees (*Malus*), with \$27.63 as average of all groups.

Fixed costs for all plant groups accounted for a greater proportion of total costs in the 50-acre nursery than in the 200-acre nursery, averaging 55% in the small nursery and 38% in the large. This is attributed to more efficient use of buildings, machinery, and equipment in the large nursery. Based on the technology budgeted, it would take a nursery of at least 200 acres to use the modern facilities and equipment in an economically efficient manner.

Cost differences among species were caused primarily by space requirements, length of the production cycle, cost of liners, and harvest labor requirements. Calculations were based on 1997 prices.

# Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in USDA Plant Hardiness Zones 5 and 6

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## INTRODUCTION

To make more informed decisions as to whether to enter, leave, or expand field production, nurserymen require production, marketing, and financial information. In the bulletin, cost models for production of crops representing five categories of field-grown production schemes and two sizes of nurseries in USDA Plant Hardiness Zones 5 and 6 (Fig. 1) are developed. Physical coefficients are included so the information can be readily updated and so individual nurserymen can use the models as standards against which to compare their own or planned operations. Information derived should provide a basis for decision-making for those evaluating the profitability of establishing a new field nursery, expanding an existing field nursery, or shifting from field production to container production.

Nurserymen throughout the United States have been gradually shifting from field to container production for many species of plants (12). Large companies and many individual nurserymen who traditionally have produced field-grown stock have diversified operations by shifting part of their production to container-grown plants. Containers allow greater flexibility in production and marketing, and at least in some cases, are less expensive than field production (12). On the other hand, 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 overwintering 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. Field production continues to account for the majority of plants grown for the landscape. However, changes and industry competition make it imperative that nurserymen continually and systematically estimate production costs.

Production cost models have recently been developed for several species of plants in the Southern and North Central regions of the U.S. (2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14). Most of these models, while providing excellent information for individual species, did not attempt to develop comprehensive models for complete nursery operations. Taylor, *et al.* developed a comprehensive model applicable to Plant

Hardiness Zone 6 for container-grown crops representing five categories of container-grown production schemes and two sizes of nurseries (14). Badenhop and Phillips (2) developed a similar study for field-grown crops in USDA Plant Hardiness Zones 7 and 8 representing five categories of field-grown production schemes and two sizes of nurseries. Procedures and data developed by the two earlier comprehensive studies have proven useful and complementary to this study.

## OBJECTIVES

The general objective of this study was to develop the resources and costs associated with two model nurseries differentiated by size, including the delineation of representative field production systems. Specific objectives were to:

- Model a series of production systems which would accommodate a majority of the plant species being field-grown in USDA Plant Hardiness Zones 5 and 6.
- Analyze the important species of plants commonly grown in the field in the USDA Plant Hardiness Zones 5 and 6, and assign each species to one of five designated groups based on similarities of growing and production requirements.
- Choose one species from each of the five groups as representative of that group for detailed cost analysis.
- Design physical facilities including land areas, land improvements, irrigation systems, buildings, and machine and equipment components for two sizes of commercial field nurseries based on the model production system

## MATERIALS AND METHODS

In the study, two model firms were synthesized using the conceptual framework of economic engineering wherein the "best proven practice" was included in each model. They were synthesized based on the North Central region. If specific items were required (*i.e.*, depth of the well), coefficients were based on the Ohio River Valley area. The complete model included developing an appropriate production cycle; schematic drawings of the physical layout, including buildings and irrigation system; lists of equipment and other items; a

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complete sequence by month and year of nursery operational steps beginning with land preparation and ending with loading the finished product for wholesale distribution; and budgets for fixed and variable costs (12).

Data for this study were obtained from wholesale nurseries and nursery suppliers in the North Central region. Price quotations obtained were from catalogs, etc. for the 1997 production season. The basic goals in synthesizing the production facilities (Figs. 2-5) were to minimize labor expenses, flow and movement of plant material and equipment, maximize the number of salable plants, and allow future expansion.

The model small nursery was 50 acres, with 40 acres of growing space and 10 acres of production facilities, holding area, field bed area, and roads. The large nursery was 200 acres, with 175 acres of growing space and 25 acres of production facilities, holding area, field bed area, and roads. Initial analysis for the small nursery showed that basic equipment needed for a modern small nursery could support a much larger operation. It was ascertained that it would take a field nursery of at least 200 acres to use modern facilities and equipment in an economically efficient manner.

## Physical Plant and Equipment

### Assumptions

Assumptions about the physical facilities and equipment can greatly affect its cost and thereby the cost per salable plant. All items a nursery would typically require were included; thus, the physical plant is probably more elaborate than that of many nurseries. A nurseryman can easily eliminate or reduce items as required. However, it would require substantial effort to do the analysis on his own if they were not included.

Both model nurseries were designed (Figs. 2-5) for future expansion. For example, the 50-acre nursery has a centrally located shipping and "order building" area for four semitractor loads of plant material surrounded by growing area (Figs. 2 and 3). Thus, expansion can occur with a minimum of disruption. If growing space was greatly expanded (to 200 acres), the central area could be easily expanded without affecting "permanent" facilities. Specific components for both sizes of nurseries are itemized in Tables 1 and 1a.

The same buildings, and to a lesser degree, machinery and equipment needed for the 50-acre nursery are also satisfactory for the 200-acre one. Most of the machinery and equipment, even in the large nursery, is under-used but must be available when needed.

Some specific assumptions which add substantially to a "stripped down" facility are as follows:

**Self-sufficiency.** It was assumed that each model nursery would be self-sufficient except for tree "lining-out" stock. Full costs of required facilities and equipment were assigned to the model nurseries in this study. These costs would have been lower if it was assumed that the facilities and equipment were

shared with other enterprises. For example, many field nurseries would also have container-grown plants, with buildings, machinery, and equipment being shared between operations.

**Site.** Land modification costs could be reduced if the nursery were located on gravelly or sandy soil with good natural drainage. Locating near an open water source could reduce or eliminate the need for a well.

**Expansion.** Provision was made for expansion, especially for the 50-acre nursery. It became obvious very quickly in the analysis that basic buildings, machinery, and equipment needed for effective operation of the 50-acre nursery were adequate for a much larger system. To provide for expansion, a larger irrigation pump, larger well casing diameter, larger in-ground water mains, and a more powerful traveler irrigation gun were provided than might have been necessary for the 50-acre nursery if expansion was not contemplated. The 50-acre nursery, as engineered, could be expanded to at least 200 acres with little addition of facilities or equipment. While expansion was also provided for the larger nursery, it is much less than for the small. It was felt that if the 200-acre nursery was to get much larger, it would start running into other "limiting factors" much faster than in the case of the 50-acre nursery. Different expandability factors for the two sizes of nurseries build some bias into the analysis favoring the 200-acre nursery when comparing costs per salable plant between the two sizes.

**Machinery and Equipment.** Purchase of new machinery and equipment was assumed for the model nurseries to achieve replacement cost at current prices. Many nurserymen, however, may choose to buy used equipment, rent equipment, or time-share some expensive items with other nurseries.

### Components

**Land Improvement.** For full utilization of the production facilities, holding area, and field-bed area, extensive grading, graveling, surface and underground drainage tiles were provided (Table 2). This area was graded to allow a gradual slope from a high point at the shipping area to lower points on the edges. In addition, every two rows of polyhouses were sloped toward each other to utilize a common buried 30-inch drain tile which drains to the grassy waterways at the perimeter of the central area. Liner bed areas and general field production were tiled with 4-inch plastic tile, 30 feet on center, 46 inches deep using a herringbone design.

Due to irrigation needs and rainfall, soil erosion occurs. Even with low application rates, the need to allow for base soil saturation and the possibility of heavy natural rainfall necessitates graveling storage and shipping areas. For any area that heavy equipment may run over (roadways, shipping area, and machine storage shed), #4 gravel was used. In other traffic areas, a finer #9 grade was utilized. Although the cost of this graveling operation is high, it is offset by greater efficiencies and dependability in the handling of plants, ability to reenter the areas after rainfall or artificial irrigation,

and reduction of soil erosion.

A pond was included even though it was assumed a well could be dug with sufficient regenerative water capacity. This was done to reduce the risk to plants while in holding areas in case of disruptions caused by repairs or electrical failure. The auxiliary pump could be powered by the power take-off from a 100-HP tractor for temporary irrigation. The pond also would function as a discharge site when operating the pump at higher efficiency levels than needed for immediate irrigation purposes.

**Buildings.** Each nursery was assumed to require similar sizes of permanent buildings for the receiving of nursery stock/storage (50' x 40'), machinery repair/storage (50' x 40'), office space (20' x 20'), and restroom facilities (20' x 20').

**Propagation Facilities.** For propagating the three classes of shrubs, the 50-acre nursery was provided with one-half of a 20' x 200' polyhouse and the 200-acre nursery a full 20' x 200' polyhouse. These propagation areas are equipped with double polyethylene covers and heating equipment.

**Overwintering Facilities.** Polyhouses were provided to overwinter one-fourth of a year's shrub harvest. Four and one-half (20' x 200') polyhouses are provided for the 50-acre nursery and 20 are provided for the 200-acre nursery. These structures, larger than the traditional 14' x 96', allow easier access and use of machinery, especially for "balled and burlapped" material. Cost per square foot is essentially the same as for smaller structures.

**Irrigation System.** Irrigation systems were designed to minimize labor efforts and plant loss risk, yet provide sufficient irrigation capabilities to meet present and future water needs even under the most unlikely situations. A basic irrigation system is composed of four parts: water source, pumping equipment, inground irrigation pipe, and above ground irrigation pipe and materials (Table 4-4c).

The water source must have adequate reserves to meet maximum water needs and sufficient purity to meet cultural requirements. Because municipal water is expensive, especially if the production site is located far from a center of population, a well in conjunction with a constructed lake or a site situated near an open water source would be desirable. The open water source would have to be chosen with care. Most open water sources have problems due to collection of water from many sources. Shallow water sources have algae problems requiring special filters. Also, present/future demands made by industries downstream or upstream may adversely affect flow rates and chemical composition of the water. Construction requirements for a pond or lake would include sufficient holding capacity to meet potential water demands and an adequate water supply furnished either by watershed areas, tappable underground water, springs, or some other source. The models in this study assumed an adequate water source found approximately 60 feet below ground. The well was dug to a depth of 80 feet to ensure adequate recharging capacity. In some areas of USDA Plant Hardiness Zones 5 and 6, wells would have to be drilled to much greater depths which would result in higher costs.

To properly develop a comprehensive irrigation system, the following must be considered: water pressure requirements of the sprinkler heads and the traveler gun, water pressure loss due to pipe and valve friction, area to be irrigated at one time, and potential future expansion.

Selection of a well pump is crucial to the nursery operation. As a basic guideline, the maximum pressure loss from entrance point to the farthest point of irrigation within a lateral should be less than 20% of the pounds per square inch (psi) reading as found at the pump. This assures a constant rate of application from all sprinkler heads on the line. The second guideline is that the combined amount of water exiting the sprinklers and/or traveler gun used at one irrigation setting must be less than the total flow of water coming from the pump. From an 80-foot deep well (Table 4c) a 100-HP electric pump was needed to pump the water and to supply enough pressure to drive the traveler gun discharging 450-500 gallons per minute. The well depth depends not only on the depth at which water is found but also on the amount of water being drawn per minute by the pump. An electric motor was chosen because of reliability of performance, low maintenance cost, and close availability of three-phase electrical power.

In addition, the following were provided for protection: a simple housing unit to enclose the pump, a branch in the foot valve attachment for pumping from the adjacent above ground auxiliary water source, and a right angled gear drive added to the pump in case of a power outage.

The third part of the irrigation system is the inground irrigation pipe. The advantages of inground water mains are: labor costs for pipe movement are eliminated, breakage due to equipment running over above ground pipe is eliminated, and lower initial cost of P.V.C. pipe compared to portable above ground aluminum. The inground system would be installed below the frost line (between 4 and 5 feet deep). As shown in Figs. 2-5, 8-inch P.V.C. pipe forms major laterals.

The fourth part of the irrigation system would be above ground and would include frost-free hydrants. Three-inch, portable, latchless, aluminum pipe was provided for irrigation within the central area. Rotating #403-00 sprinklers were provided for dispersing water in the central area. A traveler gun with a dispersion rate of 450-500 gallons per minute was provided for irrigating the growing-out areas.

**Soil Conservation.** Minimal soil conservation is provided. After the last plants are harvested in a field, the field is left fallow until the following spring. Fallow fields are disked for weed control four times during summer months and then plowed in the fall in preparation for spring planting. A more intense conservation program might consist of summer green manure crops such as alfalfa or sudan; rye grasses/fescue grown between rows of trees; and grass grown in waterways and on the surface of access roads.

Nurserymen interested in a soil conservation program should contact agents of the Soil Conservation Service located nearest to their nursery for assistance in designing a sound conservation plan which would include good cultural prac-

tices. The costs of implementing a program would have to be identified and included as a part of the annual costs of operating the nursery. These costs would have to be captured in the costs of producing a salable plant.

### Enterprise Mix

It was assumed that the two model nurseries would produce a diverse line of nursery stock. The length of the production cycle for the different species grown will vary. Commonly grown nursery stock was divided into five cultural groups. While not all-inclusive, the groups permit a range of per unit costs to be developed as they relate to input costs and cultural factors. For analytical purposes, it was assumed that each cultural group would occupy 20% of the nursery area (*i.e.*, 50-acre nursery = 8 acres production plus 2 acres facility per group; 200-acre nursery = 35 acres production plus 5 acres facility per group). Annual sales capacity for the 50-acre nursery would be 20,759 plants and for the 200-acre nursery 90,867 plants. For detailed analysis, one specific plant from each group was chosen as representative of the group. While it is recognized that other plants from each category would have somewhat different requirements, that the requirements would not vary significantly in cost from the representative plant. The five groups (plant types chosen for detailed analysis are designated with a star) with some of their cultural characteristics are listed below.

### Production Cost Budgets

Costs were established for all factors of production including management and invested capital. In economic terms, costs associated with factors of production provided by owner/operators are often referred to as 'opportunity costs' or the income these factors could have received if they were employed elsewhere. For example, owners could usually be employed as managers at other nurseries, and money invested in land, buildings, irrigation systems, and equipment could have earned interest if it had been placed in financial institutions.

Capital requirements for establishing the nurseries were first determined (Tables 1 and 1a). Second, the physical factors associated with the 50-acre and 200-acre nurseries and annual shipment requirements were established (Tables 6, 6a, 6b, 6c, and 7). Third, production systems for the enterprises budgeted were described (Appendices A-F). Fourth, annual fixed costs were calculated (Tables 5 and 5a). Fifth, estimated variable costs for each of the five groupings of plants for the 50-acre and 200-acre nurseries were determined (Tables 8-12a). Sixth, fixed and variable costs were summarized by plant group and by size of nursery (Tables 14 and 15).

Most nurseries use cash rather than accrual accounting procedures. For this reason, the analyses were completed on a "cash" basis. Analyses on a "cash" basis do not give a true economic picture of the cost of producing a plant as they do not take into account the time value of money from the time

the plant is planted until it is harvested. The analyses do, however give a true estimate of the annual cost per salable plant. Another problem with cash accounting is taking into account the start-up period (*i.e.*, the period from when costs are first incurred until salable plants are ready). This study did not attempt to assess costs or alternative actions for this period.

### Fixed Costs

Annual fixed costs are presented in Tables 5 and 5a. Most of these derived costs were based on the physical plant and equipment discussed previously. These costs were grouped into five categories: 1) land and land improvements; 2) buildings; 3) machinery and equipment; 4) general overhead; and 5) opportunity cost of capital for general overhead, insurance, and taxes. Annual fixed costs for land and land improvements, buildings, and machinery and equipment were composed of depreciation, interest, insurance, and taxes. Depreciation was calculated by dividing initial cost adjusted for salvage value by the years of useful life. Interest costs were estimated by multiplying the initial value of land and land improvements, buildings, machinery, and equipment by 12% per annum. Taxes and insurance costs were based on rates prevailing in the rural areas adjacent to Columbus, Ohio. Land, land improvements, and buildings were assessed taxes at the rate of \$20 per \$1,000 of market value. Insurance was set at \$4.46 per \$1,000 of market value for buildings and \$3.78 per \$1,000 of initial value for equipment. Costs for general overhead were determined on a current basis. Interest charges for general overhead, insurance, and taxes were computed for a 6-month average use period at a rate of 12% per annum.

**General Overhead.** Cost items not described in detail elsewhere, but which make up a substantial portion of annual fixed costs, are placed here. These costs can be classified as follows: utilities, licenses and bonds, advertising and printing, insurance for personnel, travel and professional fees, administrative and management salaries and supplies, and miscellaneous.

Utilities include heat, electricity, and telephone services to the production department. It does not include fuel for equipment or machinery. Licenses and bonds are made up of expenses for inspection and certification to sell plants. General maintenance and repairs include those expenses of maintaining roads and minor repairs to buildings which cannot be capitalized plus maintenance of grounds such as grass cutting and litter pickup. Advertising and printing involve procurement of letterhead items, nursery signs, employee handbooks, want ads for employment, and nursery price lists. Insurance for personnel includes workmen's compensation, FICA, health insurance, and unemployment insurance for administration and management personnel (hourly laborer costs are included in hourly rates). Travel is made up of expenses to extension workshops, state meetings, and regional meetings. Professional fees include membership



costs of national, state, and local nursery associations. Administration and management are made up of salaries or wages of clerical personnel, management and supervisory personnel, miscellaneous insurance, and office supplies. Miscellaneous includes replacement of office equipment not depreciable plus unexpected costs. It should be noted that this item could be significantly reduced if many of the costs, especially administrative and management, were shared with a container operation or some other type of business.

To determine annual fixed costs per cultural group, total annual fixed costs were divided by five. Annual fixed costs per salable plant were then determined by dividing the annual number of salable plants in each group into the annual fixed costs allocated to that group.

### Variable Costs

Variable costs include all cost factors which vary with the quantity of plants being grown at one point in time. For example, the number of liners required for spring planting depends upon the quantity of plants management desires to have in inventory plus production losses. The loss factor for propagation in the case of the shrubs (plant categories I, II, and III) was estimated at 23% (1.3 stock cuttings to produce a healthy rooted cutting for lining out). The loss factor for shrubs in the bedding area was estimated at 20% (1.25 rooted cuttings would need to be planted in the bedding area for each healthy plant available for transplanting into the field). Field losses from the time of planting until shipping were estimated at 15% for the shrubs (plant groups I, II, and III), and at 10% for the trees (plant groups IV and V).

Variable costs were subdivided into the categories of: propagation (for the shrub groups); materials; machinery and equipment; labor; and interest on operating capital. These costs were determined for each group of plants using a specific plant as the representative for the group (Tables 8-12a).

**Propagation.** Propagation costs were made up of rooting media (sand), labor (for collecting, stripping, sticking, maintenance, and harvesting), and for hormone powder.

**Liners.** Shrub liners (plant groups I, II, and III) were produced at the nursery, while tree (plant groups IV and V) were purchased. Two costs comprise the total for purchased liners. The major cost is the purchase price. While price is somewhat dependent upon quality and quantity, it was assumed that sufficient quantity would be ordered in either size nursery to obtain available discounts. The second cost was for packing and shipping the liner from producer to purchaser. This was estimated at 10% of the purchase price in each group of plants.

**Burlap and Twine.** Burlap and twine were provided for "ball and burlapping" each plant produced. In addition, for groups IV and V wire baskets were purchased. Burlap, twine, and wire baskets are harvest costs.

**Polyethylene Film.** The cost of the white translucent film included delivery to the nursery.

**Strip Tags.** Strip tags were provided for identifying plants by botanical name, common name, state where plant was grown, and nursery producer. Costs include printing and shipping charges.

**Chemicals.** Chemical costs were subdivided into three categories. The first is the fertilizer. For field operations the price included custom spreading for a custom blend and lime. Price for urea included delivery to the nursery. The second is the herbicide, cost of which is the purchase price of the various pre-emergence and post-emergence materials. The third combines insecticides and fungicides. Purchase price reflects total cost the chemicals purchased from local distributors were assumed. A special category of "other" was included under chemicals. Adequate chemicals were budgeted for normal control of insects and diseases. The "other" category budgeted at 50% of the cost of the "normal" insecticides and fungicides was to take care of special problems.

**Poultry Wire.** Poultry wire was provided for the two tree categories to protect tree trunks from rabbit damage.

**Machinery and Equipment.** Variable machinery and equipment costs represent all costs incurred while equipment or machinery is in use. These costs are comprised of repair, fuel, and lubrication/filter (Table 13). Repair cost per hour was calculated by multiplying initial cost by a stated repair percentage divided by the estimated lifetime use of the machinery in the large nursery in hours. The same repair cost per hour was used for both sizes of nurseries. Fuel costs were determined by multiplying units of fuel used per hour by the price per unit. Filter/lubrication cost was estimated at a constant factor of 15% of calculated fuel cost. Summation of repair, fuel, and filter/lubrication costs results in total variable cost per hour of machinery or equipment usage.

**Hourly Labor.** The hourly basic wage was estimated at \$6.50. An additional 32% or \$2.08 was allocated for various fringe benefits, making a total hourly labor cost of \$8.58. Each major production activity was allocated necessary labor hours to accomplish assigned tasks.

### Cost Summaries

After all cost factors were determined, they were summarized based upon cost per salable plant by group and size of nursery.

## RESULTS AND DISCUSSION

### Capital Investment Requirements

Capital investment requirements for establishing field nurseries include land improvements, buildings, and machinery and equipment (Tables 1 and 1a). Each was further divided into several components. The 50-acre nursery required \$847,338 in investment. Land and land improvements represented 40% or \$335,770 of the investment, buildings 13% or \$109,990, and machinery and equipment

47% or \$401,578. The 200-acre nursery had an initial investment requirement of \$2,025,189. Land and land improvements, represented 56% or \$1,133,432 of the investment, buildings 9% or \$176,326, and machinery and equipment 35% or \$715,431.

The differences in the percentages of total investment between the various components of the two nurseries were primarily caused by the larger nursery being able to make more efficient use of buildings, machinery, and equipment than the smaller nursery. Both nurseries were about equally efficient in the use of growing space.

Land improvement costs, including the pond, in the case of the 50-acre nursery were about 92% of the cost of bare land, but dropped to about 62% of the cost of bare land in the case of the 200-acre nursery. These land improvement costs would be necessary in 'normal' USDA plant hardiness zones 5 and 6 to provide drainage, water storage, and good access to fields in times of inclement weather.

Building needs included a simple office layout, a plant and supply storage building, a machine shop for repairs and storage, polyhouse space for propagation, and polyhouses for overwintering. Details on polyhouse construction are included in Table 3 and those for the irrigation system, including the pump and well, are found in Tables 4-4c.

An important consideration for managers in most industries is determination of investment per unit of production capacity. For field nurseries this indicator would be the capital requirement per-salable-plant capacity. To determine this figure, it was necessary to determine how many salable plants would be produced annually for each group in its allocated 20% of the growing space. This quantity ranged from a low of 1,869 for group IV (*Acer rubrum*) to 6,208 for group III (*Viburnum*) in the 50-acre nursery and from 8,177 to 27,162, respectively, in the 200-acre nursery.

The number of plants grown per unit of space directly relates to the capital requirements per-salable-plant. These capital costs for the small nursery differentiated by plant group were: \$40.93 for group I (*Taxus*), \$29.17 for group II (*Juniperus*), \$27.29 for group III (*Viburnum*), \$90.67 for group IV (*Acer rubrum*), and \$62.03 for group V (*Malus*). The average for all groups was \$40.81. For the 200-acre nursery the respective figures were: \$22.31 for group I, \$15.93 for group II, \$14.91 for group III, \$49.53 for group IV, and \$33.88 for group V. The average for all groups was \$22.29. It required 55% as much investment per-salable-plant capacity in the 200-acre nursery compared to the 50-acre nursery.

Individual nurserymen could, of course, incur somewhat different costs than those presented. Individual costs would depend upon variables such as production cycle chosen, labor productivity, and ability to bargain with suppliers. The nurseryman also may choose not to provide for future expansion, choose land which would require minimum drainage modifications, reduce optimal growing/overwintering space requirements, rent land and/or equipment, and/or operate used equipment. This analysis assumed average soil condi-

tions, expansion capacity, optimal spacing configurations, new buildings, equipment, and machinery.

## Production Costs

### Fixed

Annual fixed costs associated with capital including depreciation, interest, and taxes were \$169,200 per year for the 50-acre nursery. In addition there was \$121,849 allocated for general overhead and \$7,966 for interest on general overhead, insurance, and taxes. Fixed costs for the 50-acre nursery totaled \$299,016 (Table 5). It was felt that the most reasonable way of assigning annual fixed costs initially is by area. Once the physical facility is provided, fixed costs are incurred at essentially the same amount, regardless of how the nursery facility is used. These costs were divided by five and assigned to the respective production areas of the five plant groups, with each group receiving an assessment of \$59,803 (Table 14).

On a per-salable-plant basis, there was a considerable difference in annual fixed costs among plant groups (Table 15). In the 50-acre nursery, they were: \$14.44 for group I (*Taxus*), \$10.29 for group II (*Juniperus*), \$9.64 for group III (*Viburnum*), \$31.99 for group IV (*Acer rubrum*), and \$21.88 for group V (*Malus*). The average for all groups was \$14.40. These costs were proportionate to the number of salable plants per annum produced in allocated space. Fixed costs as a percentage of total costs ranged from 47 to 64% in the 50-acre nursery and averaged 55% for the five groups (Table 15).

For the 200-acre nursery, annual fixed costs associated with capital investment (depreciation, interest, insurance, and taxes) were \$385,652. An additional \$210,995 was allocated for general overhead and \$14,431 for interest on general overhead, insurance, and taxes, making a total of \$611,078 annual fixed costs for the 200-acre nursery (Table 5a). Assessment per plant group was \$122,539 (Table 14a). Fixed costs per-salable-plant were: \$6.72 for group I, \$4.80 for group II, \$4.49 for group III, \$14.94 for group IV, and \$10.22 for group V and averaged \$6.72 for all groups (Table 15a). Fixed costs as a percent of total costs were considerably lower than for the 50-acre nursery, ranging from 29% to 51% and averaged 17% for all groups (Table 15a). This lower percentage was associated with the lower capital requirement per-salable-plant capacity.

