

Economics of SDI: MAC Demonstration Project

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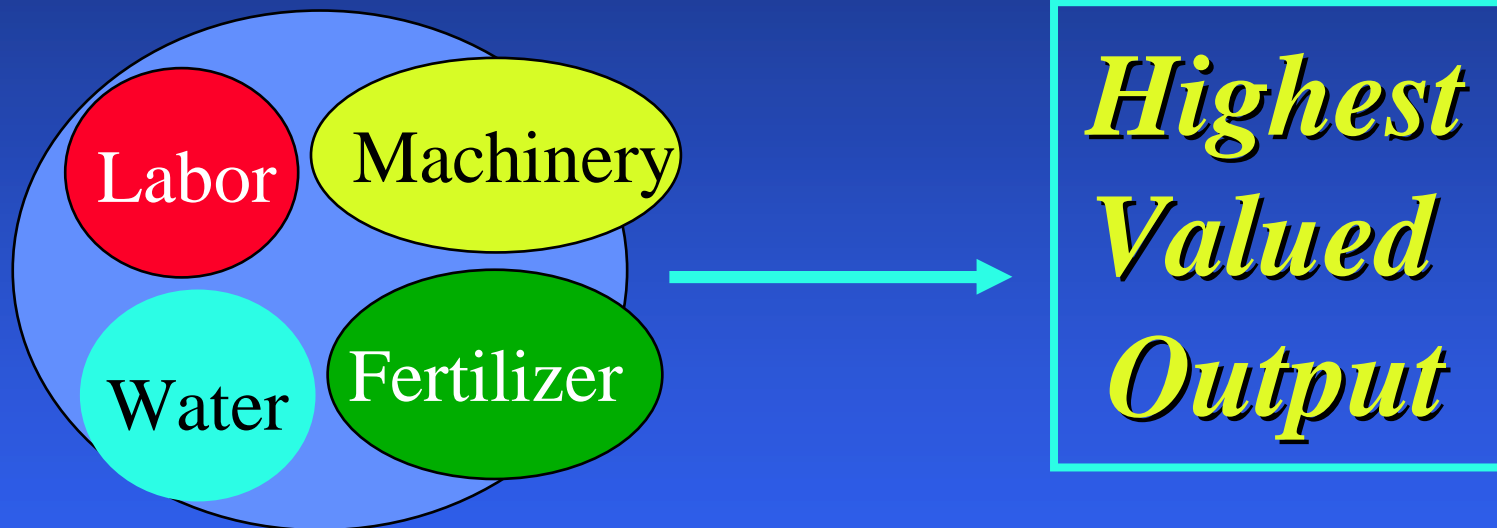
Flood Irrigation -- Laser Leveled

Efficient?



Economic Efficiency

Bundle of Resources



$$*Economic* = \frac{\textit{Value Output}}{\textit{Value Input}}$$



Comparison Values for SDI

- *Ownership / Installation Costs
(7 configurations)*
- *Annual Operating Costs*
- *Water Use*
- *Yield / Revenue Impacts*

5 plots / 7 Different Systems

Broccoli:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Installation Cost</u>	<u>Annualized Cost 20-yr life</u>	<u>10-yr life</u>
#1	80" drip bed	high	\$2,050.00	\$178.73	\$278.53
#2	40" drip bed	high	\$1,833.00	\$159.81	\$249.05
#3	80" drip bed	low	\$1,947.00	\$169.75	\$264.53
#4	Furrow	furrow	--	--	--
#5	40" drip bed	low	\$1,730.00	\$150.83	\$235.05

hypothetical mobile unit configuration

#3M	80" drip bed	low	\$1,547.00	\$134.87	\$210.19
#5M	40" drip bed	low	\$1,330.00	\$115.96	\$180.70

5 plots / 7 Different Systems

Watermelons:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Installation Cost</u>	<u>Annualized Cost 20-yr life</u>	<u>10-yr life</u>
#1	80" 3-line	high	\$2,050.00	\$178.73	\$278.53
#2	80" 2-line	high	\$1,833.00	\$159.81	\$249.05
#3	80" 3-line	low	\$1,947.00	\$169.75	\$264.53
#4	Furrow	furrow	--	--	--
#5	80" 2-line	low	\$1,730.00	\$150.83	\$235.05
hypothetical mobile unit configuration					
#3M	80" 3-line	low	\$1,547.00	\$134.87	\$210.19
#5M	80" 2-line	low	\$1,330.00	\$115.96	\$180.70



