

Practice: 449 - Irrigation Water Management

Scenario: #1 - Basic IWM = 30 acres

Scenario Description: A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: The irrigator decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 15 ac. corn field (average between 1 ac. and 30 ac.) with a surface irrigation system.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Area of Irrig. Systems Managed

Scenario Unit: Acre

Scenario Typical Size: 15

Total Scenario Cost: \$312.27

Scenario Cost/Unit: \$20.82

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|---|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 8 | \$157.88 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 4 | \$154.39 |

Practice: 449 - Irrigation Water Management

Scenario: #2 - Basic IWM > 30 acres

Scenario Description: A low Intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by the feel method, volumes of irrigation water are based on energy or water district bills, records are kept on paper copies, and calculations are made by hand. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: The irrigator decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 100 acre corn field with a sprinkler irrigation system. .

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Area of Irrig. Systems Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: \$470.15

Scenario Cost/Unit: \$9.40

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|----|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 16 | \$315.76 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 4 | \$154.39 |

Practice: 449 - Irrigation Water Management

Scenario: #3 - Intermediate IWM = 30 acres

Scenario Description: A medium intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by in-field moisture sensors with manual downloads. Irrigation amounts are recorded from a flow meter near the pump. Records are input manually into an irrigation scheduling computer program. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a corn field with a surface irrigation system. The typical irrigated field is a 15 acre corn field(average between 1 ac. and 30 ac.) with a surface irrigation system.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Area of Irrig. Systems Managed

Scenario Unit: Acre

Scenario Typical Size: 15

Total Scenario Cost: \$619.18

Scenario Cost/Unit: \$41.28

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|---|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 9 | \$177.62 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 4 | \$154.39 |

Materials

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|------------------------|-----|---|------|----------|---|----------|
| Weather Station, Basic | 314 | Basic Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, and temperature to a home weather console. Includes materials only. | Each | \$287.17 | 1 | \$287.17 |
|------------------------|-----|---|------|----------|---|----------|

Practice: 449 - Irrigation Water Management

Scenario: #4 - Intermediate IWM > 30 acres

Scenario Description: A medium intensity irrigation water management system for producers using a checkbook method (crop grown, soil moisture conditions prior to irrigation, dates of irrigation start and stop, depths of irrigation applied, duration of irrigations, and amount of rainfall). For a typical scenario, soil moisture is determined by in field moisture sensors with manual downloads. Irrigation amounts are recorded from a flow meter near the pump. Records are input manually into an irrigation scheduling computer program. Resource Concerns: Insufficient Water Supply-Inefficient use of irrigation water; Degraded Plant Condition-Undesirable plant productivity and health, and Inefficient Energy Use-Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: The farmer decides when to irrigate based on general crop or soil appearance or limited soil moisture monitoring. System run times are based on past apparent success. The typical irrigated field is a 100 acre corn field with a sprinkler irrigation system.

After Situation: Irrigations are scheduled based on measured crop water requirements. Records are used to evaluate results of past irrigation events and influence future irrigations. The irrigator keeps records of soil moisture, crop water use, rainfall amounts and irrigation timing and amounts. At the end of the irrigation season all the data has been reviewed and evaluated. Improvements planned for the next season have been determined.

Scenario Feature Measure: Area of Irrig. Systems Managed

Scenario Unit: Acre

Scenario Typical Size: 50

Total Scenario Cost: \$777.06

Scenario Cost/Unit: \$15.54

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|----|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 17 | \$335.50 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 4 | \$154.39 |

Materials

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|------------------------|-----|---|------|----------|---|----------|
| Weather Station, Basic | 314 | Basic Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, and temperature to a home weather console. Includes materials only. | Each | \$287.17 | 1 | \$287.17 |
|------------------------|-----|---|------|----------|---|----------|

Practice: 449 - Irrigation Water Management

Scenario: #5 - Advanced- Soil Moisture Sensors

Scenario Description: This practice includes the installation of soil moisture sensors such as tensiometers, gyp blocks, capacitance sensors etc, that are installed and read to determine point in time soil moisture by depth. The installation includes the purchase of soil moisture meters and sensors, installation equipment, and labor to install and read sensors or meter. Typical Scenario involves installation of resistance sensor blocks in a 80 acre field of irrigated cropland. Producer periodically monitors soil moisture sensors during the growing season. Meters used to read sensors may be portable. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: Producer uses feel method to estimate soil moisture for scheduling irrigation.