Fixed costs per-salable-plant were substantially lower for the 200-acre nursery compared to the 50-acre. For group I the difference was \$7.72, for group II \$5.49, for group III \$5.15, for group IV \$17.01, and for group V \$11.66 and averaged \$7.68 for all groups. This more than doubling in efficiency when going from the 50-acre to the 200-acre nursery is once again attributable to the more efficient use of buildings, machinery, and equipment of the large nursery over the small.

While many nurserymen and others concerned with the industry might feel that the reported fixed cost figures

ranging from 29% to 64% of total costs depending upon size of firm and species of plant is high, these percentages are in line with those for similar industries with new facilities.

Brumfield *et al.* (8), in a synthesized analyses of overhead costs of greenhouse firms, found fixed (overhead) costs as a percent of sales to range from about 45% to more than 67% depending on size of firm and market channel. The values of this study are not directly comparable with Brumfield *et al.* (percent of total costs vs. percent of sales). However, if marketing costs and potential profit were taken into account so that a direct comparison could be made, the fixed costs from the Brumfield study, as a percent of total costs, would be comparable to those reported in these analyses. Recent studies on nurseries, however, showed lower fixed costs as a percentage of total costs.

Badenhop and Phillips (2), for USDA plant hardiness zones 7 and 8, showed fixed costs ranging from 37% to 48% of total costs in a 50-acre nursery and from 27% to 36% in a 100-acre nursery. Most of the differences between the two studies could be accounted for by differences in budgeting. Badenhop and Phillips did not provide for irrigation or drainage, two very expensive procedures provided for in this study. They also allocated less for nursery overhead. Finally, they used different procedures for computing interest on investment. In computing interest on depreciable items, the calculations by Badenhop and Phillips were based on one-half the original value of depreciable items to reflect the recovery of those items through depreciation. In this study, interest was computed on the total cost of depreciable items. The procedures used by Badenhop and Phillips would reduce costs below those reported here.

Taylor, *et al.*, (14) in a study of container operations in USDA plant hardiness zone 6, found fixed (overhead) costs as a percent of total costs to range from 37% to 51% depending on size of firm and number of salable plants. Analytical procedures in the Taylor, *et al.* study were identical to this study. The major difference in that study vs. this study is in the number of salable plants produced per year. In the container study, a nursery containing approximately 8 acres of growing space would produce about 95,650 salable plants per year, and a nursery containing approximately 16 acres of growing space would produce about 192,095 salable plants per year. Therefore, fixed (overhead) costs were distributed over many more plants. Also, capital requirements per 'salable' plant capacity were much lower in the container nurseries. For the 8-acre (growing space) nursery, they ranged from \$4.63 to \$9.09 per-salable-plant capacity. In the 16-acre (growing space) nursery, they ranged from \$3.71 to \$7.39. As reported earlier, capital requirements per salable plant in this study ranged from \$10.16 to \$65.94 depending upon species of plant and size of field nursery.

One of the major reasons for the large difference in capital requirements per 'salable' plant capacity lies in the plant rotations. The container nursery operated on a 2-year rotation while the rotations for this field study range from 4 years in the case of group III (*Viburnum*) and group V plants (*Malus*)

to 7 years in the case of group I (*Taxus*) plants.

Nurserymen having established facilities might well consider annual fixed costs to be lower than those reported here. This is especially true if they calculate depreciation and repairs on the original value of land improvements, buildings, machinery, and equipment and if they place a low value on their own management input. Good management planning, however, dictates computing depreciation and repairs on the current value of facilities and equipment rather than on original cost. It also dictates placing a value on managerial time that would be comparable to salaries paid in competitive firms.

## Variable

Variable costs differentiated by size of firm and plant group are detailed in Tables 8-12a. There were substantial differences between plant groups, but little difference by size of nursery.

Total variable costs for the 50-acre nursery by plant group were \$34,113 for group I (*Taxus*), \$35,900 for group II (*Juniperus*), \$38,445 for group III (*Viburnum*), \$67,555 for group IV (*Acer rubrum*), and \$68,318 for group V (*Malus*). Total for all groups was \$244,331 (Table 14). The difference on total variable costs between groups is primarily accounted for by the cost of producing liners and in labor for harvesting. Liners for trees were purchased and were much more expensive than liners for shrubs which were propagated on site. Also, trees require much more labor to harvest per unit than is the case for the shrub groups. On a per-salable-plant basis, variable costs were \$68.25 for group I, \$6.18 for group II, \$6.20 for group III, \$36.15 for group IV, and \$25.01 for group V and averaged \$11.78 for all groups. Variable costs for the small nursery ranged from 36% to 55% of total costs and averaged 45% for all groups (Table 15).

For the 200-acre nursery, variable costs by plant group were \$116,947 for group I, \$135,355 for group II, \$157,958 for group III, \$293,196 for group IV, and \$294,593 for group V. Total for all groups was \$998,049 (Table 14a). On a per-salable-plant basis, they were \$6.44 for group I, \$5.32 for group II, \$5.82 for group III, \$35.86 for group IV, \$24.64 for group V, and averaged \$10.99 for all groups (Table 15a). Variable costs for the large nursery ranged from 49% to 71% of total cost and averaged 62% for all groups.

The difference in variable costs between sizes of nurseries was less pronounced than in the case of fixed costs. The differences for group I was \$1.81, for group II \$0.86, for group III -\$0.38, for group IV -\$0.29, and for group V -\$0.37, and averaged -\$0.79 for all groups.

## Total

Total costs are the summation of fixed and variable costs. For the 50-acre nursery they were \$93,915 for group I (*Taxus*), \$95,702 for group II (*Juniperus*), \$98,247 for group III (*Viburnum*), \$127,357 for group IV (*Acer rubrum*), and

\$128,120 for group V (*Malus*). For all groups they totaled \$543,347 (Table 14). On a per-salable-plant basis, they were \$22.69 for group I, \$16.47 for group II, \$15.84 for group III, \$68.14 for group IV, \$46.89 for group V, and averaged \$26.18 for all groups (Table 15).

Total costs for the 200-acre nursery were \$239,486 for group I, \$257,894 for group II, \$280,497 for group III, \$415,735 for group IV, and \$417,132 for group V. They totaled \$1,610,747 for all groups (Table 14a). On a per-salable-plant basis, they were \$13.16 for group I, \$10.12 for group II, \$10.31 for group III, \$50.80 for group IV, and \$34.86 for group V, and averaged \$17.71 for all groups (Table 15a).

Differences in total costs per salable plant between the two sizes of nurseries were \$9.53 for group I, \$6.35 for group II, -\$5.53 for group III, \$17.34 for group IV, and -\$12.03 for group V, and averaged -\$8.47 for all groups. Note that of the total differential, most was caused by differences in fixed costs. Overall, it was 33% less expensive to produce plants in the 200-acre nursery compared to the 50-acre (\$17.71 per plant in the 200-acre nursery vs. \$26.18 in the 50-acre). For fixed costs, the differential was 31% (\$6.72 in the 200-acre nursery vs. \$14.40 in the 50-acre), while for variable costs there was only a 6% advantage (\$10.99 in the 200-acre nursery vs. \$11.78 in the 50-acre). This means that fixed costs accounted for more than 90% and variable costs less than 10% of the cost differentials per-salable-plant between the two sizes of nurseries. For nurseries of the sizes analyzed, economies of size are achieved primarily in fixed rather than variable costs. Variable costs presented should be quite representative for zones 5 and 6 nurseries doing a good job of management.

One note of caution should be observed in comparing costs between the two sizes of nurseries. Each of the nurseries was analyzed based on the assumption that they would produce a diverse line of plants which included both shrubs and trees. This assumption might be unrealistic for the 50-acre nursery as a considerable amount of specialized equipment was required. It should also be noted that many operators of smaller nurseries might choose a different line of equipment than that budgeted. While the equipment budgeted is capable and labor saving, smaller nurserymen might have a surplus of family labor and choose less expensive, less labor-saving equipment. Also, a small nursery might well operate its office, etc. out of the home.

## SUMMARY AND IMPLICATIONS

Large-size commercial field nurseries use buildings, equipment, and machinery more efficiently than small-size field nurseries. As a result, large nurseries have a lower cost per salable plant.

Total costs per salable plant in the 50-acre nursery differentiated by species ranged from \$15.84 to \$68.14 and averaged \$26.18 for all species. In the large nursery, comparable values were \$10.12 to \$50.80 and averaged \$17.71 for all species.

More than 90% of the differential noted between the two sizes of nurseries can be attributed to differences in fixed costs.

Fixed costs per salable plant in the 50-acre nursery ranged from \$6.69 to \$31.99 and averaged \$14.40. In the 200-acre nursery, comparable costs were \$4.49 to \$14.94 and averaged \$6.72. The greater than 100% gain in efficiency when going from the 50-acre to 200-acre nursery is attributable to more efficient use of buildings, machinery, and equipment. Fixed costs as a percentage of total costs in the 50-acre nursery ranged from 47% to 64% and averaged 55% for all species. Comparable values for the 200-acre nursery were 29% to 51% and averaged 38%. Differences in fixed costs among plant groups resulted from a combination of space requirements and the number of years a plant would be in rotation.

Variable costs per salable plant showed differences among plant species and were also affected by size of nursery. In the 50-acre nursery, they ranged from \$6.18 to \$36.15 and averaged \$11.78 across species. Comparable figures for the 200-acre nursery were \$5.32 to \$35.86 and averaged \$10.99. Major differences among species affecting variable costs were spacing requirements, cost of liners, and labor for harvesting. Variable costs as a percentage of total costs in the 50-acre nursery ranged from 36% to 53% and averaged 45%. Comparable values for the 200-acre nursery were 53% to 71% and averaged 62%.

These figures demonstrated that variable costs per salable plant, while having wide variations among species, remain reasonably constant when comparisons are made between the two sizes of nurseries. The 50-acre nursery could purchase materials and other variable items almost as cheaply as could the 200-acre nursery. Fixed costs on a per-salable-plant basis, in contrast, changed significantly as size of nursery increased. This occurred because most of the fixed factors required to operate the 50-acre nursery such as management, buildings, and most machinery and equipment were also adequate to operate the 200-acre nursery. 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.

## Implications

A comparison of total costs of producing "B & B" plants in a 50-acre nursery in the field in USDA plant hardiness zones 5 and 6 with prices in producers' wholesale catalogs would undoubtedly show selling prices lower than total annual costs. In fact, a comparison of costs with prices for the 200-acre field nursery would also, at best, show marginal returns. In fact, if one were to add costs of selling, very few producers would presently be charging enough to cover all costs, let alone profits. How then can producers continue to operate? The answer lies in how producers both experience and compute costs. The authors have used the economic and accounting method which includes both explicit and implicit costs. Explicit costs are those which are paid directly and easily determined; for example, cost of liners, soil media, polyethylene, chemicals, and labor. Implicit costs are those

which are difficult to determine, such as the cost of equity capital and implied managerial salaries. The way these costs are determined varies significantly from firm to firm. Well-established nurseries are usually very accurate in determining explicit costs, but often do not consider all implicit costs. They base their costs on "cash flow" and profit and loss on "tax accounting." These established nurseries may have purchased land at low cost, be working with depreciated equipment, and may be assigning low if any value to their management; in this case determined costs would be at a much lower level than presented in this paper. Also, as pointed out earlier, careful site selection could significantly reduce fixed (overhead) costs. However, if one were to start a new field nursery, producing a wide range of plant materials, in a "normal" USDA plant hardiness zones 5 or 6 site, costs would probably be very close to those presented here.

For the industry, selling nursery products below "accounting costs" 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 operation to meet all overhead expenses. Second, starting a field nursery (unless it was quite large) in USDA plant hardiness zones 5 and 6 would probably not prove profitable unless items like buildings, equipment, machinery, and management could be shared with other enterprises or unless selling prices of nursery products in the zones increased substantially. At current prices for nursery products, this study shows that the return on investment for establishing new, independently operating, field nurseries in USDA plant hardiness zones 5 and 6 would be marginal if not negative.

## LITERATURE CITED

1. Aylsworth, James and J.B. Gartner. 1972. The Seven Costs of Ornamental Production. *Amer. Nurseryman*, 135: (2): 116-122.
2. Badenhop, M.B., T.D. Phillips, and S-103 Technical Committee. 1985. Costs of Establishing and Operating Field Nurseries Differentiated by Size of Firm and Species of Plant in USDA Climatic Zones 7 and 8. *Southern Coop. Series Bull.* 311.
3. Badenhop, M.B., T.D. Phillips, and S-103 Technical Committee. 1983. Costs of Producing and Marketing Container-Grown Woody Landscape Plants: The Pfizer Juniper. *Southern Coop. Series Bull.* 299.
4. Badenhop, M.B., A.E. Einert, and S-103 Technical Committee. 1980. Factors Affecting Production Costs and Returns for Flowering Dogwood. *Southern Coop. Series Bull.* 246.
5. Badenhop, M.B., Robert D. Wright, and S-103 Technical Committee. 1980. Costs of Producing and Marketing a Shade Tree; The Pin Oak. *Southern Coop. Series Bull.* 244.
6. Badenhop, M.B. and S-103 Technical Committee. 1979. Factors Affecting Southern Regional Production Advan-  
tages for Kurume Azaleas. *Southern Coop. Series Bull.* 241.
7. Badenhop, M.B. and S-103 Technical Committee. 1979. Factors Affecting Southern Regional Production Advantages for *Juniperus chinensis* 'Pfitzeriana.' *Southern Coop. Series Bull.* 237.
8. Brumfield, Robin G., Paul V. Nelson, Arthur J. Coutu, Daniel W. Willets, and Robert S. Sowell. 1981. Overhead Costs of Greenhouse Firms by Size of Firm and Market Channel. *North Carolina Agri. Res. Serv., Tech. Bull.* 269.
9. Coutu, A.J. and S-103 Technical Committee. 1982. Nursery Management and Production Cost: Burford Holly *Ilex Cornuta* 'Burfordii.' *Southern Coop. Series Bull.* 274.
10. Crafton, Vicky W., Travis D. Phillips, and Thomas M. Blessington. 1982. Costs of Producing Woody Ornamental Plants. *Agri. Econ. Res. Rep.* 137, Mississippi Agr. and For. Exp. Sta.
11. Dickerson, H.L., M.B. Badenhop, and J.W. Day. 1983. Costs of Producing and Marketing Rooted Cuttings of Three Woody Ornamental Species in Tennessee, 1980. *Tennessee Agri. Exp. Sta., Bull.* 624.
12. Kneen, Harold H. 1981. Comparison of Costs for Producing Containerized and Field Grown *Juniperus chinensis* 'Pfitzeriana' in USDA Climatic Zones 6 and 7. M.S. Thesis, The Ohio State Univ., Columbus.
13. Powers, Edward W. 1978. An Analysis of Production Costs for Containerized Nursery Products, M.S. Thesis, The Ohio State Univ., Columbus.
14. Taylor, Reed D., Harold H. Kneen, David E. Hahn, Elton M. Smith, and S-103 Technical Committee. 1983. Costs of Establishing and Operating Container Nurseries Differentiated by Species of Plant in U.S.D.A. Climatic Zone Six. *Southern Coop. Series Bull.* 301.
15. U.S. Dept. of Agriculture, Agriculture Research Service, Washington, D.C. Plant Hardiness Zone Map. Misc. Pub. 814, revised 1965.

**APPENDIX A**  
**PROPAGATION PRODUCTION CYCLES**  
**Slow-Growing Evergreens (*Taxus*)**

**November-December of First Production Year**

1. **Collecting Cuttings.** Collect cuttings from field plants which are at least 3 years old. Cuttings should measure at least 7 inches. Cuttings are collected at a rate of 1,400 per hour.
2. **Preparing Cuttings.** Strip lower needles off lower 4 inches of cuttings and dip into IBA powder #8. Cuttings are prepared at a rate of 1,000 per hour.
3. **Sticking Cuttings.** Stick treated cuttings into a bottom heated sand bed in overwinter house. Sticking is accomplished at a rate of 1,200 per hour.
4. **Irrigation.** Using an automatic mist system, keep watered until rooted and then reduce watering.

**January-December of Second Production Year**

1. **Irrigation.** Keep cuttings moist.
2. **Fertilization.** Liquid feed every 2 weeks between April and August.

**March of Third Production Year**

1. **Harvest.** Pull rooted cuttings from propagation beds and prune prior to transplanting into field beds.

**Fast-Growing Evergreens (*Juniperus*)**

**November-December of First Production Year**

1. **Collecting Cuttings.** Collect cuttings from plants at least 3 years old. Cuttings should measure at least 7 inches. Cuttings are collected at rate of 600 per hour.
2. **Preparing Cuttings.** Strip lower leaves off lower 3 inches and dip into IBA powder #3. Cuttings can be prepared at a rate of 500 per hour.
3. **Sticking Cuttings.** Stick treated cuttings into a bottom heated sand bed in overwinter house. Cuttings can be stuck at a rate of 1,000 per hour.
4. **Irrigation.** Using an automatic mist system, keep watered until rooted and then reduce watering.

**March of Second Production Year**

1. **Harvest.** Pull rooted cuttings from propagation beds for pruning before transplanting into field beds. Harvesting is accomplished at a rate of 500 cuttings per hour.

**Deciduous Shrubs (*Viburnum*)**

**June of First Production Year**

1. **Collect Cuttings.** Collect cuttings from field plants at least 2 years old. Cuttings are collected at a rate of 1,000 per hour.

2. **Preparing Cuttings.** Strip off the lower leaves and dip into IBA powder #1. Cuttings are prepared at a rate of 1,000 per hour.
3. **Sticking Cuttings.** Treated cuttings are stuck into a bottom heated sand bed in an overwinter house. They are stuck at a rate of 1,000 per hour.
4. **Irrigation.** Using an automatic mist system, cuttings are kept watered until rooted. After rooting, reduce irrigation.

**July of First Production Year-March of Second Production Year**

1. **Maintenance of Plants.** Standard irrigation and feeding.

**March of Second Production Year**

1. **Harvesting.** Pull rooted cuttings from propagation beds prior to transplanting into field beds. Cuttings are harvested at a rate of 400 per hour.

**APPENDIX B**  
***Taxus* LINER AND FIELD**  
**PRODUCTION CYCLES (7-YEAR CYCLE)**  
**(*Taxus* is representative of**  
**slow-growing evergreens)**  
**Liner Production**

**April of First Production Year**

1. **Land Preparation Prior to Planting Bed Liners.** The bed area for growing rooted cuttings is prepared by plowing land with a three-bottom plow. One ton of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The land is further worked, twice with a disk and then harrowed. Just prior to planting, fields are cultimulched and pre-emergence herbicide (Isoxaben + Oryzalin 2 to 4 lb ai/A) is sprayed onto the soil using a spray rig and 10-foot boom attached to the tractor pulling the cultimulcher.

**May of First Production Year**

1. **Liner Preparation.** Liners (18 months old) are root pruned by hand prior to planting.
2. **Planting of liners.** Pruned liners are transported to the bed area in a flatbed truck. They are then transplanted into beds 4 feet wide, using a three-row mechanical transplanter. The rooted cuttings are spaced 20 inches apart between rows and 7 inches within rows. Using a crew of nine, approximately 5,000 rooted cuttings can be planted per hour.

## General Maintenance

1. **Irrigation.** Irrigation of rooted cuttings is of primary concern the first year during root system development. Portable aluminum 4-inch pipe is set up and shifted within the first year's bed area to supplement natural rainfall. Plants are irrigated 20 times during the summer and fall at the rate of 1 inch of water per irrigation.
2. **Fertilization.** Nutrients (200 lb of soluble 20-20-20 fertilizer/acre/application) are injected three times into the irrigation water to help stimulate plant growth.
3. **Weed Control.** Weed control is effected by a combination of six mechanical cultivations, three hand weedings, and two applications of herbicides. The spring herbicide program consists of spraying the area with 1.0 lb aia of Simazine 80WP plus 5.25 lb aia of DCPA 75WP. The fall herbicide program involves spraying the beds with 2.0 lb aia of Simazine 80WP.
4. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb ThiophanateWP WP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.
5. **Pruning.** Where necessary, bed plants are lightly pruned of any straying branches.

## May-September of Second and Third Production Years

1. **Plant Maintenance.** The same cultural practices which occurred in the first growing season, May-September, are repeated for the second and third growing seasons.

## April of Fourth Production Year

1. **Harvesting of Bed Liners.** The 3-year bed liners are dug using a 50-inch undercutter with lift tines. The liners are separated from each other and bundled in lots of 25. The bundles are loaded onto pallets which have been placed on a flatbed truck. The truck is then driven into the storage building where the pallets are unloaded using a four-wheel drive articulated loader.

## May-September of Fourth Production Year

1. **Land Preservation.** After the bed liners are harvested, the land is left fallow until the next spring planting season. Weeds are kept down through disking the bed area four times during the third growing season. Ideally, a cover crop (sudan, for example) would be grown for one or two seasons to restore organic matter and to reduce soil compaction.

## Production in the Field

### April of First Field Production Year

1. **Land Preparation.** Prior to transplanting the bed

liners into the field, the land would be plowed. After plowing, 3 tons of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The lime and fertilizer are disked in and the ground is later harrowed. Just prior to planting, fields are cultimulched to break up clods of soil which could clog a mechanical transplanter. Pre-emergence herbicide (Isoxaben + Oryzalin 2 to 4 lb. ai/A) is also applied at this time.

2. **Liner Preparation.** The 3-year-old bed liners are root and top pruned by hand prior planting to help initiate new roots and compact branching.
3. **Planting of Liners.** Pruned liners are transplanted to the field area on a flatbed truck and mechanically transplanted at a rate of 5,065 plants per acre, with 44 inches between rows and 28 inches between plants. Using a two-row transplanter pulled by a 100 HP tractor, an eight-man crew can plant approximately 2,400 liners per hour.
4. **Irrigation.** Two irrigations are used to help set the liners.

### May-September of First Field Production Year

1. **Weed Control.** Two applications of herbicides, two mechanical cultivations, four mowings, and two hand weedings are required. Early season (1.0 lb aia Simazine, 5.25 lb aia DCPA) and late season (2.0 lb aia Simazine) herbicides are applied using a spray rig with a 10-foot boom mounted upon a 34 HP tractor. The late season herbicide is applied after the last cultivation. Mechanical cultivation (two-row cultivator attached to a 34 HP tractor) is utilized within rows to help eradicate weeds. Hand hoeing is then accomplished to reach weeds not eradicated by cultivators.
2. **Fertilizer Program.** Supplemental nitrogen, 220 lb of urea (45-0-0) per acre, is side dressed in early fall for increased plant growth.
3. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb of ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.
4. **Pruning.** Tips of branches are pruned with hedge shears to induce branching.

### May-September of Second Through Sixth Field Production Years

1. **Plant Maintenance.** Plant maintenance during these 5 years is identical to the first season except for an additional application of nitrogen fertilizer, 220 lb of urea (45-0-0) per acre, side dressed each spring.

#### **September of Sixth Field Production Year**

1. **Harvesting.** One-fourth (25%) of the salable crop is selected and tagged for digging (small nursery 1,035 plants, large nursery 4,539 plants). Seven plants per labor hour are balled and burlapped, carried out of the field, and loaded onto pallets on a flatbed truck parked at the side of the field. The palletized plants are transported to the shipping area, unloaded, and organized according to customer order.
2. **Shipping.** All plants harvested are loaded onto a semitruck. A crew of four, with an articulated four-wheel drive loader, can load 690 plants (truck capacity) in 2 hours.

#### **October-December of Sixth Field Production Year**

1. **Harvesting and Overwintering.** An additional 25% of the total salable stock is dug for early spring sales and overwintered in polyhouses (small nursery 1,035 plants, large nursery 4,534 plants). Pallets of dug material are unloaded and the material is spaced within the polyhouse framework (2 feet on centers with a 2-foot aisle way).
2. **Irrigation.** The permanent irrigation system is used an estimated five times to supply additional moisture to supplement natural rainfall.
3. **Covering of Polyhouses.** Polyhouses are covered as late as possible with 4-mil white polyfilm which acts as a barrier to drying winds, extremes in temperature, and humidity loss.
4. **Fungus Control.** Covered polyhouses are fumigated with a fumigant bomb (3-10M cu ft Exothermic Termil bombs per polyhouse) to control storage molds and fungi.

#### **January-March of Seventh Field Production Year**

1. **Inspection of Fall Dug Materials.** Fall dug plants are checked for any possible winter damage.
2. **Fungus Control.** A second set of fumigant bombs is set off to further control molds and fungi.
3. **Shipping of Fall Dug Material.** Shipments of overwintered plants start in late February with stock being loaded onto pallets, hauled to the shipping area, and loaded onto trucks. Approximately 18.5% of the total salable crop is shipped (small nursery 766 plants, large nursery 3,359 plants).
4. **Harvesting.** One-fifth (20%) of the total salable crop is harvested (small nursery 828 plants, large nursery 3,531 plants).

#### **April of Seventh Field Production Year**

1. **Inspection and Shipping of Remaining Fall Dug Material.** Any remaining overwintered stock is shipped. Care is exercised to avoid mixing overwintered and spring harvested plants.

2. **Harvesting.** The remaining 30% of the total salable crop is harvested and hauled into the shipping area (small nursery 1,242 plants, large nursery 5,446 plants).
3. **Irrigation.** Plants are irrigated using a portable irrigation system combined with the inground system to help supplement natural rainfall, especially during sunny and windy days.
4. **Shipping.** Approximately 38% of the total salable crop is shipped (small nursery 1,573 plants, large nursery 6,899 plants).

#### **May of Seventh Field Production Year**

1. **Irrigation.** Five irrigations are supplied to remaining salable plants to maintain quality.
2. **Shipping.** The remaining 18.5% of salable plants are pulled from the holding area, transported on pallets to the shipping area, arranged according to customer order, loaded, and shipped (small nursery 766 plants, large nursery 3,359 plants).
3. **Shifting of Irrigation Equipment.** Portable irrigation pipe is taken down and used in the summer irrigation system of the bed liners.

#### **Summer and Fall of Seventh Field Production Year**

1. **Land Preservation.** After the last plants are harvested, the empty fields are left fallow. Fallow fields are disked for weed control four times during summer months.
2. **Land Preparation.** Fields are plowed in the fall in preparation for spring planting.

