

Harvester Demo Comparison

The purpose of this demonstration trial was to determine the harvest efficiency of a walk behind harvester (Emerson) compared to an industry standard tractor mounted harvester (Bragg). An increasing number of growers are utilizing or are thinking about purchasing a walk behind harvester, so some analysis on its efficiency needed to be done. This trial just looked at one model.

Experimental Design

This trial was done on a flat, uniform field with 100% plant coverage. Yield was uniform and approximately 6000 lbs/acre. Harvesting was done in one direction (east to west) at a set distance of 61 metres. Five alternating passes of the walk behind and tractor mounted harvesters were done. Each pass was timed. Also, five randomly placed quadrats (25 cm x 25cm) were placed on each pass and all dropped and berries still on the plant were counted. The weights of the harvested berries after each pass were also collected. The weights were then adjusted for inch of picking area, as the picking heads are different widths. Berries were picked into boxes as opposed to large totes.

Results and Discussion

None of the variables measured, showed a statistically significant difference. Although it is not statistically significant, it does appear that the tractor mounted harvester does put more berries in the box per inch of harvest area (Summary table 1). One variable that was not accounted for was the overlap of the harvester head. If the overlap is the same for both pieces of equipment (ie. 4 inches), it will have a bigger effect on harvested yield per trip on the walk behind because that overlap would be a bigger percentage of the harvester head. For truer accuracy, each head should be completely in the blueberries so 100% of each harvester head is picking at all times. Also, this was a very high yielding field and it may have been above capacity for the walk behind harvester given the angle of the belts and fin depth of the belts. **A lower yielding field should show an increased harvesting efficiency.**

Summary Table 1: Blueberry Harvester Comparison

Treatment	Weight (lbs)/inch of harvest area	n	Time (sec) to harvest 204 ft.	n	Drops/m2	n
Tractor mounted harvester	2.4 a	5	114.0 a	5	369.6 a	25
Walk behind harvester	2.2 a	5	117.0 a	5	408.1 a	25

There was very little difference in harvesting speed, even with the walk behind harvester having to unload boxes during the trip. For this trial, boxes were only filled half full, simulating a fresh pack harvest. Filling boxes full, will slow down the walk behind harvester, as the machine needs

to be stopped momentarily to level when the box is near full, to avoid spillage. Of note the walk behind harvester makes corners much quicker than a tractor mounted and has much less impact on the stems and soil. **This could make it a viable option for first year pick in a double crop situation.**

What makes this piece of equipment interesting is its low capital cost (~\$11,000) as well as relatively low fuel and maintenance costs. The balance between potential lost revenue and lower costs has to be considered.

Versatility observations - In its current form the walk behind harvester cannot efficiently pick rolling or hilly ground. Developing fields, patchy fields or fields that are very weedy can be challenging for this device. It works well on flat fields or gentle slopes with solid plant coverage.



Numbers analysis

For many growers with limited land base, purchasing a tractor mounted harvester is not viable, so these growers are wondering if a walk behind harvester would make sense compared to contract harvesting.

7.5% loss compared to a tractor mounted on a 2500 lb/acre field = 187.5 lbs/acre

10 year price average \$0.60/lb = **\$112.5/acre lost revenue**

Harvest costs/acre:

4 hours for 2 people @ \$15/hr =	\$120.00
Fuel =	\$5.00
Lost revenue =	\$112.50
Total	\$237.50

Contract harvesting costs:

2500 lbs @ \$0.11 / lb	\$275
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The grower would save \$62.5 acre. This would be more if he did some of the work himself. At 20 acres per year, the unit would be paid for in less than 9 years.

Conclusions:

There is a clear benefit to using this harvester or similar models for smaller acreage growers who have limited capability of capital investment. The tractor mounted harvesters have clear versatility advantages and a larger number of people can be trained to use them, as the walk behind can present physical limitations for some users. Initial data (although not statistically different) shows that a well maintained and operated tractor mounted harvester may pick more berries per acre than a walk behind.

The benefit of the walk behind comes when looking at capitalization, utilization of equipment, operating costs, maintenance costs and field sizes. Small, mature, flat fields are ideally suited for this type of harvesting equipment. Other benefits include reduced impact on stems and reduced soil compaction. This could lead to second cropping options for growers.

Walk behind harvesters are not well suited for every farm and it is clear the tractor mounted harvester will be the industry standard for some time, but the walk behind harvester does provide some interesting and financially viable options for growers in certain situations.

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