2000 Bootheel Irrigation Survey

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Average irrigated acreage of those surveyed in 2000: 873 acres
Average acreage planned for irrigation in 2001: 925 acres

- 6.0 % increase
  - 18% of new irrigated land will be fixed pivots
  - 12% of new irrigated land will be towable pivots
  - 62% of new irrigated land will be poly-pipe
  - 2% of new irrigated land will be rigid pipe

I. Systems Used

Furrow, rigid pipe	4%	Center pivot, fixed	40%
Furrow, poly-pipe	30%	Center pivot, towable	10%
Furrow, poly-pipe using surge	30%	Basin	5%

II. Irrigation Costs

1) Fuel:

LP Gas	$13.07/acre	(increase of 13.5%)
Diesel	$10.78/acre	(decrease of 19.5%)
Electric	$ 9.57/acre	(decrease of 19.3%)

2) Maintenance and Repairs:

Table 1. Maintenance and Repair Cost, Bootheel of Missouri, 2000

	Per Farmer	Per Well	Per Acre
Wells	$1,627	$131.01	$1.45
Pumps	$1,293	$90.96	$1.01
System (average all types)	$2,454	---	$2.96
Total	$5,374	---	$5.41
Note: 90.3 acres/well site, 11.0 wells per farmer			

III. Irrigation Scheduling

The percentage of corn, cotton, and soybean acreage using either Arkansas Scheduler computer program or Woodruff charts was 18%. Overall scheduling produced 7 bu/ac more corn and 9 bu/ac more double crop soybeans, but 47 lbs/ac less cotton lint and 4 bu/ac less full season soybeans. The full-season soybean crop was unusual this year, and yields were less then what many people had anticipated prior to combining the fields. It may have been due to the high temperatures in late summer. In this scenario, scheduling did not help. Results can be seen in Table 2.

Table 2. Yields of Crops Based on Irrigation Scheduling Method Employed

Crop	Scheduling Methodologies			Difference between scheduling & not scheduling
	No scheduling method	*Ark. Scheduler* computer program	Woodruff irrigation charts	
Corn	169.8 bu/ac 73% of acreage n = 58	159.0 bu/ac 7% of acreage n = 5	185.6 bu/ac 20% of acreage n = 10	+6.9 bu/ac
Cotton	736.8 lbs/ac 91% of acreage n = 29	750.0 lbs/ac 2% of acreage n = 1	630.0 lbs/ac 7% of acreage n = 1	-46.8 lbs/ac
Soybean	43.1 bu/ac 86% of acreage n = 48	38.8 bu/ac 6% of acreage n = 4	40.0 bu/ac 8% of acreage n = 3	-3.8 bu/ac
Double Crop Soybean	37.6 bu/ac 88% of acreage n = 19	47.5 bu/ac 8% of acreage n = 2	45.0 bu/ac 3% of acreage n = 1	+9.1 bu/ac

IV. Irrigation Management

Growers were asked if they had changed their management style in the last recent years. Specifically, were they (1) starting to irrigate earlier in the season, (2) applying more water during the season, and (3) watering later into the season. The response to the question on starting to water earlier is seen in Figure 1, and is reported as relative yields (the average crop yield from the survey = 1.0, values above 1.0 were proportionally higher then average, and thus less then 1.0 were less then average). Except in double crop soybeans, those respondents who stated that they were beginning to water earlier did the best, and those that were starting water did the worst.