## **APPENDIX C**

### ***Juniperus* LINER AND FIELD PRODUCTION CYCLES (5-YEAR CYCLE) (*Juniperus* is representative of rapid growing evergreens) Liner Production**

#### **April of First Production Year**

1. **Land Preparation Prior to Planting Bed Liners.** The bed area for growing rooted cuttings is prepared by plowing land with a three-bottom plow. One ton of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The land is further worked, twice with a disk and then harrowed. Just prior to planting, fields are cultimulched and pre-emergence herbicide (Isoxaben + Oryzalin at 2 to 4 lb. ai/A) is sprayed onto the soil using a spray rig and 10-foot boom attached to the tractor pulling the cultimulcher.



### May of First Production Year

1. **Liner Preparation.** Liners (6 months old) are root pruned by hand prior to planting.
2. **Planting of Liners.** Pruned liners are transported to the bed area in a flatbed truck. They are then transplanted into beds 4 feet wide, using a three-row mechanical transplanter. The rooted cuttings are spaced 20 inches apart between rows and 7 inches within rows. Using a crew of nine, approximately 5,000 rooted cuttings can be planted per hour.

### General Maintenance

1. **Irrigation.** Irrigation of rooted cuttings is of primary concern the first year during root system development. Portable aluminum 4-inch pipe is set up and shifted within the first year's bed area to supplement natural rainfall. Plants are irrigated 20 times during the summer and fall at the rate of 1 inch of water per irrigation.
2. **Fertilization.** Nutrients (200 lb of soluble 20-20-20 fertilizer/acre/application) are injected three times into the irrigation water to help stimulate plant growth.
3. **Weed Control.** Weed control is effected by a combination of six mechanical cultivations, three hand weedings, and two applications of herbicides. The spring herbicide program consists of spraying the area with 1.0 lb aia of Simazine 80WP plus 5.25 lb aia of DCPA 75WP. The fall herbicide program involves spraying the beds with 2.0 lb aia of Simazine 80WP.
4. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.
5. **Pruning.** Where necessary, bed plants are lightly pruned of any straying branches.

### May-September of Second Production Year

1. **Plant Maintenance.** The same cultural practices which occurred in the first growing season, May-September, are repeated for the second growing season.

### April of Third Production Year

1. **Harvesting of Bed Liners.** The 2-year bed liners are dug using a 50-inch undercutter with lift tines. The liners are separated from each other and bundled in lots of 25. The bundles are loaded onto pallets which have been placed on a flatbed truck. The truck is then driven into the storage building where the pallets are unloaded using a four-wheel drive articulated loader.

### May-September of Third Production Year

1. **Land Preservation.** After the bed liners are harvested, the land is left fallow until the next spring planting season. Weeds are kept down through disking the bed area four times during the second growing season. Ideally, a cover crop (sudan, for example) would be grown for one or two seasons to restore organic matter and to reduce soil compaction.

## Production in the Field

### April of First Field Production Year

1. **Land Preparation.** Land would be plowed in the fall prior to transplanting bed liners into the field. Before transplanting, 3 tons of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The lime and fertilizer are disked in and the ground is later harrowed. Just prior to planting, fields are cultimulched to break up clods of soil which could clog a mechanical transplanter a pre-emergence herbicide (Isoxaben + Oryzalin at 2 lb. ai/A) is also applied at this time.
2. **Liner Preparation.** The 2-year old bed liners are root and top pruned by hand prior to planting to help initiate new roots and compact branching.
3. **Planting of Liners.** Pruned liners are transported to the field area on a flatbed truck and mechanically transplanted at a rate of 5,065 plants per acre, with 44 inches between rows and 28 inches between plants. Using a two-row transplanter pulled by a 100 HP tractor, an eight-man crew can plant approximately 2,400 liners per hour.
4. **Irrigation.** Two irrigations are used to help set the liners.

### May-September of First Field Production Year

1. **Weed Control.** Two applications of herbicides, two mechanical cultivations, four mowings, and two hand weedings are required. Early season (1.0 lb aia Simazine, 5.25 lb aia DCPA) and late season (2.0 lb aia Simazine) herbicides are applied using a spray rig with a 10-foot boom mounted upon a 34 HP tractor. The late season herbicide is applied after the last cultivation. Mechanical cultivation (two-row cultivator attached to a 34 HP tractor) is utilized within rows to help eradicate weeds. Hand hoeing is then accomplished to reach weeds not eradicated by cultivators.
2. **Fertilizer Program.** Supplemental nitrogen, 220 lb of urea (45-0-0) per acre, is side dressed in early fall for increased plant growth.
3. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb of ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an

airblast sprayer pulled by a tractor.

4. **Pruning.** Tips of branches are pruned with hedge shears to induce branching.

#### May-September of Second, Third, and Fourth Field Production Years

1. **Plant Maintenance.** Plant maintenance during these 3 years is identical to the first season except for an additional application of nitrogen fertilizer, 220 lb of urea (45-0-0 per acre), side dressed each spring.

#### September of Fourth Field Production Year

1. **Harvesting.** One-fourth (25%) of the salable crop is selected and tagged for digging (small nursery 1,452 plants, large nursery 6,355 plants). Seven plants per labor hour are balled and burlapped, carried out of the field, and loaded onto pallets on a flatbed truck parked at the side of the field. The palletized plants are transported to the shipping area, unloaded, and organized according to customer order.
2. **Shipping.** All plants harvested are loaded onto a semitruck. A crew of four, with an articulated four-wheel drive loader, can load 690 plants (truck capacity) in 2 hours.

#### October-December of Fourth Field Production Year

1. **Harvesting and Overwintering.** An additional 25% of the total salable stock is dug for early spring sales and overwintered in polyhouses (small nursery 1,452 plants, large nursery 6,355 plants). Pallets of dug material are unloaded and the material is spaced within the polyhouse framework (2 feet on centers with a 2-foot aisle way).
2. **Irrigation.** The permanent irrigation system is used an estimated five times to supply additional moisture to supplement natural rainfall.
3. **Covering of Polyhouses.** Polyhouses are covered as late as possible with 4-mil white polyfilm which acts as a barrier to drying winds, extremes in temperature, and humidity loss.
4. **Fungus Control.** Covered polyhouses are fumigated with a fumigant bomb (3-10M cu ft Exothermic Termil bombs per polyhouse) to control storage molds and fungi.

#### January-March of Fifth Field Production Year

1. **Inspection of Fall Dug Materials.** Fall dug plants are checked for any possible winter damage.
2. **Fungus Control.** A second set of fumigant bombs is set off to further control molds and fungi.
3. **Shipping of Fall Dug Material.** Shipments of overwintered plants start in late February with stock being loaded onto pallets, hauled to the shipping area, and loaded onto trucks. Approximately 18.5% of the total

salable crop is shipped (small nursery 1,075 plants, large nursery 4,702 plants).

4. **Harvesting.** One-fifth (20%) of the total salable crop is harvested (small nursery 1,162 plants, large nursery 5,084 plants).

#### April of Fifth Field Production Year

1. **Inspection and Shipping of Remaining Fall Dug Material.** Any remaining overwintered stock is shipped. Care is exercised to avoid mixing overwintered and spring harvested plants.
2. **Harvesting.** The remaining 30% of the total salable crop is harvested and hauled into the shipping area (small nursery 1,743 plants, large nursery 7,625 plants).
3. **Irrigation.** Plants are irrigated using a portable irrigation system combined with the inground system to help supplement natural rainfall, especially during sunny and windy days.
4. **Shipping.** Approximately 38% of the total salable crop is shipped (small nursery 2,208 plants, large nursery 9,659 plants).

#### May of Fifth Field Production Year

1. **Irrigation.** Five irrigations are supplied to remaining salable plants to maintain quality.
2. **Shipping.** The remaining 18.5% of salable plants are pulled from the holding area, transported on pallets to the shipping area, arranged according to customer order, loaded, and shipped.
3. **Shifting of Irrigation Equipment.** Portable irrigation pipe is taken down and used in the summer irrigation system of the bed liners.

#### Summer and Fall of Fifth Field Production Year

1. **Land Preservation.** After the last plants are harvested, the empty fields are left fallow. Fallow fields are disked for weed control four times during summer months.
2. **Land Preparation.** Fields are plowed in the fall in preparation for spring planting.

## APPENDIX D

### *Viburnum* LINER AND FIELD PRODUCTION CYCLES (4-YEAR CYCLE)

(*Viburnum* is representative of deciduous shrubs)

#### Liner Production

##### April of First Production Year

1. **Land Preparation Prior to Planting Bed Liners.** The bed area for growing rooted cuttings is prepared by plowing land with a three-bottom plow. One ton of

lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The land is further worked, twice with a disk and then harrowed. Just prior to planting, fields are cultimulched and pre-emergence herbicide (Isoxaben + Oryzalin at 2 to 4 lb. ai/A) is sprayed onto the soil using a spray rig and 10-foot boom attached to the tractor pulling the cultimulcher.

#### May of First Production Year

1. **Liner Preparation.** Liners (9 months old) are root pruned by hand prior to planting.
2. **Planting of Liners.** Pruned liners are transported to the bed area in a flatbed truck. They are then transplanted into beds 4 feet wide, using a three-row mechanical transplanter. The rooted cuttings are spaced 20 inches apart between rows and 7 inches within rows. Using a crew of nine, approximately 5,000 rooted cuttings can be planted per hour.

#### General Maintenance

1. **Irrigation.** Irrigation of rooted cuttings is of primary concern the first year during root system development. Portable aluminum 4-inch pipe is set up and shifted within the first year's bed area to supplement natural rainfall. Plants are irrigated 20 times during the summer and fall at the rate of 1 inch of water per irrigation.
2. **Fertilization.** Nutrients (200 lb of soluble 20-20-20 fertilizer/acre/application) are injected three times into the irrigation water to help stimulate plant growth.
3. **Weed Control.** Weed control is effected by a combination of six mechanical cultivations, three hand weedings, and two applications of herbicides. The spring herbicide program consists of spraying the area with 1.0 lb aia of Simazine 80WP plus 5.25 lb aia of DCPA 75WP. The fall herbicide program involves spraying the beds with 2.0 lb aia of Simazine 80WP.
4. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.
5. **Pruning.** Where necessary, bed plants are lightly pruned of any straying branches.

#### April of Second Production Year

1. **Harvesting of Bed Liners.** The 2-year bed liners are dug using a 50-inch undercutter with lift tines. The liners are separated from each other and bundled in lots of 25. The bundles are loaded onto pallets which have been placed on a flatbed truck. The truck is then driven into the storage building where the pallets are

unloaded using a four-wheel drive articulated loader.

#### May-September of Second Production Year

1. **Land Preservation.** After the bed liners are harvested, the land is left fallow until the next spring planting season. Weeds are kept down through disking the bed area four times during the second growing season. Ideally, a cover crop (sudan, for example) would be grown for one or two seasons to restore organic matter and to reduce soil compaction.

#### Production in the Field

##### April of First Field Production Year

1. **Land Preparation.** Land would be plowed in the fall prior to transplanting bed liners into the field. Before transplanting, 3 tons of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The lime and fertilizer are disked in and the ground is later harrowed. Just prior to planting, fields are cultimulched and pre-emergence herbicide (Isoxaben + Oryzalin at 2 to 4 lb. ai/A) is sprayed onto the soil using a spray rig and 10-foot boom attached to the tractor pulling the cultimulcher.
2. **Liner Preparation.** The 2-year old bed liners are root and top pruned by hand prior to planting to help initiate new roots and compact branching.
3. **Planting of Liners.** Pruned liners are transported to the field area on a flatbed truck and mechanically transplanted at a rate of 4,356 plants per acre, with 48 inches between rows and 30 inches between plants. Using a two-row transplanter pulled by a 100 HP tractor, an eight-man crew can plant approximately 2,400 liners per hour.
4. **Irrigation.** Two irrigations are used to help set the liners.

##### May-September of First Field Production Year

1. **Weed Control.** Two applications of herbicides, two mechanical cultivations, four mowings, and two hand weedings are required. Early season (1.0 lb aia Simazine, 5.25 lb aia DCPA) and late season (2.0 lb aia Simazine) herbicides are applied using a spray rig with a 10-foot boom mounted upon a 34 HP tractor. The late season herbicide is applied after the last cultivation. Mechanical cultivation (two-row cultivator attached to a 34 HP tractor) is utilized within rows to help eradicate weeds growing in spite of herbicides. Hand hoeing is then accomplished to reach weeds not eradicated by cultivators.
2. **Fertilizer Program.** Supplemental nitrogen, 220 lb of urea (45-0-0) per acre, is side dressed in early fall for increased plant growth.
3. **Pest Control.** Pest control is obtained through the use

of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb of ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.

4. **Pruning.** Tips of branches are pruned with hedge shears to induce branching.

#### April-September of Second Field Production Year

1. **Pruning.** Plants are pruned to ground level to induce multiple stem plants.
2. **Plant Maintenance.** Plant maintenance is identical to the first season except for an additional application of nitrogen fertilizer (220 lb of urea, 45-0-0 per acre), side dressed each spring.

#### April-August of Third Field Production Year

1. **Pruning.** Plants are lightly tip-pruned to maintain uniformity and promote secondary branching.
2. **Plant Maintenance.** Plant maintenance is identical to the second field production year, including side dressing nitrogen fertilizer.

#### September of Third Field Production Year

1. **Harvesting.** One-fourth (25%) of the salable crop is selected and tagged for digging (small nursery 1,552 plants, large nursery 6,791 plants). Six plants per labor hour are balled and burlapped, carried out of the field, and loaded onto pallets on a flatbed truck parked at the side of the field. The palletized plants are transported to the shipping area, unloaded, and organized according to customer order.
2. **Shipping.** All plants harvested are loaded onto a semitruck. A crew of four, with an articulated four-wheel drive loader, can load 690 plants (truck capacity) in 2 hours.

#### October-December of Third Field Production Year

1. **Harvesting and Overwintering.** An additional 25% of the total salable stock is dug for early spring sales and overwintered in polyhouses (small nursery 1,552 plants, large nursery 6,791 plants). Pallets of dug material are unloaded and the material is spaced within the polyhouse framework (2 feet on centers with a 2-foot aisle way).
2. **Irrigation.** The permanent irrigation system is used an estimated five times to supply additional moisture to supplement natural rainfall.
3. **Covering of Polyhouses.** Polyhouses are covered as late as possible with 4-mil white polyfilm which acts as a barrier to drying winds, extremes in temperature, and humidity loss.
4. **Fungus Control.** Covered polyhouses are fumigated with a fumigant bomb (3-10M cu ft Exothermic Termil

bombs per polyhouse) to control storage molds and fungi.

#### January-March of Fourth Field Production Year

1. **Inspection of Fall Dug Materials.** Fall dug plants are checked for any possible winter damage.
2. **Fungus Control.** A second set of fumigant bombs is set off to further control molds and fungi.
3. **Shipping of Fall Dug Material.** Shipments of overwintered plants start in late February with stock being loaded onto pallets, hauled to the shipping area, and loaded onto trucks. Approximately 18.5% of the total salable crop is shipped (small nursery 1,148 plants, large nursery 5,025 plants).
4. **Harvesting.** One-fifth (20%) of the total salable crop is harvested.

#### April of Fourth Field Production Year

1. **Inspection and Shipping of Remaining Fall Dug Material.** Any remaining overwintered stock is shipped. Care is exercised to avoid mixing overwintered and spring harvested plants.
2. **Harvesting.** The remaining 30% of the total salable crop is harvested and hauled into the shipping area (small nursery 1,862 plants, large nursery 8,149 plants).
3. **Irrigation.** Plants are irrigated using a portable irrigation system combined with the inground system to help supplement natural rainfall, especially during sunny and windy days.
4. **Shipping.** Approximately 38% of the total salable crop is shipped (small nursery 2,359 plants, large nursery 10,322 plants).

#### May of Fourth Field Production Year

1. **Irrigation.** Five irrigations are supplied to remaining salable plants to maintain quality.
2. **Shipping.** The remaining 18.5% of salable plants are pulled from the holding area, transported on pallets to the shipping area, arranged according to customer order, loaded, and shipped (small nursery 1,148 plants, large nursery 5,025 plants).
3. **Shifting of Irrigation Equipment.** Portable irrigation pipe is taken down and used in the summer irrigation system of the bed liners.

#### Summer and Fall of Fourth Field Production Year

1. **Land Preservation.** After the last plants are harvested, the empty fields are left fallow. Fallow fields are disked for weed control four times during summer months.
2. **Land Preparation.** Fields are plowed in the fall in preparation for spring planting.

**APPENDIX E**  
***Acer rubrum* FIELD**  
**PRODUCTION CYCLES (5-YEAR CYCLE)**  
**(*Acer rubrum* is**  
**representative of shade trees)**

**January-March of First Production Year**

1. **Liner Preparation.** Two-year liners are root and top pruned by hand prior to planting to help initiate new roots and compact branching.

**April of First Production Year**

1. **Land Preparation Prior to Planting.** Three tons of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The lime and fertilizer are "disked-in" to land which was plowed the previous fall. After disking, the ground is harrowed. Just prior to planting, fields are cutlimulched pre-emergence herbicides (Isoxaben + Oryzalin at 2 to 4 lb. ai/A) is sprayed onto the soil using a spray rig and a 10-foot boom attached to a tractor pulling the cutlimulcher.
2. **Planting of Liners.** Pruned liners are transported to the field area on a flatbed truck and hand transplanted at a rate of 1,361 plants per acre, with 96 inches between rows and 42 inches between plants. Using a one-row transplanter pulled by a 100 HP tractor, an 18-man crew can prune, haul, plant, and straighten approximately 1,000 liners per hour.
3. **Irrigation.** Two irrigations would be used to help set the liners.

**May-September of First Production Year**

1. **Weed Control.** Two applications of herbicides, two mechanical cultivations, four mowings, and two hand weeding are required. Early season herbicides (1.0 lb aia Simazine, 5.25 lb aia DCPA) are band applied. Late season, a herbicide (2.0 lb aia Simazine) is applied after the last cultivation, using a spray rig with a 7-foot boom mounted upon a 34 HP tractor. The area between rows is planted with grass (Kentucky 31), leaving a 2-foot clear band for cultivation and herbicide maintenance. This allows for good soil maintenance, minimum erosion, and early access for digging. Mechanical cultivation (one-row cultivator attached to a 34 HP tractor) is utilized within the rows to help eradicate weeds growing in spite of herbicides. Hand hoeing is then accomplished to reach weeds not eradicated by cultivators. Grass is mowed four times throughout the year.
2. **Fertilizer Program.** Supplemental nitrogen, 220 lb of urea (45-0-0) per acre, is side dressed in early fall for

increased plant growth.

3. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb of ThiophanateWP per acre). They are sprayed onto the plants three times a growing season, utilizing an airblast sprayer pulled by a tractor.
4. **Pruning.** Tips of branches are pruned with hand shears to induce branching.

**May-September of Second, Third, and Fourth Production Years**

1. **Plant maintenance.** Maintenance is identical to the first year.

**October of Fourth Production Year**

1. **Harvesting.** One-fourth (25%) of the salable crop is selected and tagged for digging (small nursery 467 plants, large nursery 2,044 plants). A digging crew of seven mechanically digs and transports 16.8 (2.4 per man hour) plants per hour to pallets on a wagon parked at the side of the field. A second crew transports and unloads the palletized plants into the shipping area according to customer orders.
2. **Shipping.** All plants harvested are loaded onto a semitruck. A crew of four with an articulated four-wheel drive loader, can load 100 plants (truck capacity) in 2½ hours.

**November-December of Fourth Production Year**

1. **Harvesting and Overwintering.** An additional 25% of the total salable stock is dug for early spring sales (small nursery 467 plants, large nursery 2,044 plants). Pallets of dug material are unloaded and spaced in rows by variety and size. Overwintering includes "healing-in" the plants in wood chips.
2. **Irrigation.** The permanent irrigation system, in conjunction with above ground pipe, is used an estimated five times to supply moisture to supplement natural rainfall.
3. **Rabbit Control.** Trunks are sprayed with rabbit repellent.

**January-March of Fifth Production Year**

1. **Inspection of Fall Dug Materials.** Fall dug plants are checked for winter damage (mice, rabbits, sunscald).
2. **Rabbit Control.** A second application of rabbit repellent is sprayed on tree trunks.
3. **Shipping of Fall Dug Material.** Shipments of overwintered plants start in late February, with stock being loaded onto pallets, hauled to the shipping area, and loaded onto trucks. Approximately 18.5% of the total salable crop is shipped (small nursery 346 plants, large nursery 1,513 plants).

4. **Harvesting.** One-fifth (20%) of the total salable crop is harvested (small nursery 363 plants, large nursery 1,635 plants).

#### April of Fifth Field Production Year

1. **Inspection and Shipping of Remaining Fall Dug Material.** Any remaining overwintered stock is shipped. Care is exercised to avoid mixing overwintered and spring harvested plants.
2. **Harvesting.** The remaining 30% of the total salable crop is harvested and hauled into the shipping area or holding area prior to "leaf-out" in the field (small nursery 561 plants, large nursery 2,453 plants).
3. **Irrigation.** Plants are irrigated using a portable irrigation system combined with the inground system to help supplement natural rainfall, especially during sunny and windy days.
4. **Shipping.** Approximately 38% of the total salable crop is shipped (small nursery 710 plants, large nursery 3,107 plants).

#### May of Fifth Field Production Year

1. **Irrigation.** Five irrigations are supplied to remaining salable plants to maintain quality.
2. **Shipping.** The remaining 18.5% of salable plants are pulled from the holding area, transported on pallets to the shipping area, loaded, and shipped (small nursery 346 plants, large nursery 1,513 plants).
3. **Shifting of Irrigation Equipment.** Portable irrigation pipe is taken down and used in the summer irrigation system of the bed liners.

#### Summer and Fall of Fifth Field Production Year

1. **Land Preservation.** After the last plants are harvested, the empty fields are left fallow. Fallow fields are disked for weed control four times during summer months.
2. **Land Preparation.** Fields are plowed in the fall in preparation for spring planting.

**APPENDIX F**  
**Malus FIELD PRODUCTION**  
**CYCLES (4-YEAR CYCLE)**  
**(Malus is representative**  
**of ornamental trees)**

#### January-March of First Production Year

1. **Liner Preparation.** Two-year liners are root and top pruned by hand prior to planting to help initiate new roots and compact branching.

#### April of First Production Year

1. **Land Preparation Prior to Planting.** Three tons of lime and 1,130 lb of blended fertilizer (200 lb of 45-0-0, 430 lb of 0-44-0, 500 lb of 0-0-60) per acre are custom applied by a local fertilizer distributor. The lime and fertilizer are "disked-in" to land which was plowed the previous fall. After disking, the ground is harrowed. Just prior to planting, fields are cultimulched and a pre-emergence herbicide (Isoxaben + Oryzalin at 2 to 4 lb ai/A) is sprayed onto the soil using a spray rig and a 10-foot boom attached to the tractor pulling the cultimulcher.
2. **Planting of Liners.** Pruned liners are transported to the field area on a flatbed truck and hand transplanted at a rate of 1,815 plants per acre with 96 inches between rows and 36 inches between plants. Using a one-row transplanter pulled by a 100 HP tractor, an 18-man crew can prune, haul, plant, and straighten approximately 1,000 liners per hour.
3. **Irrigation.** Two irrigations would be used to help set the liners.

#### May-September of First Production Year

1. **Weed Control.** Two applications of herbicides, two mechanical cultivations, four mowings, and two hand weedings are required. Early season herbicides (1.0 lb aia Simazine, 5.25 lb aia DCPA) are band applied. Late season, a herbicide (2.0 lb aia Simazine) is applied after the last cultivation, using a spray rig with a 7-foot boom mounted upon a 34 HP tractor. The area between rows is planted with grass (Kentucky 31), leaving a 2-foot clear band for cultivation and herbicide maintenance. This allows for good soil maintenance, minimum erosion, and early access for digging. Mechanical cultivation (one-row cultivator attached to a 34 HP tractor) is utilized within the rows to help eradicate weeds. Hand hoeing is then accomplished to reach weeds not eradicated by cultivators. Grass is mowed four times throughout the year.
2. **Fertilizer Program.** Supplemental nitrogen, 220 lb of urea (45-0-0) per acre, is side dressed in early fall for increased plant growth.
3. **Pest Control.** Pest control is obtained through the use of insecticides (24 oz of Malathion 57EL and 1.25 lb of Carbaryl 80WP per acre) and fungicides (0.5 lb of Thiophanate WP per acre). They are sprayed onto the plants three times per growing season, utilizing an airblast sprayer pulled by a tractor.
4. **Pruning.** Tips of branches are pruned with hand shears to induce branching.

#### February-April of Second and Third Production Years

1. **Pruning.** Corrective pruning is carried out to induce better branching.

#### **May-September of Second and Third Production Years**

1. **Plant maintenance.** Maintenance is identical to the first year.

#### **October of Third Production Year**

1. **Harvesting.** One-fourth (25%) of the salable crop is selected, and tagged for digging (small nursery 683 plants, large nursery 2,989 plants). A digging crew of seven mechanically digs and transports 16.8 (2.4 per man hour) plants per hour to pallets on a wagon parked at the side of the field. A second crew transports and unloads the palletized plants into the shipping area according to customer orders.
2. **Shipping.** All plants harvested are loaded onto a semitruck. A crew of four with an articulated four-wheel drive loader, can load 140 plants (truck capacity) in 2½ hours.

#### **November-December of Third Production Year**

1. **Harvesting and Overwintering.** An additional 25% of the total salable stock is dug for early spring sales (small nursery 683 plants, large nursery 2,989 plants). Pallets of dug material are unloaded and spaced in rows by variety and size. Overwintering includes "heeling-in" the plants in wood chips.
2. **Irrigation.** The permanent irrigation system, in conjunction with above ground pipe, is used an estimated five times to supply moisture to supplement natural rainfall.
3. **Rabbit Control.** Trunks are sprayed with rabbit repellent.

#### **January-March of Fourth Production Year**

1. **Inspection of Fall Dug Materials.** Fall dug plants are checked for winter damage (mice, rabbits, sunscald).
2. **Rabbit Control.** A second application of rabbit repellent is sprayed on tree trunks.
3. **Shipping of Fall Dug Material.** Shipments of overwintered plants start in late February, with stock being loaded onto pallets, hauled to the shipping area, and loaded onto trucks. Approximately 18.5% of the total salable crop is shipped (small nursery 505 plants, large nursery 2,211 plants).
4. **Harvesting.** One-fifth (20%) of the total salable crop is harvested (small nursery 546 plants, large nursery 2,391 plants).

