

Tobacco Irrigation Costs for the Piedmont and Coastal Plain of North Carolina

OVERVIEW

Irrigation allows tobacco growers insure they will have a crop in a period of reduced rainfall. The use of irrigation helps ensure that the crop is not lost completely in dry years, as well as reducing the variation in yield and quality from one year to the next. In this way, producers can protect themselves against losses caused by lack of rainfall. However in order for irrigation to be profitable increased yields must be large enough to offset increased costs.

This cost assessment is based on the use of a hard-hose traveling irrigation reel along with a diesel engine and pump to supply water from a surface water source, such as a pond or creek. Prices for these systems are based on costs in the Piedmont and Coastal Plain of North Carolina. A 1250' hose with a 4" diameter should be able to supply one inch of water per acre per hour when the appropriate engine and pump are used.

Tobacco needs one inch of water per week during peak growth periods. An irrigation reel can cover only a limited acreage per week, and therefore must return to the original acre irrigated for the next irrigation cycle. In years of adequate rainfall, no irrigation is necessary. In years with moderate rainfall, 2 to 3 irrigation events may be necessary. Severe drought can result in the need for up to 6 irrigation events per year to sustain the crop.

With the hard hose reel system, there are several options in terms of set-up and design. The first is one pump per reel. A reel system of this type would reasonably be expected to cover 12 acres in 12 hours. At 12 acres per day for 6 days a week, this system would cover 72 acres a week with one inch of water. Two smaller pulls of 6 hours each are more common than a full pull of the reel, particularly in small or odd-shaped fields.

Growers with large acreages often use a single pump to supply water to two reels in a field, thus reducing their pumping costs. This allows them to double the acres covered, for 144 acres irrigated in a week with two reels and one pump. Approximately 1500' of 6" lock-ring aluminum pipe would be required to reach from the field to the water source for the single reel, and 3000' of 6" lock-ring aluminum pipe would be needed to supply water to the two-reel system.



INVESTMENT COSTS – SINGLE REEL

Total investment costs for this system would be \$62,000. This is the equivalent of \$861.11 per acre assuming 72 acres are covered.

Investment Costs		
Item	Cost	Cost Per Acre
Traveling Irrigation Reel	\$35,000.00	\$486.11
Pump and Engine	\$18,000.00	\$250.00
1500' 6 in. lock-ring pipe	\$9,000.00	\$125.00
TOTAL	\$62,000.00	\$861.11

It is assumed that the water supply is already established and accessible. If a water source is not already available, the investment cost of any type of irrigation system will increase dramatically. Investment costs per acre also depend on the number of acres that the producer can cover with a given amount of equipment. If the irrigation equipment is run for 5 or 7 days instead of 6, the cost per acre must be adjusted up or down accordingly.

Investment costs can also be affected by the brand of equipment purchased, the size and model of the equipment, as well as the number of modifications and additions to the irrigation system.



ANNUAL FIXED COSTS – SINGLE REEL

The annual fixed costs of the system are included below. Depreciation is determined based on the useful life of the each system component, giving consideration to a salvage value of 20% of the original value. The useful life would be 20 years for the reel, aluminum pipe and pump and engine. This assumes an average use of 216 hours per year for the system components. Insurance costs were determined at 0.6% of total initial investment costs. Interest on the system was based on a rate of 9.25% of the average value throughout its lifespan.

Annual Fixed Costs			
Item	Depreciation Life	Cost	Cost Per Acre
Traveling Irrigation Reel	20	\$1,400.00	\$19.44
Pump and Engine	20	\$720.00	\$10.00
1500' 6 in. lock-ring pipe	20	\$360.00	\$5.00
Insurance		\$372.00	\$5.17
Interest		\$3,441.00	\$47.79
TOTAL	N/A	\$6,293.00	\$87.40

VARIABLE COSTS – SINGLE REEL

Variable costs, including labor, fuel, tractor use, and repairs, are calculated to be \$for 72 acres for one irrigation cycle. However, anywhere from zero to 6 irrigation cycles may be needed over the course of the season, thus causing significant differences in costs. In an average year of 3 irrigation cycles over 72 acres, total variable costs for the season would be \$4,422, or \$61.42 per acre.

