

2002 Bootheel Irrigation Survey
Prepared by Joe Henggeler, Extension Agricultural Engineer
Commercial Agricultural Program

Average irrigated acreage of those surveyed in 2002: 948 acres.

Average acreage planned for irrigation in 2003: 985 acres X 3.4 % increase

- 21% of new irrigated land will be fixed pivots
- 7 % of new irrigated land will be towable pivots
- 72 % of new irrigated land will be poly-pipe

I. Systems Used by Respondents

Furrow, rigid pipe	9 %	Center pivot, fixed	43 %
Furrow, poly-pipe	32 %	Center pivot, towable	11 %
Furrow, poly-pipe using surge	4 %	Furrow, rigid using surge	0 %

II. Irrigation Costs

1. Fuel

Type	Cost	Sample Size
LP Gas	\$11.31/acre	12
Diesel	\$ 9.42/acre	21
Electric	\$10.86/acre	16

2. Maintenance and Repairs

Table 1. Maintenance and Repair Cost, Bootheel of Missouri, 2002

	Per Farmer	Per Well	Per Acre
Wells	\$1,398	\$ 138	\$ 0.35
Pumps	\$ 868	\$ 139	\$ 0.48
System (average all types)	\$2,412	\$ 239	\$ 0.37
Total	\$4,678	\$ 516	\$ 1.20
<i>note: 85.1 acres/well site 11.6 wells per farmer</i>			

III. Irrigation Scheduling

The percentage of corn, cotton, and soybean acreage using either *Arkansas Scheduler* computer program or Woodruff charts was 9%. Overall scheduling produced 5 bu/ac more corn, 118 lbs more cotton, 8 bu/ac more full season soybeans, and 7 bu/ac more double-crop soybeans than irrigators who did not use either method. Results can be seen in Table 2..

Table 2. Yields of crops based on irrigation scheduling method employed, Sample sizes and average years of irrigating experience

Crop	No scheduling method	Scheduling Methodologies	Difference between scheduling & not scheduling

		Ark. Scheduler computer program	Woodruff irrigation charts	
Corn	158.7 bu/ac 81% of users n = 30	186.7 bu/ac 8% of users n = 3	146.0 bu/ac 11% of users n = 4	+ 4.7 bu/ac 3 % increase
Cotton	862.5 lbs/ac 91% of users n = 21	980.0 lbs/ac 9% of users n = 2	-----	+ 117.5 lbs/ac 14 % increase
Soybean	43.8 bu/ac 91% of users n = 22	52.0 bu/ac 9 % of users n = 2	-----	+ 8.2 bu/ac 19 % increase
Double Crop soybean	42.7 bu/ac 96% of users n = 22	50.0 bu/ac 4% of users n = 1	-----	+ 7.3 bu/ac 17 % increase

IV. Crop Cultural Practices

Deep-ripped:	56 %	(67%, 46% & 40 % for sand, silt & clay, respectively)
Limed:	62 %	(56%, 75% & 40% for sand, silt & clay, respectively)
Laser-leveled:	30 %	(14%, 41% & 35% for sand, silt & clay, respectively)
Minimum till:	63 %	(61%, 77% & 56% for sand, silt & clay, respectively)
Minimum till:	63 %	(52%, 70%, 58% & 60% for corn, cotton, soybean and d.c. soybeans, respectively)
Use of drain furrows:	43%	(59%, 27% & 66% for sand, silt & clay, respectively)

V. Iron Content of Wells

The level of iron in the irrigation wells does not seem to greatly effect the yield outcome. However, wells with watered classified by farmers as "high" may show some slight yield disadvantage (Table 3).

Table 3. Relative yields of crops based on iron content of the irrigation well.