#### **April of Fourth Field Production Year**

1. **Inspection and Shipping of Remaining Fall Dug Material.** Any remaining overwintered stock is shipped. Care is exercised to avoid mixing overwintered and spring harvested plants.
2. **Harvesting.** The remaining 30% of the total salable crop is harvested and hauled into the shipping area or

holding area prior to "leaf-out" in the field (small nursery 820 plants, large nursery 3,586 plants).

3. **Irrigation.** Plants are irrigated using a portable irrigation system combined with the inground system to help supplement natural rainfall, especially during sunny and windy days.
4. **Shipping.** Approximately 38% of the total salable crop is shipped (small nursery 1,038 plants, large nursery 4,543 plants).

#### **May of Fourth Field Production Year**

1. **Irrigation.** Five irrigations are supplied to remaining salable plants to maintain quality.
2. **Shipping.** The remaining 18.5% of salable plants are pulled from the holding area, transported on pallets to the shipping area, loaded, and shipped (small nursery 505 plants, large nursery 2,211 plants).
3. **Shifting of Irrigation Equipment.** Portable irrigation pipe is taken down and used in the summer irrigation system of the bed liners.

#### **Summer and Fall of Fourth Field Production Year**

1. **Land Preservation.** After the last plants are harvested, the empty fields are left fallow. Fallow fields are disked for weed control four times during summer months.
2. **Land Preparation.** Fields are plowed in the fall in preparation for spring planting.

**TABLE 1.--Capital Requirements for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Description~	Unit	Useful Life (yr)	Quantity	Cost per Unit (\$)	Total Cost (\$)	Percent of Total Cost
Land	Unimproved land	acre	--	50	3,500	175,000	21
+Improvements	Grading, tiling, graveling, pond		20			160,770	19
Subtotal						335,770	40
<b>Buildings</b>							
Office and restrooms	20' x 40'	sq ft	20	800	53	42,000	5
Plant and supply storage	40' x 50'	sq ft	20	2,000	11	22,260	3
Machinery storage and shop	40' x 50'	sq ft	20	2,000	13	25,000	3
Polyhouse structures	200' x 20'	each	10	5	4,146	20,730	2
Subtotal						109,990	13
<b>Machinery and Equipment</b>							
Tractor, 100 hp	100 hp. diesel fuel	each	10	1	54,900	39,079	5
Tractor, 34 hp	34 hp. gas fuel	each	10	2	37,800	75,600	9
Articulated 4-wheel drive loader	Coyote C8--lift capacity = 3,000 lb	each	10	1	42,500	42,500	5
Tree spade	530P handles 20", 22" and 24" + lift pads	each	2	1	9,080	9,080	1
Forks	For front-end loaders	each	10	1	0	0	++
Plow	4-14" plows	each	10	1	12,170	12,170	1
Disk	8' wide	each	10	1	1,450	1,450	++
Harrow	10' wide	each	10	1	1,650	1,650	++
Cultimulcher--Bed area	10' wide	each	10	1	12,325	12,325	1
Sprayrig (boom sprayer)	100" gallon tank with 7' and 10' booms	each	7	1	1,955	1,955	++
Transplanter, 3-row	3-20" row bed transplanter	each	10	1	4,026	4,026	++
Transplanter, 1-row	Tree planter	each	10	1	3,150	3,150	++
Permanent irrigation/well pump	100 hp electric pump	each	20	1	45,535	45,535	5
In-ground irrigation/bed area	PVC pipe/valves		20		18,948	18,948	2
Above ground irrigation/bed area	Aluminum pipe/valves/sprinkler heads		5		1,688	1,688	++
In-ground irrigation storage/holding	PVC pipe/valves		20		12,632	12,632	1
Above-ground irrigation storage/holding	Aluminum pipe/valves/sprinkler heads		5		2,478	2,478	++
Traveler gun-field irrigation	450-500 gallons per minute		10		14,750	14,750	2
Portable irrigation pump (emergency)	40 hp P.T.O. irrigation pump/foot valve	each	10	1	5,140	5,140	++
Airblast sprayer	FMC--300 gallon high pressure on trailer	each	7	1	9,748	9,748	1
Fertilizer injector	26-gallon injector--bed use	each	5	2	1,430	1,430	++
Transplanter, 2-row	2-42/48" row field transplanter	each	10	1	8,048	8,048	++
U-Blade--field	18" for undercutting	each	5	1	897	897	++
Undercutter--bed	Bed undercutter, 50" blade, lift tines	each	7	1	8,657	8,657	1
Fertilizer sidedresser	2-row sidedresser	each	10	1	1,950	1,950	++
Cultivator, 2-row	2-row field cultivator	each	7	1	1,750	1,750	++
Wagon	4-wheel, farm wagon	each	10	4	1,241	4,964	++
Cultivator, 3-row	3-row bed cultivator	each	7	1	5,000	5,000	++
Truck	1/2-ton pickup truck	each	5	1	17,000	17,000	2
Pallets	Wooden	each	2	181	8	1,448	++
Hand tools	Miscellaneous	sets	5	20	168	3,355	++
Seeder	Broadcast seeder		10	1	425	425	++
Mower	7"--3-blade mower		10	1	2,287	2,287	++
Flatbed truck**	24' flatbed, gas fuel		5	0.50	47,950	23,975	3
<b>Heating system for propagation</b>							
Gas-fired unit heater--Reznor	200,000 BTU (input)	each	10	1	762	762	++
Fan jet	Acme	each	10	1	1,463	1,463	++
Thermostat	Two-stage	each	10	1	94	94	++
Set-up for propane~~	Ventilator, regulator, etc.	each	10	1	150	150	++
Set-up for heating system	Plywood, braces, bolts, etc.	each	10	1	150	150	++

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed areas, roads, etc.

~For details on individual items, see the following tables: land improvements-Table 2; polyhouse construction-Table 3; overall irrigation system-Table 4; irrigation for winter storage and holding area-Table 4a; irrigation for bed and field-Table 4b; well and electric pump-Table 4c.

++Less than one-half of 1%.

\*\*One-half the cost of a flatbed truck was budgeted for the small nursery's field production.

~~Propane tanks, connectors, etc. will be leased from the company supplying propane.



**TABLE 1(continued).--Capital Requirements for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Description~	Unit	Useful Life (yr)	Quantity	Cost per Unit (\$)	Total Cost (\$)	Percent of Total Cost
Machinery and Equipment (continued)							
Other propagation materials							
Misting system	Mist-a-matic, solenoid, strainer	each	2	3	311	933	++
Pipe and nozzles	For misting system		2	1	402	402	++
Treated boards	5/4" x 8" x variable length	foot	2	330	0.55	182	++
Heating cable	Propagation	foot	2	47,040	0.05	2,352	++
Subtotal						401,578	47
TOTAL						847,338	100

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed areas, roads, etc.

~For details on individual items, see the following tables: land improvements-Table 2; polyhouse construction-Table 3; overall irrigation system-Table 4; irrigation for winter storage and holding area-Table 4a; irrigation for bed and field-Table 4b; well and electric pump-Table 4c.

++Less than one-half of 1%.

\*\*One-half the cost of a flatbed truck was budgeted for the small nursery's field production.

~~Propane tanks, connectors, etc. will be leased from the company supplying propane.

**TABLE 1a.--Capital Requirements for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Description~	Unit	Useful		Cost per Unit (\$)	Total Cost (\$)	Percent of Total Cost
			Life (yr)	Quantity			
Land	Unimproved land	acre	--	200	3,500	700,000	35
+Improvements	Grading, tilling, graveling, pond		20			433,432	21
Subtotal						1,133,432	56
<b>Buildings</b>							
Office and restrooms	20' x 40'	sq ft	20	800	53	42,000	2
Plant and supply storage	40' x 50'	sq ft	20	2,000	11	22,260	1
Machinery storage and shop	40' x 50'	sq ft	20	2,000	13	25,000	1
Polyhouse structures	200' x 20'	each	10	21	4,146	87,066	4
Subtotal						176,326	9
<b>Machinery and Equipment</b>							
Tractor, 100 hp	100 hp. diesel fuel	each	10	1	54,900	54,900	3
Tractor, 60 hp	60 hp, diesel fuel	each	10	1	35,865	35,865	2
Tractor, 34 hp	34 hp. gas fuel	each	10	4	18,000	72,000	4
Articulated 4-wheel drive loader	Kubota R420--lift capacity = 2,000 lb	each	10	2	38,500	77,000	4
Articulated 4-wheel drive loader	Kubota R520--lift capacity = 3,000 lb	each	10	2	42,500	85,000	4
Tree spade	530P handles 20", 22" and 24" + lift pads	each	2	2	9,080	18,160	++
Forks	For front-end loaders	each	10	4	0	0	++
Plow	4-14" plows	each	10	1	12,170	12,170	++
Disk	8' wide	each	10	1	1,450	1,450	++
Harrow	10' wide	each	10	1	1,650	1,650	++
Cultimulcher--Bed area	10' wide	each	10	1	12,325	12,325	++
Sprayrig (boom sprayer)	100" gallon tank with 7' and 10' booms	each	7	1	1,995	1,995	++
Transplanter, 3-row	3-20" row bed transplanter	each	10	1	4,026	4,026	++
Transplanter, 1-row	Tree planter	each	10	1	3,150	3,150	++
Permanent irrigation/well pump	100 hp electric pump	each	20	1	45,535	45,535	2
In-ground irrigation/bed area	PVC pipe/valves		20		52,447	52,447	3
Above ground irrigation/bed area	Aluminum pipe/valves/sprinkler heads		5		4,012	4,012	++
In-ground irrigation storage/holding	PVC pipe/valves		20		31,747	31,747	2
Above-ground irrigation storage/holding	Aluminum pipe/valves/sprinkler heads		5		9,109	9,109	++
Traveler gun-field irrigation	450-500 gallons per minute		10	1	14,750	14,750	++
Portable irrigation pump (emergency)	40 hp P.T.O. irrigation pump/foot valve	each	10	1	5,140	5,140	++
Airblast sprayer	FMC--300 gallon high pressure on trailer	each	7	1	9,748	9,748	++
Fertilizer injector	26-gallon injector	each	5	2	1,430	2,860	++
Transplanter, 2-row	2-42/48" row field transplanter	each	10	1	8,048	8,048	++
U-Blade--field	18" for undercutting	each	5	1	897	897	++
Undercutter--bed	Bed undercutter, 50" blade, lift tines	each	7	1	8,657	8,657	++
Fertilizer sidedresser	2-row sidedresser	each	10	1	1,950	1,950	++
Cultivator, 2-row	2-row field cultivator	each	7	2	1,750	3,500	++
Wagon	4-wheel, farm wagon	each	10	8	1,241	9,928	++
Cultivator, 3-row	3-row bed cultivator	each	7	1	5,500	5,500	++
Truck	1/2-ton pickup truck	each	5	2	17,000	34,000	2
Pallets	Wooden	each	2	482	28	13,496	++
Hand tools	Miscellaneous	sets	5	76	168	12,768	++
Seeder	Broadcast seeder		10	1	425	425	++
Mower	7"--3-blade mower		10	1	2,287	2,287	++
Flatbed truck	24' flatbed, gas fuel		5	1	47,950	47,950	2
<b>Heating system for propagation</b>							
Gas-fired unit heater--Modine	200,000 BTU (input)	each	10	2	762	1,524	++
Fan jet	Acme	each	10	2	1,463	2,926	++
Thermostat	Two-stage	each	10	2	94	188	++
Set-up for propane**	Ventilator, regulator, etc.	each	10	2	150	300	++
Set-up for heating system	Plywood, braces, bolts, etc.	each	10	2	150	300	++

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed areas, roads, etc.

--For details on individual items, see the following tables: land improvements-Table 2; polyhouse construction-Table 3; overall irrigation system-Table 4; irrigation for winter storage and holding area-Table 4a; irrigation for bed and field-Table 4b; well and electric pump-Table 4c.

++Less than one-half of 1%.

\*\*Propane tanks, connectors, etc. will be leased from the company supplying propane.

**TABLE 1a(continued).--Capital Requirements for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Description~	Unit	Useful		Cost per Unit (\$)	Total Cost (\$)	Percent of Total Cost
			Life (yr)	Quantity			
Machinery and Equipment (continued)							
Other propagation materials							
Misting system	Mist-a-matic	each	2	6	311	1,866	++
Pipe and nozzles	For misting system		2	2	402	804	++
Treated boards	5/4" x 8" x variable length	foot	2	1,320	0.55	726	++
Heating cable	Propagation	foot	2	47,040	0.05	2,352	++
Subtotal						715,431	35
TOTAL						2,025,189	100

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed areas, roads, etc.

~For details on individual items, see the following tables: land improvements-Table 2; polyhouse construction-Table 3; overall irrigation system-Table 4; irrigation for winter storage and holding area-Table 4a; irrigation for bed and field-Table 4b; well and electric pump-Table 4c.

++Less than one-half of 1%.

\*\*Propane tanks, connectors, etc. will be leased from the company supplying propane.

**TABLE 2.--Land Improvement Costs for 50- and 200-Acre Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Unit	Cost per Unit (\$)	50-Acre Field Nursery*		200-Acre Field Nursery~	
			Quantity (units)	Total Cost (\$)	Quantity (units)	Total Cost (\$)
<b>Grading</b>						
Grading of land and pond top soil removal, 410.0 cu yd per acre @ \$2.08 per cu yd	acre	852 ++	5.60	4,771	13.64	11,621
Grading including cutting and filling, 900 cu yd per acre @ \$2.08 per cu yd	acre	1,872	5.60	10,483	13.64	25,534
Grading for pond				<u>22,815</u>		<u>22,815</u>
Subtotal				<u>38,069</u>		<u>59,970</u>
<b>Tiling (Water Drainage)</b>						
Central production facilities						
30" cement pipe @ \$21.75/ft. installation labor @ \$13.81/ft.	ft	36	900.00	32,004	1,450.00	51,562
Bed area	acre	1,306	1.89	2,468	6.82	8,907
4" plastic tile, 30' on center, herringbone design, 42" depth						
Field area	acre	1,306	42.25	55,179	176.00	229,856
4" plastic tile, 30' on center herringbone design, 42" depth						
Subtotal				<u>89,651</u>		<u>290,325</u>
<b>Graveling</b>						
Production area within polyhouse structures, 20' x 200', 3" depth of #9 gravel = 37.04 cu yd per polyhouse or 37.04 ton @ \$12.50/ton delivered and spread	polyhouse	463.00	185.20	85,748	778.00	360,214
Area between polyhouse structures, 4" depth of #4 gravel = 49.38 cu yd or 49.38 ton per 20' x 200' section @ \$12.50/ton delivered and spread	20' x 200' section	617.25	148.14	91,439	629.68	388,670
Production area excluding grass, growing areas, pond--4" depth of #4 gravel = 532.4 cu yd or 532.4 ton per acre @ \$12.50/ton delivered and spread	acre	6,655.00	4.34	<u>28,883</u>	9.64	<u>64,154</u>
Subtotal				<u>206,070</u>		<u>813,038</u>
<b>TOTAL</b>				<b>333,790</b>		<b>*****</b>

\*50 acres total; 7.75 acres of production facilities, holding and field-bed area.

~200 acres total; 23.97 acres of production facilities, holding and field-bed area

++Soil removed for grading was not sold; rather it was placed in the field area.

**TABLE 3.--Cost of Polyhouse Construction for 50- and 200-Acre Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Cost per Item (\$)	Number of Items per Polyhouse	Cost per Polyhouse (\$)	50-Acre Field Nursery*		200-Acre Field Nursery~	
				Number of Polyhouses	Total Cost (\$)	Number of Polyhouses	Total Cost (\$)
<b>Polyhouse Framework-- 20' x 200'</b>							
Galvanized steel pipe arches, 3/4" x 32' lengths @ \$1.32 ft	1.32	51 ea	67	5	335	21	1,407
Ground inserts, 1" x 4.2' @ \$1.24 ft	1.24	102 ea	126	5	630	21	2,646
Threaded ridge line, 3/4" x 200' @ \$1.10 ft	1.10	1 ea	1	5	5	21	21
End braces, 3/4" x 32' @ \$1.10 ft	1.10	4 ea	4	5	20	21	84
Subtotal			198		990		4,158
<b>Hardware</b>							
Bolts for connecting arches and ground inserts, 3" x 3/4"	0.12	102 ea	12	5	60	21	252
Hinges, 3" rustproof	2.59	12 ea	31	5	155	21	651
Door latch, hasp	5.29	2 ea	11	5	55	21	231
Subtotal			54		270		1,134
<b>Wood--Treated White Pine</b>							
1 5/4" x 8" x roughcut 3 graded or better	0.90	440 ft	396	5	1,980	21	8,316
2" x 4" x 8' rough	2.65	4 ea	11	5	55	21	231
2" x 4" x 12' rough	4.72	4 ea	19	5	95	21	399
1" x 6" x 8' rough	3.04	4 ea	12	5	60	21	252
1" x 6" x 12' rough	4.56	4 ea	18	5	90	21	378
2" x 2" x 8' finished	2.50	5 ea	13	5	65	21	273
Subtotal			469		2,345		9,849
Labor Requirements	8.58 ++	100 hr	858	5	4,290	21	18,018
Miscellaneous			200	5	1,000	21	4,200
<b>TOTAL</b>			<b>1,779 **</b>		<b>8,895</b>		<b>37,359</b>

\*50 acres total; 20,000 sq ft of polyhouse space.

~200 acres total; 84,000 sq ft of polyhouse space.

++Average basic wage before withholding taxes and fringe benefits \$6.50; taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

\*\*Approximately \$2.25 per square foot.

**TABLE 4.--Costs of Irrigation Systems for 50- and 200-Acre Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	50-Acre Field Nursery*	200-Acre Field Nursery~
	Total Cost (\$)	Total Cost (\$)
Winter Storage and Holding Area++		
In-ground irrigation system	12,632	31,747
Above-ground irrigation system		
Polyhouse structures	1,248	4,840
Holding area	1,230	4,269
Subtotal (winter storage and holding area)	15,110	40,856
Field/Bed irrigation**		
In-ground irrigation system	20,244	55,039
Above-ground irrigation system	1,688	4,012
Traveler gun	14,750	14,750
Subtotal (field/bed irrigation)	36,682	73,801
TOTAL (not including well and pump)	51,792	114,657
Cost of Well~~	8,000	8,000
Cost of Pump~~	37,535	37,535
Total for irrigation System	97,327	160,192

\*50 acres total.

~200 acres total.

++For details, see Table 4a.

\*\*For details, see Table 4b.

~~For details, see Table 4c.

**TABLE 4c.--Specifications and Costs of Installing a 100 hp Electric Pump and an 80-Foot Well, USDA Plant Hardiness Zones 5 and 6, 1997.**

Specifications	Total Cost (\$)
Pump--above ground, 100 hp* lineshaft, 1800 rpm	
Basic electric motor	5,374
Discharge head, 8"	2,555
Standard 10' length, column, 80' depth assembly 8" x 1-1/2"	5,360
Suction pipe, 8" x 10'	320
Pump bowl assembly--3-stage, 12" pump	3,350
Air line gauge and air line	240
Well seal, well plate, cement	2,550
Electrical equipment	3,165
Installation fee	1,200
Right angle gear drive, auxiliary power source using a tractor	5,000
Subtotal	29,114
+Freight @10%	2,911
+Building	5,510
Total cost for pump, including shelter	37,535
Well Drilling	
Casting diameter, 14" O.D.	8,000
Total cost for well	8,000
TOTAL	45,535

\*A 100 hp pump can supply 900 gallons of water per minute at 65 psi given the specifications and site location.

**TABLE 4a.--Costs of Irrigation Systems for the Winter Storage and Holding Areas for 50- and 200-Acre Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Unit	Cost per Unit (\$)	50-Acre Field Nursery*		200-Acre Field Nursery~	
			Quantity Needed	Total Cost (\$)	Quantity Needed	Total Cost (\$)
<b>In-ground Irrigation System</b>						
8" pipe, Class 200 PVC	ft	3.25	506	1,645	1,656	5,382
6" pipe, Class 200 PVC	ft	2.20	640	1,408	1,089	2,396
4" pipe, Class 200 PVC	ft	1.05	379	398	1,114	1,170
2" pipe, Class 200 PVC	ft	0.30	36	11	124	37
Additional required equipment, estimated at 20% of pipe value				692		1,797
Installation charges						
for 6" and 8" pipe	ft	5.96	1,146	6,830	2,745	16,360
for 2" and 4" pipe	ft	3.72	443	1,648	1,238	4,605
Subtotal				12,632		31,747
<b>Above-ground Irrigation System</b>						
1. Polyhouse structures--storage						
1-frost-free hydrant 1" @ \$65.00						
200 ft of 1" PVC pipe @ \$0.39/ft = \$78.00						
Installation labor/parts, estimated at 30% of pipe cost = \$23.40						
10-rotating sprinklers, Nelson Whizhead 5/64" nozzles @ \$3.50 = \$35.50						
	polyhouse	201.90	5	1,248 ++	21	4,840 ++
2. Holding area						
3" pipe, latchless aluminum	ft	1.39	600	834	2,080	2,891
Additional fittings 20% of pipe cost				167		578
Pipe riser 3/4" diameter x 48"	ea	2.16	10	22	35	76
Rotating sprinklers, #30H Rainbird, nozzle size 5/32" x 3/32"	ea	20.68	10	207	35	724
Subtotal (above-ground irrigation system for storage and holding area)				2,478		9,109
<b>TOTAL</b>				15,110		40,856

\*50 acres total.

~200 acres total.

++Cost includes extra frost-free hydrants used in other areas.

**TABLE 4b.--Costs of Bed and Field Irrigation for 50- and 200-Acre Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Unit	Cost per Unit (\$)	50-Acre Field Nursery*		200-Acre Field Nursery~	
			Quantity Needed	Total Cost (\$)	Quantity Needed	Total Cost (\$)
<b>Field/Bed Irrigation</b>						
In-ground irrigation system						
8" pipe, PVC mainline pipe	ft	3.25	450	1,463	4,372	14,209
6" pipe, PVC mainline pipe	ft	2.47	1,659	4,098	1,008	2,490
4" pipe, PVC upright pipe	ft	1.37	4	5	64	88
Hydrant	ea	135.00	8	1,080	16	2,160
Additional required equipment, estimated at 20% of pipe and hydrant value				1,329		3,789
Installation charges						
for 6" and 8" pipe	ft	5.96	2,056	12,254	5,380	32,065
for 4" pipe	ft	3.72	4	15	64	238
Subtotal (in-ground irrigation system)				20,244		55,039
Above-ground irrigation system						
3" pipe, aluminum portable latchless	ft	1.39	820	1,140	1,940	2,697
Additional required latchless estimated at 20% of pipe value				228		539
Sprinkler risers 3/4" x 48"	ea	2.16	14	30	34	73
Rotating sprinkler, #30H Rainbird, nozzle size 5/32" x 3/32"	ea	20.68	14	290	34	703
Subtotal (above-ground irrigation system)				1,688		4,012
Traveler gun 450-500 gpm	ea	14,750	1	14,750	1	14,750
<b>Total Bed and Field Irrigation</b>				<b>36,682</b>		<b>73,801</b>

\*50 acres total.

~200 acres total.



**TABLE 5.--Annual Fixed Costs (\$) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

Item	Description	Depreciation~	Interest++	Insurance and Taxes**	Total
Land	Unimproved land	--	21,000	3,500	24,500
+Improvements	Grading, tiling, graveling, pond	7,235	19,292	3,215	29,742
Subtotal		7,235	40,292	6,715	54,242
Buildings					
Office and restrooms	20' x 40'	1,890	5,040	1,027	7,957
Plant and supply storage	40' x 50'	1,002	2,671	544	4,217
Machinery storage and shop	40' x 50'	1,125	3,000	612	4,737
Polyhouse structures (5 ea)	200' x 20'	1,866	2,488	507	4,861
Subtotal		5,883	13,199	2,690	21,772
Machinery and Equipment					
Tractor, 100 hp	100 hp, diesel fuel	3,517	4,689	148	8,354
Tractor, 34 hp (2 ea)	34 hp, gas fuel	6,804	9,072	286	16,162
Articulated 4-wheel drive loader	Coyote C8--lift capacity = 3,000 lb.	3,825	5,100	161	9,086
Tree spade	530p handles 20", 22", and 24" + lift pads	4,086	1,090	34	5,210
Forks	For front-end loaders	0	0	~~	0
Plow	3-14" plows	1,095	1,460	46	2,601
Disk	8" wide	131	174	5	310
Harrow	10' wide	149	198	6	353
Cultmulcher--bed area	10' wide	1,109	1,479	47	2,635
Sprayrig (boom sprayer)	100-gallon tank with 10' boom	251	235	7	493
Transplanter, 3-row	3-20" row bed transplanter	362	483	15	860
Transplanter, 1-row	Tree planter	284	378	12	674
Permanent irrigation/well pump	100 hp electric pump	2,049	5,464	172	7,685
In-ground irrigation/bed area	PVC pipe/valves	853	2,274	72	3,199
Above-ground irrigation/bed area	Aluminum pipe/valves/sprinkler heads	304	203	6	513
In-ground irrigation storage/holding	PVC pipe/valves	568	1,516	48	2,132
Above-ground irrigation storage/holding	Aluminum pipe/valves/sprinkler heads	446	297	9	752
Traveler gun--field irrigation	450-500 gallons per minute	1,328	1,770	56	3,154
Portable irrigation pump	40 hp P.T.O. irrigation pump/foot valve	463	617	19	1,099
Airblast sprayer	300 gallon high pressure on trailer	1,253	1,170	37	2,460
Fertilizer injector (2 ea)	26-gallon injector--bed use	257	172	5	434
Transplanter, 2-row	2-42" row field transplanter	724	966	30	1,720
U-blade--field	18" for undercutting	161	108	3	272
Undercutter--bed	Bed undercutter, 50" blade, lift tines	1,113	1,039	33	2,185
Fertilizer sidedresser	2-row sidedresser	176	234	7	417
Cultivator, 2-row	2-row field cultivator	225	210	7	442
Wagons (4 ea)	4-wheel, farm wagon	447	596	19	1,062
Cultivator, 3-row	3-row bed cultivator	643	600	19	1,262
Truck	1/2 ton pickup truck	3,060	2,040	64	5,164
Pallets (181 ea)	Wooden	652	174	5	831
Hand tools (20 sets)	Miscellaneous	604	403	13	1,020
Seeder	Broadcast seeder	38	51	2	91
Mower	7'-3-blade mower	206	274	9	489
Flatbed truck (1/2 unit)	24' flatbed, gas fuel	4,316	2,877	91	7,284
Heating system for propagation					
Gas-fired unit heater--Reznor	200,000 BTU (input)	69	91	3	163
Fan jet	Acme	132	176	6	314

\*Total of 50 acres, with 40 acres in growing space and 10 acres in production facilities, holding area, field bed area, roads, etc.

