

## Chemical Termination of Cotton Fruiting for Insect Reduction

D. L. Kittock, T. J. Henneberry, and L. A. Bariola

We are reporting data from four tests in 1978 on chemical termination at the University of Arizona Cotton Research Center in Phoenix. The tests were randomized blocks with four replications. Plots were four rows by 40 feet with the center two rows used for yield and immature boll counts. The plant growth regulators used in these tests are: TD-1123, an experimental plant growth regulator from Pennwalt Corporation; chlormequat, which is marketed by American Cyanamid under the label "Cycocel" (also known as CCC); and dicamba (Banvel), silvex, and 2,4-D which are common herbicides.

Two tests having the four most successful chemical termination treatments were established, one on Stoneville 731N cotton (Table 1) and one on Pima S-5 (Table 2). Treatments had essentially no effect on lint yield of Stoneville 731N, but did reduce yield of Pima S-5 from 5 to 10%. The difference between 731N and S-5 could be due to more late bolls on S-5 and later harvest of S-5. All treatments significantly reduced immature bolls in both tests. TD-1123 more effectively reduced immature bolls on 731N than the other three plant growth regulators. We believe the reason for this response is late application of dicamba, silvex, and 2,4-D. In contrast, in the test on Pima S-5, dicamba, silvex, and 2,4-D more effectively reduced immature bolls than on 731N, apparently as result of a later immature boll count. TD-1123 was much less effective on Pima than Stoneville cotton. This is consistent with past results. Apparently TD-1123 is not suitable for use on Pima cotton for chemical termination.

The defruiting efficiency index (DE index) is a method for overall evaluation of plant growth regulators for chemical termination. The DE index consists of lint yield reduction (% of check) plus immature bolls (% of check). DE index of 10 to 15 is about as good as usually can be obtained.

Pink bollworms in immature bolls in November are 90 to 95% in diapause (overwintering state) and constitute about 60% of the total overwintering larvae. Most of the remaining larvae are in the soil, with a few in mummified bolls or seed cotton on the ground. As can be seen in Tables 1 and 2, all treatments reduced diapausal larvae.

Treatments had little effect on gin turnout, lint % or trash %.

We have consistently shown over the last nine years that the better chemical termination treatments will reduce diapausal pink bollworms in the fall by 90% or better. Limited data have shown a reduction in emerging pink bollworm moths in the spring, though the reduction was less. In order to prove or disprove chemical termination as a commercial concept, we need to test it on large acreages to overcome the effect of pink bollworm migration. This, in turn, requires registration of a suitable treatment. It has become obvious that obtaining registration of a single plant growth regulator is difficult and registration of a mixture of two plant growth regulators is doubly difficult. Therefore, we compared three single plant growth regulators with mixtures in 1978 to see if the single plant growth regulator would give adequate control of immature bolls and pink bollworms.

Comparison of three plant growth regulators, alone and in mixture (Table 3), shows mixtures to be superior for all when comparing DE index. Results on pink bollworms were less consistent. It is our conclusion that single plant growth regulators are adequate for chemical termination, though a second application may be needed in some cases.

Application rates of dicamba and silvex used alone had not been tested. Therefore, in 1978 each was tested at three application rates (Table 4). The results are inconclusive, though the highest rate appears to have reduced yields.

Table 1. Effects of four promising chemical termination treatments applied to four replications of Stoneville 731N cotton on lint yield (11-1-78), immature bolls (11-16-78), late season pink bollworms in bolls, and certain indices of seed and fiber quality at U of A, CRC, Phoenix, Arizona.

PGR	Application rates			Lint yield Lbs/acre	Immature bolls No./acre	DE index	Pink bollworms in immature bolls (11-2) No./acre	Gin turnout	Lint	Trash
	Lb ai/acre									
1. Check				1231	18,985 a <sup>1/</sup>	100	2,492 a	32.9	36.2	9.0
2. TD-1123 @ 1.0 + chlormequat	@ 0.5 <sup>2/</sup>	@ "	@ "	1238	545 b	2	12 b	33.5	36.5	8.2
3. Dicamba @ 0.05+	"	@ "	@ "	1227	3,485 b	19	342 b	33.0	36.2	9.0
4. Silvex @ 0.05+	"	@ "	@ "	1241	4,465 b	23	1,046 b	33.1	36.7	9.7
5. 2,4-D @ 0.025+	"	@ "	@ "	1169	3,521 b	24	744 b	32.4	36.3	10.6
C.V.				4%	56%			2%	1%	13%

<sup>1/</sup> Means within a group differ significantly at the 5-percent level, according to Duncan's multiple range test, if not followed by the same letter. Means of columns having a C.V. but no letter are not significantly different at the 5-percent level by the F test.

<sup>2/</sup> Treated on September 18, 1978.

<sup>3/</sup> Treated on September 1, 1978.

