Cycocel: Effect of CCC (2-chloroethyl-ammonium chloride) on Cotton Heights and Yields in Honduras

H. N. Howell, Jr. (1) and H. G. Díaz Escoto (2)

The plant growth retardant CCC, (2-chloroethyl-trimethyl-ammonium chloride) (Thompson, 1965), since its development in 1960 (Cathey, 1964), was discovered to have several desirable effects when applied to commercial crops. It has been used commercially to initiate and regulate flowering in chrysanthemums, olilies, and poinsettias and was registered commercially for thoses uses by 1964 (ibid). Tolbert (1960) and Humphries (1968) reported its ability to reduce internode length in wheat and thus prevent lodging. The same effect along with increased tillering was reported by Bokari and Youngner in 1971. Although its effect on the plant indicates it to be an antilog of gibberellic acid, CCC is actually an antimetabolite that inhibits the action of gibberellins (Lockhart, 1962).

In 1973 American Cyanamide Co. began the introduction into Honduras of a commercial form of CCC, Cycocel 10A(R), with recommendations for is use in cotton. Through personal communications it was reported to us that several demonstration applications in commercial cotton fields had been made in Guatemala and Nicaragua with resulting yield increases. However, we could not find any data from controlled experiments on cotton. Since CCC controls flowering dates in some floral crops and has demonstrate its ability to initiate early flowering, set more fruit, and reduce internodal length in other field crops (Tolbert, 1960; Cathey, 1964; and Bokari and Youngner, 1971), we decided to observe its effects on cotton in an informal field plot and then later incorporate CCC into formal experiments.

Our interest was twofold: firstly, to reduce plant height to allow better penetration of insecticide applications and

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(1) Professor of Entomology, Escuela Agrícola Panamericana, El Zamorano, Honduras; formerly Entomologist, Cooperativa Agropecuaria Algodonera del Sur, Ltda., Tegucigalpa, Honduras.

(2) Agronomist, Cooperativa Agropecuaria Algodonera del Sur, Ltda., Tegucigalpa, Honduras.

secondly, to increase yield at normal planting densities .... (32,000 to 48,000 plants/ha).

Materials and methods: In August, 1974, formal experimental field plots were designed to measure quantitatively the effect of CCC on the yield of seed cotton and on plant height. A twice replicated 4 x 4 Latin Square design was chosen. The treatments planned were 50 gm CCC/ha and 70 gm CCC/ha, the minimum and maximum application rates recommended by American Cyanamide for the use of Cycocel 10(R) in cotton. Two ages were chosen: at squaring and at peak flowering. Two locations were chosen for the replications: the regional experimental station of the Ministry of Agriculture located at the National Agriculture School (ENA) in Catacamas, Department of Olancho and on the land of a cooperating cotton producer located near the village of Chilapa, 5 kilometers east of Catacamas. The treatment units were 4 rows, 20 m. long. Due to limited space, surrounding cotton was used as a control. The cotton variety planted was CONAL (Nicaraguan selection of Stoneville 213). The first application at ENA was made 40 days after germination and the second, 80 days after germination. At Chilapa the first application was made 52 days after germination (later than first square due to inclement weather) and the second, 80 days after germination. The cotton was picked by hand once at ENA on 28 Jan 1975 and twice at Chilapa on 3 and 10 Feb 1975.

Results: Seven days after the application of CCC the leaves became darker green and more rigid. Later the leaves took on a reddish tinge. The internodal distance in the earlier applications was reduced to about 50% of the internodal distance of the check.

There was a significant difference in plant heights between the treatments and the check with the check being the taller. There was also a significant difference between the treatment dates. The earlier application date produced the shorter plants. There was no difference between the 2 application rates (Table I). The later application dates had significantly higher yields than either the check or the earlier application dates. The only difference between rates of application was noted in the earlier date; the higher rate had a lower yield than the lower rate which was equal to the check. (Table II).

We have not made any positive recommendations for our cotton producers concerning the use of CCC. We have seen results from Nicaragua that show a great disparity of results in experimental plots using CCC. We do not feel that there

is sufficient information to warrant the use of CCC except perhaps the planting on narrower-rows and using the earliest application dates to limit growth drastically.

TABLE I

Treatment	Height in cm.	
70 gm CCC/ha at 52 days	110.00	a
50 gm CCC/ha at 52 days	112.75	a
70 gm CCC/ha at 80 days	125.50	b
50 gm CCC/ha at 80 days	133.25	b
Check (no CCC applied)	147.00	c

TABLE II

Treatment	Yield n Kg/ha of Seed Cotton	
70 gm CCC/ha at 52 days	1196.92	a
50 gm CCC/ha at 52 days	1503.66	b
Check (no CCC applied)	1565.46	b
70 gm CCC/ha at 80 days	2197.66	c
50 gm CCC/ha at 80 days	2284.97	c

Means followed by the same letter are not significantly different at the 0.01 level.

ABSTRACT

The plant growth retardant, CCC, was applied to upland cotton at the rate of 50 and 70 gm AI/ha. on 2 different dates. The later applications raised yields. All applications reduced plant heights.

LITERATURE CITED

BOKARI, U. G. and YOUNGNER, V. B.: "Effects of CCC on Tillering and Flowering in Uniculm Barley," Crop Sci. 11(5): 711-713. 1971.

CATHEY, H. M.: "Physiology of Growth Retarding Chemicals", Ann. Rev. of Plant Physio. 15:271-302. 1964.

HUMPHRIES, E. C.: "CCC and Cereals," Field Crop Abs. 21: 91-99. 1968.

LOCKHART, J. A.: "Kinetic Studies of Certain Anti-Gibberellns," Plant Physio. 37(6): 759-764. 1962.

THOMPSON, W. T.: Agricultural Chemical Book III, Miscelaneous Chemicals. Davis, Cal. Simmons Publ. 1965.

TOLBERT, N. E.: "(2-chloroethyl-trimethyl-ammonium chloride) and Related Compounds as Plant Growth Substances, II Effect on Growth of Wheat," Plant Physio. 35: 380-385. 1960.