~Depreciation was estimated by dividing initial cost (adjusted for a 10% salvage value) by the years of useful life.

++Interest costs were estimated by multiplying the initial value of land, buildings, equipment, and machinery by the interest rate, 12% per annum.

\*\*Insurance and taxes: Land and improvements--only taxes are assessed, at a rate of \$20 per \$1,000 of market value.

Buildings--taxes assessed at a rate of \$20 per \$1000 of market value. Insurance, \$500 deductible, at \$4.46 per \$1,000 of market value.

Total for category = \$24.46 per \$1,000.

Machinery and equipment--taxes are not assessed in Ohio on personal property. Insurance, \$500 deductible, at \$3.78 per \$1,000 of initial value.

~~Less than \$0.50.

~~~Insurance for personnel was estimated at 32% of salaries for owner/operator, supervisor, and clerical.

\*\*\*Owner/operator = \$35,000, supervisor = \$24,000, clerical = \$12,000, supplies 10% or \$7100. Total = \$78,100.

**TABLE 5(continued).--Annual Fixed Costs (\$) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                                          | Description                                                | Depreciation~ | Interest++ | Insurance and Taxes** | Total          |
|---------------------------------------------------------------|------------------------------------------------------------|---------------|------------|-----------------------|----------------|
| <b>Machinery and Equipment (continued)</b>                    |                                                            |               |            |                       |                |
| Thermostat                                                    | Two-stage                                                  | 8             | 11         | ~~                    | 19             |
| Set-up for propane                                            | Ventilator, regulator, etc.                                | 14            | 18         | 1                     | 33             |
| Set-up for heating system                                     | Plywood, braces, bolts, etc.                               | 14            | 18         | 1                     | 33             |
| <b>Other propagation materials</b>                            |                                                            |               |            |                       |                |
| Misting systems (3 ea)                                        | Mist-a-matic                                               | 420           | 112        | 4                     | 536            |
| Pipe and nozzle                                               | For misting systems                                        | 181           | 48         | 2                     | 231            |
| Treated Boards                                                | 5/4" x 8" x variable length                                | 82            | 22         | 1                     | 105            |
| Heating cable                                                 | Propagation                                                | 1,058         | 282        | 9                     | 1,349          |
| Subtotal                                                      |                                                            | 43,477        | 48,191     | 1,518                 | 93,186         |
| <b>Total for Depreciation, Interest, Insurance, and Taxes</b> |                                                            | 56,595        | 101,682    | 10,923                | 169,200        |
| <b>General Overhead</b>                                       |                                                            |               |            |                       |                |
| Utilities                                                     | Telephone, electric, gas heat                              |               |            |                       | 7,340          |
| Licenses and bonds                                            |                                                            |               |            |                       | 475            |
| General repairs and maintenance                               | Buildings, grounds, roads                                  |               |            |                       | 8,359          |
| Advertising and printing                                      |                                                            |               |            |                       | 1,420          |
| Insurance, personnel~~~                                       | Workman's compensation                                     |               |            |                       | 22,720         |
|                                                               | FICA, health, unemployment                                 |               |            |                       | 2,250          |
| Travel and professional fees                                  |                                                            |               |            |                       | 78,100         |
| Administrative and management***                              | Clerical, operator, supervisory labor, and office supplies |               |            |                       | 1,185          |
| Miscellaneous                                                 |                                                            |               |            |                       | 121,849        |
| Subtotal                                                      |                                                            |               |            |                       |                |
| Interest on General Overhead, Insurance and Taxes             | 12% per annum for 6 months on a total of \$132,883         |               |            |                       | 7,966          |
| <b>Total Annual Fixed Costs</b>                               |                                                            |               |            |                       | <b>299,016</b> |

\*Total of 50 acres, with 40 acres in growing space and 10 acres in production facilities, holding area, field bed area, roads, etc.  
~Depreciation was estimated by dividing initial cost (adjusted for a 10% salvage value) by the years of useful life.  
++Interest costs were estimated by multiplying the initial value of land, buildings, equipment, and machinery by the interest rate, 12% per annum.  
\*\*Insurance and taxes.  
Land and improvements--only taxes are assessed, at a rate of \$20 per \$1,000 of market value.  
Buildings--taxes assessed at a rate of \$20 per \$1,000 of market value. Insurance, \$500 deductible, at \$4.46 per \$1,000 of market value.  
Total for category = \$24.46 per \$1,000.  
Machinery and equipment--taxes are not assessed in Ohio on personal property. Insurance, \$500 deductible, at \$3.78 per \$1,000 of initial value.  
~~Less than \$0.50.  
~~~Insurance for personnel was estimated at 32% of salaries for owner/operator, supervisor, and clerical.  
\*\*\*Owner/operator = \$35,000, supervisor = \$24,000, clerical = \$12,000, supplies 10% or \$7100. Total = \$78,100.

**TABLE 5a.-Annual Fixed Costs (\$) for 200-Acre Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                    | Description                                | Depreciation~ | Interest++ | Insurance and Taxes** | Total   |
|---|--|---------------|------------|-----------------------|---------|
| Land                                    | Unimproved land                            | --            | 84,000     | 14,000                | 98,000  |
| +Improvements                           | Grading, tiling, graveling, pond           | 19,504        | 52,012     | 8,669                 | 80,185  |
| Subtotal                                |  | 19,504        | 136,012    | 22,669                | 178,185 |
| Buildings                               |  |               |            |                       |         |
| Office and restrooms                    | 20' x 40'                                  | 1,890         | 5,040      | 1,027                 | 7,957   |
| Plant and supply storage                | 40' x 50'                                  | 1,002         | 2,671      | 544                   | 4,217   |
| Machinery storage and shop              | 40' x 50'                                  | 1,125         | 3,000      | 612                   | 4,737   |
| Polyhouse structures (21 ea)            | 200' x 20'                                 | 7,836         | 10,448     | 2,130                 | 20,414  |
| Subtotal                                |  | 11,853        | 21,159     | 4,313                 | 37,325  |
| Machinery and Equipment                 |  |               |            |                       |         |
| Tractor, 100 hp                         | 100 hp, diesel fuel                        | 4,941         | 6,588      | 208                   | 11,737  |
| Tractor, 60 hp                          | 60 hp, diesel fuel                         | 3,228         | 4,304      | 136                   | 7,668   |
| Tractor, 34 hp (4 ea)                   | 34 hp, gas fuel                            | 6,480         | 8,640      | 272                   | 15,392  |
| Articulated 4-wheel drive loader(2)     | Coyote C3--lift capacity = 2,000 lb        | 6,930         | 9,240      | 291                   | 16,461  |
| Articulated 4-wheel drive loader(2)     | Coyote C8--lift capacity = 3,000 lb.       | 7,650         | 10,200     | 321                   | 18,171  |
| Tree spade (2 ea)                       | 530p handles 20", 22", and 24" + lift pads | 8,172         | 2,179      | 69                    | 10,420  |
| Forks                                   | For front-end loaders                      | 0             | 0          | ~~                    | 0       |
| Plow                                    | 3-14" plows                                | 1,095         | 1,460      | 46                    | 2,601   |
| Disk                                    | 8" wide                                    | 131           | 174        | 5                     | 310     |
| Harrow                                  | 10' wide                                   | 149           | 198        | 6                     | 353     |
| Cultimulcher--bed area                  | 10' wide                                   | 1,109         | 1,479      | 47                    | 2,635   |
| Sprayrig (boom sprayer)                 | 100-gallon tank with 10' boom              | 257           | 239        | 8                     | 504     |
| Transplanter, 3-row                     | 3-20" row bed transplanter                 | 362           | 483        | 15                    | 860     |
| Transplanter, 1-row                     | Tree planter                               | 284           | 378        | 12                    | 674     |
| Permanent irrigation/well pump          | 100 hp electric pump                       | 2,049         | 5,464      | 172                   | 7,685   |
| In-ground irrigation/bed area           | PVC pipe/valves                            | 2,360         | 6,294      | 198                   | 8,852   |
| Above-ground irrigation/bed area        | Aluminum pipe/valves/sprinkler heads       | 722           | 481        | 15                    | 1,218   |
| In-ground irrigation storage/holding    | PVC pipe/valves                            | 1,429         | 3,810      | 120                   | 5,359   |
| Above-ground irrigation storage/holding | Aluminum pipe/valves/sprinkler heads       | 1,640         | 1,093      | 34                    | 2,767   |
| Traveler gun--field irrigation          | 450-500 gallons per minute                 | 1,328         | 1,770      | 56                    | 3,154   |
| Portable irrigation pump                | 40 hp P.T.O. irrigation pump/foot valve    | 463           | 617        | 19                    | 1,099   |
| Airblast sprayer                        | 300 gallon high pressure on trailer        | 1,253         | 1,170      | 37                    | 2,460   |
| Fertilizer injector (2 ea)              | 26-gallon injector--bed use                | 515           | 343        | 11                    | 869     |
| Transplanter, 2-row                     | 2-42" row field transplanter               | 724           | 966        | 30                    | 1,720   |
| U-blade--field                          | 18" for undercutting                       | 161           | 108        | 3                     | 272     |
| Undercutter--bed                        | Bed undercutter, 50" blade, lift tines     | 1,113         | 1,039      | 33                    | 2,185   |
| Fertilizer sidedresser                  | 2-row sidedresser                          | 176           | 234        | 7                     | 417     |
| Cultivator, 2-row (2 ea)                | 2-row field cultivator                     | 450           | 420        | 13                    | 883     |
| Wagons (8 ea)                           | 4-wheel, farm wagon                        | 894           | 1,191      | 38                    | 2,123   |
| Cultivator, 3-row                       | 3-row bed cultivator                       | 707           | 660        | 21                    | 1,388   |
| Truck (2 ea)                            | 1/2 ton pickup truck                       | 6,120         | 4,080      | 129                   | 10,329  |
| Pallets (482 ea)                        | Wooden                                     | 6,073         | 1,620      | 51                    | 7,744   |
| Hand tools (76 sets)                    | Miscellaneous                              | 2,298         | 1,532      | 48                    | 3,878   |
| Seeder                                  | Broadcast seeder                           | 38            | 51         | 2                     | 91      |
| Mower                                   | 7'-3-blade mower                           | 206           | 274        | 9                     | 489     |
| Flatbed truck                           | 24' flatbed, gas fuel                      | 8,631         | 5,754      | 181                   | 14,566  |

\*Total of 200 acres, with 175 acres in growing space and 25 acres in production facilities, holding area, field bed area, roads, etc.

~Depreciation was estimated by dividing initial cost (adjusted for a 10% salvage value) by the years of useful life.

++Interest costs were estimated by multiplying the initial value of land, buildings, equipment, and machinery by the interest rate, 12% per annum.

\*\*Insurance and taxes: Land and improvements--only taxes are assessed, at a rate of \$20 per \$1,000 of market value.

Buildings--taxes assessed at a rate of \$20 per \$1000 of market value. Insurance, \$500 deductible, at \$4.46 per \$1,000 of market value.

Total for category = \$24.46 per \$1,000.

Machinery and equipment--taxes are not assessed in Ohio on personal property. Insurance, \$500 deductible, at \$3.78 per \$1,000 of initial value.