Variable Costs (1 Irrigation Cycle)		
Item	Cost (1 cycle)	Cost Per Acre (1 cycle)
Fuel	\$1008.00	\$14.00
Labor	\$216.00	\$3.00
Tractor Use	\$300.00	\$4.17
Repairs	\$310.00	\$4.31
TOTAL	\$1,834.00	\$25.48

Variable Costs (3 Irrigation Cycles- Full Season)		
Item	Cost (3 cycles)	Cost Per Acre (3 cycles)
Fuel	\$3,024.00	\$42.00
Labor	\$648.00	\$9.00
Tractor Use	\$900.00	\$12.50
Repairs	\$930.00	\$12.92
TOTAL	\$5,502.00	\$76.42

Labor costs take into account two people each working 2 hours per day, six days per week, at \$9.00 per hour for each irrigation cycle. These workers would be moving the reel system in between pulls, laying aluminum pipe to reach the water source, and keeping the diesel engine fueled.

Fuel costs for the pump and engine were calculated based on a fuel consumption of 4 gallons per hour at \$3.50 per gallon for 72 hours per week. Tractor use, required for moving the reel and pump from one pull to the next, was calculated at a cost of \$25 per hour for 2 hours per day and 6 days per week for one irrigation cycle. Repair costs of \$930 per season were based on 1.5% of the total initial investment costs.

TOTAL ANNUAL IRRIGATION COSTS - SINGLE REEL

Total annual fixed and variable irrigation costs for a season are \$10,715 over 72 acres, the equivalent of \$148.82 per acre. This would be true for a year in which 3 irrigation cycles are needed to sustain the tobacco crop.



Total Annual Irrigation Costs (3 Irrigation Cycles - Full Season)		
Item	Cost (3 cycles)	Cost Per Acre (3 cycles)
Total Fixed Costs	\$6,293.00	\$87.40
Total Variable Costs	\$5,502.00	\$76.42
TOTAL	\$10,715.00	\$148.82



INVESTMENT COSTS – DOUBLE REEL

Total investment costs for a double reel system would be \$110,000. This is the equivalent of \$763.89 per acre with the two-reel system.

Investment Costs		
Item	Cost	Cost Per Acre
2 Traveling Irrigation Reels	\$70,000.00	\$486.11
Pump and Engine	\$22,000.00	\$152.78
3000' 6 in. lock-ring pipe	\$18,000.00	\$125.00
TOTAL	\$110,000.00	\$763.89

It is assumed that the water supply is already established and accessible. If a water source is not already available, the investment cost of any type of irrigation system will increase dramatically. Investment costs per acre also depend on the number of acres that the producer can cover with a given amount of equipment. If the irrigation equipment is run for 5 or 7 days instead of 6, the cost per acre must be adjusted up or down accordingly.

Investment costs can also be affected by the brand of equipment purchased, the size and model of the equipment, as well as the number of modifications and additions to the irrigation system.

ANNUAL FIXED COSTS – DOUBLE REEL

The annual fixed costs of the system are included below. Depreciation is determined based on the useful life of the each system component, giving consideration to a salvage value of 20% of the original value. The useful life would be 20 years for the reel, the aluminum pipe and for the pump and engine. This assumes an average use of 216 hours per year for the system components. Insurance costs were determined at 0.6% of total initial investment costs. Interest on the system was based on a rate of 9.25% of the average value throughout its lifespan.

