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THE ECONOMIC IMPLICATIONS OF A COTTON PICKER WITH ONBOARD MODULE BUILDING CAPABILITIES

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Abstract

A cotton picker with an onboard module builder should result in a modest reduction in per acre harvest cost, but at the whole farm or firm level, savings should be substantial.

Introduction

Cotton harvest is more costly than weed control, fertilizers, insect management, etc. It is the most costly component of cotton production and it requires more laborers than are required at any other time during the production period. New cotton harvesters, with on-board module builders (CPwOBMB) may be available in the next few years.

The purpose of this paper is to make initial approximations of the potential savings associated with CPwOBMB and to identify critical parameters that require additional study.

Performance Rate (PR)

The Department of Agricultural Economics at Mississippi State University estimates the cost and returns associated with cotton and other crops on an annual basis. These estimates are referred to as planning budgets. The Mississippi State Budget Generator [Laughlin and Spurlock], a widely accepted computer program which standardizes many accounting calculations, is employed to produce the budget tables. Cotton picker performance rates are currently under review by the Department of Agricultural Economics at Mississippi State University. At this time the PR of a 4R-40" picker supported by a boll buggy and module builder is estimated at 0.225 hours per acre for first pick and 0.190 for second pick or scrapings. These PR's translate to 4.444 and 5.263 acres per hour.

For purposes of this paper, the PR of a 6R-40" picker supported by a boll buggy and module builder is set at 0.148 for first pick and 0.124 for scrapping.

Assumptions

The PR's and annual hour of use for the two systems will be the same. The new picker will cost an additional $40,000. Repairs and maintenance will increase but not as a percentage of new cost.

The CPwOBMB will produce a rectangular bale of seedcotton equivalent to 6-7 bales of cotton lint. It will have a "reserve" so it can continue to harvest (for a short period) and dump all modules at the field margin.

Current module haulers will haul two modules per trip and no modifications will be required at the gin.

The price of labor is set at $8.76 per hour and diesel fuel at $1.05 per gallon.

Factors Related to Equipment Cost

Table 1 lists the major components of equipment cost and estimated direct and fixed cost per hour and per acre for the equipment utilized in the report. Tractor costs are not estimated per acre in Table 1 because their per acre cost varies with the PR of the tool being towed.

Other factors necessary to compute equipment cost per acre are length of life, annual use, fuel use rate, maintenance and repairs, salvage value, and labor requirements. In addition, some combination of tractors and towed equipment require adjustments to fuel and labor requirements. Equipment cost per acre is very sensitive to price and PR.

Methodology

The Mississippi State Budget Generator was employed to construct partial budgets for two 6R-40" cotton harvesting systems: 1) Standard, picker supported by module building and boll buggy, and 2) New, picker with onboard module builder.

Results

Estimated costs per acre for the standard cotton harvest is summarized in Table 2. It reflects a 6R picker supported by a boll buggy and module builder and a 25% scrap or second harvest. Total cost is estimated at $96.37 per acre of which $52.01 or 54.0% is fixed cost.

Table 3 lists the costs associated with the new system (CPwOBMB). Total cost is $78.21 of which $45.59 or 58.3% is fixed. The savings in direct cost is $11.74 or 26.5% per acre. The savings in total cost is $18.16 or 18.8% per acre. Other savings are one boll buggy, $17,340 and one module builder, $19,890. Possible savings are two tractors, $185,420 and two laborers, $50,000/yr.

Limitations

The estimated savings of $18.16 per acre are sensitive to the price of the new system. If the price increase associated with the new system is approximately $85,000 instead of the $40,000 assumed, the estimated savings of $18.16 vanishes.

Conclusion

The new system can make cotton harvest a one-man operation. It will dramatically impact the organization and structure of cotton farms. At the whole farm level, expected cost savings will be substantial. Boll buggies and module builders will not be required. On most farms, which are currently reducing the number of "trips-over-the-field" required to produce cotton, two tractors per picker unit (6-row) will not be needed. A savings in capital requirement at approximately $225,000.00.

Most farms should be able to reduce their labor force by 2 operators (tractor drivers) per 6-row picker unit, an estimated savings of approximately $50,000.00 per year. In addition, several part-time harvest laborers will not be required.

Table 1. Self-propelled and towed equipment: estimated performance rate, purchase price, fuel consumption rate, and direct and fixed cost per hour and per acre, Mississippi, 2001.

	Performance	Purchase Price	Direct Cost		Fixed Cost	
Item Name	Rate hrs/ac	Dollars	$/hr	$/ac	$/hr	$/ac
Cotton Picker-1st-6R	0.148	292,862	134.71	19.93	224.12	33.17
Cotton Picker-2nd-6R	0.124	292,862	134.71	16.70	224.12	27.79
Picker-OBMB-1st-6R	0.148	332,862	150.71	22.30	254.73	37.70
Picker-OBMB-2nd-6R	0.124	332,862	150.71	18.68	254.73	31.58
Tractor-(180-199 hp)		92,710	16.89		19.29	
Boll Buggy – 1st pick	0.148	17,340	4.33	0.64	12.99	1.92
Boll Buggy – 2nd pick	0.124	17,340	4.33	0.53	12.99	1.61
Module Builder – 1st	0.148	19,890	4.97	0.73	14.90	2.20
Module Builder – 2nd	0.124	19,890	4.97	0.67	14.90	1.84

Table 2. Estimated costs per acre, Standard Cotton Harvest, Mississippi, 2001.

					Tractor Cost		Equipment Cost			
Operation	Size/ Unit	Tractor Size	Perf. Rate	Times Over	Direct	Fixed	Direct	Fixed	Labor Cost	Total Cost
					dollars					
Cotton Picker-1st	6R40"		0.148	1.00			19.93	33.17	2.59	55.70
Boll Buggy-1st pick	4 Bale	2WD 190	0.148	1.00	2.49	2.85	0.64	1.92	1.29	9.21
Module Building-1st	32'	2WD 190	0.148	1.00	2.49	2.85	0.73	2.20	2.31	10.61
Cotton Picker-2nd	6R40"		0.124	0.25			4.17	6.94	0.54	11.66
Boll Buggy-2nd pick	4 Bale	2WD 190	0.124	0.25	0.52	0.59	0.13	0.40	0.27	1.93
Module Builder-2nd	32'	2WD 190	0.124	0.25	0.52	0.59	0.15	0.46	0.48	2.22
Totals					6.04	6.90	25.77	45.11	7.50	91.35
Unallocated Labor										5.01
Total Specified Cost										96.37

Table 3. Estimated costs per acre, cotton picker wOBMB, Mississippi, 2001.

				Tractor Cost		Equipment Cost			
Operation	Size/ Unit	Perf Rate	Times Over	Direct	Fixed	Direct	Fixed	Labor Cost	Total Cost
				dollars					
Picker-OBMB-1st	6R-40	0.148	1.00			22.30	37.70	2.59	62.59
Picker-OBMB-2nd	6R-40	0.124	0.25			4.67	7.89	0.54	13.11
Totals						26.97	45.59	3.13	75.71
Unallocated Labor									2.50
Total Specified Cost									78.21