~~Less than \$0.50.

~~~Insurance for personnel was estimated at 32% of salaries for owner/operator, supervisor, and clerical.

\*\*\*Owner/operator = \$50,000, two supervisors @\$25,000 each = \$50,000, two clerical @\$12,000 each = \$24,000, supplies 10% or \$12,400.

Total = \$136,400.

**TABLE 5a.(continued).--Annual Fixed Costs (\$) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                                      | Description                                                   | Depreciation~ | Interest++ | Insurance and Taxes** | Total   |
|-----------------------------------------------------------|---------------------------------------------------------------|---------------|------------|-----------------------|---------|
| Machinery and Equipment<br>(continued)                    |                                                               |               |            |                       |         |
| Heating system for propagation                            |                                                               |               |            |                       |         |
| Gas-fired unit heater (2 ea)                              | 200,000 BTU (input)                                           | 137           | 183        | 6                     | 326     |
| Fan jet (2 ea)                                            | Acme                                                          | 263           | 351        | 11                    | 625     |
| Thermostat (2 ea)                                         | Two-stage                                                     | 17            | 23         | 1                     | 41      |
| Set-up for propane (2 ea)                                 | Ventilator, regulator, etc.                                   | 27            | 36         | 1                     | 64      |
| Set-up for heating system (2 ea)                          | Plywood, braces, bolts, etc.                                  | 27            | 36         | 1                     | 64      |
| Other propagation materials                               |                                                               |               |            |                       |         |
| Misting systems (6 ea)                                    | Mist-a-matic                                                  | 840           | 224        | 7                     | 1,071   |
| Pipe and nozzle                                           | For misting systems                                           | 362           | 96         | 3                     | 461     |
| Treated Boards                                            | 5/4" x 8" x variable length                                   | 327           | 87         | 3                     | 417     |
| Heating cable                                             | Propagation                                                   | 1,058         | 282        | 9                     | 1,349   |
| Subtotal                                                  |                                                               | 83,196        | 85,851     | 2,705                 | 171,752 |
| Total for Depreciation, Interest,<br>Insurance, and Taxes |                                                               | 114,553       | 243,022    | 29,687                | 387,262 |
| General Overhead                                          |                                                               |               |            |                       |         |
| Utilities                                                 | Telephone, electric, gas heat                                 |               |            |                       | 12,050  |
| Licenses and bonds                                        |                                                               |               |            |                       | 785     |
| General repairs and maintenance                           | Buildings, grounds, roads                                     |               |            |                       | 15,980  |
| Advertising and printing                                  |                                                               |               |            |                       | 2,350   |
| Insurance, personnel---                                   | Workman's compensation<br>FICA, health, unemployment          |               |            |                       | 39,860  |
| Travel and professional fees                              |                                                               |               |            |                       | 3,570   |
| Administrative and management***                          | Clerical, operator, supervisory<br>labor, and office supplies |               |            |                       | 124,000 |
| Miscellaneous                                             |                                                               |               |            |                       | 12,400  |
| Subtotal                                                  |                                                               |               |            |                       | 210,995 |
| Interest on General Overhead,<br>Insurance and Taxes      | 12% per annum for 6 months<br>on a total of \$235,525         |               |            |                       | 14,441  |
| Total Annual Fixed Costs                                  |                                                               |               |            |                       | 612,698 |

\*Total of 200 acres, with 175 acres in growing space and 25 acres in production facilities, holding area, field bed area, roads, etc.

~Depreciation was estimated by dividing initial cost (adjusted for a 10% salvage value) by the years of useful life.

++Interest costs were estimated by multiplying the initial value of land, buildings, equipment, and machinery by the interest rate, 12% per annum.

\*\*Insurance and taxes.

Land and improvements--only taxes are assessed, at a rate of \$20 per \$1,000 of market value.

Buildings--taxes assessed at a rate of \$20 per \$1000 of market value. Insurance, \$500 deductible, at \$4.46 per \$1,000 of market value.

Total for category = \$24.46 per \$1,000.

Machinery and equipment--taxes are not assessed in Ohio on personal property. Insurance, \$500 deductible, at \$3.78 per \$1,000 of initial value.

---Less than \$0.50.

---Insurance for personnel was estimated at 32% of salaries for owner/operator, supervisor, and clerical.

\*\*\*Owner/operator = \$50,000, two supervisors @\$25,000 each = \$50,000, two clerical @\$12,000 each = \$24,000, supplies 10% or \$12,400.

Total = \$136,400.

**TABLE 6.--Plant Densities and Losses for Field Production of Nursery Plants, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Plant Group | Description               | Size of Salable Plant | Years in Rotation | Spacing Between Rows | Spacing in Rows | Sq Ft per Plant* | Plants per Acre | Estimated Percent Loss~ |    |
|-------------|---------------------------|-----------------------|-------------------|----------------------|-----------------|------------------|-----------------|-------------------------|----|
| I           | Slow-growing Evergreens-- | <i>Taxus</i>          | 18-24"            | 7                    | 44"             | 28"              | 10.2            | 4,272                   | 15 |
| II          | Fast-growing Evergreens-- | <i>Juniperus</i>      | 18-24"            | 5                    | 44"             | 28"              | 10.2            | 4,272                   | 15 |
| III         | Deciduous Shrubs--        | <i>Viburnum</i>       | 3-4'              | 4                    | 48"             | 30"              | 11.9            | 3,652                   | 15 |
| IV          | Shade Trees--             | <i>Acer rubrum</i>    | 2" diameter       | 5                    | 96"             | 42"              | 33.6            | 1,298                   | 10 |
| V           | Ornamental Trees--        | <i>Malus</i>          | 5-6' (1-1/2")     | 4                    | 96"             | 36"              | 28.7            | 1,518                   | 10 |

\*Sq ft per plant includes necessary perimeter roads.

~Assume one-half of loss between first and second year and remainder in last year of production. Losses in the last year of production would be left in the field.

**TABLE 6a.--Planting and Harvesting Requirements for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Plant Group | Description               | Propagation~          | Bedding Area++          | Field Planting |                        |                        |                            |        |
|-------------|---------------------------|-----------------------|-------------------------|----------------|------------------------|------------------------|----------------------------|--------|
|             |                           | Units Struck          | Rooted Cuttings Planted | Acres          | Acres Planted per Year | Units Planted per year | Units Harvested** per Year |        |
| I           | Slow-growing Evergreens-- | <i>Taxus</i>          | 7,914                   | 6,088          | 8                      | 1.14                   | 4,870                      | 4,140  |
| II          | Fast-growing Evergreens-- | <i>Juniperus</i>      | 11,107                  | 8,544          | 8                      | 1.60                   | 6,835                      | 5,810  |
| III         | Deciduous Shrubs--        | <i>Viburnum</i>       | 11,869                  | 9,130          | 8                      | 2.00                   | 7,304                      | 6,208  |
| IV          | Shade Trees--             | <i>Acer rubrum</i> ~~ | --                      | --             | 8                      | 1.60                   | 2,076                      | 1,869  |
| V           | Ornamental Trees--        | <i>Malus</i> ~~       | --                      | --             | 8                      | 2.00                   | 3,036                      | 2,732  |
| TOTAL       |                           |                       | 30,890                  | 23,762         | 40                     | 8.34                   | 24,121                     | 20,759 |

\*Total of 50 acres, with 40 acres in field growing space and 10 acres in production facilities, holding area, field bed area, roads, etc.

~For each plant available for transplanting as a rooted cutting into the bedding area, it is estimated that 1.3 cuttings would need to be stuck in the propagation facility.

++For each plant available for transplanting into the field, it is estimated that 1.25 rooted cuttings would need to be planted in the bedding area.

\*\*Assume one-half dug in the fall for fall sales and overwintering and one-half dug in the spring.

~~Shade and ornamental trees would be purchased as bare-root liners for planting directly into the field.

**TABLE 6b.--Planting and Harvesting Requirements for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1993.**

| Plant Group | Description               | Propagation~          | Bedding Area++          | Field Planting |                        |                        |                            |        |
|-------------|---------------------------|-----------------------|-------------------------|----------------|------------------------|------------------------|----------------------------|--------|
|             |                           | Units Struck          | Rooted Cuttings Planted | Acres          | Acres Planted per Year | Units Planted per year | Units Harvested** per Year |        |
| I           | Slow-growing Evergreens-- | <i>Taxus</i>          | 34,710                  | 26,700         | 35                     | 5.00                   | 21,360                     | 18,156 |
| II          | Fast-growing Evergreens-- | <i>Juniperus</i>      | 48,594                  | 37,380         | 35                     | 7.00                   | 29,904                     | 25,418 |
| III         | Deciduous Shrubs--        | <i>Viburnum</i>       | 51,927                  | 39,944         | 35                     | 8.75                   | 31,955                     | 27,162 |
| IV          | Shade Trees--             | <i>Acer rubrum</i> ~~ | --                      | --             | 35                     | 7.00                   | 9,086                      | 8,177  |
| V           | Ornamental Trees--        | <i>Malus</i> ~~       | --                      | --             | 35                     | 8.75                   | 13,283                     | 11,954 |
| TOTAL       |                           |                       | 135,231                 | 104,024        | 175                    | 36.50                  | 105,588                    | 90,867 |

\*Total of 200 acres, with 175 acres in field growing space and 25 acres in production facilities, holding area, field bed area, roads, etc.

~For each plant available for transplanting as a rooted cutting into the bedding area, it is estimated that 1.3 cuttings would need to be stuck in the propagation facility.

++For each plant available for transplanting into the field, it is estimated that 1.25 rooted cuttings would need to be planted in the bedding area.

\*\*Assume one-half dug in the fall for fall sales and overwintering and one-half dug in the spring.

~~Shade and ornamental trees would be purchased as bare-root liners for planting directly into the field.

**TABLE 6c.--Overwintering Requirements\* for 50-Acre~ and 200-Acre++ Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Plant Group | Description                                | Sq Ft per Plant Required** | 50-Acre Field Nursery       |                                |                                | 200-Acre Field Nursery      |                                |                                |
|-------------|--------------------------------------------|----------------------------|-----------------------------|--------------------------------|--------------------------------|-----------------------------|--------------------------------|--------------------------------|
|             |                                            |                            | No. of Plants Over-wintered | Sq Ft of Polyhouse Required*** | Sq Ft of Holding Area Required | No. of Plants Over-wintered | Sq Ft of Polyhouse Required*** | Sq Ft of Holding Area Required |
| I           | Slow-growing Evergreens-- <i>Taxus</i>     | 4                          | 1,035                       | 4,140                          | --                             | 4,539                       | 18,156                         | --                             |
| II          | Fast-growing Evergreens-- <i>Juniperus</i> | 4                          | 1,453                       | 5,812                          | --                             | 6,355                       | 25,420                         | --                             |
| III         | Deciduous Shrubs-- <i>Viburnum</i>         | 4                          | 1,552                       | 6,208                          | --                             | 6,791                       | 27,164                         | --                             |
| IV          | Shade Trees-- <i>Acer rubrum</i>           | 15                         | 467                         | --                             | 7,005                          | 2,044                       | --                             | 30,660                         |
| V           | Ornamental Trees-- <i>Malus</i>            | 15                         | 683                         | --                             | 10,245                         | 2,989                       | --                             | 44,835                         |
| TOTAL       |                                            |                            | 5,190                       | 16,160 +                       | 17,250                         | 22,718                      | 70,740                         | 75,495                         |

\*Assumed one-fourth of year's production overwintered.

~Total of 50 acres of field growing space and 10 acres of production facilities, holding area, field bed area, roads, etc.

++Total of 200 acres, with 175 acres of field growing space and 25 acres of production facilities, holding area, field bed area, roads, etc.

\*\*Sq ft per plant includes necessary perimeter roads.

\*\*\*One 20 x 200 sq ft polyhouse can hold 900 plants where each requires 4 sq ft. The center pathway (2'x 200') would take up 400 sq ft of space which would not be available for plants.

+50-acre field nursery would require 4.5 polyhouses, 200-acre nursery would require 19.7 polyhouses.

**TABLE 7.--Shipping Requirements for 50-Acre\* and 200-Acre~ Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Plant Group     | Description                                | B & B Size | Units per Truck | 50-Acre Field Nursery |                   | 200-Acre Field Nursery |                   |
|-----------------|--------------------------------------------|------------|-----------------|-----------------------|-------------------|------------------------|-------------------|
|                 |                                            |            |                 | Units to be Shipped** | No. of Truckloads | Units to be Shipped**  | No. of Truckloads |
| I               | Slow-growing Evergreens-- <i>Taxus</i>     | 12"        | 690             | 4,140                 | 6.0               | 18,156                 | 26.3              |
| II              | Fast-growing Evergreens-- <i>Juniperus</i> | 12"        | 690             | 5,810                 | 8.4               | 25,418                 | 36.8              |
| III             | Deciduous Shrubs-- <i>Viburnum</i>         | 12"        | 690             | 6,208                 | 9.0               | 27,162                 | 39.4              |
| IV              | Shade Trees-- <i>Acer rubrum</i>           | 24"        | 100             | 1,869                 | 18.7              | 8,177                  | 81.8              |
| V               | Ornamental Trees-- <i>Malus</i>            | 18"        | 140             | 2,732                 | 19.5              | 11,954                 | 85.4              |
| TOTAL           |                                            |            |                 | 20,759                | 61.6              | 90,867                 | 289.7             |
| Trucks Required | Fall                                       |            |                 |                       | 15                |                        | 67                |
|                 | Spring--March                              |            |                 |                       | 11                |                        | 51                |
|                 | April                                      |            |                 |                       | 24.6 **           |                        | 100.7 **          |
|                 | May                                        |            |                 |                       | 11                |                        | 51                |

\*Total of 50 acres, with 40 acres of growing space and 10 acres of production facilities, holding area, field bed area, roads, etc.

~Total of 200 acres, with 175 acres of field growing space and 25 acres of production facilities, holding area, field bed area, roads, etc.

++One-fourth will be shipped in the fall; three-fourths will be shipped in the spring; one-fourth of the spring shipment in March, one-half in April, and one-fourth in May.

\*\*Limiting factor. In the small nursery it will be necessary to ship 6+ truckloads per week and in the large 25+.

**TABLE 8.--Variable costs (Dollars) for Group I Plants (Taxus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|---------------------|--------------------------|
| <b>Propagation++</b>                |                                                                  |          |                     |                     |                          |
| Rooting media                       | Sand                                                             | cu yd    | 12.50               | 9.00                | 113                      |
| Collecting, stripping, and sticking | 7914 units @ 1200/hr                                             | hr       | 8.58 **             | 6.60                | 57                       |
| Maintenance                         | 50% of total propagation maintenance hr                          | hr       | 8.58                | 365.00              | 3,132                    |
| Harvest                             | 7914 units @ 600/hr                                              | hr       | 8.58                | 13.19               | 113                      |
| Hormone powder                      | #8, I.B.A.                                                       | lb       | 32.45               | 0.23                | 7                        |
| Subtotal                            |                                                                  |          |                     |                     | 3,422                    |
| <b>Materials</b>                    |                                                                  |          |                     |                     |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 4,140.00            | 5,962                    |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 1.04                | 196                      |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 4,140.00            | 41                       |
| Chemicals                           | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 0.72                | 142                      |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 1.28                | 15                       |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 1.38                | 273                      |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 280.00              | 456                      |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 0.32                | 0                        |
|                                     | Simazine 4L (Princep) (herbicide)                                | gallon   | 13.38               | 17.45               | 233                      |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 50.69               | 596                      |
|                                     | Malathion, 50EC (Cythion) (insecticide)                          | gallon   | 19.98               | 16.34               | 326                      |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.    | 40.00               | 10.89               | 436                      |
|                                     | Carbaryl, 80WP (Sevin) (insecticide)                             | lb       | 4.93                | 27.23               | 134                      |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 2.29                | 3.12                | 7                        |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |                     | 448                      |
| Subtotal                            |                                                                  |          |                     |                     | 9,265                    |
| <b>Machinery and Equipment</b>      |                                                                  |          |                     |                     |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 32.54               | 711                      |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 32.31               | 177                      |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 26.98               | 418                      |
|                                     | Forks                                                            | hr       | 0.00                | 73.24               | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 1.02                | 31                       |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 2.09                | 3                        |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 0.16                | 3                        |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 0.31                | 25                       |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 2.76                | 11                       |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 1.23                | 18                       |
|                                     | Permanent irrigation/well and pump 100 hp                        | hr       | 7.42                | 86.28               | 640                      |
|                                     | In-ground irrigation--bed/field area                             | hr       | 4.75                | 72.00               | 342                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 72.00               | 122                      |
|                                     | In-ground irrigation--storage and holding                        | hr       | 10.58               | 12.00               | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00               | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 2.28                | 39                       |
|                                     | Portable PTO pump, 40 hp (emergency)                             | hr       |                     | (no costs budgeted) |                          |
|                                     | Airblast sprayer                                                 | hr       | 2.74                | 21.78               | 60                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc. Group I plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads etc. 4,140 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++7,914 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 6,088 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 4,870 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 8 (continued).--Variable costs (Dollars) for Group I Plants (Taxus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                   | Description                                     | Unit | Cost per Unit ~<br>(\$) | Quantity  | Total Variable Cost<br>(\$) |
|----------------------------------------|-------------------------------------------------|------|-------------------------|-----------|-----------------------------|
| Machinery and Equipment<br>(continued) |                                                 |      |                         |           |                             |
|                                        | Fertilizer injector                             | hr   | 20.66                   | 4.50      | 93                          |
|                                        | Transplanter, 2-row                             | hr   | 17.25                   | 2.03      | 35                          |
|                                        | Undercutter, bed                                | hr   | 35.33                   | 1.17      | 41                          |
|                                        | U-blade                                         | hr   | 65.24                   | 0.38      | 25                          |
|                                        | Sidedresser, 2-row                              | hr   | 1.42                    | 7.53      | 11                          |
|                                        | Cultivator, 2-row                               | hr   | 0.94                    | 12.56     | 12                          |
|                                        | Wagon, 4-wheel                                  | hr   | 0.30                    | 10.80     | 3                           |
|                                        | Cultivator, 3-row                               | hr   | 34.05                   | 1.38      | 47                          |
|                                        | Truck, 1/2-ton pickup                           | hr   | 5.15                    | 346.67    | 1,785                       |
|                                        | Flatbed truck, 24' bed                          | hr   | 17.72                   | 26.98     | 478                         |
| Subtotal                               |                                                 |      |                         |           | 5,395                       |
| Labor                                  |                                                 |      |                         |           |                             |
|                                        | Labor hours                                     | hr   | 8.58 **                 | 1,369.51  | 11,750                      |
|                                        | Related labor hours, 20%                        | hr   | 8.58                    | 273.90    | 2,350                       |
| Subtotal                               |                                                 |      |                         |           | 14,100                      |
| Interest Charge on Operating Capital   | Computed at 12% on an annual Basis for 6 months | %    | 6.0<br>(.06)            | 32,182.00 | 1,931                       |
| Total Variable Costs                   |                                                 |      |                         |           | 34,113                      |
| Variable Cost per 18-24" Salable Plant | Units available for sale in a given year        | ea   |                         | 4,140.00  | 8.24                        |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
Group I plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
4,140 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++7,914 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 6,088 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 4,870 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.



**TABLE 10a.--Variable costs (Dollars) for Group III Plants (Viburnum) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity  | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|-----------|--------------------------|
| <b>Propagation++</b>                |                                                                  |          |                     |           |                          |
| Rooting media                       | Sand                                                             | cu yd    | 12.50               | 24.00     | 300                      |
| Collecting, stripping, and sticking | 51,927 units @ 1000/hr                                           | hr       | 8.58 **             | 51.93     | 446                      |
| Maintenance                         | 25% of total propagation maintenance hr                          | hr       | 8.58                | 200.00    | 1,716                    |
| Harvest                             | 51,927 units @ 400/hr                                            | hr       | 8.58                | 129.93    | 1,115                    |
| Hormone powder #1, I.B.A.           |                                                                  | lb       | 17.25               | 1.49      | 26                       |
| Subtotal                            |                                                                  |          |                     |           | 3,603                    |
| <b>Materials</b>                    |                                                                  |          |                     |           |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 27,162.00 | 39,113                   |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 6.79      | 1,278                    |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 27,162.00 | 272                      |
| <b>Chemicals</b>                    |                                                                  |          |                     |           |                          |
|                                     | Custom spread, custom blend: 45-0-0; 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 5.46      | 1,079                    |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 9.67      | 116                      |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 2.89      | 572                      |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 560.00    | 913                      |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 2.42      | 3                        |
|                                     | Simazine 4L (Princep) (herbicide)                                | gallon   | 13.38               | 67.93     | 909                      |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 190.19    | 2,237                    |
|                                     | Malathion, 50EC (Cythion) (insecticide)                          | gallon   | 19.98               | 61.13     | 1,221                    |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.    | 40.00               | 40.76     | 1,630                    |
|                                     | Carbaryl, 80WP (Sevin) (insecticide)                             | lb       | 40.00               | 101.89    | 4,076                    |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 4.93                | 20.37     | 100                      |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |           | 3,464                    |
| Subtotal                            |                                                                  |          |                     |           | 56,983                   |
| <b>Machinery and Equipment</b>      |                                                                  |          |                     |           |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 29.04     | 635                      |
|                                     | Tractor, 60 hp                                                   | hr       | 14.07               | 125.56    | 1,767                    |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 156.04    | 855                      |
|                                     | Articulated loader/2,000 lb                                      | hr       | 8.7                 | 126.42    | 1,100                    |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 126.42    | 1,958                    |
|                                     | Forks                                                            | hr       | 0.00                | 252.83    | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 7.74      | 236                      |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 15.67     | 25                       |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 1.16      | 25                       |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 2.28      | 183                      |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 11.28     | 44                       |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 7.99      | 115                      |
|                                     | Permanent irrigation/well and pump 100 hp                        | hr       | 7.74                | 61.50     | 476                      |
|                                     | In-ground irrigation--bed area                                   | hr       | 4.75                | 32.00     | 152                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 32.00     | 54                       |
|                                     | In-ground irrigation--storage/holding                            | hr       | 10.58               | 12.00     | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00     | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 17.50     | 303                      |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
 Group III plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
 6,208 salable plants (3-4' in height) per year.

~Quantity discounts were applied to chemicals and other items.

++11,869 plants would be stuck in the propagation house annually and about 23% would be lost, leaving 9,130 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 7,304 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

TABLE 8a.--Variable costs (Dollars) for Group I Plants (Taxus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|---------------------|--------------------------|
| <b>Propagation++</b>                |                                                                  |          |                     |                     |                          |
| Rooting media                       | Sand                                                             | cu yd    | 12.50               | 18.00               | 225                      |
| Collecting, stripping, and sticking | 37,710 units @ 1200/hr                                           | hr       | 8.58 **             | 31.43               | 270                      |
| Maintenance                         | 50% of total propagation maintenance hr                          | hr       | 8.58                | 400.00              | 3,432                    |
| Harvest                             | 37,710 units @ 600/hr                                            | hr       | 8.58                | 62.85               | 539                      |
| Hormone powder                      | #8, I.B.A.                                                       | lb       | 32.45               | 1.08                | 35                       |
| Subtotal                            |                                                                  |          |                     |                     | 4,501                    |
| <b>Materials</b>                    |                                                                  |          |                     |                     |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 18,156.00           | 26,145                   |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 4.54                | 855                      |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 18,156.00           | 182                      |
| <b>Chemicals</b>                    |                                                                  |          |                     |                     |                          |
|                                     | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 3.17                | 627                      |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 5.16                | 62                       |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 5.50                | 1,089                    |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 1,100.00            | 1,793                    |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 1.40                | 2                        |
|                                     | Simazine 4L (Princep T&O) (herbicide)                            | gallon   | 13.38               | 79.58               | 1,065                    |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 208.89              | 2,457                    |
|                                     | Malathion, 50EC (Cythion) (insecticide)                          | gallon   | 19.98               | 71.61               | 1,431                    |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.    | 40.00               | 24.75               | 990                      |
|                                     | Carbaryl, 80WSP (Sevin) (insecticide)                            | lb       | 4.93                | 119.36              | 588                      |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 2.29                | 13.36               | 31                       |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |                     | 1,505                    |
| Subtotal                            |                                                                  |          |                     |                     | 38,822                   |
| <b>Machinery and Equipment</b>      |                                                                  |          |                     |                     |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 18.73               | 409                      |
|                                     | Tractor, 60 hp                                                   | hr       | 14.07               | 23.77               | 334                      |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 141.56              | 776                      |
|                                     | Articulated loader/2,000 lb                                      | hr       | 8.70                | 82.25               | 716                      |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 82.25               | 1,274                    |
|                                     | Forks                                                            | hr       | 0.00                | 164.50              | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 4.49                | 137                      |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 9.09                | 14                       |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 0.67                | 14                       |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 1.34                | 107                      |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 12.01               | 47                       |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 5.34                | 77                       |
|                                     | Permanent irrigation/well and pump 100 hp                        | hr       | 7.74                | 118.00              | 913                      |
|                                     | In-ground irrigation--bed/field area                             | hr       | 4.75                | 96.00               | 456                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 96.00               | 162                      |
|                                     | In-ground irrigation--storage and holding                        | hr       | 10.58               | 12.00               | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00               | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 10.00               | 173                      |
|                                     | Portable PTO pump, 40 hp (emergency)                             | hr       |                     | (no costs budgeted) |                          |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
 Group I plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
 18,156 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++34,710 plants would be stuck in the propagation house annually and about 23% would be lost, leaving 26,700 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 21,360 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

TABLE 8a (continued).--Variable costs (Dollars) for Group I Plants (Taxus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.

| Item                                   | Description                                     | Unit | Cost per Unit-<br>(\$) | Quantity   | Total Variable Cost<br>(\$) |
|----------------------------------------|-------------------------------------------------|------|------------------------|------------|-----------------------------|
| Machinery and Equipment<br>(continued) |                                                 |      |                        |            |                             |
|                                        | Airblast sprayer                                | hr   | 2.74                   | 95.49      | 262                         |
|                                        | Fertilizer injector                             | hr   | 20.66                  | 4.50       | 93                          |
|                                        | Transplanter, 2-row                             | hr   | 17.25                  | 8.90       | 154                         |
|                                        | Undercutter, bed                                | hr   | 35.33                  | 5.13       | 181                         |
|                                        | U-blade                                         | hr   | 65.24                  | 1.65       | 108                         |
|                                        | Sidedresser, 2-row                              | hr   | 1.42                   | 33.00      | 47                          |
|                                        | Cultivator, 2-row                               | hr   | 0.94                   | 59.40      | 56                          |
|                                        | Wagon, 4-wheel                                  | hr   | 0.30                   | 47.30      | 14                          |
|                                        | Cultivator, 3-row                               | hr   | 34.05                  | 6.03       | 205                         |
|                                        | Truck, 1/2-ton pickup                           | hr   | 5.15                   | 520.00     | 2,678                       |
|                                        | Flatbed truck, 24' bed                          | hr   | 17.72                  | 123.38     | 2,186                       |
| Subtotal                               |                                                 |      |                        |            | 11,858                      |
| Labor                                  |                                                 |      |                        |            |                             |
|                                        | Labor hours                                     | hr   | 8.58 **                | 5,356.02   | 45,955                      |
|                                        | Related labor hours, 20%                        | hr   | 8.58                   | 1,071.20   | 9,191                       |
| Subtotal                               |                                                 |      |                        |            | 55,146                      |
| Interest Charge on Operating Capital   | Computed at 12% on an annual Basis for 6 months | %    | 6.0<br>(.06)           | 110,327.00 | 6,620                       |
| Total Variable Costs                   |                                                 |      |                        |            | 116,947                     |
| Variable Cost per 18-24" Salable Plant | Units available for sale in a given year        | ea   |                        | 18,156.00  | 6.44                        |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
Group I plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
18,156 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++34,170 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 26,700 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 21,360 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 9.--Variable costs (Dollars) for Group II Plants (Juniperus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|---------------------|--------------------------|
| <b>Propagation++</b>                |                                                                  |          |                     |                     |                          |
| Rooting media                       | Sand                                                             | cu yd    | 12.50               | 12.00               | 150                      |
| Collecting, stripping, and sticking | 11,107 units @ 700/hr                                            | hr       | 8.58 **             | 6.60                | 57                       |
| Maintenance                         | 25% of total propagation maintenance hr                          | hr       | 8.58                | 182.50              | 1,566                    |
| Harvest                             | 11,107 units @ 500/hr                                            | hr       | 8.58                | 22.21               | 191                      |
| Hormone powder                      | #3, I.B.A.                                                       | lb       | 24.75               | 0.32                | 8                        |
| Subtotal                            |                                                                  |          |                     |                     | 1,972                    |
| <b>Materials</b>                    |                                                                  |          |                     |                     |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 5,810.00            | 8,366                    |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 1.45                | 273                      |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 5,810.00            | 58                       |
| Chemicals                           | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 1.02                | 202                      |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 1.80                | 22                       |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 0.88                | 174                      |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 240.00              | 391                      |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 0.45                | 1                        |
|                                     | Simazine 4L (Princep) (herbicide)                                | gallon   | 13.38               | 13.00               | 174                      |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 36.40               | 428                      |
|                                     | Malathion, 57EL (Cythion) (insecticide)                          | gallon   | 19.98               | 11.70               | 234                      |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | lb       | 20.00               | 19.50               | 390                      |
|                                     | Carbaryl, 80WP (Sevin) (insecticide)                             | lb       | 4.93                | 7.80                | 38                       |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 2.29                | 4.55                | 10                       |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |                     | 331                      |
| Subtotal                            |                                                                  |          |                     |                     | 11,092                   |
| <b>Machinery and Equipment</b>      |                                                                  |          |                     |                     |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 24.29               | 531                      |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 37.31               | 204                      |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 49.77               | 771                      |
|                                     | Forks                                                            | hr       | 0.00                | 49.77               | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 1.44                | 44                       |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 3.48                | 5                        |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 0.21                | 5                        |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 0.38                | 30                       |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 2.14                | 8                        |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 1.70                | 24                       |
|                                     | Permanent irrigation/well and pump 100 hp                        | hr       | 7.74                | 63.20               | 489                      |
|                                     | In-ground irrigation--bed area                                   | hr       | 4.75                | 48.00               | 228                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 48.00               | 81                       |
|                                     | In-ground irrigation--storage/holding                            | hr       | 10.58               | 12.00               | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00               | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 3.20                | 55                       |
|                                     | Portable PTO pump, 40 hp                                         | hr       |                     | (no costs budgeted) |                          |
|                                     | Airblast sprayer                                                 | hr       | 2.74                | 15.60               | 43                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.

Group II plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.

5,810 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++11,107 plants would be stuck in the propagation house annually and about 23% would be lost, leaving 8,544 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 6,835 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 9 (continued).--Variable costs (Dollars) for Group II Plants (Juniperus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                         | Description                                        | Unit | Cost per Unit~<br>(\$) | Quantity  | Total Variable Cost<br>(\$) |
|----------------------------------------------|----------------------------------------------------|------|------------------------|-----------|-----------------------------|
| Machinery and Equipment<br>(continued)       |                                                    |      |                        |           |                             |