Crop	Flood			Pivot		
	High	Medium	Low	High	Medium	Low
Corn (bu/ac)	.88 (5)	1.02 (7)	1.10 (3)	0.96 (6)	1.18 (6)	1.04 (4)
Cotton (bu/ac)	1.07 (2)	1.05 (6)	-----	0.85 (3)	1.06 (7)	0.82 (2)
Soybeans (bu/ac)	0.94 (5)	1.04 (6)	-----	0.62 (1)	1.04 (7)	1.10 (1)
DC Soybean (bu/ac)	1.18 (2)	1.00 (6)	0.82 (2)	1.07 (7)	0.99 (5)	0.83 (1)

V. Land Value Increase when Irrigation is Present

Irrigators were asked if irrigation on farm land increased the value of land. Compared to raw farm land the presence of irrigation increased land value by:

- with a center pivot: \$355/ac, (n = 39)
- with it being laser leveled: \$394/ac, (n = 44)

Table 4. Corn yield in bushels per acre for various soil types as affected by minimum tilling, deep ripping, liming,

lasering, and use of surface drains, Southeast Missouri, 2002.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
clay/gumbo	160.3 n = 3	179.4 n = 5	188.7 n = 3	172.3 n = 5	179.0 n = 4	165.5 n = 4	159.3 n = 3	180.0 n = 5	180.2 n = 6	148.5 n = 2
sand	179.0 n = 1	144.4 n = 10	158.3 n = 7	128.8 n = 4	152.9 n = 28	133.3 n = 3	173.8 n = 4	132.6 n = 7	161.0 n = 7	139.9 n = 7
silt	168.9 n = 8	157.4 n = 9	163.4 n = 9	162.1 n = 8	155.9 n = 8	169.0 n = 9	150.2 n = 9	177.0 n = 8	163.7 n = 7	162.3 n = 10
Other	---	136.0 n = 1	136.0 n = 1	---	---	136.0 n = 1	136.0 n = 2	---	---	136.0 n = 1
AVERAGE	167.6 n = 12	155.7 n = 25	164.00 n = 20	157.3 n = 17	159.3 n = 20	159.9 n = 17	156.5 n = 17	162.2 n = 20	156.5 n = 17	151.8 n = 20
AVERAGE YIELD CHANGE	+ 11.8		+ 6.8		- .6		- 5.7		+ 17.1	

Table 5. Cotton yield in pounds of lint per acre for various soil types as affected by minimum tilling, deep ripping, liming, lasering, and use of surface drains, Southeast Missouri, 2002.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
clay/gumbo	---	---	---	---	---	---	---	---	---	---
sand	910.6 n = 10	846.7 n = 3	883.6 n = 10	936.7 n = 3	951.1 n = 9	771.5 n = 4	1035.0 n = 2	870.5 n = 11	757.2 n = 5	982.5 n = 8
silt	849.4 n = 5	1000.0 n = 1	888.0 n = 1	871.8 n = 5	998.8 n = 5	253.0 n = 1	774.3 n = 4	1075.0 n = 2	956.0 n = 1	858.2 n = 5
Other	---	794.8 n = 4	794.8 n = 4	---	1050.0 n = 2	539.5 n = 2	850.0 n = 2	739.5 n = 2	600.0 n = 1	859.7 n = 3
AVERAGE	890.2 n = 15	839.9 n = 8	860.23 n = 15	896.1 n = 8	978.4 n = 16	631.1 n = 17	858.4 n = 8	880.3 n = 15	763.1 n = 7	920.6 n = 16
AVERAGE YIELD CHANGE	+ 50.3		+ 35.9		+ 347.2		- 21.9		- 157.5	

Table 6. Soybean yield in bushels per acre for various soil types as affected by minimum tilling, deep ripping, liming, lasering, and use of surface drains, Southeast Missouri, 2002.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
clay/gumbo	45.2 n = 6	37.0 n = 2	43.3 n = 3	43.0 n = 5	44.0 n = 2	42.8 n = 6	44.3 n = 4	42.0 n = 4	42.3 n = 3	43.6 n = 5
sand	50.6 n = 5	44.5 n = 2	45.5 n = 4	53.3 n = 3	50.8 n = 4	46.3 n = 3	50.0 n = 1	48.7 n = 6	48.2 n = 6	53.0 n = 1
silt	49.7 n = 6	18.9 n = 2	49.6 n = 5	29.0 n = 3	50.0 n = 4	33.8 n = 4	40.5 n = 4	43.3 n = 4	43.3 n = 4	40.5 n = 4
Other	---	46.0 n = 1	46.0 n = 1	---	---	46.0 n = 1	---	46.0 n = 1	---	46.0 n = 1
AVERAGE	48.4 n = 17	35.3 n = 7	46.6 n = 13	42.0 n = 11	49.1 n = 10	41.2 n = 11	43.2 n = 9	45.3 n = 15	45.3 n = 13	43.5 n = 11
AVERAGE YIELD CHANGE	+ 13.1		+ 4.6		+ 7.9		- 2.0		+ 1.8	