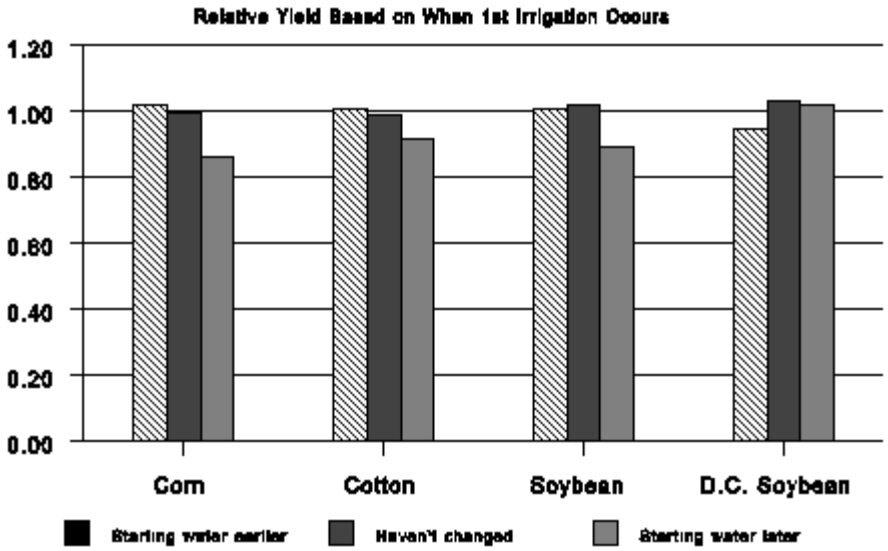

Fig. 1. Relative corn, cotton, soybean, and double-crop soybean yields based on when the first irrigation of the season was applied. The proportion of corn growers watering either earlier, the same, or later was 56%, 36%, 8%, respectively. For cotton: 59%, 39%, and 3%. For soybean: 60%, 29%, and 12%. For double-crop soybean: 39%, 48%, and 13%.

V. Iron in Irrigation Water

Growers reported that most of their wells had water with iron content, but most thought that yields were not compromised. Results showed that those respondents who reported that few or non of their wells had iron in them, had approximately % higher yields on corn, soybeans, and double-crop soybeans. It most be noted that the sample from which the "few or none of the wells" was small.

Do your wells have high iron content?

None	9%
About half	9%
Most of them	82%

Are your yields being effected?

Helps yield	4%
No effect	83%
Hurts yield	14%

Is iron in your wells?	Corn	Soybean	D.C. Soybean
None or few	189 (n = 4)	46 (n = 5)	44 (n = 2)
Half or most wells	170 (n = 69)	42 (n = 48)	38 (n = 20)

VI. Crop Cultural Practices

Deep-ripped:	45%	(88%, 39% & 0% for sand, silt & clay, respectively)
Limed:	50%	(48%, 55% & 33% for sand, silt & clay, respectively)
Laser-leveled:	55%	(37%, 60% & 71% for sand, silt & clay, respectively)
Minimum till:	56%	(53%, 61%, 51% & 90% for corn, cotton, soybean and d.c. soybeans, respectively)
Use of drain furrows:	55%	(37%, 60% & 71% for sand, silt & clay, respectively)

Table A. 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, 2000.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Clay/Gumbo	168.1 n = 8	174.6 n = 5	182.0 n = 4	165.6 n = 9	168.6 n = 7	173.0 n = 6	165.6 n = 8	178.6 n = 5	171.3 n = 6	170.0 n = 7
Sand	165.0 n = 10	172.1 n = 15	170.1 n = 18	172.9 n = 7	172.4 n = 18	167.7 n = 7	175.1 n = 7	169.2 n = 18	178.5 n = 11	164.9 n = 14
Silt	173.4 n = 20	168.4 n = 11	168.2 n = 18	176.4 n = 13	171.4 n = 18	171.8 n = 13	176.5 n = 20	162.8 n = 11	168.2 n = 13	174.1 n = 18
Other	172.0 n = 3	177.0 n = 1	172.0 n = 3	173.3 n = 1	173.3 n = 4	---	165.7 n = 3	196.0 n = 1	175.5 n = 2	171.0 n = 2
AVERAGE	170.2 n = 41	171.4 n = 32	170.54 n = 43	172.24 n = 30	171.53 n = 47	170.70 n = 26	173.09 n = 38	169.30 n = 35	168.1 n = 8	168.1 n = 8
AVERAGE YIELD CHANGE	-1.16		-1.70		0.82		3.80		2.67	

Table B. Cotton yield in pounds of lints per acre for various soil types as affected by minimum tilling, deep ripping, liming, lasering, and use of surface drains, Southeast Missouri, 2000.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Clay/Gumbo	788.5 n = 4	815.0 n = 2	1008.0 n = 1	735.7 n = 5	902.0 n = 1	771.0 n = 5	675.0 n = 1	846.7 n = 5	819.0 n = 2	788.5 n = 4
Sand	712.8 n = 10	782.0 n = 2	673.8 n = 8	735.7 n = 5	724.6 n = 7	726.8 n = 5	776.5 n = 6	664.0 n = 6	667.3 n = 3	747.1 n = 9
Silt	768.8 n = 9	606.0 n = 4	676.7 n = 11	949.5 n = 2	661.7 n = 6	767.6 n = 7	750.6 n = 8	667.6 n = 5	678.2 n = 6	753.2 n = 7
Other	---	---	---	---	---	---	---	---	---	---
	747.88	702.25	692.11	820.86	710.31	756.60	755.92	722.22	700.83	757.53

