

EFFECT OF LINTPLUS APPLIED AT 30% OPEN BOLLS ON HARVEST TIMING, YIELD, AND LINT QUALITY

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Abstract

Lintplus (dimethipin) plant growth regulator was applied to cotton at 30% open bolls in large field demonstrations in the mid-south and southeast in 2003 to evaluate its impact on harvest timing, yield and lint quality, especially micronaire. Targeted fields were with growers that normally would make two defoliation applications and cotton varieties which trend to high micronaire. Treatments were applied in split plot trials on varieties in TX, LA, AR, MS, AL, & GA. Harvest timing data was obtained from 12 trials, with 7 of them indicating earlier harvest after Lintplus applications ranging from 2 – 3 days to 23 days with an average of 9.5 days. With the excellent conditions for defoliation in the 2003 season, Lintplus showed varying degrees of activity on defoliation 7 – 14 days after application. At 5-10 DAT (Days After Treatment), defoliation ranged from 20 – 80%. Yield differences between Lintplus and non-Lintplus (grower standard) treated fields ranged from -6.1% to +2.6% of yield, except for one trial that had an increase of 297 lb/A yield, or +39.7% over the grower standard, in the Lintplus treated plot. This MS location was applied to evaluate Lintplus as an aid in reducing a boll rot problem, and the final results were very positive. Overall, yield data from these trials showed no negative impact from Lintplus applications. Evaluation of Lintplus effects on micronaire were mixed with approximately 50% of the field locations showing reductions in micronaire, between 0.1 and 0.6 units. These demonstrations support past research and field use data that Lintplus can help growers schedule harvest, potentially reduce boll rot and micronaire depending on variety and crop conditions.

Introduction

Lintplus (dimethipin) is a plant growth regulator whose mode of action blocks protein production. Without protein regeneration, integrity of cell wall structure collapses and fine cracks appear on leaf surfaces. This leads to excessive water loss, a metabolic signal for senescence and natural dry down of leaves, and increased maturation of bolls and lint. Lintplus is labeled as a harvest growth regulant and maturation agent. It is formulated to enhance plant uptake and maximize dimethipin activity. As a maturation agent, Lintplus is applied @ 20 fluid ounces per acre at 30% open bolls, followed by a standard program at 60 – 70% open bolls for defoliation and desiccation. Lintplus does not require high temperatures to perform, is effective on Pima and conventional cotton, and does not require any additives or surfactants during application unless drift control is desired. Lintplus should be applied in sufficient volume to allow optimal plant coverage and penetration of leaf surface. The label requires a minimum of 2 gallons of spray solution per acre with aerial application, and 10 – 20 gallons per acre for ground application.

Research results conducted by Boman et al (1998) showed effects of early and normal applications (i.e. 10%, 30%, and 60% open bolls) of harvest aids including Lintplus on yield and quality of lint and seed. Lintplus showed no impact on cotton yields at 30% open boll stage, and only limited yield impact at 10% in upland cotton grown in the High Plains of Texas. Lintplus provided enhanced activity of following defoliant and desiccants, enhanced harvest in late cotton, improved yields when applied before early freeze, and improved harvest timing.

Lintplus applications at 30% open bolls are designed to: promote plant senescence; accelerate loss of moisture from bolls and other plant tissues; and cause partial defoliation. During this process, immature harvestable bolls will continue to develop, at a reduced rate, due to continuing formation of photosynthate in leaves, bracts, boll walls, and transfer of carbohydrates from leaves to seed and lint. Potential benefits include: reduction of moisture levels in the bolls, which will reduce potential of freeze damage; partial defoliation, which allows better penetration and effectiveness of sequential harvest aid treatments and earlier harvest or scheduling of harvest; and reduced micronaire.

Demonstration trials were targeted in the Mid-South cotton growing areas where growers typically apply sequential harvest aid treatments and favor practices that advance harvest. (Supak 2002).

Discussion

Lintplus demonstration trials were conducted across the mid-south and southeast cotton belt during 2003. Lintplus @ 20 fluid ounces per acre was applied at the 30% open boll stage in split block fields and then both plots were defoliated at the normal timing (60 to 70% bolls open) with the grower's standard defoliation program, using the available equipment, ground rigs or airplanes. Trials were to be harvested when ready to pick, but some locations were not harvested until both plots were ready. Data from 12 trials are presented here. Defoliation in Lintplus trials ranged from 20 – 80% at 5-10 days after treatment (DAT), and from 86 – 100% at 5-11 days after the sequential defoliant treatment. Ratings in the Wharton, TX trial showed Lintplus at 98% defoliated in the lower canopy and 70% in the upper canopy at 13 DAT with 97% open bolls compared with the check at 0 defoliation and 35% open bolls. The Lintplus plot was harvested 12 days earlier than the grower standard treatment. A location at Daemon, TX was similar, with the Lintplus treatment at 95% defoliation in the lower canopy and 65% in the upper canopy with 92% open bolls at 14 DAT compared with the check at 0 defoliation and 40% open bolls. An early season trial at Leland, MS applied in late August to cotton with a boll rot problem was picked 9 days sooner than the check and resulted in a higher final yield (+297 lbs/A) than the check plot. Yield differences between Lintplus treated and non-treated fields ranged from –51 to +22 lb of lint/A, or –6.1 to +2.6%, excluding the one MS location (+297 lbs.). Overall, this data showed that yields were similar when using Lintplus @ 30% open bolls followed by defoliants compared with defoliants applied at the normal 60 – 70% open boll timing.