Table 7. Double-crop soybean yield in bushels per acre for various soil types as affected by minimum tilling, deep ripping, liming, lasering, and use of surface drains, Southeast Missouri, 2002.

	Minimum Till	Deep Ripped	Limed	Lasered	Drain Furrow
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	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
clay/gumbo	38.8 n = 5	41.0 n = 2	38.0 n = 1	39.7 n = 6	35.0 n = 2	41.2 n = 5	36.2 n = 5	47.5 n = 2	35.0 n = 2	41.2 n = 5
sand	37.0 n = 2	42.0 n = 3	35.7 n = 3	46.5 n = 2	46.5 n = 2	35.7 n = 3	53.0 n = 1	36.8 n = 4	36.8 n = 4	53.0 n = 1
silt	45.3 n = 4	46.8 n = 5	42.0 n = 4	49.4 n = 5	49.0 n = 6	40.3 n = 3	48.5 n = 4	44.2 n = 5	36.5 n = 2	48.9 n = 7
Other	54.0 n = 1	37.0 n = 1	45.5 n = 2	---	---	45.5 n = 2	---	45.5 n = 2	45.5 n = 2	---
AVERAGE	41.9 n = 12	43.5 n = 11	40.4 n = 10	44.2 n = 13	45.7 n = 10	40.4 n = 13	42.8 n = 10	42.6 n = 15	38.1 n = 10	46.3 n = 13
AVERAGE YIELD CHANGE	- 1.6		- 3.8		+ 5.3		+ 0.2		- 8.1	

TABLE 8.-- 2002 BOOTHEEL IRRIGATION RESULTS

	CORN	COTTON	FC SOY	DC SOY	MILO
Number Reported	37	23	24	23	2
Acres Reported	4136	3488	2887	2065	255
# of Irrigations, furrow	4.9 @ 2.4"	3.0 @ 2.0"	3.3 @ 3.9"	3.5 @ 1.9"	---
# of Irrigation, pivot	4.9 @ 2.4"	4.4 @ 1.0"	5.8 @ 1.1"	6.2 @ 1.4"	---
Irrigated Yield	160 bu	873 lbs	45 bu	43 bu	114 bu
Dryland Yield	104 bu	686 lbs	28 bu	30 bu	63 bu
Increase over Dryland	55.3 bu	203.0 lbs	15.6 bu	11.7 bu	51.0 bu

TABLE 9.--1987-2002 BOOTHEEL IRRIGATION SURVEY
Yields for Irrigated vs Dryland Crops and their Breakeven Costs

Year	Irrig. Corn (bu)	Non-Irrig. Corn (bu)	Irrig. Soybeans (bu)	Non-Irrig. Soybeans (bu)	Irrig. DC Soybeans (bu)	Non-Irrig. DC Soybeans (bu)	Irrig. Cotton (lbs)	Non-Irrig. Cotton (lbs)	Irrig. Milo (bu)	Non-Irrig. Milo (bu)
1987	149	121	44	32	33	19	---	---	110	101
1988	148	88	39	32	36	27	877	718	108	91
1989	152	117	37	27	29	23	807	605	92	77
1990	146	86	44	29	38	31	768	528	82	32
1991	143	84	42	29	43	30	917	678	105	69
1992	189	135	48	37	44	32	1029	990	121	108
1993	137	95	44	31	41	30	722	546	113	75
1994	162	123	47	38	43	37	933	779	101	93
1995	156	124	43	29	42	31	637	422	90	66
1996	170	124	43	32	42	25	905	719	98	63
1997	155	103	41	28	42	31	865	723	110	70
1998	140	95	37	22	40	27	692	542	82	---
1999	163	121	49	21	43	17	787	471	---	---
2000	171	---	43	---	39	---	733	---	140	---
2001	183	119	46	31	36	21	966	777	84	50
2002	160 (\$2.36)*	104 (\$2.36)*	45 (\$5.59)*	28 (\$2.36)*	43 (\$5.19)*	30 (\$2.36)*	873 (\$0.62)*	686 (\$2.36)*	114 (\$0.62)*	63 (\$2.36)*
Avg	158	109	43	30	40	27	834	656	103	74