AVERAGE	n = 23	n = 8	n = 20	n = 11	n = 14	n = 17	n = 15	n = 16	n = 11	n = 20
AVERAGE YIELD CHANGE	45.63		-128.76		-46.29		33.70		-56.69	

Table C. 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, 2000.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Clay/Gumbo	38.9 n = 11	40.1 n = 7	43.7 n = 6	37.3 n = 12	43.1 n = 9	35.7 n = 9	42.5 n = 8	36.9 n = 10	38.2 n = 12	41.81 n = 6
Sand	38.1 n = 7	44.0 n = 3	38.0 n = 3	40.2 n = 7	37.7 n = 4	40.3 n = 6	43.6 n = 6	34.3 n = 4	41.7 n = 3	38.3 n = 7
Silt	46.2 n = 10	48.3 n = 11	47.91 n = 9	46.7 n = 12	51.2 n = 11	43.6 n = 10	49.5 n = 14	43.3 n = 7	45.3 n = 12	50.4 n = 9
Other	44.0 n = 5	37.0 n = 1	37.0 n = 2	47.5 n = 4	44.0 n = 5	37.0 n = 1	44.0 n = 4	37.0 n = 2	44.0 n = 3	37.0 n = 3
AVERAGE	41.72 n = 33	44.59 n = 22	44.07 n = 20	42.27 n = 35	45.58 n = 29	39.85 n = 26	45.96 n = 32	38.40 n = 23	41.97 n = 30	43.34 n = 25
AVERAGE YIELD CHANGE	-2.87		1.80		5.73		7.55		-1.37	

Table D. 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, 2000.

	Minimum Till		Deep Ripped		Limed		Lasered		Drain Furrow	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Clay/Gumbo	42.3 n = 4	44.0 n = 2	---	42.8 n = 6	---	42.8 n = 6	---	42.8 n = 6	42.3 n = 4	44.0 n = 2
Sand	36.80 n = 9	---	37.0 n = 6	36.3 n = 3	39.1 n = 7	28.5 n = 2	34.5 n = 2	37.4 n = 7	39.3 n = 6	31.7 n = 3
Silt	42.74 n =	30.0 n =	40.01 n =	40.0 n =	40.0 n =	---	45.0 n = 1	38.3 n = 3	36.0 n = 2	44.0 n = 2
Other	35.7 n = 3	---	35.0 n = 1	36.0 n = 2	35.01 n = 1	36.0 n = 2	35.0 n = 1	36.0 n = 2	36.0 n = 2	35.0 n = 1
AVERAGE	38.72 n = 19	39.33 n = 3	37.70 n = 10	39.81 n = 12	39.06 n = 12	38.58 n = 10	37.25 n = 4	39.19 n = 18	39.21 n = 14	38.26 n = 8
AVERAGE YIELD CHANGE	-0.62		-2.11		0.48		-1.94		0.95	

Table 2.-- 2000 Bootheel Irrigation Results

	CORN	COTTON	SOY	DC SOY	MILO
Number Reported	73	31	55	22	1
Acres Reported	6833	680	5739	2357	100
# of Irrigations, furrow					
# of Irrigations, pivot					
Irrigated Yield	171 bu	733 lbs	43 bu	39 bu	---
Dryland Yield	---	---	---	---	---
Increase over Dryland	---	---	---	---	---

Table 3.-- 1987-2000 Bootheel Irrigation Survey
Yields for Irrigated vs Dryland Crops and their Breakeven Costs

	Irrig.	Non-Irrig.	Irrig.	Non-Irrig.	Irrig. DC	Non-Irrig. DC	Irrig.	Non-Irrig.	Irrig.	Non-Irrig.

Year	Corn (bu)	Corn (bu)	Soybeans (bu)	Soybeans (bu)	Soybeans (bu)	Soybeans (bu)	Cotton (lbs)	Cotton (lbs)	Milo (bu)	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 ($2.48)	135** ($2.40)	43 ($6.77)	33** ($7.07)	39 ($7.46)	27** ($8.66)	733 ($0.67)	---	140 ($2.14)	---
Avg	156	111	43	30	40	28	828	642	101	77

** Break-even price; after D. Reinbott. 2000. Crop Budgets: Southeast Missouri. Un-numbered report. University of Missouri Outreach & Extension Service. Scott County.*

