NUTRIENT MANAGEMENT PROGRAMS FOR COTTON GROWERS IN THE TEXAS COASTAL PLAIN: PETIOLE TESTING.

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Abstract

Growers benefit from the information obtained from petiole tests. A sound basic soil fertility program combined with petiole analyses should provide a means to limit excess fertilizer inputs while obtaining maximum economic yield. Field demonstrations were set up to determine how well current petiole recommendations apply to growers in the Texas Coastal Plain. Lint yield was increased by foliar N in two of the five field demonstrations, indicating that further tests are needed to determine any adjustments in recommendations that may be needed.

Introduction

Nutrient management for cotton (*Gossypium* spp.) should provide maximum economic yields for producers with the least environmental impact. A sound basic soil fertility program combined with petiole analyses should provide a means to limit excess fertilizer inputs while obtaining maximum economic yield.

Cotton petiole testing at the Wharton County Junior College Soil and Forage Testing Laboratory began in 1993 as a service to local growers. The objective of this work was to see how current petiole recommendations are adapted to the Texas Coastal Plain.

Materials and Methods

Dryland and irrigated plots were located in cooperating farmers' fields in Wharton County and surrounding counties in 1993, 1994, and 1995 to obtain data over a range of environmental conditions found in the Texas Coastal Plain. In addition, growers from Wharton, Fort Bend, Matagorda, Nueces, Brazoria, Austin and Jackson counties have submitted petioles. Treatments in grower fields were 1.) Check: no supplemental fertilizer applied, and 2.) Program: supplemental fertilizer applied as recommended by the petiole test. Plots were 16 to 24 rows wide. Nutrient recommendations were made based upon levels of nitrate-N, P and K found in the cotton petioles submitted weekly for testing, the fertilizer history of the crop, and recent insect, fruiting and soil moisture conditions.

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In 1995, plant samples were collected from plots bi-weekly, beginning at first bloom. Two one-meter samples were collected in each plot, and six plants from each one meter sample were plant mapped to observe differences in fruiting (Landivar, 1991). Each plant sample was then separated into leaf, stem and fruit tissue, oven dried and weighed to determine plant dry matter.

Results and Discussion

Foliar application of nitrogen on fields determined to be deficient in nitrate-nitrogen resulted in increased petiole nitrate concentration the following week.

Lint yield of cooperating fields ranged from 320 to 740 pounds per acre in 1993 due to a wet spring and summer drought. These yields were similar to slightly higher than the 1993 county average lint yield in the area (Table 1). Some fields were abandoned as a result of the weather, so that later season petiole samples and final lint yield were not available in 1993.

In 1994, one to three applications of supplemental nitrogen were made on cooperating fields, while 1 to 7 recommendations for foliar N were made (due to timeliness of application, or the growers decision not to apply). Lint yield of cooperating fields ranged from 600 to 1000 pounds per acre for dryland and from 920 to 1200 pounds per acre for irrigated plots. These yields reflect a normal planting date compared to a wet spring in 1993, timely in-season rainfall, and avoidance (in our test fields) of late season rains. Each Check plot received 115 pounds N and no foliar or side-dressed N in 1994. The Pivot Program plot received 115 pounds N plus 4.5# foliar in one application. The Road and House Program plots received 115 pounds N plus 12.5# foliar in three applications. All three fields were irrigated. Little or no increase in lint yield was observed in plots that received in-season fertilizer (side-dressed or foliar applied) in 1994 (Table 2).

Deficiencies of phosphorous or potassium were not observed in samples tested in 1993 or 1994. In 1995, petiole potassium tested as low as 0.14 percent on petioles from fields suffering severe potassium deficiency (5-6 weeks after first bloom stage).

In 1995, one to four applications of supplemental nitrogen were made on cooperating fields, while 2 to 7 recommendations for foliar N were made (due to timeliness of application, or the growers decision not to apply). Lint yield of cooperating fields ranged from 650 to 1050 pounds per acre for dryland and from 850 to 1150 pounds per acre for irrigated plots. These yields reflect a normal planting date and timely in-season rainfall. The House Program plot (irrigated) received 135 pounds N plus 45# foliar in four applications. The Pavlowsky Check plot (dryland) received 60 pounds N plus 12.5# sidedress and 4.5# foliar, the Program plot received an additional 6# foliar in two

applications, while the Grower applied 1.5# foliar in addition to the Check plot amount (76# total). Lint yield increased in 1 of 2 plots that received in-season fertilizer (side-dressed or foliar applied) in 1995 (Table 2). No differences were found in fruiting (from plant maps) or in dry matter between Check and Program plots despite the differences in yields.

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References

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Table 1. Average county lint yield (lb./A).

County	1993	1994	1995	1985-1994 Average
Ft. Bend	350	640	600	695
Jackson	305	695	850	720
Matagorda	445	730	925	800
Wharton	375	675	850	730

Table 2. Average plot lint yield (lb./A).

Field	Treatment	1994	1995
Pivot	Check	879	--
	Program	907	--
Road	Check	956	--
	Program	921	--
House	Check	999	833
	Program	988	1026
Pavlowsky	Check	--	1250
	Program	--	1130
	Grower	--	1150