

FIXED SOD COST DECREASES AS MARYLAND FARM SIZE RISES

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This article discusses fixed and variable costs and returns by size of farm for producing unharvested turfgrass in Maryland in 1976.² A previous article detailed the importance of the commercial sod industry in Maryland. In 1976, the industry was composed of 63 growers who produced 8,712 acres of turfgrass. Of this acreage, an estimated 2,497 acres were sold for \$5.4 million at the farm level.

Total cost estimates derived from conducting interviews with Maryland turfgrass producers were divided into categories of variable and fixed costs. Variable costs refer to all expenses that are a function of output and are incurred only if production is carried on. Fixed costs refer to those expenses incurred for employing fixed resources.

Variable expenditures for the production of turfgrass included seed, fertilizer, top-dress fertilizer, herbicides, lime, fuel and oil, production labor (labor used in field operations) and interest on variable capital (calculated at 8.25 percent). These variable costs of production for the various sizes of turfgrass farms are presented in Table 1.

The largest expenditure for any item of average variable cost for all growers was for top-dress fertilizer. This was followed closely by the expenditure for seed (Table 1). Producers were willing to spend these amounts for seed and fertilizer to promote a good stand of quality turfgrass. Individual costs for seed and top-dressing requirements were 22 and 24 percent, respectively, of total variable cost for the all growers category.

The next most important expense item of average variable cost was for production labor. Expenditures for production labor were based on labor requirements and hourly wages used in performing various typical cultural practices.

Table 2 shows that total labor requirements decreased as farm size increased to 300 acres then increased for farms with more than 300 acres. However, production labor cost economies were offset by an increasing average hourly wage paid as farm size increased. Wage rates ranged from \$2.88 per hour on the smallest farms to \$3.67 per hour on the largest farms, or a 27 percent increase. This increasing average wage rate caused average production labor expenditures to vary little for all farm sizes except farms with 151-300 acres. Pro-

ducers in this category reported an average production labor cost of \$45.44 per acre while other categories averaged around \$60.00 per acre. The large decrease in production labor to 14.22 hours accounted for the lower labor cost for this size group (Table 2). Too, these 14.22 hours required for production labor were 35 percent less than the highest reported figure found on farms with less than 100 acres and 27 percent less than the state average.

Variable input cost requirements (seed, fertilizer, top-dressing fertilizer, herbicides, lime and

Table 1. Average Variable Costs of Production for Various Sizes of Turfgrass Farms, Maryland, 1976

Item	Farm Size				
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	All Growers
	Dollars Per Acre, Two-Year Production Period				
Seed	78.40	60.80	69.00	84.32	76.13
Fertilizer	32.96	33.40	29.12	37.06	33.54
Top-dressing	84.12	79.26	72.52	77.64	80.80
Herbicides	11.07	11.91	15.25	20.85	14.31
Lime	17.59	13.25	19.25	14.83	16.59
Fuel and Oil	32.27	30.36	26.77	31.55	31.11
Production Labor	63.65	60.39	45.44	59.58	59.61
Interest					
Variable Capital	28.11	25.47	24.40	28.65	27.43
Average					
Variable Cost	348.17	314.84	301.75	354.48	339.52

Table 2. Average Labor Requirements for Turfgrass Production for Various Farm Sizes, Maryland, 1976^a

Cultural Practices	Farm Size				
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	All Growers
	Hours Per Acre, Two-Year Production Period				
Seedbed Preparation	4.13	3.59	3.20	3.10	3.69
Stone Removal	4.03	2.90	2.11	2.11	2.99
Seeding	1.05	.83	.48	.64	.85
Top-dressing	1.09	.74	.60	.94	.95
Spraying	.49	.28	.54	.55	.49
Mowing	13.72	13.69	7.94	10.11	12.11
Total Labor	22.07	20.33	14.22	16.24	19.43

^a Simple summation by cultural practices will not give the reported total labor requirement for each size of farm. Each estimate of the labor requirement by cultural practice was computed from only those growers in each farm size category who actually performed that practice. Total labor for each size of farm is therefore a weighted summation of the labor requirement by cultural practice.

