

**Fall 2000**

**CONSIDERATIONS FOR SOD PRODUCTION:**

Commercial Tall Fescue-Kentucky Bluegrass Sod Production in Tennessee

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# CONSIDERATIONS FOR SOD PRODUCTION

## ✓ Effective use of resources

- land & water
- equipment
- managerial ability
- agronomic skills
- labor management
- equipment maintenance skills

## ✓ Adapted to local environment

- fescue
- zoysia
- Bermuda

## ✓ Serve a market that is well defined and expanding

- housing lawns
- sports & recreation facility
- commercial landscaping
- highway right of way
- golf courses
- parks
- cemeteries
- schools



**Crop practices increase yields . . .**

**sod practices result in healthy,  
dense vegetation free of troublesome  
sod pests**



# Publication #1649... for New, Potential and/or Existing Growers

- ▶ Overview of Fescue Sod
- ▶ Brief Summary of the Industry
- ▶ Production Summary
- ▶ Irrigation Focus
- ▶ Budgets for 50-Acre & 150-Acre Production Systems



# Tennessee . . .

**302,930 acres of sod in 1997,**

**up 39% from 1992 and**

**65% above 1987**



# Tennessee has approximately 2.1% of the national acreage

<b>Table 1. Tennessee's Sod Industry</b>			
	<b><u>1997</u></b>	<b><u>1992</u></b>	<b><u>1987</u></b>
<b>Number of Farms</b>	41	26	13
<b>Acreage</b>	6,516	3,304	814
<b>Sales</b>	\$15,585,000	\$5,424,00	\$1,603,000



# The top five sod producing states account for 46% of the national total

Table 2. Leading Sod States

Farms		Acres		Total Sales	
State	Number	State	Number	State	Sales
Florida	166	Florida	65,185	Florida	\$127,803,000
Texas	156	Texas	27,627	California	\$124,487,000
Alabama	92	Alabama	17,184	Georgia	\$52,118,000
Minnesota	90	Georgia	17,134	Texas	\$51,600,000
Georgia	72	California	13,665	Alabama	\$37,867,000



**There is no research data or survey  
results for the sod industry in  
Tennessee**



# Description of Production System

- Field size
- ▶ Remove existing vegetation
- ▶ Kill vegetation
- ▶ Install irrigation
- ▶ Kill & mow vegetation
- ▶ Turning plow
- ▶ Disk
- ▶ Fertilizer
- ▶ Disk & drag harrow
- ▶ Drill seed
- ▶ Install biodegradable netting
- ▶ Begin irrigation
- ▶ Armyworm control
- ▶ Mow
- ▶ Fertilize
- ▶ Weed control
- ▶ Mow
- ▶ Sweep/Vac.
- ▶ Weed control
- ▶ Nutsedge control
- ▶ Fertilize
- ▶ Fertilize
- ▶ Brown-patch control
- ▶ Grub control
- ▶ Brown-patch control
- ▶ Roll
- ▶ Harvest



# Soil & Water

- ▶ **Soils**
- ▶ **Irrigation**
- ▶ **Available water**
- ▶ **Water quality**
- ▶ **Water requirements**
- ▶ **Application equipment & methods**
- ▶ **Pump Stations**
- ▶ **Mainlines**
- ▶ **Irrigation uniformity**
- ▶ **A hard-hose traveling gun system**



**Table 7. Capital Requirements: Tall Fescue-Kentucky Bluegrass, 50-Acre System**

Equipment Listing	Description	New Price (\$)	Per-acre Estimates		
			Estimated Hours of Use	Five-Year Average Depreciation Cost (\$)	Five-Year Average Repair Cost (\$)
Tractor	45-horsepower, 4 wd	25,000.00	11.69	12.90	6.20
Sprayer	300-gallon, 3-point hitch with 28-foot boom	3,000.00	0.48	3.76	0.65
Turning plow	48", 3-16 bottom	3,500.00	0.53	1.40	0.25
Disk	10 foot	6,300.00	0.33	5.60	0.10
Fertilizer spreader	Besco®, 2000-pound capacity, 3 point-hitch	2,500.00	0.40	1.24	0.36
Seeder	Brillion®, with 2 seed boxes, 10 foot, pull type	13,300.00	0.165	4.94	0.055
Scotch harrow	12 foot	1,200.00	0.165	1.07	0.050
Roller	12-foot drum with cement	1,000.00	0.138	0.98	0.040
Mower	Progressive® Mower, 15,5-foot, 3 gang, finishing mower	11,500.00	5.55	5.56	39.30
Harvester	Brouwer®, Model 1560, 16" cut, with options	50,000.00	6.4	52.45	8.96
Sweeper /Vac.	Brouwer®, BV138, 8-foot, 5 cubic-yard capacity	11,700.00	0.9	4.37	0.96
Forklift	Brouwer®, Hitchhiker, 23-horsepower	35,000.00	1	27.00	6.75
Rotary mower	Five-foot, 3-point hitch	2,500.00	0.24	1.25	0.38
Irrigation system	Hard-hose, traveling gun, pump & station, diesel engine, mainline risers	43,000.00	42	86.00	17.20
Shop, office, storage	780 sq. ft. storage, 120 sq. ft. office, @ \$20/sq. ft.	18,000.00			
<b>Total</b>		<b>\$227,500.00</b>		<b>\$208.52</b>	<b>\$81.26</b>