Fiber quality obtained from the trials showed mixed results with 5 trials showing slight to no difference in micronaire, while 6 trials showed lower micronaire in Lintplus treated plots, ranging from 0.2 – 0.6 units lower than in the standard treatment. The average in Lintplus plots with positive effect (lower mic) was 0.37. The varieties included in these trials included PM 1218 B/R, DP 493, FM 989 B/R, DP 555 B/R, and DP 436.

Data from these demonstrations support use of Lintplus in scheduling or advancing cotton harvest without impacting yield, potentially reducing losses due to boll rot, and potentially reducing micronaire depending on variety and crop conditions.

In summary, grower demonstration trials conducted in 2003 showed that Lintplus can be used to help schedule or advance harvest when applied at the 30% open boll stage while not adversely impacting yield. Effects on fiber quality showed variable results with micronaire lowered in approximately 50% of field locations. Limited data suggests that Lintplus can be used to help reduce impact of boll rot in cotton on yield.

References

Boman, R., Kelley, M., and Hopper, N. 1998. 1998 High Plains harvest-aid application timing studies. Texas Agricultural Experiment Service. College Station, TX

Supak, J. R., Supak. 2002. Advancing The Lintplus System (Unpublished) Crop Consulting Services, Bryan, TX.

Table 1. Yield and Micronaire in 12 large plot field trials with Lintplus in AL, AR, GA, LA, MS, and TX in 2003.

Location	Lint Yield (lb/A)			Micronaire		
	Lintplus plot	Standard treatment	Δ	Lintplus plot	Standard treatment	Δ
1. Shorter, AL	-	-	-	4.4	4.9	-0.5
2. Marion, AR	895	902	-7	5.0	5.1	-0.1
3. Scott, AR	1048	1041	+7	4.5	4.6	-0.1
4. Tillar, AR #1	1128	1106	+22	5.2	5.2	0.0
5. Tillar, AR #2	1096	1118	-22	5.1	5.0	-0.1
6. Cochran, GA	1346	1329	+17	-	-	-
7. Catahoula Parish, LA	1162	1188	-26	4.7	4.9	-0.2
8. Concordia Parish, LA	784	835	-51	4.3	4.9	-0.6
9. Leland, MS	1046	749	+297	4.8	5.2	-0.4
10. Senatobia, MS	755	736	+19	4.9	4.9	0.0
11. Daemon, TX	-	-	-	4.6	4.8	-0.2
12. Wharton, TX	-	-	-	4.4	4.7	-0.3

Table 2. Harvest timing in 12 large plot field trials with Lintplus in AL, AR, GA, LA, MS, and TX in 2003.

Location	Harvest timing
1. Shorter, AL	Lintplus plot could have been harvested 1 week earlier
2. Marion, AR	Both plots were harvested at the same day, however the Lintplus one could have been harvested 2-3 days earlier
3. Scott, AR	Both plots harvested at the same day
4. Tillar, AR #1	Lintplus plot harvested 15 days earlier
5. Tillar, AR #2	Both plots harvested at the same day
6. Cochran, GA	Lintplus plot harvested 10 days earlier
7. Catahoula Parish, LA	Both plots harvested at the same day
8. Concordia Parish, LA	Both plots harvested at the same day
9. Leland, MS	Lintplus plot harvested 9 days earlier
10. Senatobia, MS	Both plots harvested at the same day. % open bolls in Lintplus plot higher than in the standard at harvest time.
11. Daemon, TX	Lintplus plot could have been harvested 23 days earlier
12. Wharton, TX	Lintplus plot could have been harvested 12 days earlier

Table 3. Defoliation and Boll Opening in 12 large plot field trials with Lintplus in AL, AR, GA, LA, MS, and TX in 2003.

Location	% Defoliation				% Open Bolls			
	5-10 days after Lintplus		5-11 days after grower standard		5-10 days after Lintplus		5-11 days after grower standard	
	Lintplus plot	Standard treat	Lintplus plot	Standard treat	Lintplus plot	Standard treat	Lintplus plot	Standard treat
1. Shorter, AL	20	0	100	95	30	30	100	90
2. Marion, AR	-	-	86	54	-	-	76	54
3. Scott, AR	20	0	95	85	50	50	90	90
4. Tillar, AR #1	50	10	-	-	50	40	-	-
5. Tillar, AR #2	20	20	-	-	30	30	-	-
6. Cochran, GA	80	0	-	-	-	-	-	-
7. Catahoula Parish, LA	-	-	-	-	-	-	-	-
8. Concordia Parish, LA	-	-	-	-	-	-	-	-
9. Leland, MS	56	0	-	-	68	61	-	-
10. Senatobia, MS	62	16	96	82	55	48	94	78
11. Daemon, TX	18/85 ¹	0/0 ¹	-	-	75	35	-	-
12. Wharton, TX	45/80 ¹	0/0 ¹	-	-	80	30	-	-

¹ Defoliation in the upper canopy/lower canopy

Table 4. Boll Rot in a large plot field trial with Lintplus in Leland, MS in 2003.

Location	% Boll Rot at 19 days after Lintplus ¹	
	Lintplus plot	Standard treat
9. Leland, MS	7.3	17.0

¹ 7 days after application of defoliants in both fields