|                                              | Fertilizer injector                                | hr   | 20.66                  | 3.00      | 62                          |
|                                              | Transplanter, 2-row                                | hr   | 17.25                  | 2.84      | 49                          |
|                                              | Undercutter, bed                                   | hr   | 35.33                  | 1.64      | 58                          |
|                                              | Sidedresser, 2-row                                 | hr   | 1.42                   | 4.80      | 7                           |
|                                              | Cultivator, 2-row                                  |      | 0.94                   | 9.51      | 9                           |
|                                              | Wagon, 4-wheel                                     |      | 0.30                   | 15.12     | 5                           |
|                                              | Cultivator, 3-row                                  | hr   | 34.05                  | 1.32      | 45                          |
|                                              | Truck, 1/2-ton pickup                              | hr   | 5.15                   | 346.67    | 1,785                       |
|                                              | Flatbed truck, 24' bed                             | hr   | 17.72                  | 36.47     | 646                         |
| Subtotal                                     |                                                    |      |                        |           | 5,449                       |
| Labor                                        |                                                    |      |                        |           |                             |
|                                              | Labor hours                                        | hr   | 8.58 **                | 1,491.56  | 12,798                      |
|                                              | Related labor hours, 20%                           | hr   | 8.58                   | 298.00    | 2,557                       |
| Subtotal                                     |                                                    |      |                        |           | 15,355                      |
| Interest Charge on<br>Operating Capital      | Computed at 12% on an annual<br>Basis for 6 months | %    | 6.0<br>(.06)           | 33,868.00 | 2,032                       |
| Total Variable Costs                         |                                                    |      |                        |           | 35,900                      |
| Variable Cost<br>per 18-24"<br>Salable Plant | Units available for sale<br>in a given year        | ea   |                        | 5,810.00  | 6.18                        |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
Group II plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
5,810 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++11,107 plants would be stuck in the propagation house annually and about 23% would be lost, leaving 8,544 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 6,835 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 9a.--Variable costs (Dollars) for Group II Plants (Juniperus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity  | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|-----------|--------------------------|
| Propagation++                       |                                                                  |          |                     |           |                          |
| Rooting media                       | Sand                                                             | cu yd    | 12.50               | 24.00     | 300                      |
| Collecting, stripping, and sticking | 48,594 units @ 700/hr                                            | hr       | 8.58 **             | 69.42     | 596                      |
| Maintenance                         | 25% of total propagation maintenance                             | hr       | 8.58                | 200.00    | 1,716                    |
| Harvest                             | 48,594 units @ 600/hr                                            | hr       | 8.58                | 97.19     | 834                      |
| Hormone powder                      | #3, I.B.A.                                                       | lb       | 24.75               | 1.39      | 34                       |
| Subtotal                            |                                                                  |          |                     |           | 3,480                    |
| Materials                           |                                                                  |          |                     |           |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 25,418.00 | 36,602                   |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 6.35      | 1,195                    |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 25,418.00 | 254                      |
| Chemicals                           | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 4.44      | 878                      |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 4.95      | 59                       |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 4.95      | 980                      |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 1,040.00  | 1,695                    |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 1.97      | 2                        |
|                                     | Simazine 4L (Princep) (herbicide)                                | gallon   | 13.38               | 61.10     | 818                      |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 159.04    | 1,870                    |
|                                     | Malathion, 50Ec (Cythion) (insecticide)                          | gallon   | 19.98               | 48.59     | 971                      |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.    | 40.00               | 32.36     | 1,294                    |
|                                     | Carbaryl, 80WP (Sevin) (insecticide)                             | lb       | 4.93                | 80.90     | 399                      |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 2.29                | 19.05     | 44                       |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |           | 1,332                    |
| Subtotal                            |                                                                  |          |                     |           | 48,393                   |
| Machinery and Equipment             |                                                                  |          |                     |           |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 26.23     | 573                      |
|                                     | Tractor, 60 hp                                                   | hr       | 1.11                | 79.25     | 88                       |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 142.18    | 779                      |
|                                     | Articulated loader/2,000 lb                                      | hr       | 8.70                | 49.88     | 434                      |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 49.88     | 773                      |
|                                     | Forks                                                            | hr       | 0.00                | 99.67     | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 6.29      | 191                      |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 10.84     | 17                       |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 0.94      | 20                       |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 1.65      | 132                      |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 9.37      | 37                       |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 7.48      | 108                      |
|                                     | Permanent irrigation/well and                                    | hr       | 7.74                | 88.00     | 681                      |
|                                     | In-ground irrigation--bed area                                   | hr       | 4.75                | 62.00     | 295                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 62.00     | 105                      |
|                                     | In-ground irrigation--storage/holding                            | hr       | 10.58               | 12.00     | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00     | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 14.00     | 242                      |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
 Group II plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
 25,418 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++48,594 plants would be stuck in the propagation house annually and about 23% would be lost, leaving 37,380 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 29,904 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

TABLE 9a (continued).--Variable costs (Dollars) for Group II Plants (Juniperus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.

| Item                                   | Description                                     | Unit | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|----------------------------------------|-------------------------------------------------|------|---------------------|---------------------|--------------------------|
| Machinery and Equipment (continued)    |                                                 |      |                     |                     |                          |
|                                        | Portable PTO pump, 40 hp (emergency)            | hr   |                     | (no costs budgeted) |                          |
|                                        | Airblast sprayer                                | hr   | 2.74                | 68.16               | 187                      |
|                                        | Fertilizer injector                             | hr   | 20.66               | 3.00                | 62                       |
|                                        | Transplanter, 2-row                             | hr   | 17.25               | 12.46               | 215                      |
|                                        | Undercutter, bed                                | hr   | 35.33               | 7.19                | 254                      |
|                                        | Sidedresser, 2-row                              | hr   | 1.42                | 21.00               | 30                       |
|                                        | Cultivator, 2-row                               | hr   | 0.94                | 41.58               | 39                       |
|                                        | Wagon, 4-wheel                                  | hr   | 0.30                | 66.20               | 20                       |
|                                        | Cultivator, 3-row                               | hr   | 34.05               | 5.68                | 193                      |
|                                        | Truck, 1/2-ton pickup                           | hr   | 5.15                | 520.00              | 2,678                    |
|                                        | Flatbed truck, 24' bed                          | hr   | 17.72               | 159.48              | 2,826                    |
| Subtotal                               |                                                 |      |                     |                     | 11,244                   |
| Labor                                  |                                                 |      |                     |                     |                          |
|                                        | Labor hours                                     | hr   | 8.58 **             | 6,271.93            | 53,813                   |
|                                        | Related labor hours, 20%                        | hr   | 8.58                | 1,254.38            | 10,763                   |
| Subtotal                               |                                                 |      |                     |                     | 64,576                   |
| Interest Charge on Operating Capital   | Computed at 12% on an annual Basis for 6 months | %    | 6.0 (.06)           | 127,693.00          | 7,662                    |
| Total Variable Costs                   |                                                 |      |                     |                     | 135,355                  |
| Variable Cost per 18-24" Salable Plant | Units available for sale in a given year        | ea   |                     | 25,418.00           | 5.33                     |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
 Group II plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
 25,418 18-24" salable plants per year.

~Quantity discounts were applied to chemicals and other items.

++48,594 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 37,380 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 29,904 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 10.--Variable costs (Dollars) for Group III Plants (Viburnum) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                | Description                                                      | Unit     | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|-------------------------------------|------------------------------------------------------------------|----------|---------------------|---------------------|--------------------------|
| <b>Propagation++</b>                |                                                                  |          |                     |                     |                          |
| Rooting media                       | Sand                                                             | cu yd    | 8.50                | 12.00               | 102                      |
| Collecting, stripping, and sticking | 11,869 units @ 1000/hr                                           | hr       | 8.58 **             | 11.87               | 102                      |
| Maintenance                         | 25% of total propagation maintenance hr                          | hr       | 8.58                | 182.50              | 1,566                    |
| Harvest                             | 11,869 units @ 400/hr                                            | hr       | 8.58                | 29.68               | 255                      |
| Hormone powder                      | #1, I.B.A.                                                       | lb       | 17.40               | 0.34                | 6                        |
| Subtotal                            |                                                                  |          |                     |                     | 2,031                    |
| <b>Materials</b>                    |                                                                  |          |                     |                     |                          |
| Burlap                              | 32" x 32" squares + twine                                        | ea       | 1.44                | 6,208.00            | 8,940                    |
| Polyethylene film                   | 4 mil white, 32' x 225'                                          | ea       | 188.26              | 1.55                | 292                      |
| Strip tags                          | 5/8" x 7" plastic strip tags                                     | ea       | 0.01                | 6,208.00            | 62                       |
| <b>Chemicals</b>                    |                                                                  |          |                     |                     |                          |
|                                     | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton      | 197.66              | 1.25                | 247                      |
|                                     | Custom spread (lime)                                             | ton      | 12.00               | 1.21                | 15                       |
|                                     | Urea, 45-0-0 (fertilizer)                                        | ton      | 198.00              | 0.66                | 131                      |
|                                     | Soluble 20-20-20 (fertilizer)                                    | lb       | 1.63                | 120.00              | 196                      |
|                                     | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb       | 1.25                | 0.55                | 1                        |
|                                     | Simazine 4L (Princep) (herbicide)                                | gallon   | 13.38               | 15.53               | 208                      |
|                                     | DCPA 75WP (Dacthal) (herbicide)                                  | lb       | 11.76               | 43.47               | 511                      |
|                                     | Malathion, 50EC (Cythion) (insecticide)                          | gallon   | 19.98               | 13.97               | 279                      |
|                                     | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.    | 40.00               | 9.32                | 373                      |
|                                     | Carbaryl, 80WP (Sevin) (insecticide)                             | lb       | 4.93                | 23.29               | 115                      |
|                                     | Chlorothalonil 10M cu ft (Termil) (fungicide)                    | canister | 2.29                | 4.65                | 11                       |
|                                     | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |          |                     |                     | 384                      |
| Subtotal                            |                                                                  |          |                     |                     | 11,765                   |
| <b>Machinery and Equipment</b>      |                                                                  |          |                     |                     |                          |
|                                     | Tractor, 100 hp                                                  | hr       | 21.85               | 35.58               | 777                      |
|                                     | Tractor, 34 hp                                                   | hr       | 5.48                | 34.44               | 189                      |
|                                     | Articulated loader/3,000 lb                                      | hr       | 15.49               | 57.78               | 895                      |
|                                     | Forks                                                            | hr       | 0.00                | 57.78               | 0                        |
|                                     | Plow, 3-14"                                                      | hr       | 30.43               | 1.77                | 54                       |
|                                     | Disk, 8' wide                                                    | hr       | 1.57                | 3.58                | 6                        |
|                                     | Harrow, 10' wide                                                 | hr       | 21.45               | 0.27                | 6                        |
|                                     | Cultimulcher, 10' wide                                           | hr       | 80.11               | 0.54                | 43                       |
|                                     | Spray rig with 10' boom                                          | hr       | 3.93                | 2.57                | 10                       |
|                                     | Transplanter, 3-row                                              | hr       | 14.38               | 1.83                | 26                       |
|                                     | Permanent irrigation/well and pump 100 hp                        | hr       | 7.74                | 40.00               | 310                      |
|                                     | In-ground irrigation--bed area                                   | hr       | 4.75                | 24.00               | 114                      |
|                                     | Above-ground irrigation--bed area                                | hr       | 1.69                | 24.00               | 41                       |
|                                     | In-ground irrigation--storage/holding                            | hr       | 10.58               | 12.00               | 127                      |
|                                     | Above-ground irrigation--storage/holding                         | hr       | 11.54               | 12.00               | 138                      |
|                                     | Traveler gun                                                     | hr       | 17.32               | 4.00                | 69                       |
|                                     | Portable PTO pump, 40 hp                                         | hr       |                     | (no costs budgeted) |                          |
|                                     | Airblast sprayer                                                 | hr       | 2.74                | 18.63               | 51                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
 Group III plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
 6,208 salable plants (3-4' in height) per year.

~Quantity discounts were applied to chemicals and other items.

++11,869 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 9,130 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost, leaving 7,304 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.



**TABLE 10 (continued).--Variable costs (Dollars) for Group III Plants (*Viburnum*) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                 | Description                                     | Unit | Cost per Unit~ (\$) | Quantity  | Total Variable Cost (\$) |
|--------------------------------------|-------------------------------------------------|------|---------------------|-----------|--------------------------|
| Machinery and Equipment (continued)  |                                                 |      |                     |           |                          |
|                                      | Fertilizer injector                             | hr   | 20.66               | 1.50      | 31                       |
|                                      | Transplanter, 2-row                             | hr   | 17.25               | 3.04      | 52                       |
|                                      | Undercutter, bed                                | hr   | 35.33               | 1.76      | 62                       |
|                                      | Sidedresser, 2-row                              | hr   | 1.42                | 3.60      | 5                        |
|                                      | Cultivator, 2-row                               | hr   | 0.94                | 11.88     | 11                       |
|                                      | Wagon, 4-wheel                                  | hr   | 0.30                | 16.16     | 5                        |
|                                      | Cultivator, 3-row                               | hr   | 34.05               | 0.69      | 23                       |
|                                      | Truck, 1/2-ton pickup                           | hr   | 5.15                | 346.71    | 1,786                    |
|                                      | Flatbed truck, 24' bed                          | hr   | 17.72               | 35.92     | 637                      |
| Subtotal                             |                                                 |      |                     |           | 5,468                    |
| Labor                                |                                                 |      |                     |           |                          |
|                                      | Labor hours                                     | hr   | 8.58 **             | 1,651.59  | 14,171                   |
|                                      | Related labor hours, 20%                        | hr   | 8.58                | 330.32    | 2,834                    |
| Subtotal                             |                                                 |      |                     |           | 17,005                   |
| Interest Charge on Operating Capital | Computed at 12% on an annual Basis for 6 months | %    | 6.0 (.06)           | 36,269.00 | 2,176                    |
| Total Variable Costs                 |                                                 |      |                     |           | 38,445                   |
| Variable Cost per 3-4' Salable Plant | Units available for sale in a given year        | ea   |                     | 6,208.00  | 6.19                     |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
 Group III plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
 6,208 salable plants (3-4' in height) per year.

~Quantity discounts were applied to chemicals and other items.

++11,869 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 9,130 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 7,304 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 10a (continued).--Variable costs (Dollars) for Group III Plants (Viburnum) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                 | Description                                     | Unit | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|--------------------------------------|-------------------------------------------------|------|---------------------|---------------------|--------------------------|
| Machinery and Equipment (continued)  |                                                 |      |                     |                     |                          |
|                                      | Portable PTO pump, 40 hp                        | hr   |                     | (no costs budgeted) |                          |
|                                      | Airblast sprayer                                | hr   | 2.74                | 78.75               | 216                      |
|                                      | Fertilizer injector                             | hr   | 20.66               | 1.50                | 31                       |
|                                      | Transplanter, 2-row                             | hr   | 17.25               | 13.31               | 230                      |
|                                      | Undercutter, bed                                | hr   | 35.33               | 7.68                | 271                      |
|                                      | Sidedresser, 2-row                              | hr   | 1.42                | 15.75               | 22                       |
|                                      | Cultivator, 2-row                               | hr   | 0.94                | 34.66               | 33                       |
|                                      | Wagon, 4-wheel                                  | hr   | 0.30                | 70.76               | 21                       |
|                                      | Cultivator, 3-row                               | hr   | 34.05               | 3.04                | 104                      |
|                                      | Truck, 1/2-ton pickup                           | hr   | 5.15                | 533.31              | 2,747                    |
|                                      | Flatbed truck, 24' bed                          | hr   | 17.72               | 157.14              | 2,785                    |
| Subtotal                             |                                                 |      |                     |                     | 14,653                   |
| Labor                                |                                                 |      |                     |                     |                          |
|                                      | Labor hours                                     | hr   | 8.58 **             | 7,165.73            | 61,482                   |
|                                      | Related labor hours, 20%                        | hr   | 8.58                | 1,433.15            | 12,296                   |
| Subtotal                             |                                                 |      |                     |                     | 73,778                   |
| Interest Charge on Operating Capital | Computed at 12% on an annual Basis for 6 months | %    | 6.0<br>(.06)        | 149,017.00          | 8,941                    |
| Total Variable Costs                 |                                                 |      |                     |                     | 157,958                  |
| Variable Cost per 3-4' Salable Plant | Units available for sale in a given year        | ea   |                     | 27,162.00           | 5.82                     |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
 Group III plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
 27,162 salable plants (3-4' in height) per year.

~Quantity discounts were applied to chemicals and other items.

++51,927 plants would be stuck in the propagation house annually and about 23% would be lost over a 2-year period, leaving 39,944 for transplanting into liner beds. About 20% of the plants in the liner beds would be lost over a 3-year period, leaving 31,955 for transplanting into the field.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 11.--Variable costs (Dollars) for Group IV Plants (*Acer rubrum*) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                           | Description                                                      | Unit   | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|--------------------------------|------------------------------------------------------------------|--------|---------------------|---------------------|--------------------------|
| <b>Materials</b>               |                                                                  |        |                     |                     |                          |
| Burlap                         | 54" x 54" squares + 24" basket                                   | ea     | 3.50                | 1,869.00            | 6,542                    |
| Twine                          | Nails + twine                                                    | ea     | 0.18                | 1,869.00            | 336                      |
| Liners                         | 6-8' 2 yr branched                                               | ea     | 15.95               | 2,076.00            | 33,112                   |
| Strip tags                     | 5/8" x 7" plastic strip tags                                     | ea     | 0.01                | 1,869.00            | 19                       |
| Poultry wire                   | 1" for rabbit control                                            | roll   | 29.95               | 2.00                | 60                       |
| Seed                           | Ryegrass                                                         | lb     | 0.87                | 348.48              | 303                      |
| <b>Chemicals</b>               |                                                                  |        |                     |                     |                          |
|                                | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton    | 197.66              | 0.90                | 178                      |
|                                | Custom spread (lime)                                             | ton    | 12.00               | 1.60                | 19                       |
|                                | Urea, 45-0-0 (fertilizer)                                        | ton    | 198.00              | 0.70                | 139                      |
|                                | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb     | 1.25                | 0.40                | 1                        |
|                                | Simazine 4L (Princep) (herbicide)                                | gallon | 13.38               | 16.00               | 214                      |
|                                | DCPA 75WP (Dacthal) (herbicide)                                  | lb     | 11.76               | 47.04               | 553                      |
|                                | Malathion, 50EC (Cythion) (insecticide)                          | gallon | 19.98               | 14.40               | 288                      |
|                                | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.  | 40.00               | 9.60                | 384                      |
|                                | Carbaryl, 80WP (Sevin) (insecticide)                             | lb     | 4.93                | 24.00               | 118                      |
|                                | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |        |                     |                     | 395                      |
| Subtotal                       |                                                                  |        |                     |                     | 42,661                   |
| <b>Machinery and Equipment</b> |                                                                  |        |                     |                     |                          |
|                                | Tractor, 100 hp                                                  | hr     | 21.85               | 49.84               | 1,089                    |
|                                | Tractor, 34 hp                                                   | hr     | 5.48                | 22.86               | 125                      |
|                                | Articulated loader/3,000 lb                                      | hr     | 15.49               | 54.89               | 850                      |
|                                | Tree spade                                                       | hr     | 2.83                | 125.79              | 356                      |
|                                | Forks                                                            | hr     | 0.00                | 54.89               | 0                        |
|                                | Plow, 3-14"                                                      | hr     | 30.43               | 1.28                | 39                       |
|                                | Disk, 8' wide                                                    | hr     | 1.57                | 2.28                | 4                        |
|                                | Harrow, 10' wide                                                 | hr     | 21.45               | 0.19                | 4                        |
|                                | Cultimulcher, 10' wide                                           | hr     | 80.11               | 0.34                | 27                       |
|                                | Spray rig with 10' boom                                          | hr     | 3.93                | 2.50                | 10                       |
|                                | Transplanter, 1-row (tree)                                       | hr     | 0.58                | 37.75               | 22                       |
|                                | Permanent irrigation/well and pump 100 hp                        | hr     | 7.74                | 15.20               | 118                      |
|                                | In-ground irrigation--storage/holding                            | hr     | 10.58               | 12.00               | 127                      |
|                                | Above-ground irrigation--storage/holding                         | hr     | 11.54               | 12.00               | 138                      |
|                                | In-ground irrigation--bed/field                                  | hr     | 4.75                | 3.20                | 15                       |
|                                | Traveler gun                                                     | hr     | 17.32               | 3.20                | 55                       |
|                                | Portable PTO pump, 40 hp                                         | hr     |                     | (no costs budgeted) |                          |
|                                | Airblast sprayer                                                 | hr     | 2.74                | 19.20               | 53                       |
|                                | Mower                                                            | hr     | 2.98                | 4.36                | 13                       |
|                                | Seeder                                                           | hr     | 2.55                | 2.16                | 6                        |
|                                | Sidedresser, 2-row                                               | hr     | 1.42                | 3.84                | 5                        |
|                                | Cultivator, 2-row                                                | hr     | 0.94                | 4.24                | 4                        |
|                                | Wagon, 4-wheel                                                   | hr     | 0.30                | 6.10                | 2                        |
|                                | Truck, 1/2-ton pickup                                            | hr     | 5.15                | 384.42              | 1,980                    |
|                                | Flatbed truck, 24' bed                                           | hr     | 17.72               | 125.76              | 2,228                    |
| Subtotal                       |                                                                  |        |                     |                     | 7,270                    |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
 Group IV plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
 1,869 2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 11 (continued).--Variable costs (Dollars) for Group IV Plants (*Acer rubrum*) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                         | Description                                     | Unit | Cost per Unit~<br>(\$) | Quantity  | Total Variable Cost<br>(\$) |
|----------------------------------------------|-------------------------------------------------|------|------------------------|-----------|-----------------------------|
| Labor                                        | Labor hours                                     |      |                        |           |                             |
|                                              | Related labor hours, 20%                        | hr   | 8.58 **                | 1,340.44  | 11,501                      |
| Subtotal                                     |                                                 | hr   | 8.58                   | 268.00    | 2,299                       |
|                                              |                                                 |      |                        |           | 13,800                      |
| Interest Charge on Operating Capital         | Computed at 12% on an annual basis for 6 months | %    | 6.0<br>(.06)           | 63,731.00 | 3,824                       |
| Total Variable Costs                         |                                                 |      |                        |           | 67,555                      |
| Variable Cost per salable Plant (2" Caliper) | Units available for sale in a given year        | ea   |                        | 1,869.00  | 36.14                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
Group IV plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
1,869 2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 11a.--Variable costs (Dollars) for Group IV Plants (*Acer rubrum*) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item         | Description                                                      | Unit   | Cost per Unit~<br>(\$) | Quantity | Total Variable Cost<br>(\$) |
|--------------|------------------------------------------------------------------|--------|------------------------|----------|-----------------------------|
| Materials    |                                                                  |        |                        |          |                             |
| Burlap       | 54" x 54" squares + 24" basket                                   | ea     | 3.50                   | 8,177.00 | 28,620                      |
| Twine        | Nails + twine                                                    | ea     | 0.18                   | 8,177.00 | 1,472                       |
| Liners       | 6-8' 2 yr branched                                               | ea     | 15.95                  | 9,086.00 | 144,922                     |
| Strip tags   | 5/8" x 7" plastic strip tags                                     | ea     | 0.01                   | 8,177.00 | 82                          |
| Poultry wire | 1" for rabbit control                                            | roll   | 29.95                  | 9.00     | 270                         |
| Seed         | Ryegrass                                                         | lb     | 0.87                   | 1,524.60 | 1,326                       |
| Chemicals    | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton    | 197.66                 | 3.95     | 781                         |
|              | Custom spread (lime)                                             | ton    | 12.00                  | 7.00     | 84                          |
|              | Urea, 45-0-0 (fertilizer)                                        | ton    | 198.00                 | 3.08     | 610                         |
|              | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb     | 1.25                   | 1.75     | 2                           |
|              | Simazine 4L (Princep) (herbicide)                                | gallon | 13.38                  | 70.00    | 937                         |
|              | DCPA 75WP (Dacthal) (herbicide)                                  | lb     | 11.76                  | 196.00   | 2,305                       |
|              | Malathion, 57EL (Cythion) (insecticide)                          | gallon | 19.98                  | 63.00    | 1,259                       |
|              | Thiophanate Ethyl (Cleary's 3336) (fungicide)                    | pkgs.  | 40.00                  | 42.00    | 1,680                       |
|              | Carbaryl, 80WP (Sevin) (insecticide)                             | lb     | 4.93                   | 105.00   | 518                         |
|              | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |        |                        |          | 1,729                       |
| Subtotal     |                                                                  |        |                        |          | 186,597                     |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
Group IV plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.  
8,177 2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 11a (continued).--Variable costs (Dollars) for Group IV Plants (*Acer rubrum*) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                         | Description                                       | Unit | Cost per Unit~<br>(\$) | Quantity            | Total Variable Cost<br>(\$) |
|----------------------------------------------|---------------------------------------------------|------|------------------------|---------------------|-----------------------------|
| <b>Machinery and Equipment</b>               |                                                   |      |                        |                     |                             |
|                                              | Tractor, 100 hp                                   | hr   | 21.85                  | 170.82              | 3,732                       |
|                                              | Tractor, 60 hp                                    | hr   | 14.07                  | 102.20              | 1,438                       |
|                                              | Tractor, 34 hp                                    | hr   | 5.48                   | 88.85               | 487                         |
|                                              | Articulated loader/2,000 lb                       | hr   | 8.70                   | 108.75              | 946                         |
|                                              | Articulated loader/3,000 lb                       | hr   | 15.49                  | 108.75              | 1,685                       |
|                                              | Tree spade                                        | hr   | 2.83                   | 543.07              | 1,537                       |
|                                              | Forks                                             | hr   | 0.00                   | 217.49              | 0                           |
|                                              | Plow, 3-14"                                       | hr   | 30.43                  | 5.60                | 170                         |
|                                              | Disk, 8' wide                                     | hr   | 1.57                   | 9.45                | 15                          |
|                                              | Harrow, 10' wide                                  | hr   | 21.45                  | 0.84                | 18                          |
|                                              | Cultimulcher, 10' wide                            | hr   | 80.11                  | 1.47                | 118                         |
|                                              | Spray rig with 10' boom                           | hr   | 3.93                   | 10.99               | 43                          |
|                                              | Transplanter, 1-row (tree)                        | hr   | 0.58                   | 165.20              | 96                          |
|                                              | Permanent irrigation/well and pump 100 hp         | hr   | 7.74                   | 26.00               | 201                         |
|                                              | In-ground irrigation--storage/holding             | hr   | 10.58                  | 12.00               | 127                         |
|                                              | Above-ground irrigation--storage/holding          | hr   | 11.54                  | 12.00               | 138                         |
|                                              | In-ground irrigation--bed/field                   | hr   | 4.75                   | 14.00               | 67                          |
|                                              | Traveler gun                                      | hr   | 17.32                  | 14.00               | 242                         |
|                                              | Portable PTO pump, 40 hp                          | hr   |                        | (no costs budgeted) |                             |
|                                              | Airblast sprayer                                  | hr   | 2.74                   | 84.00               | 230                         |
|                                              | Mower                                             | hr   | 20.66                  | 19.04               | 393                         |
|                                              | Seeder                                            | hr   | 2.55                   | 4.76                | 12                          |
|                                              | Sidedresser, 2-row                                | hr   | 1.42                   | 16.80               | 24                          |
|                                              | Cultivator, 2-row                                 | hr   | 0.94                   | 18.48               | 17                          |
|                                              | Wagon, 4-wheel                                    | hr   | 0.30                   | 26.20               | 8                           |
|                                              | Truck, 1/2-ton pickup                             | hr   | 5.15                   | 685.20              | 3,529                       |
|                                              | Flatbed truck, 24' bed                            | hr   | 17.72                  | 545.07              | 9,659                       |
|                                              | <b>Subtotal</b>                                   |      |                        |                     | <b>24,932</b>               |
| <b>Labor</b>                                 |                                                   |      |                        |                     |                             |
|                                              | Labor hours                                       | hr   | 8.58 **                | 6,320.04            | 54,226                      |
|                                              | Related labor hours, 20%                          | hr   | 8.58                   | 1,264.00            | 10,845                      |
|                                              | <b>Subtotal</b>                                   |      |                        |                     | <b>65,071</b>               |
| Interest Charge On Operating Capital         | Computed at 12% on an annual basis for six months | %    | 6.0<br>(.06)           | 276,600.00          | 16,596                      |
| <b>Total Variable Costs</b>                  |                                                   |      |                        |                     | <b>293,196</b>              |
| Variable Cost per Salable Plant (2" Caliper) | Units available for sale in a given year          | ea   |                        | 8,177.00            | 35.86                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
Group IV plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
1,869 2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336Benomyl, and Carbaryl.

**TABLE 12.--Variable costs (Dollars) for Group V Plants (Malus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                           | Description                                                      | Unit   | Cost per Unit~ (\$) | Quantity            | Total Variable Cost (\$) |
|--------------------------------|------------------------------------------------------------------|--------|---------------------|---------------------|--------------------------|
| <b>Materials</b>               |                                                                  |        |                     |                     |                          |
| Burlap                         | 54" x 54" squares + 20" basket                                   | ea     | 3.25                | 2,732.00            | 8,879                    |
| Twine                          | Nails + twine                                                    | ea     | 0.18                | 2,732.00            | 492                      |
| Liners                         | 5-6' 2 yr branched                                               | ea     | 8.70                | 3,036.00            | 26,413                   |
| Strip tags                     | 5/8" x 7" plastic strip tags                                     | ea     | 0.01                | 2,732.00            | 27                       |
| Poultry wire                   | 1" for rabbit control                                            | roll   | 29.95               | 2.00                | 60                       |
| Seed                           | Ryegrass                                                         | lb     | 0.87                | 435.60              | 379                      |
| <b>Chemicals</b>               |                                                                  |        |                     |                     |                          |
|                                | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton    | 197.66              | 1.13                | 223                      |
|                                | Custom spread (lime)                                             | ton    | 12.00               | 2.00                | 24                       |
|                                | Urea, 45-0-0 (fertilizer)                                        | ton    | 198.00              | 0.66                | 131                      |
|                                | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb     | 1.25                | 0.50                | 1                        |
