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EFFECTS OF SHIFTS IN PRICES OF LAND, LABOR, AND CAPITAL ON THE COST OF GROWING PFITZER JUNIPER[1]

CECIL N. SMITH
University of Florida, IFAS,
Food and Resource Economics Department,
Gainesville, FL 32611
AND
DENNIS B. MCCONNELL
University of Florida, IFAS,
Ornamental Horticulture Department,
Gainesville, FL 32611

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Abstract. **The land, labor, capital, and management or entrepreneurial resources involved in nursery stock production take many forms. The effects of price changes of 5 of these factors were analyzed. A synthetic example of a 5-acre container nursery with 10% of the 4 (stock production) acres in pfitzer juniper was used to determine various hypothetical and relative input cost changes on production costs. The rank, from high to low, of their influence on costs in the overall product, with the same percentage changes in input costs, is as follows: 1. wages, 2. rate of interest, 3. level of operator's salary, 4. cost of supervisory labor, and 5. land.**

During the past few years the University of Florida has cooperated with researchers of the Tennessee Valley Authority and in 8 other Southern agricultural experiment stations in conducting a study on production inputs and costs for a number of nursery products grown in the South—kurume azaleas, crape myrtle, forsythia, pfitzer juniper, pin oak, and others. Southern regional bulletins and other reports have carried the results of this research (1, 2, 3, 4).

The purpose of this paper is to present cost estimates showing the effect of inflation over the past several years on the cost of production inputs; furthermore, it also helps to illustrate a method for showing the effect of changes in production input costs on the overall cost of producing a gallon container of pfitzer juniper. Throughout the analysis it is assumed that there is no change in the cost or composition of other production inputs (i.e., that all other costs remain constant and there is no change in factor productivity) while the cost of the input studied is varied from one level to another.

With continuing inflation and further anticipated rises in the costs of various inputs, a systematic way of planning for such cost changes is essential to efficient nursery planning operations. Certain inputs, for example, exercise a larger influence on output cost than others.

Materials and Methods

In order to standardize results in the input-cost phase of the work a synthesized model of a 5-acre nursery with 4 acres of shaded container plant production space was utilized. The remaining acre was devoted to propagation houses, an office, storage and utility facilities, parking space, roads, and related purposes. A tenth of the production area—0.4A.—was devoted to each of 10 nursery products. In this paper it is assumed that 10% of the area was in pfitzer junipers. The data from which the synthetic model was developed to show the various inputs required—and their costs—in a 0.5 A. nursery operation were obtained from cooperating growers.

This paper reports a synthesized analysis of the effect on output costs of various elements of input costs reported in the initial study, but adjusted for inflation to reflect current cost levels. Fixed costs included depreciation, interest, and taxes charged for the use of land, buildings, and equipment; a tenth of the annual costs was allocated to the juniper crop. General overhead costs included the operator's salary at $15,000, supervisory labor at $9,000, and payments for electricity, travel, and other expenses allocated to all crops grown. These items were also classified in the fixed cost category in the reports on the S-103 study; this paper follows that procedure. Variable expenses included machinery operating costs, wages for labor, the opportunity cost of operating capital, and related items.

In the analysis presented here the costs of *all inputs* were adjusted to reflect inflationary price increases. The cost of land was assumed to be $2,500 per A. and the interest rate to be 15%. The basic wage rate utilized was $3.35 (the current minimum wage), with the operator's salary at $17,500 and supervisory labor costs at $10,000 annually. In the analyses made the basic input costs are those given here.

The variable and fixed costs per 0.4 A. and per plant sold are shown in Table 1. Total costs for producing the 0.4 A. of pfitzer junipers were estimated at $15,360 for 12,800 salable plants. This amounted to $1.20 per plant sold. Data for the study pertain to Climatic Zone 9, which includes northern Florida and southern Alabama.

Table 1. Estimated costs of producing 12,800 container-grown pfitzer juniper plants, nursery with 4 acres growing area, Climatic Zone 9, 1980.

Item	Variable	Fixed	Total
	Cost of producing 12,800 salable plants		
Cost per acre (12,800 plants)	$8,704	$6,656	$15,360
Cost per plant sold	$ .68	$ .52	$ 1.20

Results and Discussion

The analysis shows the effect of various cost levels for the 5 input items considered on the production cost per container of pfitzer juniper. Another segment of the analysis is concerned with the effect on production cost per container when various levels of percentage change from the basic cost level of each production input are postulated.

Operator's salaries

Each change of $2,500 in nursery operators' salary results in a shift in the same direction of 2¢ in the cost per container of pfitzer junipers (Table 2). An increase of $10,000 in the grower's salary, for example, would result in a rise of almost 8¢ in the cost per container.

Supervisory labor

An increase of $1,000 in supervisory labor costs is associated with a change of 0.8¢ in the cost per plant (Table 2). If, over a period of time, the foreman, manager, or

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Table 2. Estimated effect of various levels of salaries for nursery operators and costs of supervisory labor on costs per plant of pfitzer junipers, Climatic Zone 9, 1980.