Table 2. Effects of four promising chemical termination treatments applied to four replications of Pima S-5 cotton on lint yield (11-22-78), immature bolls (11-28-78), late season pink bollworms in bolls, and certain other indices of seed and fiber quality at U of A, CRC, Phoenix, Arizona.

PGR	Application rates			Lint yield Lbs/acre	Immature bolls No./acre	DE index	Pink bollworms in immature bolls (11-28) No./acre	Gin turnout	Lint	Trash
	Lb ai/acre									
1. Check				643	101,822 a <sup>1/</sup>	100	9,829 a	33.4	36.8	9.3
2. TD-1123 @ 1.0 + chlormequat	@ 0.5 <sup>2/</sup>	@ "	@ "	566	44,540 b	56	4,893 ab	33.1	36.5	9.4
3. Dicamba @ 0.05+	"	@ "	@ "	610	6,244 c	11	1,081 b	33.2	36.6	9.3
4. Silvex @ 0.05+	"	@ "	@ "	613	7,115 c	12	1,289 b	32.8	36.8	10.7
5. 2,4-D @ 0.025+	"	@ "	@ "	581	5,082 c	15	273 b	32.9	37.0	11.2
C.V.				15%	43%			3%	2%	21%

<sup>1/</sup> Means within a group differ significantly at the 5-percent level, according to Duncan's multiple range test, if not followed by the same letter. Means of columns having a C.V. but no letter are not significantly different at the 5-percent level by the F test.

<sup>2/</sup> Treated on September 18, 1978.

<sup>3/</sup> Treated on September 1, 1978.

Table 3. Comparison of effects of three plant growth regulators applied alone and in mixture with chlormequat (CCC) for chemical termination of Stoneville 731N cotton in four replications on lint yield (11-1-78), immature bolls (11-16-78), late season pink bollworms in bolls, and certain indices of seed and fiber quality at U of A, CRC, Phoenix, Arizona.

PGR	Application rates		Lint yield	Immature bolls	DE index	Pink bollworms in immature bolls (11-2)	Gin turnout	Lint	Trash
	Lb ai/acre								
1. Check			1401	17,714 a <sup>1/</sup>	100	4,184 a	34.2	37.2	8.1
2. TD-1123 @ 1.0 <sup>2/</sup>			1307	617 b	10	32 b	33.6	36.9	8.8
3. TD-1123 @ 1.0 + chlormequat @ 0.5 <sup>2/</sup>			1325	109 b	6	0 b	33.7	36.9	8.8
4. Dicamba @ 0.05			1278	3,775 b	30	325 b	33.5	36.5	8.1
5. " @ " + " @ " <sup>3/</sup>			1318	2,505 b	20	305 b	33.5	36.8	9.0
6. Silvex @ " <sup>3/</sup>			1285	4,392 b	33	161 b	33.8	37.2	9.2
7. " @ " + " @ " <sup>3/</sup>			1267	1,670 b	19	494 b	33.2	36.5	9.1
C.V.			5%	61%			1%	1%	9%

<sup>1/</sup> Means within a group differ significantly at the 5-percent level, according to Duncan's multiple range test, if not followed by the same letter. Means of columns having a C.V. but no letter are not significantly different at the 5-percent level by the F test.

<sup>2/</sup> Treated on September 18, 1978.

<sup>3/</sup> Treated on September 1, 1978.

Table 4. Effects of different rates of application of dicamba and silvex applied to four replications of Stoneville 731N cotton on September 5, 1978 for chemical termination on lint yield (11-1-78), immature bolls (11-17-78), late season pink bollworms in bolls, and certain indices of seed and fiber quality at U of A, CRC, Phoenix, Arizona.

PGR	Application rates		Lint yield	Immature bolls	DE index	Pink bollworms in immature bolls (11-2)	Gin turnout	Lint	Trash
	Lb ai/acre								
1. Check			1292	25,011 a <sup>1/</sup>	100	8,078 a	33.6	37.0	9.5
2. Dicamba @ 0.050			1292	3,594 b	14	321 b	33.8	37.3	9.5
3. " @ 0.075			1223	8,821 b	41	597 b	33.2	36.7	9.5
4. " @ 0.100			1202	7,369 b	37	208 b	33.4	36.9	9.4
5. Silvex @ 0.050			1271	2,069 b	10	312 b	33.1	36.9	10.5
6. " @ 0.075			1274	3,194 b	14	362 b	33.5	37.2	10.1
7. " @ 0.100			1154	980 b	15	55 b	33.2	37.2	11.4
C.V.			10%	82%			2%	1%	17%

<sup>1/</sup> Means within a group differ significantly at the 5-percent level, according to Duncan's multiple range test, if not followed by the same letter. Means of columns having a C.V. but no letter are not significantly different at the 5-percent level by the F test.