Yield Differences

Broccoli:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Yield (ctn./ac)</u>	<u>% change from furrow</u>
#1	80" drip bed	high	905	7.5%
#2	40" drip bed	high	926	10.0%
#3	80" drip bed	low	911	8.2%
#4	Furrow	furrow	842	--
#5	40" drip bed	low	862	2.4%

hypothetical mobile unit configuration

#3M	80" drip bed	low	911	8.2%
#5M	40" drip bed	low	862	2.4%

Yield Differences

Watermelons:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Yields /cwt.</u>		<u>% change furrow</u>
			<u>Seeded</u>	<u>Seedless</u>	
#1	80'' 3-line	high	204	320	182%
#2	80'' 2-line	high	169	256	128%
#3	80'' 3-line	low	160	235	112%
#4	Furrow	furrow	102	84	--
#5	80'' 2-line	low	160	142	62%
<i>hypothetical mobile unit configuration</i>					
#3M	80'' 3-line	low	160	160	112%
#5M	80'' 2-line	low	235	142	62%

Water Use & Cost

Broccoli:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Actual Water Used (af:\$/ac)</u>	<u>Longer-Runs (af:\$/ac)</u>
#1	80" drip bed	high	1.83: \$65.70	same
#2	40" drip bed	high	1.78: \$63.90	same
#3	80" drip bed	low	1.83: \$65.70	same
#4	Furrow	furrow	1.88: \$67.80	3.77: \$135.60
#5	40" drip bed	low	1.78: \$63.90	same

hypothetical mobile unit configuration

#3M	80" drip bed	low	1.83: \$65.70	same
#5M	40" drip bed	low	1.78: \$63.90	same

Water Use & Cost

Watermelons:

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Actual Water Used (af:\$/ac)</u>	<u>Longer-Runs (af:\$/ac)</u>
#1	80" 3-line	high	2.47: \$89.08	same
#2	80" 2-line	high	2.25: \$80.99	same
#3	80" 3-line	low	2.47: \$89.08	same
#4	Furrow	furrow	2.35: \$84.60	4.70: \$169.20
#5	80" 2-line	low	2.25: \$80.99	same

hypothetical mobile unit configuration

#3M	80" 3-line	low	2.47: \$89.08	same
#5M	80" 2-line	low	2.25: \$80.99	same

Operating Cost Differences -- except for water and harvest on Broccoli

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Operating Cost (\$/ac)</u>	<u>Cost Difference to furrow (\$/ac)</u>
#1	80" drip bed	high	\$ 2,951	- \$16.21
#2	40" drip bed	high	\$ 2,958	- \$8.50
#3	80" drip bed	low	\$ 2,951	-\$16.21
#4	Furrow	furrow	\$ 2,967	--
#5	40" drip bed	low	\$ 2,958	- \$8.50
hypothetical mobile unit configuration				
#3M	80" drip bed	low	\$ 2,970	\$ 3.79
#5M	40" drip bed	low	\$ 2,978	\$ 11.50

Operating Cost Differences -- except for water & harvest on Watermelons

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>Operating Cost (\$/ac)</u>	<u>Cost Difference to furrow (\$/ac)</u>
#1	80" 3-line	high	\$ 930	- \$54.63
#2	80" 2-line	high	\$ 937	- \$47.13
#3	80" 3-line	low	\$ 930	-\$54.63
#4	Furrow	furrow	\$ 978	--
#5	80" 2-line	low	\$ 1,025	\$47.97
hypothetical mobile unit configuration				
#3M	80" 3-line	low	\$ 943	\$ 34.63
#5M	80" 2-line	low	\$ 1,045	\$ 67.97

Return Difference (\$/ac) from Furrow: 20 yr. life of SDI, actual water used: Broccoli

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>\$5.00</u>	<u>\$7.38</u>	<u>Price (\$/carton)</u> <u>\$10.00</u>
#1	80" drip bed	high	-6.07	143.87	308.93
#2	40" drip bed	high	58.39	258.31	181.83
#3	80" drip bed	low	17.61	181.83	362.61
#4	Furrow	furrow		--	
#5	40" drip bed	low	-89.43	-41.83	10.57
hypothetical mobile unit configuration					
#3M	80" drip bed	low	32.49	196.71	377.49
#5M	40" drip bed	low	-74.56	-26.96	25.44

Return Difference (\$/ac) from Furrow: 10 yr. life of SDI, actual water used: Broccoli