* Break-even price; after D. Reinbott. 2003. *Crop Budgets: Southeast Missouri. Un-numbered report. University of Missouri Outreach & Extension Service. Scott County.*

TABLE 10A.--IRRIGATED FULL-SEASON SOYBEAN YIELD
2002 Bootheel Irrigation Survey
Showing # of irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	47.8 (6.8 @ 1.1") n = 5	---	---	51.5 (8.0 @ 5.6") n = 2	48.86 n = 7
Silt	25.0 (3.0 @ 2.0") n =	48.0 (4.0 @ 1.0") n = 1	50.0 (--- @ ---) n = 1	42.4 (4.2 @ 3.0") n = 5	41.88 n = 8
Clay/Gumbo	40.0 (5.5 @ 1.0") n = 2	---	---	44.2 (2.2 @ 4.2") n = 6	43.15 n = 8
Other	---	---	---	46.0 (--- @ ---) n = 1	46.00 n = 1
Average	43.00 n = 8	48.00 n = 1	52.00 n = 1	44.73 n = 14	44.50 n = 24
furrow users <i>with</i> surge = 54.0 bu/ac (n = 1)					
furrow users <i>without</i> surge = 44.4 bu/ac (n = 14)					

TABLE 10B.-- YIELD INCREASE DUE TO IRRIGATION FOR FULL-SEASON SOYBEAN
2002 Bootheel Irrigation Survey

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	17.2 n = 7	---	---	29.0 n = 2	20.57 n = 9
Silt	17.0 n = 1	19.0 n = 1	---	9.6 n = 5	11.97 n = 7
Clay/Gumbo	6.0 n = 2	---	---	15.0 n = 6	12.75 n = 8
Other	---	---	---	---	---
Average	14.38 n = 10	19.00 n = 1	---	15.08 n = 13	15.56 n = 24
furrow users <i>with</i> surge = 54.0 bu/ac (n = 1)					
furrow users <i>without</i> surge = 44.4 bu/ac (n = 14)					

TABLE 11A.--IRRIGATED DOUBLE-CROP SOYBEANS YIELD
2002 Bootheel Irrigation Survey Showing # of irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	38.0 (9.3 @ 0.8") n = 3	33.0 (6.0 @ 0.8") n = 1	---	53.0 (5.0 @ 1.0") n = 1	40.00 n = 5
Silt	39.0 (6.0 @ 3.8") n = 3	---	43.7 (2.7 @ 2.5") n = 3	51.5 (3.8 @ 2.0") n = 4	45.41 n = 10
Clay/Gumbo	38.0 (3.0 @ 1.0") n = 1	47.5 (3.0 @ 0.9") n = 1	37.0 (3.0 @ ?) n = 1	35.3 (4.0 @ 1.5") n = 3	39.43 n = 7
Other	45.5 (6.5 @ 1.0") n = 2	---	---	---	45.50 n = 2
Average	40.13 n = 8	42.67 n = 3	42.00 n = 4	45.61 n = 8	42.70 n = 23

furrow users with surge = 43.0 bu/ac (n = 2)
 furrow users without surge = 44.7 bu/ac (n = 10)

