ECONOMIC COMPARISON OF ON-BOARD MODULE BUILDER HARVEST METHODS

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Abstract

Cotton pickers with on-board module builders (OBMB) eliminates the need for boll buggies, module builders, the tractors, and labor needed to operate this machinery. Additionally, field efficiency may be increased due to less stoppage for unloading and/or waiting to unload. This study estimates the cost of production per pound of lint from harvest through ginning for a standard 6-row picker with the needed support equipment (e. g. module builders, boll buggies, tractors and labor), and two versions of the OBMB pickers that build their own modules, Case IH 625 Cotton Module Express (Red System) and John Deere 7760 (Green System). Analysis showed that the Red System had the lowest harvesting/operating costs per acre. Operating costs were lower for the Red System than the Green, due primarily to the lower assumed purchase price. The Red and the Green System's harvesting costs were lower than the 6RStandard picker, due to the elimination of the equipment and labor expenses associated with the boll buggies and module builders. The Red System also had lower per acre costs delivered to the gin, primarily due to the lower assumed expenses for tarps/covers and module handling as compared to the Green System. Both OBMB systems had a lower cost over the standard 6-row picker.

Introduction

Interest has been growing recently about cotton pickers that build modules on-board. The interest has been born out of the need to reduce costs as well as the shortage of harvest labor in many regions. The ability to use cotton pickers with on-board module builders (OBMB) eliminates the need for boll buggies, module builders, the tractors, and labor needed to operate this machinery. Additionally, field efficiency may be increased due to less stoppage for unloading and/or waiting to unload. The down side of the new pickers is obviously the increased purchase price. Currently, the market environment for cotton production versus grain crops favors grain production in much of the cotton belt. As cotton prices rise in order to secure adequate cotton acreage, the financial feasibility as well as producer interest in cotton production may very well lead to increased market demand for the "new fangled" pickers.

This study attempts to measure the cost of production per pound of lint from harvest through ginning for a current 6-row picker with the needed support equipment (e. g. module builders, boll buggies, tractors and labor), and two versions of the OBMB pickers that build their own modules.

In October, 2006, Case IH began offering its new 625 Cotton Module Express 6-row harvester (red system) (Delta Farm Press, 2006). The Module Express 625 picks at 4 mph, about the same as a traditional six-row picker, but it builds the module at the same time it's picking, using a framework of augers to move and compress the cotton into an average 10,000-pound module. The modules are 8-foot by 8-foot by 16-foot and was reported to take about the same time to unload than to empty 10,000 pounds of cotton from a conventional basket. Modules are set on the turn row and two 16-foot modules are handled like a conventional 32-foot module when loaded on a module truck and hauled to the gin. No additional equipment is needed.

In September, 2007, John Deere unveiled its new 7760 (green system) on board, round-module-building cotton harvester. Cotton flows from the picker heads into an accumulator, then is formed into a round module, wrapped in plastic and deposited onto a transport reel without stopping. The modules weight about 5,000 pounds and are 8 feet wide by 7.5 feet in diameter. John Deere designed the harvester to operate at a speed of 4.2 mph which represents a 5% increase in normal picking speeds of 4 mph. John Deere estimates an improved field efficiency of 90%, compared to a conventional 6-row harvester of 70% (Delta Farm Press, 2007). The wrap is estimated to cost about $25 per module. A special device, Cotton Module Handler, attaches to a 200 hp tractor and is used in the field to assemble the round modules into rolls of four which can be picked up with a conventional module

truck and hauled to the gin. In the gin, a round module unwrapper, developed by Stover Equipment. Co., is used to remove the plastic wrap prior to entering into the module feeder.

