A Cost–Benefit Analysis of Drip Irrigation

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How A Drip Irrigation System Works

- Applies water directly to plant’s root zone
- Uses drip lines with emitters to accomplish this
- System has pressure regulators, chemical injectors and control equipment to get water to drip lines
- Can be automated more than other systems
University of Nebraska Studies

- 2 years, 2005 and 2006
- Found that water stress will have a negative impact on yields
- Found that drip irrigation will improve the crop’s water use efficiency
- Improved efficiency can lead to lower irrigation costs
Kansas State University

- System has been in use since 1989
- System has not had any major problems or failures while in use
- Study observed that drip irrigation life expectancy allows it to be competitive with center pivot systems
- Observed lower nitrogen build up in groundwater when nitrogen was fertigated with drip irrigation system
California Irrigation Conversion

- There are about 73,000 acres that have converted from flood and sprinkler systems to drip irrigation systems
- Most conversion is due to drip irrigation with groundwater pumping being more reliable and efficient
- There are a lot of farmers planting almonds, drip irrigation offers excellent irrigation guarantees
- Some farmers won’t convert, mostly due to poor groundwater availability or quality
Initial Investment Costs

- Flood/Furrow system: about $165/acre
- Center pivot system: about $367/acre
- Drip irrigation system: about $832/acre
- Also need to consider: anticipated water availability, soil type, field shape, field size, anticipated crop price, anticipated yield, anticipated input costs
Water Use Efficiency

- Flood/Furrow system: about 65%
- Center pivot system: about 85%
- Drip irrigation system: about 95%–99%
- Factors impacting efficiency: Soil type, terrain, crop health, weather
Center Pivot vs. Drip Irrigation

- Time for drip irrigation system to pay its initial investment back vs. Center Pivot
- Both systems life expectancy: 20 years
Overall Possible Returns

- This farmer had some government financial assistance
- Field size unknown
- Drip system allowed for better profits from reduced inputs and increased yield

<table>
<thead>
<tr>
<th>Drip Irrigation Payback in Years Based on Actual Results*</th>
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<td>Drip Scenario 1:</td>
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<tr>
<td>Drip Irrigation System Investment</td>
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<td>EQIP Cost Share</td>
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<td>Potential Yield Increase with Drip (assuming 175 bu/ac with Gravity)</td>
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<td>Corn Price</td>
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<td>Potential Additional Revenue</td>
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| Potential Savings | Drip Scenario 1: | Drip Scenario 2: | Drip Scenario 3: |
|------------------|------------------|------------------|
| Fuel Savings | $25.00 | $25.00 | $25.00 |
| Chemical/Fungicide Savings | $27.50 | $27.50 | $27.50 |
| Fertilizer Savings | $43.88 | $43.88 | $43.88 |
| Cultivation Savings | $37.50 | $37.50 | $37.50 |
| Potential Cost Savings | $160.50 | $160.50 | $160.50 |

| Payback Calculation † | 3.6 | 4.2 | 1.5 Years |

*Results based on specific conditions - variations may apply
† Grower Investment divided by sum of Potential Additional Revenue and Potential Cost Savings.
Drip Scenario 1: No Subsidy; 50 bu/ac yield increase: $3.50/bu
Drip Scenario 2: No Subsidy; 50 bu/ac yield increase: $2.50/bu
Drip Scenario 3: EQIP Subsidy; 100 bu/ac yield increase: $3.50/bu
Common Problems

- Root intrusion into drip tape
- Insect damage to drip tape
- Rodents damaging drip tape
- Some soils are fine enough particle size to enter drip tape through emitters
- Some bacteria may combine with soil particles to plug emitter
Common Problems (cont.)

Bacteria and soil combining to plug emitter

Insect damage
Root Intrusion
Rodent Damages
Solutions to Problems

- Insecticide injection to kill insects
- Chlorination and other chemical treatments to kill bacteria
- Herbicide injection to kill roots
- No good solution known for rodents at this time
Conclusions

- Drip irrigation has high initial costs, but does have the potential to pay for itself fairly quickly.
- Drip irrigation has better water efficiency, making it a good choice in low water or water restricted areas.
- Depending on your willingness to do so, drip irrigation is a good investment overall.
Questions?