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Influence of Galecron and Pix on cotton yield

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INTRODUCTION

GALECRON® was first introduced as an ovicide for fruit crops, vegetables, and cotton. In addition, yield enhancement of cotton was reported in the mid-1970's (*6*) and since then other researchers (*2,9*) have reported similar findings. Cotton yield increases ranged from 9 to 28 percent in field studies and as high as 39 percent in a greenhouse study. Galecron rate ranged from 1/8 to 1/2 pound per acre applied 6 to 9 times at weekly intervals, generally beginning at the pin-head square stage. However, reports have also been published that failed to show cotton yield enhancement with Galecron (*1*). Therefore, the primary objective of this study was to determine the usefulness of Galecron as a yield enhancer in a major cotton producing area of Alabama.

A secondary objective was to evaluate the effectiveness and potential need for Pix®. Pix is a foliar-applied chemical which modifies cotton growth and reproduction. It has been shown (*3,5,7,8,10*) to produce one or more of the following effects in cotton: darker leaf color, reduction of internode length, more open canopy, better boll retention, increased yield, increased water-stress resistance, and earlier maturity.

MATERIALS AND METHODS

Field experiments were conducted for 3 years (1980-82) on a Lucedale fine sandy loam (Rhodic Paleudult) at Prattville, Alabama. Cotton, Deltapine 61, was planted with conventional equipment in late April each year, table 1. Plots were 12 rows wide and 25 feet long, with a row width of 42 inches. Lime and fertilizer were applied according to recommendations of

[1]The authors are former Research Associate, Associate Professor, and Professor, respectively, of Agronomy and Soils.

TABLE 1. APPLICATION DATES OF GALECRON AND PIX FOR 1980, 1981, AND 1982

Item	Date		
	1980	1981	1982
Planting	4-25	4-20	4-30
Pix application	7-9	7-15	7-9
Galecron application			
(1st)	6-12	6-18	6-11
(2nd)	6-18	6-25	6-18
(3rd)	6-26	7-1	6-24
(4th)	7-2	7-8	7-1
(5th)	7-8	7-14	7-7
(6th)	7-15	7-20	7-13
Insecticide application			
(1st)	7-28[1]	7-7	7-17
(last)	8-29	9-3	9-3
Harvest			
(1st)	10-8	9-29	9-28
(2nd)	11-5	11-11	11-5

[1]Insecticides for bollworm control only; six applications of Dimilin applied from June 10 to July 14 for boll weevil control.

the Auburn University Soil Testing Laboratory for optimum cotton production. Weed control was achieved by broadcast application of Prowl® (pendimethalin) and Cotoran® (fluometuron) at recommended rates and with cultivation as needed.

Galecron applications were initiated at the pin-head square stage which was approximately 6 to 7 weeks after planting, table 1. The Galecron treatments consisted of two rates (1/8 and 1/4 pound per acre) applied three or six times. Application frequency was on 5- to 7-day intervals, table 1. Pix (0.04 pound per acre) was applied in a single application approximately 10 weeks after planting with and without Galecron, table 1. The Galecron treatments consisted of nine applications in 1980 and six in 1981 and 1982 at a rate of 1/8 pound per acre per application. A no-Galecron/no-Pix control treatment was also included. Treatments were arranged in a randomized complete block design with four replications.

During the growing season, the entire experimental area was scouted regularly and treated for insects when necessary. Insecticides used most frequently and according to recommended rates and label specifications were Dimilin® (diflubenzuron) for boll weevil control, and Ambush® (permethrin), Lannate® (methomyl), and Azodrin® (monocrotophos) primarily as a larvicide and/or ovicide. EPN plus methyl parathion was used for boll weevil and bollworm control. Starting and ending dates for these applications are listed in table 1. These insecticides were applied in an effort to eliminate insects as a variable (*4,6*).

Cotton was machine-harvested twice yearly with a one-row cotton picker, table 1. Eight rows were harvested from each 12-row plot. Data for each harvest were summed to determine total seed cotton yield.