**Table 8. Labor and Equipment Inputs: Tall Fescue-Kentucky Bluegrass, 50-Acre System**

			Minutes per Acre	
Date	Activity	Power Unit and Equipment	Machine	Labor
After harvest (July-Aug.)	Spray Roundup Pro® (two applications)	Tractor and sprayer	4.42	5.53
		Tractor and sprayer	4.42	5.53
Prior to plowing	Mow	Tractor and rotary mower	14.14	17.68
After mowing vegetation	Plow	Tractor and plow	32.00	40.00
After mowing	Disk	Tractor and disk	9.90	12.38
After disking	Fertilize	Tractor and fertilizer spreader	6.60	8.25
After fertilizing	Disk and drag	Tractor, disk and harrow	9.90	12.38
Mid Aug. to Oct.	Seed	Tractor and seeder	9.90	12.38
After seeding	Install netting	Tractor	35.00	43.75
		Additional labor		137.00
Within two days of seeding	Begin irrigation	Irrigation system (no labor)	2112.00	
		Tractor	132.00	165.00
Prior to mowing	Insect control	Tractor and sprayer	4.42	5.53
Approximately three weeks post-plant	Mow	Tractor and mower	6.40	8.00
After seedling emergence	Fertilize	Tractor and fertilizer spreader	6.60	8.25
Every four days until mid Dec. (22 mowings)	Mow	Tractor and mower	140.80	176.00
After 4th mowing	Broadleaf weed control	Tractor and sprayer	4.42	5.53
March until harvest (30 mowings)	Mow	Tractor and finishing mower	192.00	240.00
March, April and May	Sweep/Vac.	Tractor and sweeper/vac.	54.00	67.50
March	Broadleaf weed control	Tractor and sprayer	4.42	5.53
March	Nutsedge control	Tractor and sprayer	4.42	5.53
March	Fertilize	Tractor and fertilizer spreader	6.60	8.25
April	Fertilize*	Tractor and fertilizer spreader	4.36	5.45
May	Fungus control*	Tractor and sprayer	2.92	3.65
May - June	Insect control*	Tractor and sprayer	2.21	2.76
June	Fungus control*	Tractor and sprayer	1.46	1.83
Prior to harvest	Roll	Tractor and roller	8.25	10.31
April - July 1	Harvest	Tractor-mounted harvester	380.80	1800.00
<b>TOTAL LABOR MINUTES PER ACRE</b>				<b>2813.95</b>
<b>TOTAL LABOR HOURS PER ACRE</b>				<b>46.90</b>

**Table 9. Estimated Expenses per Acre: Tall Fescue-Kentucky Bluegrass, 50-Acre System**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Price (\$)</i>	<i>Amount (\$/Acre)</i>	<i>Your Farm</i>
<b>Variable Costs:</b>						
Seed	Tall Fescue blend	lb.	350	1.50	525.00	
	Kentucky Bluegrass	lb	35	2.90	101.50	
Fertilizer	12-24-24	lb	400	0.13	51.28	
	Urea*	lb	250	0.30	75.00	
Agricultural lime	Custom applied	ton	1	18.00	18.00	
Netting	Sodnet netting	roll	0.133	1332.00	177.16	
	Wooden stakes	ea	500	0.02	12.00	
Herbicides	Roundup Pro®	qt	6	12.38	74.28	
	Strike 3®	pt	6	2.35	14.10	
	Surfactant	qt	0.2	2.50	0.50	
	Manage 75DF®	oz	1	79.23	79.23	
	Surfactant	qt	0.2	2.50	0.50	
Fungicides	Daconil Ultrex®*	lb	10	8.67	86.70	
	Bayleton 25WSP®*	oz	87	1.99	57.71	
Insecticide	Sevin 4SL®*	oz	195	0.23	44.85	
Irrigation	Repairs	2 percent of per-acre purchase price per year			17.20	
	Fuel (diesel)	gal	114	0.70	79.80	
Pallets	Wooden pallets				137.19	
Non-irrigation Equipment	Fuel				61.06	
	Oil and filter				9.11	
	Repairs and maintenance				64.02	
Sub-total					1686.19	
Operating capital	6 months	acre	1870.64	0.09	75.88	
<b>Total Variable Costs</b>					<b>1762.06</b>	

