THE GEORGIA BOLL WEEVIL ERADICATION PROGRAM - ESTIMATED NET RETURNS TO SOUTH GEORGIA PRODUCERS

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Abstract

The biological success of Boll Weevil Eradication Programs (BWEP) in the Carolinas and Georgia has raised the economic question of when the pro-gram cost will be fully recovered. Cotton producers who are considering a state or regional BWEP can regard implementation as an investment decision with an initial, multi-year treatment period characterized by elevated annual costs followed by a perpetual containment period with lower, relatively stable annual costs. This study of the Georgia BWEP uses actual cotton yields and extension budget estimates of insect control costs to estimate the required time frame for full cost recovery.

Introduction

The cotton boll weevil has been one of the most damaging pests in U.S. agricultural crop production history. Its effect on Georgia, coupled with world cotton market factors, is especially dramatic. Georgia Agricultural Statistics Service (GASS) records show how Texas introduction of the boll weevil from Mexico in 1892 (Parencia) and to Georgia in 1915 (Worsham) took a Georgia agronomic crop valued in excess of $90 million dollars as recently as the early 1960's and contributed to its reduction in value, eventually reaching a low of $20 million in 1977. Individual producer efforts to eliminate the boll weevil were unsuccessful and farmer production systems using extensive chemical applications had only limited success (Haney and Lewis). The first broad-scale advance in boll weevil control was the 1971 Pilot Boll Weevil Eradication Experiment conducted in Mississippi, Louisiana, and Alabama (Parencia; Perkins). Results of the experiment suggested that boll weevil eradication was feasible. In addition to the potential savings in chemical costs, tests in North Carolina during 1969 and 1971 had shown that cotton yields might also be increased by successful BWEPs (Grube et al.). In 1978, a five-year Trial Boll Weevil Eradication Program was initiated in portions of North Carolina. This program verified the biological possibility of boll weevil eradication and launched the Southeast BWEP that has essentially cleared Virginia, North Carolina, South Carolina, and Georgia of weevil infestations (Cunningham).

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Review of Literature

Rapid expansion of cotton production following early successes of the BWEP have fueled a number of cost-benefit studies. Some focused on public and private rates of return generated in the early BWEP treatment areas (Carlson et al.; Ahouissoussi). Others considered how an increased use of Integrated Pest Management (IPM) practices could reduce annual chemical use (White and Wetzstein). Still others have used optimization programs to compare crop-mix and farm-program decisions in Alabama with and without the BWEP (Duffy et al.). But a key concern of producers has not been extensively addressed: the required payback period for having a BWEP in areas with few natural climatic insect controls, i.e. cold temperatures. This study provides some insight on the concern by examining BWEP results in South Georgia.

Analytical Approach

The analysis in this study examined budget estimates of producer program expenditures and selected cotton production costs per acre incurred under the Southeast Boll Weevil Eradication Program in Georgia. Dryland and irrigated systems were evaluated separately for three time periods: Pre-Eradication, 1984-87; Treatment, 1988-93; and Containment, 1994-96. Analysis began with the 1984 crop year in recognition of the higher annual yield level observed in Georgia compared to earlier production years (Figure 1). Insect control cost in this study was defined as total dollars expended for insecticide materials, custom and producer spray applications, and crop scouting services. By calculating a baseline insect control cost over the Pre-Eradication period and subtracting this value from budgeted annual costs during the Treatment period, nominal annual estimates of net cost were obtained under the BWEP. These estimates were then converted to 1987 dollars to determine the required payback periods under irrigated and dryland systems, respectively. Conversion to 1987 dollars is appropriate since Georgia producers voted on BWEP acceptance or rejection during that year. Thus, producers' expectations in 1987 would determine their BWEP voting preferences. Cotton producers in other regions would similarly estimate their annual net benefits and required payback period when considering a BWEP. Georgia estimates of annual on-going insect control savings were obtained by comparing the average Pre-Eradication and Containment (1994-96) budgeted cost levels under each system.

Data Sources

Data for conducting this analysis were taken from publications of the Georgia Agricultural Statistics Service (GASS) and The University of Georgia Cooperative Extension Service (Various issues). Acreage and yield data are actual GASS survey numbers. Total cotton production costs and cotton insect control costs were taken from

annual enterprise production budgets generated by The University of Georgia Cooperative Extension Service. Adjustments of nominal cost values to 1987 dollars utilized the Index of Prices Paid by Farmers, Agricultural Chemicals (United States Department of Agriculture 1993; 1995).