All data were subjected to an analysis of variance and treatment differences were separated at the 0.05 level of probability using Duncan's multiple range test.

RESULTS AND DISCUSSION

First-harvest results showed some seed-cotton yield response to treatments, table 2. The responses were not, however, consistent among years. Six applications of Galecron at 1/4 pound per acre per application in 1980 produced a significant yield increase (21 percent) when compared to the control. This same treatment in 1981 and 1982 showed a trend for higher first-harvest yield (7 to 10 percent), but the response was not statistically significant. Treatments that received three applications of Galecron at 1/4 pound per acre or those receiving three or six applications at 1/8 pound per acre produced first-harvest yield that was no different from the control treatment for all years.

A single application of Pix (no Galecron) significantly reduced (23 percent) first-harvest yield in 1981, but yield was equivalent to the control treatment for the remaining years, table 2. This yield reduction did not occur when Pix was

TABLE 2. INFLUENCE OF GALECRON AND PIX ON 1ST AND 2ND HARVEST OF SEED COTTON, 1980-82

Treatment	Seed cotton yield/acre[1]					
	1980		1981		1982	
	1st harvest	2nd harvest	1st harvest	2nd harvest	1st harvest	2nd harvest
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Galecron						
3 app., ⅛ lb./acre	1,500 b	107 a	1,750 b	902 a	2,044 c	589 a
6 app., ⅛ lb./acre	1,571 b	107 a	1,767 b	1,044 a	2,205 abc	527 a
3 app., ¼ lb./acre	—	—	1,776 b	973 a	2,160 bc	598 a
6 app., ¼ lb./acre	1,732 a	107 a	2,017 a	902 a	2,383 a	553 a
Pix, 1 app., 0.04 lb./acre	1,286 c	125 a	1,410 c	919 a	2,124 c	661 a
Galecron[2], 6 app., ⅛ lb./acre + Pix, 1 app., 0.04 lb./acre	1,500 b	116 a	1,741 b	821 a	2,339 ab	643 a
Control; no Galecron/no Pix	1,428 bc	116 a	1,830 ab	902 ab	2,222 abc	678 a

[1]Means within a column followed by the same letter are not significantly different at the .05 probability level according to DRMT.

[2]Nine applications of Galecron at ⅛ pound per acre per application were made in 1980.

applied to cotton that received six applications of Galecron at 1/8 pound per acre. The Galecron plus Pix treatment produced first-harvest yield equivalent to the control treatment for the remaining 2 years. No differences in second-harvest yield were detected among any Galecron and/or Pix treatments for any year, table 2.

Total seed-cotton yield (first harvest plus second harvest) showed results similar to first-harvest yield data, table 3. Galecron applied six times at 1/4 pound per acre per application produced the highest total yield. Percent increase over the control treatment was 19, 7, and 1 percent for 1980, 1981, and 1982, respectively. Only the 1980 response was significant.

Pix applied alone produced a total seed-cotton yield lower in 1980 (9 percent) and 1981 (15 percent) than the control treatment. Yield in 1983 was equivalent to the control, table 3. Rainfall decreased sharply in 1980 and 1981 after the Pix application, which indicates that dry weather and Pix have at least an additive effect in checking growth of cotton. When Pix was applied to cotton that received six applications of Galecron at 1/8 pound per acre per application, reduction in total seed-cotton yield was prevented in 1980 and partially prevented in 1981. The reason for this is not clear.