Methods

Harvesting costs for each of the systems were calculated as costs per acre with the assumption of 1,000 pounds per acre lint yield. The expenses for a standard 6-row picker (6RStandard) and support equipment were taken directly from the Mississippi State Budget Generator (MSBG) (Laughlin and Spurlock, 2007). Harvesting costs for the two versions of the OBMB pickers (Red System and Green System) were adapted from the standard picker information in the MSBG. The MSBG assumes a speed of 3.6 miles per hour and a field efficiency of 70%. Our study assumes a harvest speed of 4.0 miles per hour for both the Red and Green Systems and a field efficiency of 80% for the Red System (includes additional down time for staging modules and 85% for the Green System since the operator does not have to stop the Green machine to unload. Purchase prices for the new machines were estimated at $450,000 for the Red System and $498,000 for the Green System (Parvin, 2007 and Stile and Hogan, 2007).

One person "on the ground" per two machines was assumed for the Red System to place tarps on the modules with a cost $0.75 (Valco, et al., 2006) per bale assumed for the tarps. For the Green System a cost was included for a tractor and module handler per two machines. Wrapper cost was estimated at $15.15 per acre (Stiles and Hogan, 2007).

Module hauling expense was based on 20,000 pounds per trip or 15 bales at $4.25 per bale or $8.50 per acre (Valco, et al., 2006). In this analysis, hauling expense was increased an additional $0.50 per acre for both the Red and the Green Systems because of the additional time for picking up 2 and 4 modules, respectively.

The MSBG ginning cost for each of the harvesting systems was included in the analysis. An additional expense to modify the gin module feeder for the warp removal was added to the green system, which was approximately $250,000 in fixed capital expenditures plus the cost of two additional employees. Fixed expenses were amortized over 20 years with an 8% discount rate and a 10% salvage value. Gin capacity was assumed to be 50 bales/hr and 40,000 bales per year.

Results and Discussion

Table 1 lists the assumed costs for each of the three systems. The Red System had the lowest harvesting/operating costs per acre. Operating costs were lower for the Red System than the Green, due primarily to the lower assumed purchase price. The Red System's harvesting costs were lower than the 6RStandard picker, due to the elimination of the equipment and labor expenses associated with the boll buggies and module builders. The Red System also had lower per acre costs delivered to the gin, primarily due to the lower assumed expenses for tarps/covers and module handling as compared to the Green System. When costs are considered all the way through ginning, the Red System still had the lowest costs since costs were lower going into the gin and no gin modifications were needed. It is obvious from Table 1 that either of the two module building systems are advantageous over the traditional system on a per acre or per pound of lint basis. Under the currently assumed costs and performances, the Red System appears to be advantageous to the Green primarily due to module cover expense and to a lesser degree the modifications and additional labor possibly needed at the gin.

Assumptions and adjustments to harvest speed and field efficiency were evaluated and did not result in significant changes in costs or results. Additional information is needed to determine actual field speeds and field efficiencies for various crop and field conditions. The primary cost difference between the two module building systems was in tarp wrapping and handling. The elimination of lost lint yield or quality provided by the module wraps associated with the Green system may overcome part or all of this cost difference. However, that data was not available to include in this analysis. Growers can use this information to get an idea of the costs associated with the different harvesting systems, with the acknowledgement that each individual operation may have different assumptions and costs.

Table1. Comparison of costs for three cotton picking systems.

	6RStandard	Red System	Green System
Operating costs per acre	$59.02	$61.23	$63.05
Tarps/wrapper per acre (including labor)*	$1.50	$2.34	$15.15
Module staging*			$4.00
Hauling*	$8.50	$9.00	$9.00
Boll buggies/module builders/labor	$29.44		
Total cost per acre from harvest through gin delivery*	$98.46	$72.57	$91.20
Total cost per lb of lint (harvest through gin delivery)*	$0.09846	$0.07257	$0.09120
Ginning per lb of lint	$0.07	$0.07	$0.07
Additional ginning expense per lb of lint			$0.00207
Total cost per pound of lint (harvest through ginning)	$0.16846	$0.14257	$0.16327
Cost per 500 lb bale	$84.23	$71.29	$81.64

*Assumes a yield of 1,000 pounds of lint per acre and a 37.5% gin turnout.

Disclaimer

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