Results

Budgeted Insect Control Costs Per Acre

Georgia budgeted total costs for irrigated and dryland cotton production have essentially remained constant since the early 1980's when considered on a nominal basis (Figures 2 & 3). But insect control costs, as defined in this study, have declined substantially. Dryland cotton budgeted costs have fallen from $94 per acre in the Pre-Eradication period to $67 in the Containment period (Figure 4). Irrigated costs have shown an even larger decrease from $109 in Pre-Eradication to $67 in Containment (Figure 5). This suggests that the BWEP has provided increased net returns for cotton producers, especially in light of the yield/acre increases (Figure 1) and relatively constant total cost levels (Figures 2 & 3).

BWEP Annual Net Differences in Cost

Estimates of annual net differences in insect control cost between the average Pre-Eradication level and subsequent year levels were obtained for all years of the BWEP Treatment and Containment periods. Summing these net differences from 1988 forward, cumulative net cost of the BWEP by year increments was approximated. Cumulative net cost of insect control reached zero for dryland systems in 1993, the sixth year of the BWEP (Figure 6). Zero net cost was reached in 1990 by irrigated systems (Figure 7). Assuming that cost of insect control has now stabilized or continued to decrease, net differences between the Pre-Eradication level and future cost levels would represent minimum annual profits from the BWEP. Adjustment of the net differences to real 1987 dollar terms decreased the total net profits of the BWEP. But zero net costs were still reached in the same calendar years for each production system.

On-going Insect Control Net Savings

The BWEP in Georgia was instituted to reduce cotton pest damage and insecticide costs per acre. If the program has been truly successful, mean insect control costs in the Containment period (1994-96) should be lower than mean costs in the Pre-Eradication period (1984-87). Examination of the data showed Containment period costs to be $27 less than Pre-Eradication costs for dryland cotton systems and $42 less for irrigated systems (Figure 8). Assuming that new pests are not introduced to the cotton production systems or other cost changes occur, the dollar values may be considered annuity benefits from the BWEP.

Summary

Successful implementation of the BWEP in Georgia has produced three notable outcomes with regard to budgeted insect control costs and recovery of the program costs to producers. Insect costs per acre have decreased on both dryland and irrigated acreage with the largest decrease ($42) on irrigated production systems. Nominal costs of the BWEP were fully recovered by cotton producers in year three of the program when growing irrigated cotton and by the sixth program year under dryland systems. Adjustment of net costs and returns under the BWEP to decision year dollars showed that Georgia producer investment in the program was justified.

References

1. Ahouissoussi, Nicolas B. C. 1992. "Economic Returns to the Boll Weevil Eradication Program in Alabama, Florida and Georgia." Unpublished M.S. Thesis, The University of Georgia, Athens, Georgia.

2. Carlson, Gerald A., Glenn Sappie, and Michael Hammig. 1989. *Economic Returns to Boll Weevil Eradication*. Agricultural Economic Report No. 621, USDA-ERS, Washington, D.C., September.

3. Cunningham, G.L. 1995. Boll Weevil Eradication: Status and Future Plans. In *1995 Proceedings Beltwide Cotton Conferences*, National Cotton Council, Memphis, TN, p. 13-14.

4. Duffy, Patricia A., Danny L. Cain, George J. Young, and Michael E. Wetzstein. 1994. "Effects of the Boll Weevil Eradication Program on Alabama Cotton Farms." *Journal of Agribusiness* 12-1 (Spring): 1-14.

5. Georgia Agricultural Statistics Service. 1995. *Georgia Agricultural Facts*. Georgia Department of Agriculture, Athens, Georgia.

6. Grube, A.H. and G.A. Carlson. 1978. *Economic Analysis of Cotton Insect Control in North Carolina*. Department of Economics and Business, North Carolina State University, Economic Report Number 52.

7. Haney, P.B. and W.J. Lewis. "Cotton and the Boll Weevil in Georgia - History, Cost of Control and Benefits of Eradication." Unpublished manuscript. USDA-ARS, CPES, Tifton, Georgia.

8. Parencia, C.R. Jr. 1978. *One Hundred Twenty Years of Research on Cotton Insects in the United States*. U.S.D.A. Agricultural Handbook No. 515.

9. Perkins, J.H. 1980. "Boll Weevil Eradication." *Science* 207(7): 1044-1050.

10. The University of Georgia Cooperative Extension Service. 1979-83. "Crop Enterprise Cost Analysis." Miscellaneous Publication No. 27.

11. The University of Georgia Cooperative Extension Service. 1984-91. "Crop Enterprise Cost Analysis - South Georgia." Miscellaneous Publication No. 27-S.

12. The University of Georgia Cooperative Extension Service. 1992. "Crop Enterprise Cost Analysis - South Georgia." AG ECON 91-010-S.

13. The University of Georgia Cooperative Extension Service. 1993-94. "Crop Enterprise Cost Analysis - South Georgia." AG ECON 91-010-S-Revised.

