

# Economics of Turfgrass Establishment

*Steven W. Martin and Wayne Wells*

## INTRODUCTION

Many U.S. farmers are experiencing financial difficulty (Ratliff). The current farm financial crisis is the result of low commodity prices combined with below-average yields. While government disaster payments and increased subsidies have helped, owner equity has still declined. This is in contrast with the rest of the U.S. economy; during the last decade, the gross domestic product (GDP) has increased by 23 percent and the Dow-Jones Industrial Average, by 291 percent (U.S. Department of Commerce). This contrast has caused many farmers to look for alternative crops and alternative means of income (Adrian et al.).

The growth in the U.S. economy has led to increased housing starts, new office development, golf course development and recreational complex development. This economic growth has also led to an increased demand for turfgrass (McCarty et al.). In 1995, U.S. homeowners spent more than \$535 million on lawn sod (Adrian et al.). Many areas in Mississippi also have seen an increased demand for turfgrass. Subsequently, many Mississippi farmers are considering turfgrass as an alternative crop.

## OBJECTIVES

The objective of this study is to evaluate the economic feasibility of turfgrass production. In a similar and more elaborate study in 1995, Adrian et al. analyzed the economic feasibility of turfgrass in conjunction with different row crop mixtures. However, the 1996 Federal Agriculture Improvement and Reform Act (FAIR) makes the current farm situation somewhat different from the farm situation described in their research. More importantly, turfgrass production is location specific. Sod markets differ depending on their proximity to areas experiencing economic growth, and turfgrass varieties differ depending on the degree of latitude (McCarty et al., Adrian et al., Hall et al.). Therefore location-specific budgets need to be developed for turfgrass vari-

eties. Additionally, sensitivity analyses on sod price, market saturation, and variety selection are needed.

The objective of the study was accomplished through the development of enterprise budgets for hybrid Bermuda turfgrass and Zoysia turfgrass for the northern half of Mississippi. Particular attention was given to "trips-over-the-field." The initial budgets were developed for a 40-acre sod farm. Selected capital investments needed for a 40-acre sod farm are also reported. Based on the enterprise budgets developed, returns above specified costs for various sod prices are analyzed. Finally, the issues of market saturation and variety selection are addressed.

Martin is an assistant specialist at the Delta Research and Extension Center (DREC) in Stoneville; Wells is an assistant specialist in the Department of Plant and Soil Sciences, Mississippi State University. For more information, contact Martin at 662-686-3264; e-mail SMartin@ext.msstate.edu. This research report was published by the Office of Agricultural Communications, a unit of the Division of Agriculture, Forestry, and Veterinary Medicine at Mississippi State University.



**Experiment Station**  
Vance H. Watson, Director

**Mississippi Agricultural & Forestry Experiment Station**

Malcolm A. Portera, President • Mississippi State University • J. Charles Lee, Vice President

## DATA AND METHODS

Selected producers in North MS were contacted in order to obtain actual on-farm information on turfgrass establishment. To prepare establishment budgets, these on-farm practices were summarized and adjusted for agronomic concerns. The budgets were produced using the Mississippi State Budget Generator (MSBG); this tool is available on the web at <http://www.agecon.msstate.edu/researchandinformation/software.asp>. The MSBG contains the 2000 Mississippi State University Planning Budgets (MSUPB). Where appropriate, input prices and performance rates contained in the MSUPB were used. For those inputs and performance rates unique to the turfgrass industry and not contained in the MSUPB, actu-

al data from producers and manufacturers were summarized and used. Table 1 shows an establishment budget for hybrid Bermuda turfgrass; table 2 shows an establishment budget for Zoysia turfgrass. These budgets do not include delivery, installation, returns to management, land costs or the initial cost of a well. Table 3 shows summarized prices for selected capital investments needed for turfgrass production. Tables 4 and 5 show returns above specified costs for selected prices for hybrid Bermuda and Zoysia grass, respectively. Table 6 shows average on farm prices for hybrid Bermuda and Zoysia for the 1998-2000 growing seasons.