Operator's salary			Supervisory labor costs		
Level	Avg. cost/ plant	Difference	Level	Avg. cost/ plant	Difference
Dollars					
10,000	1.141	–.059	7,075[y]	1.177	–.023
12,500	1.161	–.039	7,500	1.180	–.020
15,000	1.180	–.020	9,000	1.192	–.008
17,500	1.200[z]	—	10,000[z]	1.200[z]	—
20,000	1.220	.020	12,000	1.216	.016
22,500	1.239[x]	.039	12,500	1.220[w]	.020
25,000	1.259	.059	15,000	1.239	.039
27,500	1.278	.078	17,500	1.259	.059
30,000	1.298	.098	20,000	1.278	.078
35,000	1.337	.137	22,500	1.298	.098

[z]Budgeted level of costs derived as follows: $15,360 ÷ 12,800 = $1.20.
[y]Cost at minimum wage level.
[x]Computed as follows: [$15,360 + 0.1 ($22,500 – $17,500)] ÷ 12,800 = $1,220.
[w]Computed as follows: [$15,360 + 0.1 ($12,500 – $10,000)] ÷ 12,800 = $1.220.

other supervisor had an increase in renumeration from $10,000 to $12,500, there would be a rise in costs per plant of 2¢.

Wages

With some 920 hours of labor required to produce 12,800 pfitzer juniper plants, it is obvious that the resulting total wage payment makes up a hefty portion of total costs. A rise of 15¢ an hour in the average wage means an increase in costs per container of 1.1¢. On the other hand, a rise of 65¢—from $3.35 to $4.00 an hour—means an increase in costs (with no changes in the other factors of production) of 4.7¢ (Table 3). In brief, for each 10¢ an hour increase in the average wages of labor, per unit costs shift in the same direction by 0.72¢.

Value of land

With an interest rate of 15% and taxes estimated at 2% of the value of land, annual ownership costs amount to 17% of the value of land (Table 4). Thus, for the half acre (0.4 A. in production plus 0.1 A. in utilities) in pfitzer juniper, the annual ownership costs are $212.50. For each increase of $1,000 in value, the incremental annual cost is $170 per acre or $85 per half acre. For an increase of $1,000 in land value, the average cost per plant rises 0.66¢.

Table 3. Estimated effect of various level of wages of labor on the costs per plant for pfitzer junipers in Climatic Zone 9, 1980.

Wages per hour	Avg. cost per plant	Differential
Dollars		
2.75	1.157	–.043
3.00	1.175	–.025
3.25	1.193	–.007
3.35[z]	1.200[z]	.—
3.50	1.211	.011
3.75	1.229	.029
4.00	1.247[y]	.047
4.25	1.265	.065
4.50	1.283	.083
5.00	1.319	.119
6.00	1.390	.190
7.00	1.462	.262

[z]Budgeted basic level of costs.
[y]Computed as follows: [$15,360+920 ($4.00–$3.35]÷12,800=$1,247.

Rate of interest

Although a nursery operator may own completely his land, buildings, equipment, etc., he nevertheless must include interest charges on these as well as operating capital as a business expense. It is considered appropriate to charge to any economic enterprise the return that the investment in it would have returned had the money been invested in an alternative. Higher interest rates along with increased costs of land, buildings, equipment, and operating capital mean substantial increases in costs of producing each plant. As noted, the basic interest rate selected was 15% (Table 4).

On the average, a change of 1% in the interest rate means a shift in the same direction of 1.3¢ in the cost per plant. Were the interest rate to drop from 15 to 12% and this change reflected throughout the pattern of costs, the cost per plant would drop by 3.9¢ to $1.16.

Relative changes in costs

The data in Table 5 show the effect of percentage changes in the costs of the five production factors or services analyzed in this paper. The top portion of the table is concerned with the percentage change in the cost per container of nursery stock with given percentage rises in the costs of the inputs studied. The lower section of the table presents data on the actual cost of the output, given the appropriate percentage change in the cost of inputs. In every case, as noted previously, it is assumed there is no change in the cost or quantity of other input items utilized.

The relationships shown are linear. Nevertheless, due to

Table 4. Estimated effect of various levels of land prices and rates of interest on the costs per plant for pfitzer juniper in Climatic Zone 9, 1980.

	Value of land			Rate of interest		
Value/A	Ownership cost/0.5A	Avg. cost/ plant	Diff.	Level	Avg. cost/ plant	Diff.
	Dollars			Percent	Dollars	
1,000	85.00	1.1900	–.0100	6	1.084	–.116
1,500	127.50	1.1934	–.0066	8	1.110	–.090
2,000	170.00	1.1967	–.0033	10	1.136	–.064
2,500	212.50[z]	1.2000[z]	—	12	1.161	–.039
3,000	255.00	1.2033	.0033	15[z]	1.200	—
3,500	297.50[y]	1.2066	.0066	18	1.239	.039
4,000	340.00	1.2100	.0100	20	1.264	.064
5,000	425.00	1.2166	.0166	25	1.329	.129

[z]Budgeted basic level of input costs.
[y]Computed as follows: [$15,360 + ($297.50 – $212.50] ÷ 12,800 = $1.2066.