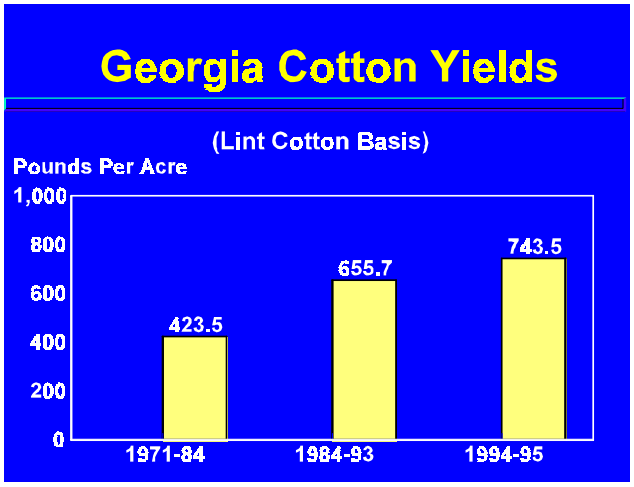
14. The University of Georgia Cooperative Extension Service. 1995-96. "Crop Enterprise Cost Analysis - South Georgia." AG ECON 94-010-S-Revised.

15. United States Department of Agriculture. 1995. *Agricultural Outlook*. Economic Research Service, various issues.

16. United States Department of Agriculture. 1993. *Agricultural Statistics*. U.S. Government Printing Office, Washington, D.C., p 372.

17. White, Fred C. and Michael E. Wetzstein. 1995. "Market Effects of Cotton Integrated Pest Management." *American Journal of Agricultural Economics* 77(August):602-612.

18. Worsham, E.L. (State Entomologist). 1916. *The Mexican Cotton Boll Weevil*. Georgia State Board of Entomology Bulletin 44: 1-22.



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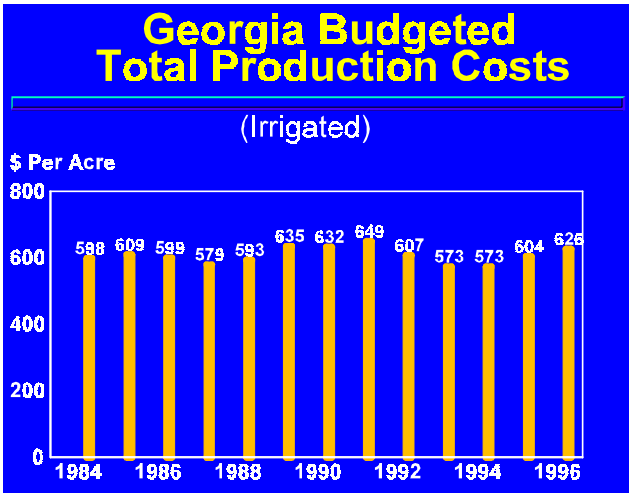

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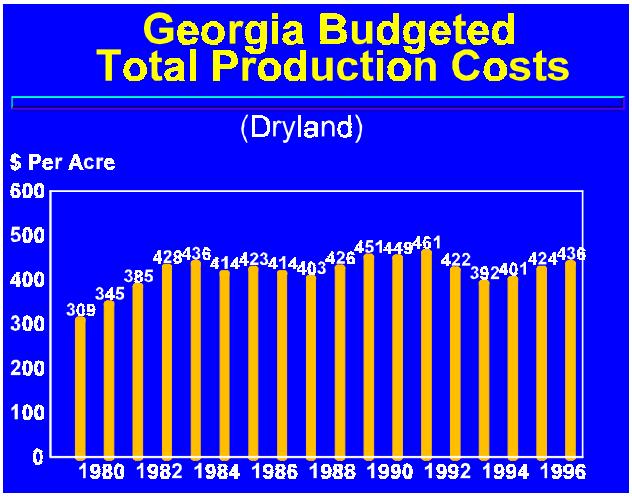

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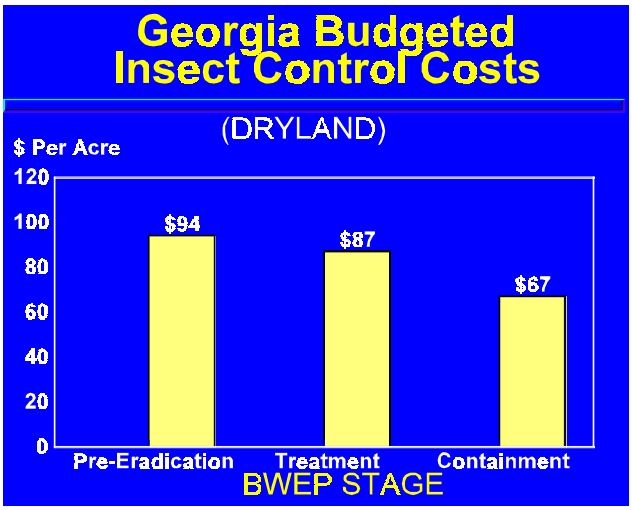