*** Estimates of dryland yield from survey taken at a Cape Girardeau educational meeting.*

Table 5.-- Irrigated Full-Season Soybeans Yield
2000 Bootheel Irrigation Survey
Showing # of Irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Towable Pivot	Rigid Pipe	Poly-pipe	Poly-pipe with surge	Average
Sand	35.5 (10.0@0.9") n = 2	26.0 (10.0@0.9") n = 1	---	41.3 (10.0@0.9") n = 5	46.5 (2.0@7.0") n = 2	44.00 n = 3
Silt	42.5 (13.0@1.0") n = 4	45.0 (12.0@0.7") n = 1	47.3 (4.0@6.0") n = 3	49.1 (10.0@0.9") n = 13	---	50.89 n = 9
Clay/Gumbo	35.1 (10.0@0.9") n = 7	33.05 (10.0@0.9") n = 2	---	45.5 (10.0@0.9") n = 6	41.3 (4.3@3.7") n = 3	49.00 n = 6
Other	---	00.0 (10.0@0.9") n = 2		43.5 (10.0@0.9") n = 2	37.0 (10.0@0.9") n = 1	
Average	37.46 n = 13	34.25 n = 4	47.33 n = 3	46.30 n = 26	42.33 n = 6	49.11 n = 18

furrow users with surge = 42.3 bu/ac (n=6)
furrow users without surge = 46.6 bu/ac (n=10)

Table 7.-- Irrigated Double-Crop Soybeans Yield
2000 Bootheel Irrigation Survey
Showing # of Irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Towable Pivot	Rigid Pipe	Poly-pipe	Poly-pipe with surge	Average
Sand	39.8 (14.5@0.6") n = 6	30.7 (14.5@0.6") n = 3	---	---	---	41.50 n = 4
Silt	---	36.0 (7.3@0.9")	43.0 (10.0@0.9")	---	45.0 (14.5@0.6")	43.55

		n = 2	n = 1		n = 1	n = 9
Clay/Gumbo	42.3 (6.5@1.0") n = 4	---	44.0 (14.5@0.6") n = 2	---	---	43.00 n = 2
Other	45.7 (6.5@1.0") n = 3				---	38.86 n = 22
Average	39.62 n = 13	32.80 n = 5	43.67 n = 3	45.00 n = 1		42.80 n = 15

furrow users with surge = 47.8 bu/ac (n = 4)
furrow users without surge = 41.0 bu/ac (n = 11)

Table 9.-- Irrigated Corn Yield
2000 Bootheel Irrigation Survey
Showing # of Irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Towable Pivot	Rigid Pipe	Poly-pipe	Poly-pipe with surge	Average
Sand	172.6 (8.0@0.8") n = 14	143.0 (8.0@0.8") n = 1	---	166.7 (8.0@0.8") n = 7	181.7 (8.0@0.8") n = 3	132.00 n = 2
Silt	163.6 (8.5@0.7") n = 5	167.5 (9.5@4.1") n = 2	176.2 (3.0@?) n = 5	172.2 (8.0@0.8") n = 14	175.0 (5.6@1.8") n = 5	170.93 n =14
Clay/Gumbo	172.0 (8.0@0.8") n = 3	175.0 (8.0@0.8") n = 1	185.0 (6.0@?) n = 2	148.0 (8.0@0.8") n = 4	190.0 (8.0@0.8") n = 2	120.00 n = 1
Other	160.0 (8.0@0.8") n = 2	196.0 (8.0@0.8") n = 1	---	177.0 (8.0@0.8") n = 1	---	171.26 n = 73
Average	169.88 n = 24	169.80 n = 5	178.71 n = 7	167.19 n = 26	180.00 n = 10	163.36 n = 17

Table 11.-- Irrigated Cotton Yield
2000 Bootheel Irrigation Survey
Showing # of Irrigations & Average Depth Applied

Soil Type	Fixed Pivot	Towable Pivot	Rigid Pipe	Poly-pipe	Poly-pipe with surge	Average
Sand	605.3 (4.0@6.0") n = 3	---	---	708.0 (4.0@6.0") n = 6	874.3 (6.0@2.0") n = 3	833.33 n = 3
Silt	728.0 (4.0@6.0") n = 3	---	---	676.0 (4.0@6.0") n = 7	809.0 (4.0@6.0") n = 3	650.00 n = 1
Clay/Gumbo	819.0 (4.0@6.0") n = 4	---	---	902.0 (4.0@6.0") n = 1	675.0 (4.0@6.0") n = 1	---
Average	704.75 n = 10	---	---	705.69 n = 14	817.86 n = 14	787.48 n = 4