<b>Table 9. (continued) Estimated Expenses per Acre: Tall Fescue-Kentucky Bluegrass, 50-Acre System</b>						
<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Price (\$)</i>	<i>Amount (\$/Acre)</i>	<i>Your Farm</i>
<b>Fixed Costs:</b>						
Non-irrigation equipment	Depreciation				130.82	
	Interest				150.58	
	Housing and insurance				8.21	
Land	Per-acre opportunity cost				100.00	
Irrigation	Straight-line depreciation (\$43,000 for 10 years over 50 acres)				86.00	
	Interest (annualized interest for 10 years at 9 percent)				48.01	
Annual overhead	Pick-up truck, ATV, communications, clerical staff, advertising				500.00	
<b>Total Fixed Costs</b>					<b>1,023.62</b>	
<b>Labor Costs:</b>						
Production	Install netting & field work	hours	14.06	9.00	126.54	
Harvesting	Harvest	hours	30.00	9.00	270.00	
Irrigation	Irrigate	hours	2.75	9.00	24.75	
<b>Total Labor Costs</b>					<b>421.29</b>	
<b>Total Budgeted Expenses (per acre)</b>					<b>3,206.97</b>	
<b>Total Budgeted Expenses (per square yard)</b>					<b>0.78</b>	



**Table 10. Basic Parameters for the 150-Acre Operation**

Field size	150 Acres
Field layout	Three 50-acre fields Each field relatively flat Approximately 2,178,000 square feet (1,044 feet by 2,088 feet)
Irrigation	Three hard-hose traveling gun systems, with 1000 feet of 3" diameter P.E. tubing - \$75,000. Pump and stationary engine - \$15,000. Mainline, risers, and valve openers - \$12,300 (mainline cost assumes that water source is adjacent to field). Water filtration - \$1,000. Total initial cost for irrigation approximately \$103,000.
Mowing schedule	45-horsepower tractor and 15.5 foot mower will be dedicated to 50 acres and a 60-horsepower tractor and 21.5 foot mower will be dedicated to 100 acres for 22 fall mowings and 30 spring mowings.



**Table 11. Capital Requirements: Tall Fescue-Kentucky Bluegrass, 150-Acre System**

<i>Equipment Listing</i>	<i>Description</i>	<i>Per-acre Estimates</i>			
		<i>New Price (\$)</i>	<i>Annual Hours of Use</i>	<i>Five-Year Average Depreciation Cost (\$)</i>	<i>Five-Year Average Repair Cost(\$)</i>
Tractor	45-horsepower, 4 wheel drive	25,000	5.44	6.01	2.89
Tractor	60-horsepower, 4 wheel drive	30,000	5.15	5.91	4.10
Sprayer	300-gallon, 3 point-hitch with 28-foot boom	3,000	0.55	4.31	0.74
Turning plow	48", 3-16 bottom	3,500	0.48	1.35	0.24
Disk	10 foot	6,300	0.33	5.60	0.10
Fertilizer spreader	Besco® 2000-pound capacity, 3-point hitch	2,500	0.4	1.24	0.36
Seeder	Brillion®, with 2 seed boxes, 10 foot, pull type	13,300	0.165	4.94	0.06
Scotch harrow	12 foot	1,200	0.165	1.07	0.05
Roller	12-foot drum with cement	1,000	0.069	0.49	0.02
Roller	12-foot drum with cement	1,000	0.069	0.49	0.02
Mower	Progressive® Mower, 15.5-foot, 3-gang finishing	11,500	1.83	1.73	12.91
Mower	Mathis® Mower, 21.5-foot, 3-gang finishing	17,900	2.76	2.85	3.85
Harvester	Brouwer®, Model 1560, 16" cut, with options	50,000	3.17	21.88	3.74
Harvester	Brouwer®, Model 1560, 16" cut, with options	50,000	3.17	21.88	3.74
Sweeper/vac.	Brouwer®, BV138, 8-foot, 5 cubic-yard capacity	11,700	1.81	3.93	.86
Forklift	Brouwer®, Hitchhiker, 23-horsepower	35,000	1	27.00	6.75
Rotary mower	Five-foot, 3-point hitch	2,500	0.24	1.25	0.38
Irrigation system	Hard-hose, traveling guns, pump & stationary diesel engine, mainline risers	103,000	42	68.00	13.73
Shop, office, storage	780 sq. ft. storage, 120 sq. ft. office @ \$20/sq ft	35,600			
<b>Total</b>		<b>\$404,000</b>		<b>\$179.93</b>	<b>\$54.54</b>