After Situation: Producer has installed four sensors at each monitoring site to a depth of four feet with one sensor representing each foot of depth. Producer uses periodic soil moisture measurements to schedule irrigation results supplemented by weather station data providing improved irrigation water management and reduced energy use. Two monitoring stations are installed.

Scenario Feature Measure: Number of Measuring Sites

Scenario Unit: Each

Scenario Typical Size: 2

Total Scenario Cost: \$1,338.40

Scenario Cost/Unit: \$669.20

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|---|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 7 | \$138.15 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 5 | \$192.99 |

Materials

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|------------------------|------|---|------|----------|---|----------|
| Soil Moisture Meter | 1455 | Soil Moisture Sensor Reader. Equipment only. | Each | \$285.50 | 1 | \$285.50 |
| Soil Moisture Sensor | 1456 | Soil moisture resistance sensor W/10' cables. Equipment only. | Each | \$36.74 | 8 | \$293.89 |
| Weather Station, Basic | 314 | Basic Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, and temperature to a home weather console. Includes materials only. | Each | \$287.17 | 1 | \$287.17 |

Mobilization

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|------------------------------------|------|--|------|---------|---|----------|
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$70.35 | 2 | \$140.70 |
|------------------------------------|------|--|------|---------|---|----------|

Practice: 449 - Irrigation Water Management

Scenario: #6 - Soil Moisture Sensors with Data Recorder

Scenario Description: This practice includes the installation of one weather station, eight electrical soil moisture sensors such as capacitance or resistance sensors that are monitored to determine soil moisture. The installation includes the purchase of soil moisture sensors, installation equipment (probe or auger), and two data loggers to log continuous soil moisture data that can be downloaded to a personal computer and associated graphing software. Typical Scenario involves installation of resistance sensor blocks in a 120 acre field of sprinkler irrigated cropland, two monitor stations are installed representing 60 acres of typical soil and crop. Producer periodically monitors soil moisture sensors during the growing season. Resource Concerns: Insufficient Water - Inefficient use of irrigation water, and Degraded Plant Condition - Undesirable plant productivity and health, and Inefficient Energy Use - Equipment and facilities. Associated Practices: 441-Irrigation System Microirrigation, 442-Irrigation System Sprinkle, 328-Conservation Crop Rotation, 590-Nutrient Management or 447-Tail Water Recovery.

Before Situation: Producer uses feel method to estimate soil moisture for scheduling irrigation in the field.

After Situation: Producer has installed four sensors at each monitoring site to a depth of four feet with one sensor representing each foot of depth. Producer periodically downloads continuously recorded soil moisture measurements that are used to schedule irrigation more effectively resulting in improved irrigation water management and reduced energy use.

Scenario Feature Measure: Number of Measuring Sites

Scenario Unit: Each

Scenario Typical Size: 2

Total Scenario Cost: \$2,329.79

Scenario Cost/Unit: \$1,164.89

Cost Details

| Component Name | Id | Description | Unit | Cost | Qty | Total |
|----------------|----|-------------|------|------|-----|-------|
|----------------|----|-------------|------|------|-----|-------|

Labor

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|-----------------------|-----|--|------|---------|---|----------|
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$19.74 | 5 | \$98.68 |
| Skilled Labor | 230 | Labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc. | Hour | \$30.84 | 4 | \$123.37 |
| Supervisor or Manager | 234 | Labor involving supervision or management activities. Includes crew supervisors, foremen and farm/ranch managers time required for adopting new technology, etc. | Hour | \$38.60 | 5 | \$192.99 |

Materials

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|------------------------|------|---|------|----------|---|------------|
| Data Logger | 1453 | Data Logger W/Graphic Output for water management. Materials only. | Each | \$596.50 | 2 | \$1,192.99 |
| Soil Moisture Sensor | 1456 | Soil moisture resistance sensor W/10' cables. Equipment only. | Each | \$36.74 | 8 | \$293.89 |
| Weather Station, Basic | 314 | Basic Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, and temperature to a home weather console. Includes materials only. | Each | \$287.17 | 1 | \$287.17 |

Mobilization

| | | | | | | |
|------------------------------------|------|--|------|---------|---|----------|
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$70.35 | 2 | \$140.70 |
|------------------------------------|------|--|------|---------|---|----------|