Annual Fixed Costs			
Item	Depreciation Life	Cost	Cost Per Acre
Traveling Irrigation Reel	20	\$2,800.00	\$19.44
Pump and Engine	20	\$880.00	\$6.11
3000' 6 in. lock-ring pipe	20	\$720.00	\$5.00
Insurance		\$660.00	\$4.58
Interest		\$6,105.00	\$42.40
TOTAL	N/A	\$11,165.00	\$77.53

VARIABLE COSTS – DOUBLE REEL

Variable costs, including labor, fuel, tractor use, and repairs, are calculated to be \$3,094 for 144 acres for one irrigation cycle. However, anywhere from zero to 6 irrigation cycles may be needed over the course of the season, thus causing significant differences in costs. In an average year of 3 irrigation cycles over 144 acres, total variable costs for the season would be \$9,282, or \$64.46 per acre.

Variable Costs (1 Irrigation Cycle)		
Item	Cost (1 cycle)	Cost Per Acre (1 cycle)
Fuel	\$1,512.00	\$10.50
Labor	\$432.00	\$3.00
Tractor Use	\$600.00	\$4.17
Repairs	\$550.00	\$3.82
TOTAL	\$3,094.00	\$21.49

Variable Costs (3 Irrigation Cycles- Full Season)		
Item	Cost (3 cycles)	Cost Per Acre (3 cycles)
Fuel	\$4,536.00	\$31.50
Labor	\$1,296.00	\$9.00
Tractor Use	\$1,800.00	\$12.50
Repairs	\$1,650.00	\$11.46
TOTAL	\$9,282.00	\$64.46

Labor costs take into account two people each working 4 hours per day, six days per week, at \$9.00 per hour for each irrigation cycle. These workers would be moving the reel system in between pulls, laying aluminum pipe to reach the water source, and keeping the diesel engine fueled.

Fuel costs for the pump and engine were calculated based on a fuel consumption of 6 gallons per hour at \$3.50 per gallon for 72 hours per week. Tractor use, required for moving the reel and pump from one pull to the next, was calculated at a cost of \$25 per hour for 4 hours per day and 6 days per week for one irrigation cycle. Repair costs of \$1650 per season were based on 1.5% of the total initial investment costs.

TOTAL ANNUAL IRRIGATION COSTS – DOUBLE REEL

Total annual fixed and variable irrigation costs for a season are \$20,447 for the 144 acres, and \$141.99 per acre. We assumed a typical year 3 irrigation cycles are needed to sustain the tobacco crop.

Total Annual Irrigation Costs (3 Irrigation Cycles - Full Season)		
Item	Cost (3 cycles)	Cost Per Acre (3 cycles)
Total Fixed Costs	\$11,165.00	\$77.53
Total Variable Costs	\$9,282.00	\$64.46
TOTAL	\$20,447.00	\$141.99

 Based on the calculations of total annual irrigation costs, the yield increase per acre that is necessary to offset the irrigation costs are listed below at various prices per pound.

Yield Increase Needed to Pay for Reel Irrigation Systems		
	Single Reel	Double Reel
Tobacco Price per lb.	Yield Increase per Acre (lbs.)	Yield Increase per Acre (lbs.)
\$1.20	124	109
\$1.25	119	105
\$1.30	115	101
\$1.35	110	97
\$1.40	106	94
\$1.45	103	90
\$1.50	99	87
\$1.55	96	85
\$1.60	93	82
\$1.65	90	79
\$1.70	88	77
\$1.75	85	75
\$1.80	83	73

CONCLUSION

Irrigation has the potential to save a tobacco crop in a dry year. It can be an important management tool, as long as it is timed properly and used efficiently. The lack of an established water supply would greatly affect the costs of irrigation, and is one of the most common reasons cited for not irrigating tobacco. However, the cost assessment above illustrates that a moderate increase in yield, in the range of 73 to 124 pounds per acre, is needed to justify irrigating tobacco.

SOME THINGS TO CONSIDER

- What yield increase can be expected from irrigation, and will that offset the increase in costs?
- Does the producer have the financial ability and cash flow to invest in this sort of system? Does he foresee the need for an irrigation system for several years?
- Will a producer have the time, resources, and management to operate the irrigation system effectively?

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