## RESULTS

As can be seen in tables 1 and 2, hybrid Bermuda is \$1,166 per acre less expensive to establish than Zoysia. Hybrid Bermuda grows much faster and can be harvested sooner. Hybrid Bermuda is typically harvested 12-16 weeks after sprigging; Zoysia grass is usually not harvested until

approximately 15-20 months after sprigging. This increases costs due to the additional waterings and mowings, and interest on the investment. Additionally, fertilizer and chemical costs for the fall and preceding spring are included in the establishment budget for Zoysia, whereas they would be

**Table 1. Estimated Costs Per Acre\*  
Hybrid Bermuda Turf/Sod Establishment, Mississippi, 2000**

	ITEM	UNIT	PRICE	QUANTITY	\$ AMOUNT
<b>DIRECT EXPENSES</b>					
<b>Custom</b>	Custom chisel plow	acre	7.50	1.0000	7.50
	Custom spread (truck)	appl	3.50	1.0000	3.50
	Sod sprig	acre	1200.00	1.0000	1200.00
<b>Fertilizer</b>	Lime (spread)	ton	26.73	1.0000	26.73
	Amm nitrate (34%N)	cwt	9.15	4.5000	41.17
	Phosphate (46% P <sub>2</sub> O <sub>5</sub> )	cwt	12.47	1.5000	18.70
	Potash (60% K <sub>2</sub> O)	cwt	8.35	1.0000	8.35
<b>Herbicide</b>	Roundup Ultra	pt	5.68	6.0000	34.08
	Atrazine 4L	pt	1.34	4.0000	5.36
	2,4-D Amine	pt	1.52	1.5000	2.28
	MSMA + surfactant	pt	1.97	6.0000	11.82
<b>Other</b>	Wood pallets	each	6.00	38.0000	228.00
<b>Operator labor</b>	Tractors	hour	8.31	11.2620	93.58
<b>Hand labor</b>	Implements	hour	6.91	16.3060	112.67
	Unallocated labor	hour	8.31	11.2620	93.58
<b>Diesel fuel</b>	Tractors	gal	1.20	28.9433	34.73
	Self-propelled equipment	gal	1.20	22.5000	27.00
<b>Repair &amp; maintenance</b>	Implements	acre	74.27	1.0000	74.27
	Tractors	acre	21.82	1.0000	21.82
	Self-propelled equipment	acre	9.66	1.0000	9.66
	Interest on operating capital	acre	50.67	1.0000	50.67
<b>TOTAL DIRECT EXPENSES</b>					<b>2105.47</b>
<b>FIXED EXPENSES</b>					
	Implements	acre	188.89	1.0000	188.89
	Tractors	acre	53.25	1.0000	53.25
	Self-propelled equipment	acre	43.33	1.0000	43.33
<b>TOTAL FIXED EXPENSES</b>					<b>285.47</b>
<b>TOTAL SPECIFIED EXPENSES</b>					<b>2390.94</b>

\*Note: Cost of production estimates are based on 1999 input prices.

included in a maintenance budget for hybrid Bermuda. The major differences in establishment costs are the additional waterings and mowings needed over an additional 8-12 months, and the lack of cash flow associated with the delayed harvest of the Zoysia variety. The delayed cash flow was mentioned by many producers as the reason for planting hybrid Bermuda instead of Zoysia.

It should be mentioned that initial land preparation can vary significantly regardless of grass variety. Most producers preferred land that had been row-cropped for the last several years. Such land is relatively free of weeds and grasses. Land that is not weed/grass free or has some type of grass already established (such as pasture, hay, etc.) will likely require fumigation in order to eliminate present vegetation and seeds. If fumigation costs are included, establishment costs will increase by \$1000-1700/acre above costs specified in tables 1 and 2. Because of the magnitude of this added expense, most producers select land that has previously been in a row crop operation.

Table 6 shows on-farm sod prices for the 1998-2000 growing seasons. The 2000 growing season was extremely

dry and hot. Those producers without irrigation were severely affected. Those with irrigation had to work extremely hard to keep grass growing vigorously. The hot, dry weather caused a decrease in production per acre. However, the decrease in production per acre was offset somewhat by new producers entering the market. This, coupled with rising interests rates (and consequently, lower housing starts), made turfgrass readily available; ready availability brought reports of lower grass prices.