**Table 12. Labor and Equipment Inputs: Tall Fescue-Kentucky Bluegrass, 150-Acre System**

			<i>Minutes per acre</i>	
<i>Date</i>	<i>Activity</i>	<i>Power Unit and Equipment</i>	<i>Machine</i>	<i>Labor</i>
After harvest (July-Aug.)	Spray Roundup Pro® (two applications)	45-horsepower tractor and sprayer 45-horsepower tractor and sprayer	4.42 4.42	5.53 5.53
Prior to plowing	Mow	45-horsepower tractor and rotary mower	14.14	17.68
After mowing vegetation	Plow	60-horsepower tractor and plow	28.80	36.00
After mowing	Disk	60-horsepower tractor and disk	9.90	12.38
After disking	Fertilize	45-horsepower tractor and fertilizer spreader	6.60	8.25
After fertilizing	Disk and drag	60-horsepower tractor, disk and harrow	9.90	12.38
Mid Aug. to Oct.	Seed	45-horsepower tractor and seeder	9.90	12.38
After seeding	Install netting	60-horsepower tractor Additional labor	35.00	43.75 137.00
Within two days of seeding	Begin irrigation	Irrigation system (no labor) 45-horsepower tractor	2,112.00 132.00	165.00
Prior to mowing	Insect control	45-horsepower tractor and sprayer	4.42	5.53
Approximately three weeks post plant	Mow	45-horsepower tractor and mower	6.40	8.00
After seedling emergence	Fertilize	45-horsepower tractor and fertilizer spreader	6.60	8.25
Every four days until mid Dec. (22 mowings)	Mow	1/3 of acres mowed with 45-horsepower tractor and Brouwer® mower 2/3 of acres mowed with 60-horsepower tractor and Mathis mower	46.46 71.10	58.08 88.87
After 4th mowing	Broadleaf weed control	45-horsepower tractor and sprayer	4.42	5.53
March until harvest (30 mowings)	Mow	1/3 of acres mowed with 45-horsepower tractor and Brouwer® mower	63.36	79.20
	Mow	2/3 of acres mowed with 60-horsepower tractor and Mathis® mower	94.25	117.81
March, April and May	Sweep/Vac.	60-horsepower tractor and sweeper/vac.	48.60	60.75
March	Broadleaf weed control	45-horsepower tractor and sprayer	4.42	5.53
March	Nutsedge control	45-horsepower tractor and sprayer	4.42	5.53
March	Fertilize	45-horsepower tractor and fertilizer spreader	6.60	8.25
April	Fertilize*	45-horsepower tractor and fertilizer spreader	4.36	5.45
May	Fungus control*	60-horsepower tractor and sprayer	2.92	3.65
May - June	Insect control*	45-horsepower tractor and sprayer	2.21	2.76
June	Fungus control*	45-horsepower tractor and sprayer	1.46	1.83
Prior to harvest	Roll	45-horsepower tractor and roller	4.13	5.16
	Roll	60-horsepower tractor and roller	4.13	5.16
April - July 1	Harvest	Tractor-mounted harvester	380.80	1,800.00
<b>Total Labor Minutes per Acre</b>				<b>2,731.16</b>
<b>Total Labor Hours per Acre</b>				<b>45.52</b>

