ECONOMIC ANALYSIS OF HARVEST-AID TREATMENTS

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Abstract

Information is limited on the tradeoffs of applying a harvest-aid followed by a once-over or twice-over harvest for picker cotton. Factors that influence this decision are: responses of first-harvest yield and quality to the harvest-aid, variation in base and quality prices, and substitution of harvest-aid for second-harvest costs. Results of the partial budgeting analysis that considers these factors show that the Dropp-Prep combination has the greatest potential to increase first harvest and total harvest net revenue.

Introduction

Information is limited on the economic tradeoffs of applying a harvest-aid followed by a once-over or twice-over harvest for picker-type cotton. Factors that may influence this decision are: responses of first harvest yield and quality to the harvest-aid, variation in base quality and quality difference prices, and substitution of harvest-aid for second harvest costs. The grading system beginning in 1993 has also placed greater emphasis on price discounts for trash. The objective of this study was to evaluate how these elements influence net returns to alternative harvest-aids.

Methods

Partial budgeting was used to evaluate the impact of each element on the harvest-aid decision. Yield and fiber quality data were from a harvest-aid study (1992, 1993, 1994) at the West Tennessee Experiment Station, Jackson, Tennessee. The study evaluated 11 defoliant and boll opener and defoliant combination treatments. Table 1 presents the combinations and rates used to formulate the 11 treatments. The control was not treated with harvest-aid chemicals (untreated).

Gross revenue for each treatment was calculated using North Delta spot base
and quality difference prices (Agricultural Marketing Service, Various Issues). The reported base price is for color 41, leaf 4, staple 34, micronaire 35-36 and 43-49, and strength 23.5-25.4 cotton (Strict Low Middling). The price discount relationship for leaf grade is reported for each color grade and staple length. Since November 1993, leaf grade discounts have generally been higher for the difference between LEAF 5 and 6 than for the difference between 4 and 5 or 6 and 7 for color grades 51 (low middling) and above and staple 35 and above. The resulting price difference curve has a downward sloping, backward s-shape. The slope of the discount relationship becomes more concave for staple 34 and under and flat for white color grades less than 51. Discounts were also hypothesized to be inversely related to P_B. Consequently, the following price difference relationship was specified

$$P_D^{CS} = \beta_0 + \beta_1 \times LGD + \beta_2 \times LGD^2 + \beta_3 \times LGD^3 + \beta_4 \times P_B + \beta_5 \times P_B \times LGD + \mu, \quad (1)$$

where P_D^{CS} is price discount ($/lb) for color grade (C) and staple length (S), LGD is deviation from the base leaf grade (0 = LEAF 4, 1 = LEAF 5, 2 = LEAF 6, and 3 = LEAF 7), P_B is a monthly base quality price ($/lb), β_i are parameters estimated by regression, and μ, is a random error term. Intercept $\beta_0 + \beta_4$ represents color and staple price difference from the base quality for LEAF 4 for a specified base price. Monthly North Delta spot price data for November 1993 to May 1995 were used to estimate equation (1) (Agricultural Marketing Service, Various Issues). Average price differences for the period for micronaire and fiber strength were used because the discount relationship for these attributes did not change with the base price. The average base price for the period of $0.75/lb and the estimated discounts at this price were used for the analysis. Cotton seed price for the analysis was $0.05/lb (Tennessee Dept. of Agriculture, 1994).

Net revenue was assumed to be gross revenue less the fixed and variable costs incurred for the harvest-aid, picking, handling, and ginning seed cotton. Harvest-aid treatment costs varied from $6.24 to $23.04/acre (Table 1). The cost of applying the harvest-aid was assumed to be $3.50/acre (Gerloff, 1995). The assumed harvest equipment complement includes a 4-row, self-propelled cotton picker (160HP), a module builder with a tractor (125 HP), and three trailers with a tractor (125 HP). Ownership and operating cost of each harvest was modeled as a function of machine hours per acre with the once-over operation costing $67.03/acre and twice-over harvest costing $81.57/acre. Selected marketing costs for each pound of lint sold was assumed to be $0.05/lb (Glade et al., 1995). The cost of ginning per pound of lint harvested was assumed to be $0.06/lb (Glade et al., 1995).

