



Cost of supplemental irrigation for potato production in Prince Edward Island

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Highly variable precipitation in the growing season presents a challenge for consistent potato production in Prince Edward Island (PEI). Potato growers have shown an increasing interest in supplemental irrigation for mitigating drought risk. However, information regarding local costs for different irrigation systems is lacking, posing a barrier for doing cost-benefit analyses and making irrigation investment decisions. A review of local irrigation costs was conducted with the help of four growers who use irrigation in central PEI to fill this knowledge gap.

Of the four growers, two provided irrigation cost data for centre pivots (50-ac and 100-ac systems), one provided cost data for irrigating using a reel gun, and one shared the cost information for a boom system. The overall cost of each irrigation system consisted of annual ownership and operation costs. The annual ownership cost included capital depreciation and interest payments. Capital costs covered equipment purchase, piping installation, water reservoir (or pond) construction and accessories (e.g. float and in-pond pump), power access (power line, electrical panel and wiring), well drilling, and pump installation. Operation costs covered services (setting/wrapping up, system operation/mobilization, and app subscription) and fuel/electricity. Since all four systems used groundwater and/or spring water, there was no water source development cost. The total capital cost over the life of the capital asset was annualized to give a uniform annual capital cost with interest included. For this process, the capital asset was assumed to have a lifespan of 25 years with an annual depreciation rate of 8.1% (i.e. the salvage value was assumed to be 12% of the total capital cost). It was further assumed that growers took out a bank loan for 85% of the capital investment. The total interest over 25 years was calculated using an annual rate of 5% amortized over 25 years. The annual interest payment was calculated as the total interest divided by 25 years. The operation costs were based on five water applications each season. The marketable potato yield increase (as a result of irrigation) that is required to break even for each system was calculated using the average 2018 provincial farm-gate potato sale price of \$254/ton. The results are summarized in Table 1.

On an annual basis, ownership costs accounted for 61%, 73%, 46% and 82% of the total costs for centre pivots I and II, the reel gun and the boom, respectively. This means that growers had to pay the majority of the total annual irrigation cost to get the irrigation system in place regardless of whether or not they irrigated, or how often. Pivot I was 52% more expensive than pivot II because it covers twice as much area in one pass. Although the two pivots required a similar investment in a water supply system and were used to irrigate a 100-ac area in one season, the total annual cost of pivot II was 39% lower because it was moved back and forth to irrigate two 50-ac fields, lowering the unit capital cost, and because the service cost for pivot II was also lower. The overall costs for the reel gun and boom systems were considerably higher than the two pivots because the cost of the water supply systems for the reel gun and boom was substantially higher. Additionally, the service cost for the reel gun was higher, and the boom was used to irrigate only one 50-ac field instead of being moved back and forth to serve two 50-ac fields per season. These cost data suggest that different irrigation systems require different levels of investment and that operation and water supply system costs are field-dependent. Using site-specific parameters, including type of irrigation system, financial variables, capital depreciation rates, power/fuel, and service costs would produce a more accurate estimate.



Table 1 Cost of supplemental irrigation for potato production in PEI

Equipment type and irrigation area	Centre pivot I: 100-ac system covers one 100-ac field per season	Centre pivot II: 50-ac system covers two 50-ac fields per season	Reel gun: 50-ac system covers two 50-ac fields per season	Boom system: 50- ac system covers one 50-ac field per season
Equipment (\$)	140,000	92,000	68,000	100,000
Piping (\$)		29,000	56,000	130,680
Water pond + accessories (\$)		45,000	83,000	45,000
Well(s) + pump(s) (\$)		30,000	90,000	75,000
Power access (\$)		15,000	450,00	
Total asset (\$)	250,000	210,000	342,000	350,680
Annual depreciation (\$/ac)	93	74	120.2	246.6
Annual interest (\$/ac)	82.6	53.2	86.6	177.6
Annual ownership cost (\$/ac)	175.6	127.2	206.8	424.2
Power/fuel use (\$/ac)	5.2		103.5	50
Services (\$/ac)	103.3		135	40
App. subscription (\$/ac)	3		N/A	N/A
Annual operation cost (\$/ac)	111.5	48	238.5	90
Total cost (\$/ac) = Annual ownership cost + operation cost	287.1	175	445.3	514.2
Marketable yield gain from irrigation required to break even (CWT/ac)	20	15	31	36

Note: All costs are in (or approximately equal to) 2018 Canadian Dollars.

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