SOME ECONOMIC CONSIDERATIONS FOR BT COTTON PLANTING IN THE YAZOO-MISSISSIPPI DELTA

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Abstract

A survey of 160 growers in the Mississippi Delta in 1996 was conducted to obtain data on cotton insect control costs for that production year. Each interview conducted with a farmer in the sample provided data on a typical cotton field on that farm for conventional cotton and Bt varieties if they were grown on that farm. An analysis of these data indicate that there was no meaningful difference in insect control costs when the technology fee of $32 per acre was added to the Bt varieties. These data indicated a reduction in costs of control for the tobacco budworm and to a lesser degree for the cotton bollworm. However, due to the low number of applications for these two pests, insect control costs for boll weevil and tarnished plant bug were greater on fields where Bt cotton was grown. Yields as reported by farmers indicated that the conventional varieties produced 73 pounds of lint per acre more than the Bt variety when data from all farms were considered. However, a direct comparison of both Bt and conventional yields on the same farms indicated a yield difference of only 47 pounds per acre advantage to the conventional cotton.

Introduction

The availability of cotton varieties including the *Bacillus thuringiensis* gene became generally available in the Mid-South in 1996. The introduction of this gene, hereafter called Bt, was greeted with considerable enthusiasm by many in the cotton industry but with some concerns by others. The principal concern that farmers had for these varieties was the technology fee charge for growing these varieties. This fee is $32 per acre. There was much data from many different sources throughout the Cotton Belt concerning the performance of Bt cotton varieties in 1996. Some of these data reported excellent results, particularly in the Southeast. Yet, there were considerable mixed reports in the Mid-South. This paper will present some of the data that was obtained from a large intensively sampled survey of cotton producers in the Mississippi Delta in 1996.

Results

The data for this study were collected from the 1996 survey of cotton insect control costs conducted by the authors for the Mississippi Boll Weevil Management Corporation. Such data has been collected either state-wide or for selected areas of the state since 1992. The data presented here were obtained from a stratified random sample of a list of cotton growers obtained from county agents records in the eleven Delta and part Delta counties. Stratification was based on size, that is data would only be collected from farms with more than 200 acres of cotton. Usable data was obtained from 160 farms. One hundred fifty of these farms grew conventional cotton and 88 of the 160 also grew Bt cotton. A few farms producing only Bt cotton were in the sample. Data were collected for a typical field or fields on each farm.

Table 1 presents a comparison from the boll weevil survey of the data collected from all the farms and from conventional variety fields and from Bt variety fields. This table, of course, indicates that the average Bt fee was $12.22 when averaged over all acres in the study, which has little meaning but presents the costs for various categories of cotton pest control, primarily related to each species such as aphids, boll weevil, bollworm, plant bug, budworm, thrips and other insects. A total cost per acre for insect control for each category was determined as well as total insect control cost per acre. These data indicate that an insect control cost was lower in the Bt fields for both the bollworm and the budworm. However, it should be pointed out that the budworm infestation experienced in 1996 were certainly the lowest experienced in the last ten years. However, due to lack of insecticide applications for the bollworm and budworm it was necessary to make additional applications for the boll weevil and the tarnished plant bugs in the Bt fields. Comparison of total costs shows that there is no meaningful difference between the total cost of insect control for conventional fields or Bt fields in 1996.

Table 2 presents farmers' estimates of yields obtained in 1996. It should be noted that the number of observations of fields for yield is slightly different than that reported for insect control. This is due to lack of confidence on the part of some farmers to estimate the yields from the fields from which data was collected. Table 2 clearly indicates that the conventional cotton produced higher yields than the Bt fields by some 71 pounds of lint per acre. A more meaningful comparison of conventional and Bt cotton is made on made 61 farms which grew both Bt and conventional cotton (Table 3). An analysis of the data from these farms showed no significant difference in insect control costs than those presented in Table 1. However, a comparison of yields indicated that there was only a 47-pound difference in favor of conventional cotton over Bt on the 61 farms, with similar management and practices.

Summary

The 1996 data presented here indicated that there were slightly lower yields in the Bt varieties grown by farmers in the Mississippi Delta when compared with conventional

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varieties. These data do however, suggest two things. First, Bt varieties are effective in controlling the tobacco budworm even though it was a very light infestation year and gives some control of the cotton bollworm. Secondly, the reduction in application of insecticides for these two pests clearly result in increased need for application for the bollweevil and tarnished plant bug. Some preliminary data from entomological research also suggests that other minor pests may increase as a result of these reduced applications. Some farmers have reported to the authors that they have modified their production practices in an attempt to force the Bt varieties to mature somewhat earlier. This is usually accomplished by increased use of systemic insecticides, a reduction in the quantity of nitrogen used and not irrigating the Bt varieties.

Table 1. Bt comparison from boll weevil survey, all Delta fields.

Item	Cost/Acre All Fields	Cost/Acre Conventional Fields	Cost/Acre Bt Fields
Number of farms	160	151	88
Bt fee	12.22	0.00	32.00
Aphids	4.08	3.89	4.38
Boll weevil	10.24	8.00	13.83
Bollworm	31.15	47.11	5.34
Plant bugs	19.84	17.50	23.64
Budworm	2.02	3.24	0.06
Thrips	6.58	5.74	7.94
Other	1.65	2.05	1.08
Total all insects	87.43	87.18	87.85

Table 2. Bt comparison from boll weevil surveys, all fields.

Fields	Yield - Pounds	Number fields
Conventional fields	966	128
Bt fields	893	71
All fields	939	199

Table 3. Bt comparison from boll weevil surveys, comparable fields.

Fields	Yield - Pounds	Number fields
Conventional fields	966	61
Bt fields	919	61