Photos of the same cotton boll taken once a day for seven days show the accelerated ripening process of cotton treated with ethephon. (Photos courtesy of Hartt Porteous.)

Ethephon may hasten cotton boll opening, increase yield

Bill L. Weir □ J. M. Gaggero

Ethephon (Ethrel) has traditionally been used to hasten the ripening of fruits and nuts, such as tomatoes, melons, and walnuts. These studies show that it also causes a boll-opening response in cotton, especially when the crop has been planted late and is maturing slowly. Three studies conducted in 1980 and 1981 showed increased lint yields from the treatments and also showed that it is important to apply ethephon when the crop has approximately 50 percent open bolls and not more than 10 percent immature bolls.

Test applications

In September of each year, we selected Acala SJ-2 cotton fields that might benefit from an ethephon application. Boll counts were made by sampling ten plants from each of four random areas in the field. Fruit from these plants was separated into three categories: open, mature, and immature bolls. Any boll that had white lint showing through the bracts was considered open. We differentiated between mature and immature bolls by attempting to cut them with a sharp knife. (Mature bolls resist cutting; immature bolls are easily cut through.)

Boll counts were made two or three weeks before ethephon application to determine if the field was late maturing and to pinpoint a precise application date. The counts were made at weekly intervals until there were no more than 10 percent immature bolls. Application of ethephon at this time will cause mature bolls to open within one to two weeks, but immature bolls will cease development or fall off the plant.

In the 1980 test and one of the 1981 tests, ethephon was applied by fixed-wing aircraft; in the other 1981 test, a helicopter was used. In all tests, each treatment consisted of a strip 30 rows wide and the length of the field. Treatments were: none, 2 quarts, and 3 quarts of ethephon per acre. Each treatment was replicated four times.

Boll opening and yields

Weekly boll counts continued for up to four weeks after application. On October 2, one week after the 2-quart rate had been applied, test field 3 (1981) had 51 percent open bolls, compared with only 22 percent for control plots. The plot receiving 3 quarts was essentially the same as the control, since the application had been made the day before.

One week later (October 8), both the 2- and 3-quart plots had larger percentages of open bolls than did the controls. On October 26, 73 percent of the bolls were open in both ethephon treatments, compared with 47 percent in the untreated check. These counts remained constant through the last count on November 10.

In all three tests, ethephon treatments increased first-pick lint yields by 202, 119, and 137 pounds per acre at the 2-quart rate (tests 1, 2, and 3, respectively) and 211 pounds per acre at the 3-quart rate (test 3), when compared with the controls (see table).

Conclusions

Greatest benefits would be realized from ethephon during a year of adverse weather conditions. The northernmost part of the cotton-growing area of the San Joaquin Valley often has late rains in the spring that delay planting, and early rains and fog in the fall that hamper maturation and harvesting. When not enough heat units are accumulated during the growing season, ethephon can be applied to hasten boll opening. The grower can make boll counts to decide whether ethephon is needed and, if so, to determine the best time for application.

Bill L. Weir is soils and field crops Farm Advisor, Cooperative Extension, Merced County, Merced, and J.M. Gaggero is Field Development Representative, Union Carbide Company, Citrus Heights, California.

Cotton on right received two-quart ethephon rate three weeks before photo was taken. Rows on left with fewer open bolls are untreated control.

Lint cotton yields as affected by ethephon application in three tests, Acala SJ-2

Ethephon treatment	Lint cotton per acre	Bales per acre	Increase per acre
	lb		*lb*
Test #1, 1980			
Untreated check	882*	1.76	. . .
2 qt/acre	1,084	2.17	202
LSD (0.05)	111	. . .	. . .
CV%	5.02	. . .	. . .
Test #2, 1981			
Untreated check	867	1.73	. . .
2 qt/acre	986	1.92	119
LSD (0.05)	NS	. . .	. . .
CV%	1.02	. . .	. . .
Test #3, 1981			
Untreated check	665*	1.33	. . .
2 qt/acre	802	1.60	137
3 qt/acre	876	1.75	211
LSD (0.05)	69.09	. . .	. . .
CV%	5.28	. . .	. . .

*Significant at the 0.05 level.