At current prices, both Zoysia and hybrid Bermuda show positive returns above specified costs. Only weed pest management has been considered in the establishment budgets. Insect and disease control are often not needed but (when necessary) can result in considerable additional expense. Potential growers also need to consider local costs associated with obtaining an adequate well for irrigation (quotes ranged from \$10,000 - \$80,000). Additionally, the opportunity costs associated with land and management must be considered.

**Table 2. Estimated Costs Per Acre\*  
Zoysia Turf/Sod Establishment, Mississippi, 2000**

	ITEM	UNIT	PRICE	QUANTITY	\$ AMOUNT
<b>DIRECT EXPENSES</b>					
<b>Custom</b>	Custom chisel plow	acre	7.50	1.0000	7.50
	Custom spread (truck)	appl	3.50	2.0000	7.00
	Sod sprig	acre	1800.00	1.0000	1800.00
<b>Fertilizer</b>	Lime (spread)	ton	26.73	2.0000	53.46
	Amm nitrate (34%N)	cwt	9.15	7.0000	64.05
	Phosphate (46% P <sub>2</sub> O <sub>5</sub> )	cwt	12.47	1.5000	18.70
	Potash (60% K <sub>2</sub> O)	cwt	8.35	1.0000	8.35
	0-20-20	cwt	10.90	3.0000	32.70
<b>Herbicide</b>	Roundup Ultra	pt	5.68	6.0000	34.08
	Atrazine 4L	pt	1.34	4.0000	5.36
	2,4-D Amine	pt	1.52	4.5000	6.84
	MSMA + surfactant	pt	1.97	18.0000	35.46
<b>Other</b>	Wood pallets	each	6.00	38.0000	228.00
<b>Operator labor</b>	Tractors	hour	8.31	13.7600	114.34
<b>Hand labor</b>	Implements	hour	6.91	16.4950	113.98
	Unallocated labor	hour	8.31	13.7600	114.34
<b>Diesel fuel</b>	Tractors	gal	1.20	31.3760	37.65
	Self-propelled equipment	gal	1.20	58.5000	70.20
<b>Repair and maintenance</b>	Implements	acre	84.70	1.0000	84.70
	Tractors	acre	26.66	1.0000	26.66
	Self-propelled equipment	acre	25.13	1.0000	25.13
<b>Interest on operating capital</b>		acre	261.47	1.0000	261.47
<b>TOTAL DIRECT EXPENSES</b>					<b>3149.97</b>
<b>FIXED EXPENSES</b>					
	Implements	acre	209.28	1.0000	209.28
	Tractors	acre	65.09	1.0000	65.09
	Self-propelled equipment	acre	112.66	1.0000	112.66
<b>TOTAL FIXED EXPENSES</b>					<b>387.03</b>
<b>TOTAL SPECIFIED EXPENSES</b>					<b>3537.00</b>

\*Note: Cost of production estimates are based on 1999 input prices.

**Table 3. Estimated Capital Investments  
40-acre Hybrid Bermuda Sod Farm**

Land	54@\$857/acre	\$46,278
Buildings	2500@\$20/sq ft	\$50,000
Well/pump/risers		\$40,000
<b>Tractors</b>		
45hp		\$20,000
50 hp		\$21,700
70hp		\$30,000
<b>Spin spreader</b>		
4 ton		\$7,140
<b>Boom sprayer</b>		
21 ft		\$1,453
42 ft		\$4,010
<b>Rotary mower</b>		
6 ft		\$1,523
12 ft		\$6,940
15 ft		\$9,693
<b>Irrigation</b>		
Traveling gun		\$22,000
<b>Harvesters</b>		
Small block		\$50,000
Large roll		\$40,000
<b>Other</b>		
Roller/12ft		\$3,050
Forklift		\$21,000
Trailer 20ft.		\$1,810
Sweep/vac		\$11,700
Blower 3pt		\$3,500
<b>Trucks</b>		
Pickup		\$15,000
Bob/2-ton		\$31,000