¹ Scientific Article Number A2491, Contribution Number 5522 of the Maryland Agricultural Experiment Station, Department of Agricultural and Resource Economics. For more detailed information, an Experiment Station publication will be available in late fall or early winter.

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³ All costs are based on a two-year production period. This period was reported by the majority of growers as the production-marketing period that one could expect under normal conditions.

⁴ George A. Stevens, *Farm Data Manual*, Department of Agricultural and Resource Economics, AREIS No. 18, Cooperative Extension Service, University of Maryland, College Park, Maryland, August, 1977. Repair estimates were based on a percentage of investment for buildings and equipment and were placed in the fixed cost category.

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interest on variable capital) ranged from a high of \$354.48 per acre on farms with more than 300 acres

to a low of \$301.75 per acre on farms with 151-300 acres (Table 1). The largest farms were charac-

Table 3. Average Fixed Costs of Production for Various Sizes of Turfgrass Farms, Maryland, 1976

Item	Farm Size				All Growers
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	
— Dollars Per Acre, Two-Year Production Period —					
Fixed Costs					
Machinery and Equipment					
Depreciation	68.12	48.10	37.64	35.55	41.29
Repairs	34.06	24.05	18.82	17.78	20.65
Insurance	4.08	2.89	2.26	2.13	2.48
Permanent Structures					
Depreciation	19.26	14.56	10.78	10.18	14.70
Repairs	3.86	2.92	2.16	2.04	2.94
Insurance	3.86	2.92	2.16	2.04	2.94
Supervisory Services	7.21	6.70	15.14	26.05	13.65
Real Estate Tax	9.00	9.28	9.24	9.38	9.28
Interest on Fixed					
Capital	52.50	38.26	30.44	29.78	35.52
Land Rental Rate	70.00	70.00	70.00	70.00	70.00
Average Fixed Cost	271.95	219.68	198.64	204.93	213.45

Table 4. Average Total Costs of Production for Various Sizes of Turfgrass Farms, Maryland, 1976

Item	Farm Size				All Growers
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	
— Dollars Per Acre, Two-Year Production Period —					
Fixed Costs					
Machinery and Equipment					
Depreciation	68.12	48.10	37.64	35.55	41.29
Repairs	34.06	24.05	18.82	17.78	20.65
Insurance	4.08	2.89	2.26	2.13	2.48
Permanent Structures					
Depreciation	19.26	14.56	10.78	10.18	14.70
Repairs	3.86	2.92	2.16	2.04	2.94
Insurance	3.86	2.92	2.16	2.04	2.94
Supervisory Services	7.21	6.70	15.14	26.05	13.65
Real Estate Tax	9.00	9.28	9.24	9.38	9.28
Interest on Fixed					
Capital	52.50	38.26	30.44	29.78	35.52
Land Rental Rate	70.00	70.00	70.00	70.00	70.00
Average Fixed Cost	271.95	219.68	198.64	204.93	213.45
Variable Costs					
Seed	78.40	60.80	69.00	84.32	76.13
Fertilizer	32.96	33.40	29.12	37.06	33.54
Top-dressing	84.12	79.26	72.52	77.64	80.80
Herbicides	11.07	11.91	15.25	20.85	14.31
Lime	17.59	13.25	19.25	14.83	16.59
Fuel and Oil	32.27	30.36	26.77	31.55	31.11
Production Labor	63.65	60.39	45.44	59.58	59.61
Interest on Variable					
Capital	28.11	25.47	24.40	28.65	27.43
Average Variable Cost	348.17	314.84	301.75	354.48	339.52
Average Total Cost	620.12	534.52	500.39	559.41	552.97

terized as spending above or near average per acre costs for seed, fertilizer, top-dressing fertilizer and production labor. The use of these inputs at or above average cost was not a function of farm size, rather a function of production management decisions. The more intensive applications of production inputs were an effort to insure adequate growth, appearance and quality of the grass which would ultimately help in the marketing and sale of the product.