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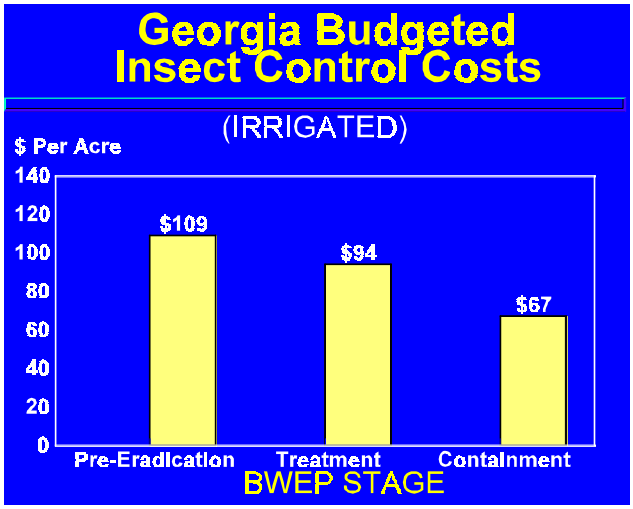

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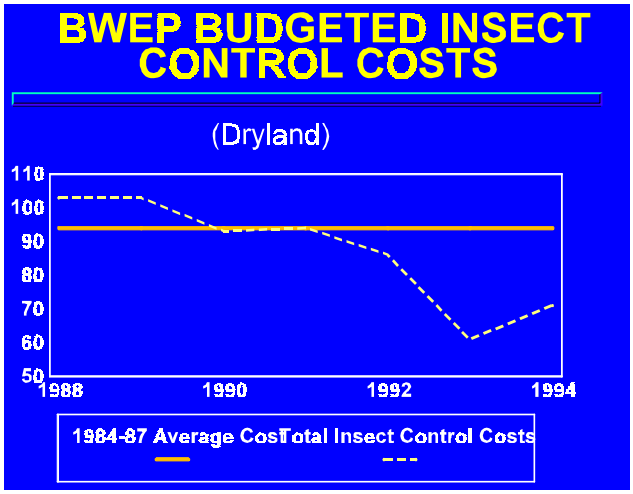

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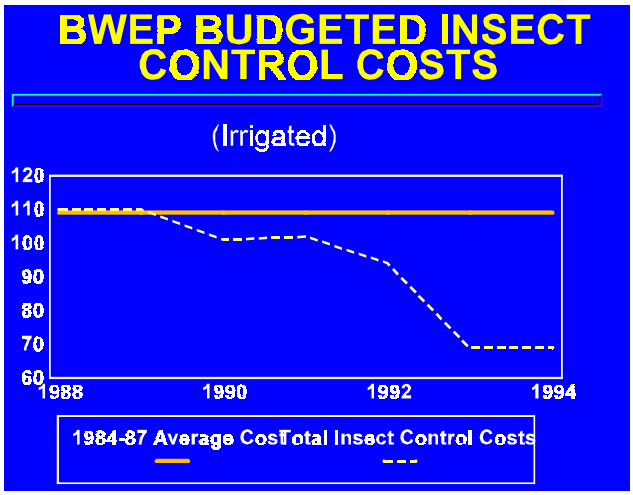

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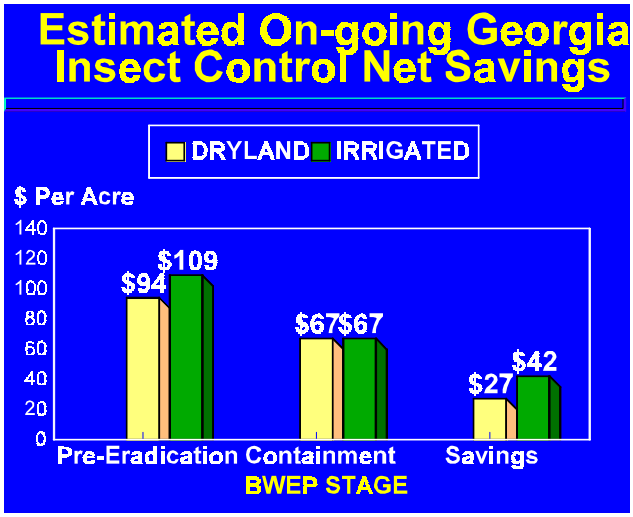

Figure 8.