**Table 13. Estimated Expenses Per Acre: Tall Fescue-Kentucky Bluegrass, 150-Acre System**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Price (\$)</i>	<i>Amount (\$/acre)</i>	<i>Your Farm</i>
<b>Variable Costs:</b>						
Seed	Tall Fescue blend	lb	350	1.50	525.00	
	Ky. Bluegrass	lb	35	2.90	101.50	
Fertilizer	12-24-24	lb	400	0.13	51.28	
	Urea*	lb	250	0.30	75.00	
Agricultural lime	Custom-applied	ton	1	18.00	18.00	
Netting	Sodnet netting	roll	0.133	1,332.00	177.16	
	Wooden stakes	ea	500	0.02	12.00	
Herbicides	Roundup Pro®	qt	6	12.38	74.28	
	Strike 3	pt	6	2.35	14.10	
	Surfactant	qt	0.2	2.50	0.50	
	Manage 75DF®	oz	1	79.23	79.23	
	Surfactant	qt	0.2	2.50	0.50	
Fungicides	Daconil Ultrex®**	lb	10	8.67	86.70	
	Bayleton 25WSP®**	oz	87	1.99	57.71	
Insecticides	Sevin 4SL®**	oz	195	0.23	44.85	
Irrigation	Repairs	2% of per-acre purchase price /year			13.73	
	Fuel (diesel)	gal	114	0.70	79.80	
Pallets	Wooden pallets				137.19	
Non-irrigation Equipment	Fuel				63.47	
	Oil and filter				10.36	
	Repairs and maintenance				40.81	
Sub-total					1,663.17	



**Table 13. (continued) Estimated Expenses Per Acre: Tall Fescue-Kentucky Bluegrass, 150-Acre System**

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Quantity</i>	<i>Price (\$)</i>	<i>Amount (\$/acre)</i>	<i>Your Farm</i>
Operating Capital	6 months	acre	1848.75	0.09	74.84	
<b>Total Variable Costs</b>					<b>1,738.01</b>	
<b>Fixed Costs:</b>						
Non-irrigation equipment	Depreciation				111.93	
	Interest				83.60	
	Housing and insurance				7.30	
Land	Per acre opportunity cost				100.00	
Irrigation	Straight-line depreciation (\$103,000 for 10 years over 150 acres)				68.67	
	Interest (annualized interest for 10 years at 9 percent)				38.33	
Annual Overhead	Pick-up truck, ATV, communications, clerical staff, advertising				167.00	
<b>Total Fixed Costs</b>					<b>576.16</b>	
<b>Labor Costs:</b>						
Production	Install netting & field work	hours	12.68	9	114.10	
Harvesting	Harvest	hours	30	9	270.00	
Irrigation	Irrigate	hours	2.75	9	24.75	
<b>Total Labor Costs</b>					<b>408.87</b>	
<b>Total Budgeted Expenses (per acre)</b>					<b>2,723.04</b>	
<b>Total Budgeted Expenses (per square yard)</b>					<b>0.66</b>	

**Table 15. Gross Revenue Projections with Various Yields and Price per Square Yard**

<i>Per-Acre Yield (square yards)</i>	<i>Wholesale Price per Square Yard</i>				
	<b>\$1.00</b>	<b>\$1.10</b>	<b>\$1.20</b>	<b>\$1.25</b>	<b>\$1.30</b>
3800	\$3,800	\$4,180	\$4,560	\$4,750	\$4,940
4000	\$4,000	\$4,400	\$4,800	\$5,000	\$5,200
4114	\$4,114	\$4,525	\$4,937	\$5,143	\$5,348
4200	\$4,200	\$4,620	\$5,040	\$5,250	\$5,460
4500	\$4,500	\$4,950	\$5,400	\$5,625	\$5,850



## Comparison of 50-Acre and 150-Acre Production

	<u>50-Acre System</u>	<u>150-Acre System</u>	<u>Difference</u>
Total Start-Up Cost (\$)	\$227,500	\$404,000	(+) \$176,500
Per-Acre Start-Up Cost (\$)	\$4,550	\$2,693	(-) \$1,857
Five-year Average Depreciation (per acre)	\$208	\$180	(-) \$28
Five-year Average Repair Cost (per acre)	\$81	\$54	(-) \$27
Labor Hours (per acre)	46.90	45.52	(-) 1.38
Variable Cost (per acre)(\$)	\$1,762	\$1,738	(-) \$24
Fixed Cost (per acre) (\$)	\$1,023	\$576	(-) \$447
Total Labor Cost (\$)	\$21,050	\$61,350	(+) \$40,300
Total Labor Cost (per acre) (\$)	\$421	\$409	(-) \$12
Total Budgeted Expenses (per acre) (\$)	\$3,207	\$2,723	(-) \$484
Cost Per Square Yard (\$)	\$0.78	\$0.66	(-) \$0.12
Total Budgeted Expenses (\$) (system)	\$160,350	\$408,450	(+) \$248,100



## Summary

- 1) Sod is worthy of consideration in many cases**
- 2) Start-up costs may be staggering**
- 3) Labor may be worse**
- 4) It is not a commodity market**
- 5) Economic efficiencies exist as acres increase**
- 6) Practical efficiencies compound as acres increase**
- 7) Irrigation, agronomic management, available labor and reliable marketing are not optional**