



## ANOTHER LOOK AT ASPARAGUS MECHANICAL HARVESTING UTILIZING THE SILER HARVESTER

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### Take home messages:

- ✓ The Siler harvester was used in 2013 to salvage asparagus from mowing.
- ✓ We estimate an annual return of nearly 12 and 37% for using two and three row machines for a single day of salvage operations each year.
- ✓ Mechanical harvesters should be considered as a risk management tool in an era of labor uncertainty



### What do we know about the Siler Mechanical Asparagus Harvester?

- It was invented by Dave Siler in the 1990s during a period of labor scarcity and produced in models that harvested one, two and three rows.
- The Siler is as efficient at hand harvest during any one picking.
- However, the machine damages spears that would have been harvested in subsequent pickings, resulting in season-long-yields estimated to be 60% of hand-harvest.
- A 1996 economic analysis<sup>1</sup> showed this yield reduction negates any benefit due to reduced labor *when compared to hand harvest*.
- The Siler harvester is no longer produced, but a number of machines are still in use.

### How is the Siler machine being used now?

- **Risk management:** A small number of growers used their Siler Harvesters to salvage asparagus that would otherwise have been mowed.
- **Small-scale production:** One commercial grower has continued to use the Siler as a true season-long alternative to hand-labor.

**Could the Siler Harvester pay-off as a way to manage risk due to labor uncertainty?**

- We used a partial budget to calculate additional costs and revenue, net change in income, return on investment and years to payback for growers using the Siler to salvage single pickings during short-term labor shortages.
- These were calculated for one day of use from initial machine costs for used two-and three-row harvesters. The annual rate of use is the acreage over which a single picking was salvaged at an average yield of 150 lbs/acre.
- Custom machine rates, asparagus sales prices, and hand harvest labor costs were assumed as detailed in the appendix.

**What are the major costs and benefits of using the Siler to salvage asparagus?**

In 2013, some of the growers that had mothballed their Siler machines discovered they could use them to salvage a picking rather than destroy it by mowing it off. Others purchased formerly mothballed machines and made them field ready. A combination of unseasonably warm weather and a shortage of available hand pickers led to these decisions. From discussions with machine owners that purchased used machines, we learned a used two-row had a value of \$14,000 and a used three-row a value of \$16,000 (after deducting salvage value). We examined the costs and returns to use the machine to **salvage one picking**. We used the current cuts and tips price and current costs for all the inputs that went into the partial budget analysis. All of the assumptions used for this analysis are in the appendix.

**Partial Budget Analysis:**

Purchase Used Two-Row Siler Machine	Amount:	\$14,000
<b>Annual Additional Returns:</b>		
<i>Estimated increase in income</i>		
24 acres x 150lb/ac = 3600 lbs x \$.76/lb		\$2,736
<b>Annual Reduced Costs:</b>		
<i>Mowing @ \$12.50/acre x24 ac</i>		\$300 or \$.083/lb
Total Reduced Costs and Additional income:		\$3,036
<b>Less Annual Additional Costs:</b>		
<i>Interest @ 5% = 14,000 x .05</i>	\$700 =	\$.19/lb
<i>Depreciation= \$14,000/20 yrs</i>	\$700 =	\$.19/lb
<i>Maintenance= \$14,000 x 3.5%</i>	\$490 =	\$.136/lb
<i>Tractor fuel/oil= \$13.0/hr x 8 hrs</i>	\$105 =	\$.029/lb
<i>One additional laborer @ \$10/hr x 8 hrs</i>	\$80 =	\$.022/lb
<b>Total Annual Additional Costs:</b>		<b>\$2,075</b>
<b>Less Annual Reduced Returns:</b>		<b>\$0</b>
<b>Total Additional Costs or Reduced Returns:</b>		<b>\$2,075</b>
<b>Net Change in Annual Income:</b>		<b>\$ 961</b>

**Return on Investment:**  $\frac{\text{Net Change} + \text{Interest}}{\text{Initial Cost}} \times 100 = \frac{1661}{14000} \times 100 = 11.9\%$