Table 5. Estimated effect on total costs for 1-gal. containers of pfitzer juniper in Climatic Zone 9 with changes of 5%, 10%, 15%, 20%, 25%, 50%, 75%, and 100% in the cost of various production inputs, 1980.

Item	Percent rise in cost of input							
	5	10	15	20	25	50	75	100
	Percent increase in cost per container[z]							
Operator's salary	.58	1.17	1.75	2.25	2.83	5.67	8.58	11.42
Supervisory labor	.33	.67	1.00	1.33	1.67	3.25	4.92	6.50
Wages	1.00	2.00	3.00	4.00	5.00	10.00	15.08	20.08
Land	.08	.17	.17	.25	.33	.67	1.00	1.42
Rate of interest	.83	1.58	2.42	3.23	3.33	8.33	12.08	16.17
	Cost per container							
Operator's salary	1.207	1.214	1.221	1.227	1.234	1.268	1.303	1.337
Supervisory labor	1.204	1.208	1.212	1.216	1.220	1.239	1.259	1.278
Wages	1.212	1.224	1.236	1.248	1.260	1.320	1.381	1.441
Land	1.201	1.202	1.202	1.203	1.204	1.208	1.212	1.217
Rate of interest	1.210	1.219	1.229	1.239	1.240	1.300	1.345	1.394

[z]Percentages may differ from expected arithmetic relationship because of rounding.

the expected continuation of inflation, a series of 8 different levels of input cost increases, ranging from 5% to 100%, is shown.

If it is assumed that each factor was to increase at the same percentage (with no change in the others), the largest rise in output cost would come about from wage increases. For example, a 25% rise in the cost of wages would result in a 5% increase (i.e., 6¢) in the cost per container. The factor bringing about the next highest increase in costs is the interest rate. A 25% increase—from 15 to 18.75% —would result in a 3.33% increase in the cost per unit of output. This would mean a cost rise from $1.20 to $1.24 per plant.

The operator's level of salary ranks third in affecting the cost per unit of output. A shift upward of 25%—from $17,500 to $21,875—would result in a 2.8% increase in the cost per container, which would rise from $1.20 to $1.234.

Although an important element in affecting cost, supervisory labor ranks in fourth place among the five factors analyzed. A 25% increase in the cost of supervisory labor—from $10,000 to $12,500—would result in an increase of 1.67% in the cost per unit of output. This would mean a shift from $1.20 to $1.22 per output unit.

Among the input units considered in the hypothetical case in question a change in cost of land has the smallest impact on cost per unit of output. A 25% rise in the price of land—from $2,500 to $3,125 per A.—would mean an increase of 0.33% in the per unit cost of output. It would bring about a rise in prices of only 0.4¢ per plant.

The implications of the relatively small impact of an increase in the price of land on costs per unit are that other factors may be more important than the price of land in the decision process. A favorable location which would minimize the cost of transportation, movement of labor and management, and other productive resources as well as the final product may more than offset the higher initial costs and carrying charges of the land.

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RINGSPOT OF SCAEVOLA[1]

J. J. McRitchie and G. C. Wisler
Florida Department of Agriculture and Consumer Services, Division of Plant Industry, P.O. Box 1269, Gainesville, FL 32602

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Abstract. Scaevola frutescens **is a perennial shrub of the family Goodeniaceae which is valuable in landscaping where a salt-tolerant planting is required. Recently, a chlorotic and necrotic ringspot was detected in plantings of this shrub in South Florida. Leaf symptoms appeared at first as subcircular, translucent areas which became chlorotic and/or necrotic along the periphery. Surveys indicate that this disease is widespread in South Florida. Host range, electron microscopy, inclusion body examination, and immunodiffusion tests indicated that the causal agent is cucumber mosaic virus (CMV) but that it is not identical to other CMV strains to which it was compared, nor is it serologically related to peanut stunt virus (PSV) or tomato aspermy virus (TAV), both members of the cucumovirus group. This may be the first instance of CMV infecting a member of the Goodeniaceae.**

[1]Contribution No. 514, Bureau of Plant Pathology.

Species of *Scaevola* are perennial herbs or shrubs which belong to the family Goodeniaceae. This family contains about 14 genera and 320 species, most of which are indigenous to Australia, tropical Africa, Polynesia, and New Zealand (9). Two species, *Scaevola frutescens* (Mill.) Kurt Krause, and *S. plumieri* (L.) Vahl, are currently grown in the coastal areas of southern Florida. *S. frutescens* is particularly valuable in landscaping where a salt tolerant planting is required.

Recently, a chlorotic and necrotic ringspot was detected in plantings of *S. frutescens* in South Florida. Leaf symptoms appeared at first as subcircular, translucent areas which became chlorotic and/or necrotic along the periphery. They may also take the form of oak-leaf patterns on Scaevola leaves (Fig. 1). Symptoms are most readily observed during the fall and winter months, and in fact, plants may appear healthy at other times of the year. Similar symptoms were noted in 1946 in the Kailua area of Oahu, Hawaii, but apparently no studies were initiated (7). Surveys indicate that the disease is widespread in South Florida.