Fixed costs incurred in the production of sod over a two-year production period are reported in Table 3. The calculated annual fixed cost for all machinery and equipment was based on an assumed life of the asset of eight years with 20 percent salvage value. The average fixed cost per acre for buildings and permanent structures assumed a 20 year life and zero salvage value. The resulting annual cost for depreciation, repairs and insurance was calculated at 15.6 percent of the value of the machinery and equipment complements and seven percent of the new value for permanent structures.⁴ Interest on fixed capital was charged at an annual rate of 8.5 percent of the average value for fixed investments. A land rental rate of \$70 per acre (\$35.00 per year) was used as the opportunity cost of land for sod production.

The cost of supervisory labor (other than required for field operations) increased per acre as farm size increased, except for the 100-150 acre farm size category which was nearly equal to that reported for the less than 100 acre category (Table 3). Costs for these services ranged from \$6.70 per acre for farms with 100-150 acres to \$26.05 per acre for farms with more than 300 acres. Producers on the larger farms generally spent more time for travel to the fields, hired more supervisory labor and spent more time finding and negotiating sales.

Table 3 shows that average fixed cost per acre decreased as average size of farm increased up to the farm size of greater than 300 acres. Fixed costs attributed to machinery and equipment, permanent structures and interest on fixed capital decreased per acre as farm size increased for all farm sizes. Since the land rental rate was assumed to be constant for all farm sizes, and real estate tax over the two-year period was reported to be nearly equal for all farm sizes, the increase in the total fixed cost per acre on farms of greater than 300 acres can be traced to increasing supervisory labor costs as farm size increased. Again, the higher supervisory cost is explained by time being spent in supervising a large number of employees and managing the intensive cultural practices, while also spending time in transacting sales for the extra volume of output on the largest turfgrass farms.

To summarize, an examination of the average total cost items shown in Table 4 reveals there are four areas which affected the total cost structure for the various farm sizes:

1. Average fixed cost per acre for machinery, equipment and permanent structures decreased as farm size increased for all farm sizes.

2. Costs of supervisory services increased per acre as farm size increased except for the 100-150 acre farm size category where the cost was nearly equal to that reported for the less than 100 acre size

category.

3. Average variable cost decreased through the three smallest farm size groups but increased to its highest level on the largest farms.

4. Hourly wages paid, according to farm size, increased as farm size increased, virtually offsetting any dollar savings from lower per acre labor requirements on the larger farms.

Gross receipts per acre for mixtures of Kentucky bluegrasses and Red Fescue or Kentucky-31 Tall Fescue and Kentucky bluegrass sold on an unharvested basis for an average of \$657.09 per acre in 1976 (Table 5). The receipts ranged from a low of \$611.36 per acre on farms with less than 100 acres to a high of \$734.50 per acre on farms with 100-150 acres.

Table 5. Return to Management from Sale of Turfgrass by the Acre, Maryland, 1976

Item	Farm Size (Net Acres of Turf)				
	Less Than 100 Acres	100-150 Acres	151-300 Acres	Greater Than 300 Acres	All Growers
	\$ per acre	\$ per acre	\$ per acre	\$ per acre	\$ per acre
Gross Receipts Per Acre	611.36	734.50	685.00	700.00	657.09
Less Variable Cost Per Acre Including Hired or Operator Labor Equals	348.17	314.84	301.75	354.48	339.52
Return to Land, Fixed Capital, and Management	263.19	419.66	383.25	345.52	317.57
Less Fixed Cost Per Acre Including 8.5% on Fixed Capital and \$70.0 Land Rental Rate Equals	271.95	219.68	198.64	204.93	213.45
Return to Management	-8.76	199.98	184.61	140.59	104.12

Return to management (gross receipts minus expenses) from the sale of turfgrass sold on an unharvested basis for various farm sizes is also reported in Table 5. Under industry conditions prevailing in 1976, farms with 100-150 acres, selling turfgrass on an unharvested basis, realized the highest return to management of \$199.98 per acre over the two-year production period. Farms with less than 100 acres, which incurred the lowest average price per acre and the highest total production costs per acre, realized a negative return to management of -\$8.76 per acre for the two-year production period.

The third article in this series concerning the Maryland sod industry will present costs and returns for various vertically integrated production, harvest and transportation options observed for the industry in 1976. **WTT**