**Payback Period:**  $\frac{\text{Initial Cost}}{\text{Net Change} + \text{Interest}} = \frac{14000}{1661} = 8.4 \text{ years}$



## WHAT ABOUT THE FUTURE?

It has already been noted that new Siler machines have not been produced in many years. The following are questions to think about when considering resumed manufacturing of the Siler Harvester:

- Using current commodity prices, labor and equipment costs, is the relationship between cost and benefit unchanged from the 1996 study?
- Estimated returns are based on one day of salvage per year. Is this realistic?
- Is the shortage of motivated, legal and available hand harvesters a long term trend that should be planned for, just as weather risks are being addressed through the addition of irrigation?
- Is there new manufacturing technology that could improve the design and performance of the original Siler machine?
- Does the total cost of supplying seasonal housing for migrant labor make the potential for mechanical harvesting a more competitive option to hand harvest?
- For the small grower that cannot afford to supply migrant housing, could use of a mechanical harvester be a practical and profitable business model?
- Each producer's tolerance of harvest risk is individualized. Does the current and future labor market provide a niche for mechanical harvesting for those with a low tolerance for locating, housing and managing migrant labor?

## References:

Bakker, J. 1996. Study of Siler machine vs. hand harvest yields, unpublished research.

Purdy, TW, NL Myers, and RE Hepp (1996). Economics of Mechanical Harvesting of Asparagus. Michigan State University, East Lansing, MI, Dept. of Ag-Economics, Staff paper 96-27.

Stein, D. (2013). 2013 Custom Machine Work Rate Estimates. Michigan State University Farm and Resource Management Team Fact sheet 13-01.

**APPENDIX:**

**Used Siler Machine Purchase Partial Budget Assumptions:** We assumed the Siler machine is part of a risk management program. The machine is owned to salvage asparagus harvest(s) if adequate labor is not available for timely harvest or the only other option is to mow and destroy that picking. It is assumed machines are used for a single day each year. It should be noted that weather events such as abnormally warm weather or grower choice of harvest method would allow usage beyond one picking. Yield exceeding 150 pounds per picking would improve economic returns. We assumed that the Siler requires an extra person to sort the spears prior to falling into the bin. This may not be necessary, as lack of weed growth and processor grade requirements may eliminate that need. A producer should utilize their own situation to calculate profitability, particularly if they plan to use it more than once per season. Management labor was assumed the same for hand picking or Siler harvest.

Item	Value	Source of value
Two-row machine used cost (less \$2,000 salvage)	\$14,000	
Three-row machine used cost (less \$2,000 salvage)	\$16,000	Grower interview
Two-row machine – acreage harvested per day	24 acres	Grower interview
Three-row machine – acreage harvested per day	60 acres	Grower interview
Remaining life of used Siler	20 years	Based on life of existing machines
Yield/picking/acre	150 lbs/acre	Grower interview
Price/lb <sup>1</sup>	\$0.76/lb	MACMA 2013, adjusted for 97% grade
Hand-harvest labor (wages+benefits) <sup>2</sup>	\$0.18/lb	Local grower records, 2011
Mowing costs	\$12.5/acre	MSU custom rates 2014
Tractor fuel/oil <sup>3</sup>	\$13.07/hr	MSU custom rates 2014
Wage for Siler labor	\$10/hr	
Annual interest rate on loan for machine purchase	5%	
Annual rate of depreciation	5%	
Annual maintenance cost as percentage of machine cost	3.5%	Purdy, Myers and Hepp 1996
Number of additional workers to man Siler <sup>4</sup>	1 person	

<sup>1</sup>Asparagus sales price set at 2013 MACMA levels, or \$.78/lb, a 97% grade was assumed, yielding a gross return to growers of \$0.76/lb

<sup>2</sup>Harvest labor = \$.15/lb plus benefits (\$.03).lb) = \$.18/lb

<sup>3</sup>75 hp tractor fuel and oil cost

<sup>4</sup>The harvest crew for the Siler is one driver and two sorters, for a total of 3 people. Hand harvest requires two platform drivers. Therefore, the Siler requires one additional person on the machine. Labor requirements for hand harvest are indicated on the partial budget analysis.

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