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>\$5.00</u>	<u>\$7.38</u>	<u>\$10.00</u>
#1	80" drip bed	high	-105.87	44.07	209.13
#2	40" drip bed	high	-30.85	169.07	389.15
#3	80" drip bed	low	-77.17	87.05	267.83
#4	Furrow	furrow		--	
#5	40" drip bed	low	-173.65	-126.05	-73.65
hypothetical mobile unit configuration					
#3M	80" drip bed	low	-42.83	121.39	302.17
#5M	40" drip bed	low	-139.30	-91.70	-39.30

***Return Difference (\$/ac) from Furrow: 20 yr.
life of SDI, actual water used: Watermelons***

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>\$5.00</u>	<u>\$7.78</u>	<u>\$10.50</u>
#1	80" 3-line	high	1396	2416	3414
#2	80" 2-line	high	981	1707	2417
#3	80" 3-line	low	834	1469	2091
#4	Furrow	furrow		--	
#5	80" 2-line	low	294	624	947
hypothetical mobile unit configuration					
#3M	80" 3-line	low	849	1484	639
#5M	40" 2-line	low	309	639	962

***Return Difference (\$/ac) from Furrow: 10 yr.
life of SDI, actual water used: Watermelons***

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>\$5.00</u>	<u>\$7.78</u>	<u>\$10.50</u>
#1	80" 3-line	high	1296	2316	3314
#2	80" 2-line	high	891	1618	2328
#3	80" 3-line	low	739	1365	1997
#4	Furrow	furrow		--	
#5	80" 2-line	low	209	540	863
hypothetical mobile unit configuration					
#3M	80" 3-line	low	774	1409	2031
#5M	40" 2-line	low	244	574	897

Break-Even Water Cost with Same Yield: long-run water use: and 20 yr. drip life for Broccoli

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>All SDI Costs on Broc.</u>	<u>1/2 SID Costs on Broc</u>
#1	80" drip bed	high	83.70	37.68
#2	40" drip bed	high	75.97	35.85
#3	80" drip bed	low	79.08	35.36
#4	Furrow	furrow		
#5	40" drip bed	low	71.46	33.60
hypothetical mobile unit configuration				
#3M	80" drip bed	low	71.42	36.68
#5M	40" drip bed	low	63.99	34.88

Break-Even Water Cost with Same Yield: long-run water use: and 10 yr. drip life for Broccoli

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>All SDI Costs on Broc.</u>	<u>1/2 SID Costs on Broc</u>
#1	80" drip bed	high	135.10	63.38
#2	40" drip bed	high	120.78	58.25
#3	80" drip bed	low	127.89	59.77
#4	Furrow	furrow		
#5	40" drip bed	low	113.75	54.74
hypothetical mobile unit configuration				
#3M	80" drip bed	low	110.20	56.08
#5M	40" drip bed	low	96.50	51.14

Break-Even Water Cost with Same Yield: long-run water use: and 20 yr. drip life for Watermelons

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>All SDI Costs on Wat.</u>	<u>1/2 SDI Costs on Wat.</u>
#1	80" 3-line	high	58.59	18.44
#2	80" 2-line	high	45.98	13.38
#3	80" 3-line	low	51.73	13.59
#4	Furrow	furrow		
#5	80" 2-line	low	81.13	50.36
hypothetical mobile unit configuration				
#3M	80" 3-line	low	45.04	14.74
#5M	80" 2-line	low	75.06	51.40

Break-Even Water Cost with Same Yield: long-run water use: and 10 yr. drip life for Watermelons

<u>Plot</u>	<u>Bed Config.</u>	<u>Irrig. Freq.</u>	<u>All SDI Costs on Wat.</u>	<u>1/2 SDI Costs on Wat.</u>
#1	80" 3-line	high	103.43	40.86
#2	80" 2-line	high	82.41	31.59
#3	80" 3-line	low	94.32	34.88
#4	Furrow	furrow		
#5	80" 2-line	low	115.51	67.54
hypothetical mobile unit configuration				
#3M	80" 3-line	low	78.88	31.66
#5M	80" 2-line	low	101.49	64.61

Knowledge & Management??

- *Learning curve for most.*
- *Start on a reasonable scale and grow responsibly.*
- *Risks are very real*
 - 5, 10, or 20 yr life?*
 - yield increase?*

Output Values for Drip

- *Quality / Price Enhancements?*
- *Yield Increase? Market?*
- *Harvesting / Delivery Schedule?*
- *Ground Water Quality?*