**TABLE 11B.-- YIELD INCREASE DUE TO IRRIGATION FOR DOUBLE-CROP SOYBEAN
 2002 Bootheel Irrigation Survey**

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	12.0 n = 3	5.0 n = 1	---	18.0 n = 1	11.80 n = 5
Silt	10.07 n = 2	---	17.0 n = 3	12.5 n = 4	13.44 n = 9
Clay/Gumbo	13.0 n = 1	5.5 n = 2	---	7.0 n = 3	7.50 n = 6
Other	16.0 n = 2	---	---	---	16.50 n = 2
Average	13.17 n = 8	5.33 n = 3	17.00 n = 35	11.13 n = 8	11.67 n = 22

**TABLE 12A.--IRRIGATED CORN YIELD
 2002 Bootheel Irrigation Survey Showing # of irrigations & Average Depth Applied**

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	152.65 (15.0@ 1.1") n = 5	137.5 (6.5@ 1.6") n = 2	---	146.3 (5.8 @ 2.7") n = 4	147.56 n = 11
Silt	181.9 (3.0@ 2.3") n = 4	---	176.8 (4.0 @ 3.3) n = 4	148.4 (5.0 @ 1.9") n = 9	162.82 n = 17
Clay/Gumbo	187.5 (6.8 @ 0.7") n = 4	150.0 (4.0 @ 0.8") n = 1	150.0 (4.0 @ 2.0) n = 1	164.0 (6.0 @ ?) n = 2	172.25 n = 8
Other	---	---	---	136.0 (3.0@ ?) n = 1	136.00 n = 1
Average	172.20 n = 13	141.70 n = 3	171.40 n = 5	139.50 n = 16	159.60 n = 37

furrow users with surge =170.2 bu/ac (n = 5)
 furrow users without surge =149.5 bu/ac (n = 11)

**TABLE 12B.-- YIELD INCREASE DUE TO IRRIGATION FOR CORN
 2002 Bootheel Irrigation Survey**

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	62.6 n = 5	80.0 n = 2	---	27.5 n = 4	53.00 n = 11
Silt	83.3 n = 4	---	82.3 n = 4	39.5 n = 9	59.88 n = 17
Clay/Gumbo	55.0 n = 4	25.0 n = 1	25.0 n = 1	---	45.00 n = 6
Other	---	---	---	---	---
Average	67.58 n = 13	52.50 n = 3	68.00 n = 5	35.78 n = 13	55.29 n = 34

**TABLE 13A.--IRRIGATED COTTON YIELD
 2002 Bootheel Irrigation Survey Showing # of irrigations & Average Depth Applied**

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
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Sand	849.5 (4.6 @ 1.0") n = 8	1000.0 (2.0 @ 0.8") n = 1	300.0 (20 @ ?) n = 1	1183.0 (3.0 @ ?) n = 3	895.77 n = 13
Silt	701.5 (5.0 @ 1.5") n = 2	978.0 (4.0 @ 0.5") n = 2	---	944.0 (3.5 @ 2.0") n = 2	874.56 n = 6
Clay/Gumbo	---	---	---	---	---
Other	1000.0 (4.0 @ 0.8") n = 1	---	---	726.3 (3.0 @ ?) n = 3	794.73 n = 4
Average	836.30 n = 11	985.30 n = 3	300.00 n = 1	952.10 n = 8	872.70 n = 23
<i>furrow users <u>with</u> surge = 1000.0 bu/ac(n = 4)</i> <i>furrow users <u>without</u> surge = 945.0 bu/ac(n = 11)</i>					

**TABLE 13B.-- YIELD INCREASE DUE TO IRRIGATION FOR COTTON
2002 Bootheel Irrigation Survey**

Soil Type	Fixed Pivot	Tow-able Pivot	Rigid Pipe	Poly-pipe	Average
Sand	136.3 n = 8	300.0 n = 1	0.0 n = 1	466.7 n = 3	214.656 n = 13
Silt	-507.0 n = 2	240.5 n = 2	---	314.0 n = 2	15.83 n = 6
Clay/Gumbo	334.0 n = 1	---	---	210.5 n = 2	251.67 n = 3
Other	250.0 n = 1	---	---	350.0 n = 3	325.0 n = 4
Average	77.44 n = 11	260.30 n = 3	---	396.30 n = 8	202.90 n = 23