Discussion

Dropp at 0.05 lb active ingredient (a.i.)/acre and Prep at 1.0 lb a.i./acre with a cost of $18.32/acre has the greatest

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potential to improve both first harvest and total harvest net revenue. Dropp and Prep (treatment 6) produced significantly higher first harvest net revenue of $726/acre compared with $587/acre for no harvest-aid treatment at a base quality price of $0.75/lb (Figure 1A). The price difference for this combination was $0.005/lb compared with -$0.073/lb for the untreated (Figure 1B). Both Dropp and Prep combinations (treatments 6 and 11) also produced the largest total net revenue of $830/acre compared with $743/acre for the untreated (Fiure 1C). Harvade 5F (treatment 3) applied at 0.30 lb a.i./acre and a cost of $9.23/acre produced the largest total NR among non-Prep treatments in the experiment of $807/acre. The two most important factors influencing net return to the Dropp-Prep combination were a consistently low trash measurement resulting in a higher leaf grade and an increase in first harvest yield. The other lint quality factors used in pricing cotton that were measured in the experiment did not significantly impact harvest-aid net revenue.

References

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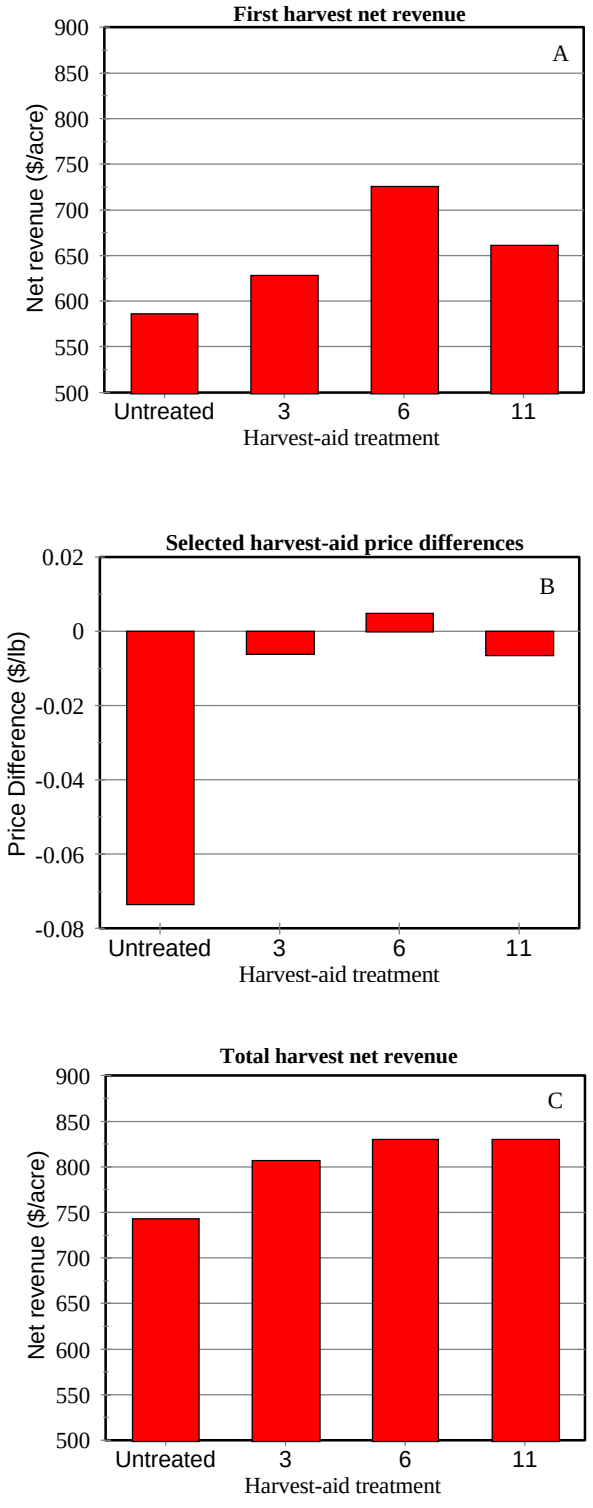

Figure 1. Selected Harvest-aid Treatment Price Difference, First Harvest Net Revenue, and Total Net Revenue at a Base Price of $0.75/lb.

Table 1. Harvest-aid treatments and costs.

Item/ Treatment Number	Treatment Name	Rate†	Chemical Cost/Acre‡
Untreated	Control	NA	NA
1	Folex	1.1250	$6.94
2	Dropp	0.1000	$9.76
3	Harvade 5F	0.3000	$5.73
4	Harvade 5F	0.2500	$14.79
	Prep	1.0000	
5	Folex	0.5600	$13.39
	Prep	1.0000	
6	Dropp	0.0500	$14.82
	Prep	1.0000	
7	Harvade 5F	0.2500	$10.99
	Dropp	0.0625	
8	Dropp	0.0500	$8.37
	Folex	0.5600	
9	Defol 6	4.5000	$2.74
10	Folex	0.7500	$19.54
	Prep	1.5000	
11	Dropp	0.0625	$8.61
	Prep	0.2500	

† Pounds of active ingrediant applied per acre.
‡ Treatment chemical costs are based on prices from an informal survey by the authors and the chemical application rate.