|                                | Simazine 4L (Princep) (herbicide)                                | gallon | 13.38               | 15.00               | 201                      |
|                                | DCPA 75WP (Dacthal) (herbicide)                                  | lb     | 11.76               | 44.10               | 519                      |
|                                | Malathion, 50EC (Cythion) (insecticide)                          | gallon | 19.98               | 13.50               | 270                      |
|                                | Thiophanate Ethyl WP (Cleary's 3336) (fungicide)                 | pkgs.  | 40.00               | 9.50                | 380                      |
|                                | Carbaryl, 80WP (Sevin) (insecticide)                             | lb     | 4.93                | 22.50               | 111                      |
|                                | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |        |                     |                     | 381                      |
| Subtotal                       |                                                                  |        |                     |                     | 38,491                   |
| <b>Machinery and Equipment</b> |                                                                  |        |                     |                     |                          |
|                                | Tractor, 100 hp                                                  | hr     | 21.85               | 68.48               | 1,496                    |
|                                | Tractor, 34 hp                                                   | hr     | 5.48                | 41.78               | 229                      |
|                                | Articulated loader/3,000 lb                                      | hr     | 15.49               | 92.10               | 1,427                    |
|                                | Tree spade                                                       | hr     | 2.83                | 102.57              | 290                      |
|                                | Forks                                                            | hr     | 0.00                | 92.10               | 0                        |
|                                | Plow, 3-14"                                                      | hr     | 30.43               | 1.60                | 49                       |
|                                | Disk, 8' wide                                                    | hr     | 1.57                | 3.24                | 5                        |
|                                | Harrow, 10' wide                                                 | hr     | 21.45               | 0.24                | 5                        |
|                                | Cultimulcher, 10' wide                                           | hr     | 80.11               | 0.49                | 39                       |
|                                | Spray rig with 10' boom                                          | hr     | 3.93                | 2.46                | 10                       |
|                                | Transplanter, 1-row (tree)                                       | hr     | 0.58                | 55.20               | 32                       |
|                                | Permanent irrigation/well and pump 100 hp                        | hr     | 7.74                | 16.00               | 124                      |
|                                | In-ground irrigation--storage/holding                            | hr     | 10.58               | 12.00               | 127                      |
|                                | Above-ground irrigation--storage/holding                         | hr     | 11.54               | 12.00               | 138                      |
|                                | In-ground irrigation--bed/field                                  | hr     | 4.75                | 4.00                | 19                       |
|                                | Traveler gun                                                     | hr     | 17.32               | 4.00                | 69                       |
|                                | Portable PTO pump, 40 hp                                         | hr     |                     | (no costs budgeted) |                          |
|                                | Airblast sprayer                                                 | hr     | 2.74                | 18.00               | 49                       |
|                                | Mower                                                            | hr     | 2.98                | 4.08                | 12                       |
|                                | Seeder                                                           | hr     | 2.55                | 1.02                | 3                        |
|                                | Sidedresser, 2-row                                               | hr     | 1.42                | 3.60                | 5                        |
|                                | Cultivator, 2-row                                                | hr     | 0.94                | 3.96                | 4                        |
|                                | Wagon, 4-wheel                                                   | hr     | 0.30                | 8.16                | 2                        |
|                                | Truck, 1/2-ton pickup                                            | hr     | 5.15                | 346.67              | 1,785                    |
|                                | Flatbed truck, 24' bed                                           | hr     | 17.72               | 157.77              | 2,796                    |
| Subtotal                       |                                                                  |        |                     |                     | 8,715                    |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.

Group V plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.

2,732 1-1/2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 12 (continued).--Variable costs (Dollars) for Group V Plants (Malus) for a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                             | Description                                     | Unit | Cost per Unit~ (\$) | Quantity  | Total Variable Cost (\$) |
|--------------------------------------------------|-------------------------------------------------|------|---------------------|-----------|--------------------------|
| Labor                                            | Labor hours                                     |      |                     |           |                          |
|                                                  | Related labor hours, 20%                        | hr   | 8.58 **             | 1,674.91  | 14,371                   |
| Subtotal                                         |                                                 | hr   | 8.58                | 335.00    | 2,874                    |
|                                                  |                                                 |      |                     |           | 17,245                   |
| Interest Charge on Operating Capital             | Computed at 12% on an annual basis for 6 months | %    | 6.0<br>(.06)        | 64,451.00 | 3,867                    |
| Total Variable Costs                             |                                                 |      |                     |           | 68,318                   |
| Variable Cost per salable Plant (1-1/2" Caliper) | Units available for sale in a given year        | ea   |                     | 2,732.00  | 25.01                    |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
Group V plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
2,732 1-1/2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 12a.--Variable costs (Dollars) for Group V Plants (Malus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item         | Description                                                      | Unit   | Cost per Unit~ (\$) | Quantity  | Total Variable Cost (\$) |
|--------------|------------------------------------------------------------------|--------|---------------------|-----------|--------------------------|
| Materials    |                                                                  |        |                     |           |                          |
| Burlap       | 54" x 54" squares + 20" basket                                   | ea     | 3.25                | 11,954.00 | 38,851                   |
| Twine        | Nails + twine                                                    | ea     | 0.18                | 11,954.00 | 2,152                    |
| Liners       | 5-6' 2 yr branched                                               | ea     | 8.70                | 13,283.00 | 115,562                  |
| Strip tags   | 5/8" x 7" plastic strip tags                                     | ea     | 0.01                | 11,954.00 | 120                      |
| Poultry wire | 1" for rabbit control                                            | roll   | 29.95               | 9.00      | 270                      |
| Seed         | Ryegrass                                                         | lb     | 0.87                | 1,905.75  | 1,658                    |
| Chemicals    | Custom spread, custom blend: 45-0-0, 0-44-0, 0-0-60 (fertilizer) | ton    | 197.66              | 4.94      | 976                      |
|              | Custom spread (lime)                                             | ton    | 12.00               | 8.75      | 105                      |
|              | Urea, 45-0-0 (fertilizer)                                        | ton    | 198.00              | 3.85      | 762                      |
|              | Isoxaben+Oryzalin (Snapshot 2.5TG) (herbicide)                   | lb     | 1.25                | 8.75      | 11                       |
|              | Simazine 4L (Princep) (herbicide)                                | gallon | 13.38               | 87.50     | 1,171                    |
|              | DCPA 75WP (Dacthal) (herbicide)                                  | lb     | 11.76               | 245.00    | 2,881                    |
|              | Malathion, 50EC (Cythion) (insecticide)                          | gallon | 19.98               | 78.75     | 1,573                    |
|              | Thiophanate Ethyl, (Cleary's 3336) (fungicide)                   | pkgs   | 40.00               | 131.25    | 5,250                    |
|              | Carbaryl, 80WP (Sevin) (insecticide)                             | lb     | 4.93                | 52.50     | 259                      |
|              | Other (i.e., Kelthane, Captan, Di-syston, Orthene, etc.)~~       |        |                     |           | 3,541                    |
| Subtotal     |                                                                  |        |                     |           | 175,142                  |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.

Group V plants = 40 acres, with 35 acres of growing space and 5 acres in production facilities, holding and field bed area, roads, etc.

11,954 1-1/2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Cleary's 3336, and Carbaryl.

**TABLE 12a (continued).--Variable costs (Dollars) for Group V Plants (Malus) for a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                         | Description                                       | Unit | Cost per Unit--<br>(\$) | Quantity            | Total Variable Cost<br>(\$) |
|----------------------------------------------|---------------------------------------------------|------|-------------------------|---------------------|-----------------------------|
| <b>Machinery and Equipment</b>               |                                                   |      |                         |                     |                             |
|                                              | Tractor, 100 hp                                   | hr   | 21.85                   | 248.51              | 5,430                       |
|                                              | Tractor, 60 hp                                    | hr   | 14.07                   | 252.38              | 3,551                       |
|                                              | Tractor, 34 hp                                    | hr   | 5.48                    | 102.65              | 563                         |
|                                              | Articulated loader/2,000 lb                       | hr   | 8.70                    | 157.26              | 1,368                       |
|                                              | Articulated loader/3,000 lb                       | hr   | 15.49                   | 157.87              | 2,445                       |
|                                              | Tree spade                                        | hr   | 2.83                    | 475.16              | 1,345                       |
|                                              | Forks                                             | hr   | 0.00                    | 314.52              | 0                           |
|                                              | Plow, 3-14"                                       | hr   | 30.43                   | 7.00                | 213                         |
|                                              | Disk, 8' wide                                     | hr   | 1.57                    | 14.18               | 22                          |
|                                              | Harrow, 10' wide                                  | hr   | 21.45                   | 1.05                | 23                          |
|                                              | Cultimulcher, 10' wide                            | hr   | 80.11                   | 2.02                | 162                         |
|                                              | Spray rig with 10' boom                           | hr   | 3.93                    | 13.73               | 54                          |
|                                              | Transplanter, 1-row (tree)                        | hr   | 0.58                    | 241.51              | 140                         |
|                                              | Permanent irrigation/well and pump 100 hp         | hr   | 7.74                    | 29.50               | 228                         |
|                                              | In-ground irrigation--storage/holding             | hr   | 10.58                   | 12.00               | 127                         |
|                                              | Above-ground irrigation--storage/holding          | hr   | 11.54                   | 12.00               | 138                         |
|                                              | In-ground irrigation--bed/field                   | hr   | 4.75                    | 17.50               | 83                          |
|                                              | Traveler gun                                      | hr   | 17.32                   | 17.50               | 303                         |
|                                              | Portable PTO pump, 40 hp                          | hr   |                         | (no costs budgeted) |                             |
|                                              | Airblast sprayer                                  | hr   | 2.74                    | 78.75               | 216                         |
|                                              | Mower                                             | hr   | 2.98                    | 23.80               | 71                          |
|                                              | Seeder                                            | hr   | 2.55                    | 5.96                | 15                          |
|                                              | Sidedresser, 2-row                                | hr   | 1.42                    | 15.70               | 22                          |
|                                              | Cultivator, 2-row                                 | hr   | 0.94                    | 17.34               | 16                          |
|                                              | Wagon, 4-wheel                                    | hr   | 0.30                    | 38.34               | 12                          |
|                                              | Truck, 1/2-ton pickup                             | hr   | 5.15                    | 520.00              | 2,678                       |
|                                              | Flatbed truck, 24' bed                            | hr   | 17.72                   | 716.67              | 12,699                      |
|                                              | Subtotal                                          |      |                         |                     | 31,924                      |
| <b>Labor</b>                                 |                                                   |      |                         |                     |                             |
|                                              | Labor hours                                       | hr   | 8.58 **                 | 6,881.83            | 59,046                      |
|                                              | Related labor hours, 20%                          | hr   | 8.58                    | 1,376.00            | 11,806                      |
|                                              | Subtotal                                          |      |                         |                     | 70,852                      |
| Interest Charge On Operating Capital         | Computed at 12% on an annual basis for six months | %    | 6.0<br>(.06)            | 277,918.00          | 16,675                      |
| <b>Total Variable Costs</b>                  |                                                   |      |                         |                     | <b>294,593</b>              |
| Variable Cost per Salable Plant (2" Caliper) | Units available for sale in a given year          | ea   |                         | 11,954.00           | 24.64                       |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.  
 Group IV plants = 10 acres, with 8 acres of growing space and 2 acres in production facilities, holding and field bed area, roads, etc.  
 1,869 2" caliper salable plants per year.

~Quantity discounts were applied to chemicals and other items.

\*\*Average basic wage before withholding taxes and fringe benefits=\$6.50, taxes and fringe benefits add 32% or \$2.08 for a total of \$8.58.

~~To achieve better pest and disease control, alternative chemical usage is advisable. Alternative chemical costs were estimated at 50% of the cost of Malathion, Benomyl, and Carbaryl.



**TABLE 13.--Estimated Variable Costs per Hour of Use for Machinery and Equipment for Field Nurseries, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item Number | Item                                       | New Cost (\$) | Expected Life (yr.) | Estimated Annual Use   |                         | Estimated Cost per Hour of Use |             |                             |            |
|-------------|--------------------------------------------|---------------|---------------------|------------------------|-------------------------|--------------------------------|-------------|-----------------------------|------------|
|             |                                            |               |                     | 50-Acre* Nursery (hr.) | 200-Acre~ Nursery (hr.) | Repairs++ (\$)                 | Fuel** (\$) | Lubrication and Filter (\$) | Total (\$) |
| 1           | Tractor, 100 hp                            | 54,900        | 10                  | 217                    | 494                     | 10.00                          | 10.30       | 1.55                        | 21.85      |
| 2           | Tractor, 60 hp                             | 35,865        | 10                  | --                     | 583                     | ea. 5.54                       | 7.42        | 1.11                        | 14.07      |
| 3           | Tractor, 34 hp                             | 18,000        | 10                  | 169                    | 632                     | 2.56                           | 2.54        | 0.38                        | 5.48       |
| 4           | Flatbed truck                              | 47,950        | 5                   | 383                    | 1,702                   | 5.07                           | 11.00       | 1.65                        | 17.72      |
| 5           | Articulated loader/2,000 lb                | 38,500        | 10                  | --                     | 600                     | 5.78                           | 2.54        | 0.38                        | 8.70       |
| 6           | Articulated loader/3,000 lb                | 42,500        | 10                  | 328                    | 600                     | 6.38                           | 7.92        | 1.19                        | 15.49      |
| 7           | Tree spade                                 | 9,080         | 2                   | 181                    | 641                     | 2.83                           |             |                             | 2.83       |
| 8           | Forks for loader                           | 0             | 10                  | 328                    | 1,200                   | 0.00                           |             |                             | 0.00       |
| 9           | Plow                                       | 12,170        | 10                  | 8                      | 32                      | 30.43                          |             |                             | 30.43      |
| 10          | Disk                                       | 1,450         | 10                  | 15                     | 60                      | 1.57                           |             |                             | 1.57       |
| 11          | Harrow                                     | 1,650         | 10                  | 2                      | 5                       | 21.45                          |             |                             | 21.45      |
| 12          | Cultimulcher                               | 12,325        | 10                  | 3                      | 10                      | 80.11                          |             |                             | 80.11      |
| 13          | Spray rig (boom sprayer)                   | 1,995         | 7                   | 13                     | 58                      | 3.93                           |             |                             | 3.93       |
| 14          | Transplanter, 3-row                        | 4,026         | 10                  | 5                      | 21                      | 14.38                          |             |                             | 14.38      |
| 15          | Transplanter, 1-row                        | 3,150         | 10                  | 93                     | 407                     | 0.58                           |             |                             | 0.58       |
| 16          | Permanent irrigation, well + pump          | 45,535        | 20                  | 221                    | 323                     | 0.70                           | 6.12        | 0.92                        | 7.74       |
| 17          | In-ground irrigation--bed/field~~          | 52,447        | 20                  | 151                    | 221                     | 4.75                           |             |                             | 4.75       |
| 18          | Above-ground irrigation--bed/field~~       | 4,012         | 5                   | 144                    | 190                     | 1.69                           |             |                             | 1.69       |
| 19          | In-ground irrigation--storage/holding~~    | 31,747        | 20                  | 60                     | 60                      | 10.58                          |             |                             | 10.58      |
| 20          | Above-ground irrigation--storage/holding~~ | 8,652         | 5                   | 60                     | 60                      | 11.54                          |             |                             | 11.54      |
| 21          | Traveler gun~~                             | 31,600        | 10                  | 17                     | 73                      | 17.32                          |             |                             | 17.32      |
| 22          | Portable irrigation pump (emergency)       | 5,140         | 10                  | --                     | --                      | --                             | --          | --                          | --         |
| 23          | Airblast sprayer                           | 9,748         | 7                   | 94                     | 406                     | 2.74                           |             |                             | 2.74       |
| 24          | Fertilizer injector                        | 1,430         | 5                   | 9                      | ea. 9                   | ea. 20.66                      |             |                             | 20.66      |
| 25          | Transplanter, 2-row                        | 8,048         | 10                  | 8                      | 35                      | 17.25                          |             |                             | 17.25      |
| 26          | Undercutter--bed                           | 8,657         | 7                   | 5                      | 21                      | 35.33                          |             |                             | 35.33      |
| 27          | U-blade--field                             | 897           | 5                   | 0.38                   | 1.65                    | 65.24                          |             |                             | 65.24      |
| 28          | Fertilizer sidedresser                     | 1,950         | 10                  | 24                     | 103                     | 1.42                           |             |                             | 1.42       |
| 29          | Cultivator, 2-row                          | 1,750         | 7                   | 44                     | 172                     | 0.94                           |             |                             | 0.94       |
| 30          | Wagon                                      | 1,241         | 10                  | 57                     | ea. 249                 | ea. 0.30                       |             |                             | 0.30       |
| 31          | Cultivator, 3-row                          | 5,500         | 7                   | 4                      | 15                      | 34.05                          |             |                             | 34.05      |
| 32          | Truck--1/2-ton pickup                      | 17,000        | 5                   | 1,771                  | 2,779                   | 1.10                           | 3.52        | 0.53                        | 5.15       |
| 33          | Mower                                      | 2,287         | 10                  | 9                      | 46                      | 2.98                           |             |                             | 2.98       |
| 34          | Seeder                                     | 425           | 10                  | 4                      | 10                      | 2.55                           |             |                             | 2.55       |

\*50 total acres.

~200 total acres.

++Repairs per hour were based on usage of the large nursery. They were computed on the basis of percent of new cost over the life of the asset. Percent factors used were: 90 for items 1, 2, 3, 4, 5, 6, 32; 80 for items 9, 13, 23; 75 for items 14, 15, 25, 28; 65 for items 10, 11, 12, 24, 29, 31; 60 for items 26, 27, 30, 33, 34; 40 for items 7, 17, 18, 19, 20, 21, 22; and 10 for items 8, 16. The total was then divided by the estimated total number of hours the equipment would be an asset.

\*\*Fuel was estimated at \$1.10 per gallon for gasoline-driven items, \$1.03 for diesel-driven items, and \$0.31 per kilowatt for electrical-driven items.

~~Cost is for a large nursery on which variable costs per hour were based. Cost for the small nursery was lower.

**TABLE 14.--Summary of Fixed, Variable and Total Costs (Dollars) of Operating a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                                  | Group I<br>( <i>Taxus</i> ) | Group II<br>( <i>Juniperus</i> ) | Group III<br>( <i>Viburnum</i> ) | Group IV<br>( <i>Acer rubrum</i> ) | Group V<br>( <i>Malus</i> ) | Total     |
|-------------------------------------------------------|-----------------------------|----------------------------------|----------------------------------|------------------------------------|-----------------------------|-----------|
| <b>Fixed Costs</b>                                    |                             |                                  |                                  |                                    |                             |           |
| Land and improvements                                 | 10,848                      | 10,848                           | 10,848                           | 10,848                             | 10,848                      | 54,242 ~  |
| Buildings                                             | 4,354                       | 4,354                            | 4,354                            | 4,354                              | 4,354                       | 21,772 ~  |
| Machinery and equipment                               | 18,637                      | 18,637                           | 18,637                           | 18,637                             | 18,637                      | 93,186 ~  |
| General overhead                                      | 24,370                      | 24,370                           | 24,370                           | 24,370                             | 24,370                      | 121,849 ~ |
| Interest on general overhead,<br>insurance, and taxes | 1,593                       | 1,593                            | 1,593                            | 1,593                              | 1,593                       | 7,966 ~   |
| Subtotal                                              | 59,802                      | 59,802                           | 59,802                           | 59,802                             | 59,802                      | 299,016 ~ |
| <b>Variable Costs</b>                                 |                             |                                  |                                  |                                    |                             |           |
| Propagation                                           | 3,422                       | 1,972                            | 2,031                            | ++                                 | ++                          | 7,425     |
| Materials                                             | 9,265                       | 11,092                           | 11,765                           | 42,661                             | 38,491                      | 113,274   |
| Machinery and equipment                               | 5,395                       | 5,449                            | 5,468                            | 7,270                              | 8,715                       | 32,297    |
| Labor                                                 | 14,100                      | 15,355                           | 17,005                           | 13,800                             | 17,245                      | 77,505    |
| Interest on operating capital                         | 1,931                       | 2,032                            | 2,176                            | 3,824                              | 3,867                       | 13,830    |
| Subtotal                                              | 34,113                      | 35,900                           | 38,445                           | 67,555                             | 68,318                      | 244,331   |
| Total                                                 | 93,915                      | 95,702                           | 98,247                           | 127,357                            | 128,120                     | 543,347 ~ |
| Salable Plants Per Year                               | 4,140                       | 5,810                            | 6,208                            | 1,869                              | 2,732                       | 20,759    |
| Cost per Salable Plant                                | 22.68                       | 16.47                            | 15.83                            | 68.14                              | 46.90                       | 26.17     |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.

~Individual figures do not always add to the total due to rounding.

++Tree liners were purchased rather than propagated. Liner costs were included under materials.

**TABLE 14a.--Summary of Fixed, Variable and Total Costs (Dollars) of Operating a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                                  | Group I<br>( <i>Taxus</i> ) | Group II<br>( <i>Juniperus</i> ) | Group III<br>( <i>Viburnum</i> ) | Group IV<br>( <i>Acer rubrum</i> ) | Group V<br>( <i>Malus</i> ) | Total       |
|-------------------------------------------------------|-----------------------------|----------------------------------|----------------------------------|------------------------------------|-----------------------------|-------------|
| <b>Fixed Costs</b>                                    |                             |                                  |                                  |                                    |                             |             |
| Land and improvements                                 | 35,637                      | 35,637                           | 35,637                           | 35,637                             | 35,637                      | 178,185 ~   |
| Buildings                                             | 7,465                       | 7,465                            | 7,465                            | 7,465                              | 7,465                       | 37,325 ~    |
| Machinery and equipment                               | 34,350                      | 34,350                           | 34,350                           | 34,350                             | 34,350                      | 171,752 ~   |
| General overhead                                      | 42,199                      | 42,199                           | 42,199                           | 42,199                             | 42,199                      | 210,995 ~   |
| Interest on general overhead,<br>insurance, and taxes | 2,888                       | 2,888                            | 2,888                            | 2,888                              | 2,888                       | 14,441 ~    |
| Subtotal                                              | 122,539                     | 122,539                          | 122,539                          | 122,539                            | 122,539                     | 612,698 ~   |
| <b>Variable Costs</b>                                 |                             |                                  |                                  |                                    |                             |             |
| Propagation                                           | 4,501                       | 3,480                            | 3,603                            | ++                                 | ++                          | 11,584      |
| Materials                                             | 38,822                      | 48,393                           | 56,983                           | 186,597                            | 175,142                     | 505,937     |
| Machinery and equipment                               | 11,858                      | 11,244                           | 14,653                           | 24,932                             | 31,924                      | 94,611      |
| Labor                                                 | 55,146                      | 64,576                           | 73,778                           | 65,071                             | 70,852                      | 329,423     |
| Interest on operating capital                         | 6,620                       | 7,662                            | 8,941                            | 16,596                             | 16,675                      | 56,494      |
| Subtotal                                              | 116,947                     | 135,355                          | 157,958                          | 293,196                            | 294,593                     | 998,049     |
| Total                                                 | 239,486                     | 257,894                          | 280,497                          | 415,735                            | 417,132                     | 1,610,747 ~ |
| Salable Plants Per Year                               | 18,156                      | 25,418                           | 27,162                           | 8,177                              | 11,954                      | 90,867      |
| Cost per Salable Plant                                | 13.19                       | 10.15                            | 10.33                            | 50.84                              | 34.89                       | 17.73       |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.

~Individual figures do not always add to the total due to rounding.

++Tree liners were purchased rather than propagated. Liner costs were included under materials.

**TABLE 15.--Summary of Fixed, Variable and Total Costs (Dollars) per Salable Plant of Operating a 50-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                               | Group I<br>( <i>Taxus</i> ) |                       | Group II<br>( <i>Juniperus</i> ) |                       | Group III<br>( <i>Viburnum</i> ) |                       | Group IV<br>( <i>Acer rubrum</i> ) |                       | Group V<br>( <i>Malus</i> ) |                       | Average                |                       |
|----------------------------------------------------|-----------------------------|-----------------------|----------------------------------|-----------------------|----------------------------------|-----------------------|------------------------------------|-----------------------|-----------------------------|-----------------------|------------------------|-----------------------|
|                                                    | Cost per Salable Plant      | Percent of Total Cost | Cost per Salable Plant           | Percent of Total Cost | Cost per Salable Plant           | Percent of Total Cost | Cost per Salable Plant             | Percent of Total Cost | Cost per Salable Plant      | Percent of Total Cost | Cost per Salable Plant | Percent of Total Cost |
| <b>Fixed Cost Items</b>                            |                             |                       |                                  |                       |                                  |                       |                                    |                       |                             |                       |                        |                       |
| Land and Improvements                              | 2.62                        | 12%                   | 1.87                             | 11%                   | 1.75                             | 11%                   | 5.80                               | 9%                    | 3.97                        | 8%                    | 2.61                   | 10%                   |
| Buildings                                          | 1.05                        | 5%                    | 0.75                             | 5%                    | 0.70                             | 4%                    | 2.33                               | 3%                    | 1.59                        | 3%                    | 1.05                   | 4%                    |
| Machinery and Equipment                            | 4.50                        | 20%                   | 3.21                             | 19%                   | 3.00                             | 19%                   | 9.97                               | 15%                   | 6.82                        | 15%                   | 4.49                   | 17%                   |
| General Overhead                                   | 5.89                        | 26%                   | 4.19                             | 25%                   | 3.93                             | 25%                   | 13.04                              | 19%                   | 8.92                        | 19%                   | 5.87                   | 22%                   |
| Interest on General Overhead, Insurance, and Taxes | 0.38                        | 2%                    | 0.27                             | 2%                    | 0.26                             | 2%                    | 0.85                               | 1%                    | 0.58                        | 1%                    | 0.38                   | 1%                    |
| Subtotal                                           | 14.44                       | 64%                   | 10.29                            | 62%                   | 9.64                             | 61%                   | 31.99                              | 47%                   | 21.88                       | 47%                   | 14.40                  | 55%                   |
| <b>Variable Cost Items</b>                         |                             |                       |                                  |                       |                                  |                       |                                    |                       |                             |                       |                        |                       |
| Propagation                                        | 0.83                        | 4%                    | 0.34                             | 2%                    | 0.33                             | 2%                    | ++                                 |                       | ++                          |                       | 0.36                   | 1%                    |
| Materials                                          | 2.24                        | 10%                   | 1.91                             | 12%                   | 1.90                             | 12%                   | 22.83                              | 34%                   | 14.09                       | 30%                   | 5.46                   | 21%                   |
| Machinery and Equipment                            | 1.30                        | 6%                    | 0.94                             | 6%                    | 0.88                             | 6%                    | 3.89                               | 6%                    | 3.19                        | 7%                    | 1.56                   | 6%                    |
| Labor                                              | 3.41                        | 15%                   | 2.64                             | 16%                   | 2.74                             | 17%                   | 7.38                               | 11%                   | 6.31                        | 13%                   | 3.73                   | 14%                   |
| Interest on Operating Capital                      | 0.47                        | 2%                    | 0.35                             | 2%                    | 0.35                             | 2%                    | 2.05                               | 3%                    | 1.42                        | 3%                    | 0.67                   | 3%                    |
| Subtotal                                           | 8.25                        | 36%                   | 6.18                             | 38%                   | 6.20                             | 39%                   | 36.15                              | 53%                   | 25.01                       | 53%                   | 11.78                  | 45%                   |
| <b>Total Costs per Salable Plant</b>               | <b>22.69</b>                | <b>100%</b>           | <b>16.47</b>                     | <b>100%</b>           | <b>15.84</b>                     | <b>100%</b>           | <b>68.14</b>                       | <b>100%</b>           | <b>46.89</b>                | <b>100%</b>           | <b>26.18</b>           | <b>100%</b>           |

\*Total nursery = 50 acres, with 40 acres of growing space and 10 acres in production facilities, holding and field bed area, roads, etc.

++Tree liners were purchased rather than propagated. Liner costs were included under materials.

**TABLE 15a.--Summary of Fixed, Variable and Total Costs (Dollars) per Salable Plant of Operating a 200-Acre\* Field Nursery, USDA Plant Hardiness Zones 5 and 6, 1997.**

| Item                                                       | Group I<br>( <i>Taxus</i> )     |                                | Group II<br>( <i>Juniperus</i> ) |                                | Group III<br>( <i>Viburnum</i> ) |                                | Group IV<br>( <i>Acer rubrum</i> ) |                                | Group V<br>( <i>Malus</i> )     |                                | Average                         |                                |
|------------------------------------------------------------|---------------------------------|--------------------------------|----------------------------------|--------------------------------|----------------------------------|--------------------------------|------------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|--------------------------------|
|                                                            | Cost<br>per<br>Salable<br>Plant | Percent<br>of<br>Total<br>Cost | Cost<br>per<br>Salable<br>Plant  | Percent<br>of<br>Total<br>Cost | Cost<br>per<br>Salable<br>Plant  | Percent<br>of<br>Total<br>Cost | Cost<br>per<br>Salable<br>Plant    | Percent<br>of<br>Total<br>Cost | Cost<br>per<br>Salable<br>Plant | Percent<br>of<br>Total<br>Cost | Cost<br>per<br>Salable<br>Plant | Percent<br>of<br>Total<br>Cost |
| <b>Fixed Cost Items</b>                                    |                                 |                                |                                  |                                |                                  |                                |                                    |                                |                                 |                                |                                 |                                |
| Land and Improve-<br>ments                                 | 1.96                            | 15%                            | 1.40                             | 14%                            | 1.31                             | 13%                            | 4.36                               | 9%                             | 2.98                            | 9%                             | 1.98                            | 7%                             |
| Buildings                                                  | 0.41                            | 3%                             | 0.29                             | 3%                             | 0.27                             | 3%                             | 0.91                               | 2%                             | 0.62                            | 2%                             | 0.41                            | 1%                             |
| Machinery and<br>Equipment                                 | 1.89                            | 14%                            | 1.35                             | 13%                            | 1.26                             | 12%                            | 4.20                               | 8%                             | 2.87                            | 8%                             | 2.32                            | 8%                             |
| General Overhead                                           | 2.32                            | 18%                            | 1.66                             | 16%                            | 1.55                             | 15%                            | 5.16                               | 10%                            | 3.53                            | 10%                            | 0.00                            | 0%                             |
| Interest on General<br>Overhead, Insur-<br>ance, and Taxes | 0.16                            | 1%                             | 0.11                             | 1%                             | 0.11                             | 1%                             | 0.35                               | 1%                             | 0.24                            | 1%                             | 0.00                            | 0%                             |
| Subtotal                                                   | 6.74                            | 51%                            | 4.81                             | 47%                            | 4.50                             | 44%                            | 14.98                              | 29%                            | 10.24                           | 29%                            | 4.69                            | 17%                            |
| <b>Variable Cost Items</b>                                 |                                 |                                |                                  |                                |                                  |                                |                                    |                                |                                 |                                |                                 |                                |
| Propagation                                                | 0.25                            | 2%                             | 0.14                             | 1%                             | 0.13                             | 1%                             | ++                                 |                                | ++                              |                                | 3.63                            | 13%                            |
| Materials                                                  | 2.14                            | 16%                            | 1.90                             | 19%                            | 2.10                             | 20%                            | 22.82                              | 45%                            | 14.65                           | 42%                            | 0.62                            | 2%                             |
| Machinery and<br>Equipment                                 | 0.65                            | 5%                             | 0.44                             | 4%                             | 0.54                             | 5%                             | 3.05                               | 6%                             | 2.67                            | 8%                             | 0.00                            | 0%                             |
| Labor                                                      | 3.04                            | 23%                            | 2.54                             | 25%                            | 2.72                             | 26%                            | 7.96                               | 16%                            | 5.93                            | 17%                            | 17.73                           | 64%                            |
| Interest on<br>Operating Capital                           | 0.36                            | 3%                             | 0.30                             | 3%                             | 0.33                             | 3%                             | 2.03                               | 4%                             | 1.39                            | 4%                             | 1.00                            | 4%                             |
| Subtotal                                                   | 6.44                            | 49%                            | 5.32                             | 53%                            | 5.82                             | 56%                            | 35.86                              | 71%                            | 24.64                           | 71%                            | 22.98                           | 83%                            |
| <b>Total Costs per<br/>Salable Plant</b>                   | <b>13.18</b>                    | <b>100%</b>                    | <b>10.13</b>                     | <b>100%</b>                    | <b>10.32</b>                     | <b>100%</b>                    | <b>50.84</b>                       | <b>100%</b>                    | <b>34.88</b>                    | <b>100%</b>                    | <b>27.67</b>                    | <b>100%</b>                    |

\*Total nursery = 200 acres, with 175 acres of growing space and 25 acres in production facilities, holding and field bed area, roads, etc.  
 ++Tree liners were purchased rather than propagated. Liner costs were included under materials.