ECONOMIC ANALYSIS OF AUTO-SWATH CONTROL FOR ALABAMA CROP PRODUCTION

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ABSTRACT

The aim of this project was to estimate the savings that can be achieved with Auto-Swath Control technology on herbicide sprayers, planters and liquid fertilizer applicators. Therefore, the overlap has been simulated on base of real field boundaries. The reduction of the overlap areas was transformed in savings of input costs. The overlap can be reduced by 1 % to 8 % when using Auto-Swath Control. That allows savings of $1.50/ac up to $25.00/ac depending on crop, equipment size and the accuracy of the technology. A field index has been developed that describes the field geometry and is based on some field variables. With this index, the overlap areas can be predicted. This may provide more detailed information and help for farmers to make the decision whether to buy Auto-Swath Control.

Keywords: automatic section control, economics, savings, overlap

INTRODUCTION

Auto-Swath Control (ASC) is an input saving technology that is available for some applications. When using ASC technology, boom sections or individual units are switched ON and OFF automatically based on a field map or mapping the outer pass around the field and areas where application has occurred.

METHODOLOGY

Overlap areas were calculated in ArcGIS. Field boundaries of 19 actual Alabama fields and RTK correction was used for analysis. This analysis was performed for a 90 ft, 5 boom sprayer as well as individual nozzle control. The overlap areas were calculated for 12 and 24 row planters and individual row control. The liquid nitrogen applicator width was equal to the 12 row planter. Input costs for seed, herbicides, fungicides, insecticides and liquid nitrogen are average data of the year 2008. The economic analysis was conducted for corn (rainfed and irrigated), cotton (rainfed and irrigated), peanut, soybean and wheat.

Overlap areas depend on field size and geometry. These characteristics can also be used to predict the overlap reduction. To make the field geometry a measurable value, simple field indices were developed. The overlap reduction equals the percentage of input savings. Savings was calculated by multiplying the overlap reduction of an implement by the cost of all inputs applied with it.

RESULTS

With increasing field size, the double applied area percentage decreases, as well as overlap reduction using ASC. Savings is crop specific based on input cost and Table 1 shows average savings for five crops. The highest savings were found for peanut when no precision nitrogen application was used and for irrigated corn if ASC was also used on the nitrogen applicator.

Field index results showed higher indices for irregular shaped, smaller fields. Increased savings with an increased field index was determined.

CONCLUSIONS

ASC technology reduces the overlap areas by 1% to 8% depending on field geometry, implement width and technology accuracy. ASC savings depend on the particular crop and range from $1.50/ac to $25.00/ac. To maximize profitability ASC should be used on all implements and fixed costs can be minimized by using the equipment in larger areas. With profitability of ASC technology predicted, producers have a guide to determine benefits for their operation.

Table 1. Average savings for different crops and technology scenarios ($/ac)

Sprayer	5 boom sections		Nozzle control		Nozzle control	
Planter	12 rows		12 rows		24 rows	
Precision N appl.	no	yes	no	yes	no	yes
Corn - Rainfed	3.80	7.40	4.21	7.81	5.50	9.10
Corn - Irrigated	4.00	11.36	4.41	11.77	5.83	13.19
Cotton - Rainfed	5.06	7.51	5.81	8.26	7.06	9.52
Cotton - Irrigated	5.39	8.33	6.14	9.08	7.58	10.53
Peanut	7.34	-	8.73	-	9.86	-
Soybean	4.29	-	5.12	-	5.73	-
Wheat	3.94	7.21	4.68	7.95	5.29	8.56