In 1981 and 1982, each plot was monitored to determine if Galecron had an effect on bollworm egg populations. In 1981, egg populations were high in early July and decreased rapidly with time, table 4, but there were no differences in egg populations (P = 0.05) among treatments. In 1982, mul-

TABLE 3. TOTAL SEED COTTON YIELD AS INFLUENCED BY VARIOUS RATES AND APPLICATIONS OF GALECRON AND PIX, 1980-82

Treatment	Seed cotton yield/acre[1]		
	1980	1981	1982
	Lb.	*Lb.*	*Lb.*
Galecron			
3 app., ⅛ lb./acre	1,607 b	2,651 ab	2,633 b
6 app., ⅛ lb./acre	1,607 b	2,812 ab	2,731 ab
3 app., ¼ lb./acre	—	2,749 ab	2,758 ab
6 app., ¼ lb./acre	1,839 a	2,919 a	2,937 ab
Pix, 1 app., 0.04 lb./acre	1,410 c	2,330 c	2,785 ab
Galecron[2], 6 app., ⅛ lb./acre + Pix, 1 app., 0.04 lb./acre	1,616 b	2,562 bc	2,981 a
Control; no Galecron, no Pix	1,544 bc	2,731 ab	2,901 ab

[1]Means within a column followed by the same letter are not significantly different at the .05 probability level according to DMRT.

[2]Nine applications of Galecron at ⅛ pound per acre per application were made in 1980.

TABLE 4. INFLUENCE OF GALECRON AND PIX ON THE PRESENCE OF BOLLWORM EGGS IN COTTON, 1981

Treatment	Eggs/100 terminals, by sampling date								
	July					August			
	4	9	16	23	30	6	13	23	27
Galecron	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
3 app., ⅛ lb./acre	36	39	30	15	9	4	2	6	3
6 app., ⅛ lb./acre	35	31	28	9	6	5	2	5	3
3 app., ¼ lb./acre	44	40	32	9	5	4	2	6	2
6 app., ¼ lb./acre	48	32	32	18	5	6	2	6	2
Pix. 1 app., 0.04 lb./acre	34	35	15	18	4	5	2	5	2
Galecron, 6 app., ⅛ lb./acre + Pix, 1 app., 0.04 lb./acre	44	50	32	9	6	4	2	4	1
Control; no Galecron, no Pix	26	46	19	11	11	5	2	6	3

tiple applications of EPN + methyl parathion were applied to control boll weevil infestations, and as a result, bollworm populations were low. These data show that bollworm control was eliminated as a variable.

In this study, Galecron increased cotton yield in 1 of 3 years. It is believed this increase was due to effects other than insect control. However, until conditions are identified that will make it more consistent, the full potential for Galecron as a yield enhancer will not be realized.

Pix (no Galecron) reduced cotton growth but also reduced cotton yield. Pix plus dry weather was probably responsible for detrimental yield effects. When Pix was applied to cotton that received Galecron, most detrimental yield effects were eliminated. Perhaps Galecron could be used as a tool to safeguard cotton yield where producers normally use Pix and are faced with variable weather patterns.

SUMMARY

Field studies were conducted for 3 years to determine the effects of Galecron (chlordimeform) and Pix (mepiquat chloride) on seed-cotton yield. Treatments included three and six applications of Galecron at rates of 1/8 and 1/4 pound per acre per application. The initial treatment was applied at the pin-head square stage, and subsequent applications were at 5- to 7-day intervals. A single application of Pix (0.04 pound per acre) was applied during early bloom with and without six applications of Galecron (1/8 pound per acre per application). Cotton (Deltapine 61) was harvested mechanically twice each year.

Six applications of Galecron at 1/4 pound per acre per

application increased yield of the first harvest in 2 of 3 years when compared to the no-Galecron control, but the other Galecron treatments (reduced rate or number of applications) did not affect yield. No differences in second-harvest yield were found among any treatments for any year. Total seed-cotton yield was increased by Galecron (1/4 pound per acre, six applications) in 1 of 3 years, but the other Galecron treatments (reduced rate or number) did not affect total yield.

Pix alone reduced first-harvest yield in 1 year and total seed-cotton yield in 2 years, and failed to increase seed-cotton yield in any year. Yield with the Pix + Galecron treatment did not differ from the no-Galecron check. However, the Pix + Galecron treatment increased total yield over that of Pix alone in 1 of 3 years.

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