**Table 4. Returns Per Acre Above Specified Costs,  
Hybrid Bermuda Sod**

Sod prices	\$1.00	\$.85	\$.75	\$.50
Revenue @ 3800 yd per acre	\$3800	\$3230	\$2850	\$1900
Minus specified costs	-\$2391	-\$2391	-\$2391	-\$2391
Returns above specified costs	\$1409	\$839	\$459	-\$491

**Table 5. Returns Per Acre Above  
Specified Costs, Zoysia Sod**

Sod Prices	\$2.00	\$1.50	\$1.00	\$.75
Revenue @ 3800 yd per acre	\$7600	\$5700	\$3800	\$2850
Minus specified costs	-\$3537	-\$3537	-\$3537	-\$3537
Returns above specified costs	\$4063	\$2163	\$263	-\$687

**Table 6. On-farm Hybrid Bermuda And Zoysia Turf  
Prices Per Yard, 1998-2000**

Turf	1998	1999	2000
Hybrid Bermuda	\$1.00	\$.80	\$.70
Zoysia	\$1.25	\$1.50	\$2.00

## IMPLICATIONS

The lower grass prices and the increased number of producers growing hybrid Bermuda could be an indication of market saturation for hybrid Bermuda. While most established producers sold all their 2000 crop, some first year producers were able to market only 20 percent of their crop. The degree of substitution between Zoysia and hybrid Bermuda is then a factor to consider. If the market price for hybrid Bermuda falls, it might be assumed that the price of Zoysia

will also fall. However, Zoysia has some unique characteristics that may keep it at a premium when compared to hybrid Bermuda. The degree of substitution is unknown at this time. However, the implication may be that producers should consider Zoysia or other grasses as a long-term investment. Even though the establishment costs are higher, if Zoysia is able to maintain or increase its current price while hybrid Bermuda prices fall, Zoysia might be the better investment.

## FURTHER RESEARCH AREAS

Most turfgrass is sold delivered to the buyer. Some is sold delivered and installed. Thus, there is an immediate need for research on the costs associated with the delivery and/or installing of turfgrass. Additionally, the degree of substitution

between varieties and the price fluctuations for each variety need to be researched in order to further understand the market dynamics associated with turfgrass production.

---

## REFERENCES

---

**Adrian, John L., William M. Loyd, and Patricia A. Duffy.** *Economic Feasibility of Turfgrass-Sod Production.* Alabama Agricultural Experiment Station. Auburn University. Bulletin 625. March 1995.

**Hall, Charles R., Lennie G. Kizer, Jeffery V. Krans, Travis D. Phillips and G. Euel Coats.** *Economic and Agronomic Analysis of Mississippi Turfgrass Sod Farms.* Agricultural Economics Research Report 182. Mississippi State University. September 1988.

**Laughlin, David H. and Stan R. Spurlock.** *Mississippi State Budget Generator.* Agricultural Economics Department. Mississippi State University. Mississippi State, Mississippi.

**Mississippi State Budget Generator User's Guide, Version 5.2 for Windows.** Agricultural Economics Department. Mississippi State University. Mississippi State, Mississippi.

**McCarty, Bert, Gil Landry, Jr., Jeff Higgins, and Landon Miller.** *Sod Production in the Southern United States.* Extension Circular 702, Clemson University Cooperative Extension Service. Clemson, South Carolina.

**Ratliff, Tonya.** "Ag Leaders Tell Congress to Fix 1996 Farm Bill." Available at <http://www.agweb.com/news/news.cfm?id=8818&breakingnews=1&pf=1>. July 2000.

**Thompson, J. H.** *Mississippi Turfgrass Association Newsletter.* Volume 33, Number 9, September 2000.

**U. S. Department of Commerce, Bureau of Economic Analysis.** *Gross Domestic Product: Implicit Price Deflator 1992=100, Seasonally Adjusted.* Available at <http://www.stls.frb.org/fred/data/gdp/gdpdef>. The Federal Reserve Bank of St. Louis. 1999.

# Mississippi State UNIVERSITY



*Printed on Recycled Paper*

Mention of a trademark or proprietary product does not constitute a guarantee or warranty of the product by the Mississippi Agricultural and Forestry Experiment Station and does not imply its approval to the exclusion of other products that also may be suitable.