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FOLIAR NUTRITION FOR TEXAS DRYLAND COTTON

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Objective

To study the economic viability of foliar nutrition with dryland cotton on the high plains of west Texas and the Texas panhandle.

Procedure

Three fields were included in this study, located a distance of 2.5 miles of each other. Variety on all fields was PM 2280 BG-RR. Initial planting was destroyed on June 13 as a result of hail and high winds. The fields were replanted from June 17 to 20, in a solid pattern on 40" row spacing. Final stand averaged 40,000 plants per acre, or about 3 plants per foot of row.

Soil type is a reddish, calcareous sandy loam. Common characteristics include low organic matter, less than 1%, and high soil pH, from 7.8 to 8.0. This soil is common to a fairly large portion of the Texas panhandle and western Oklahoma.

Base fertilizer consisted of 75 pounds of anhydrous ammonia per acre, and was consistent across all three fields. On July 21 a portion of each field received a foliar application consisting of 2 pounds of soluble plant food (23-13-13) with 1.6 ounces of EnzAct CTN growth stimulant per acre. This was applied at a 5 gallon per acre rate with a ground sprayer, and also included 4 ounces of Bidrin for fleahopper control. On September 4, a second application was applied consisting per acre of 2 pounds of soluble plant food (32-8-8) with 8 ounces FoliCal (10% liquid calcium) and 3.2 ounces Seed Boost stimulant. This second application was also applied with a ground sprayer at a 5 gallon per acre solution application rate.

Replicated yield samples were taken in all fields (ranging from four to seven replications, control and foliar, per field). Tim Trimble, TAEX County Agent, Childress County, assisted in the sampling and site selection. Sampling methods consisted of six consecutive plants for mapping and estimating yield, as well as hand harvesting 1,000th of an acre plots. Individual samples were then labeled and bagged for later analysis.

Environment

There was good moisture when the crop was replanted, providing strong emergence and early growth. There was no further rainfall until August 29th, when an additional 1.2" was received. This moisture, coupled with potential fruit abortion, was what prompted the foliar on September 4.

Results

Although there was quite a wide variance between estimated yield (Table 1), the average yield was increased in all three of the fields, ranging from just over 50 pounds per acre on the Home field to slightly more than 119 pounds per acre on the Airport field. This is shown in Graph 1.

Additional yield must come from one of three factors, population, additional bolls per plant or heavier weight. Population was quite consistent, varying less 4% from one site to another, so the next factor was higher boll counts per plant. Being the main objective of the foliar applications, this was checked and the results are shown in Graph 2. There was a slight decrease in the Home field, but the other two showed an increase, with the Airport field being very significant. Overall, when averaging the three fields, there was an increase of 1.37 bolls per plant (19.32%).

Using mapping data from the Franklin field, a set of sample plants were compiled showing percentage of fruit set at each position. In Figure 1, these are illustrated, with the control on the left and foliar on the right. In Table 2, other pertinent data is shown.

In Figure 1, each of the horizontal lines indicates possible fruiting sites by node. As an example the foliar sample at node 5, there was at least one plant in the set of six that had up to five positions.

The numbers at each position indicate the overall percentage of fruit set at that particular position. It was somewhat interesting to note that the foliar plants exhibited a more “controlled” fruiting pattern, with higher percentages in the center of the plant, and fewer secondary bolls at positions three, four and five.

The foliar sample plants were somewhat taller (by 3.5 inches), with just a slight increase in total node count of 16.33 as compared to 16.89. Node spacing on the foliar plants was almost ideal at 1.47", indicating that the plant had adequate vegetative growth.

Graph 3 illustrates average boll weights for each of the fields. The Home field, which had slightly lower boll counts, and the Franklin field both had significant increases. The Airport field, which had significantly higher boll counts, showed a decrease in boll weight, which to some degree should perhaps be expected with limited water and nutrient.

Overall, the average increase from the three fields was 14 grams, or 3.99%, which is not significant in itself, even though each field individually showed a significant impact, either positive or negative.

Conclusion

The initial goal was to reduce fruit abortion, thus taking full advantage of moisture, which would provide the potential for increasing yield. Based upon mapping data this was achieved in two of the three fields, resulting in an additional 1.37 bolls per plant for all three fields combined. This translated into an increase in average yield of 90.56 pounds per acre (18.4%). While there was a high level of variance from sample site to sample site, this is still a significant increase.

Dryland cotton is always dependent upon weather, and there are certainly instances where any additional expense should be avoided. At the same time, there are also opportunities, such as this one, where additional investment can be made with the expectation of positive economic return. The total cost of plant food and growth stimulants for both foliars was $7.95/acre, not counting application costs. But foliar nutrients can often be combined with other management practices, which adds no additional application expense.

In this specific instance, the foliar treated cotton averaged an increase of 90.56 pounds of lint per acre. Average loan rate was $.5278/lb., which equates to additional income of $67.80 per acre. It is apparent the use of foliar applied nutrient, even in small amounts, to take advantage of timely moisture appears to be a valuable management tool.

Acknowledgement

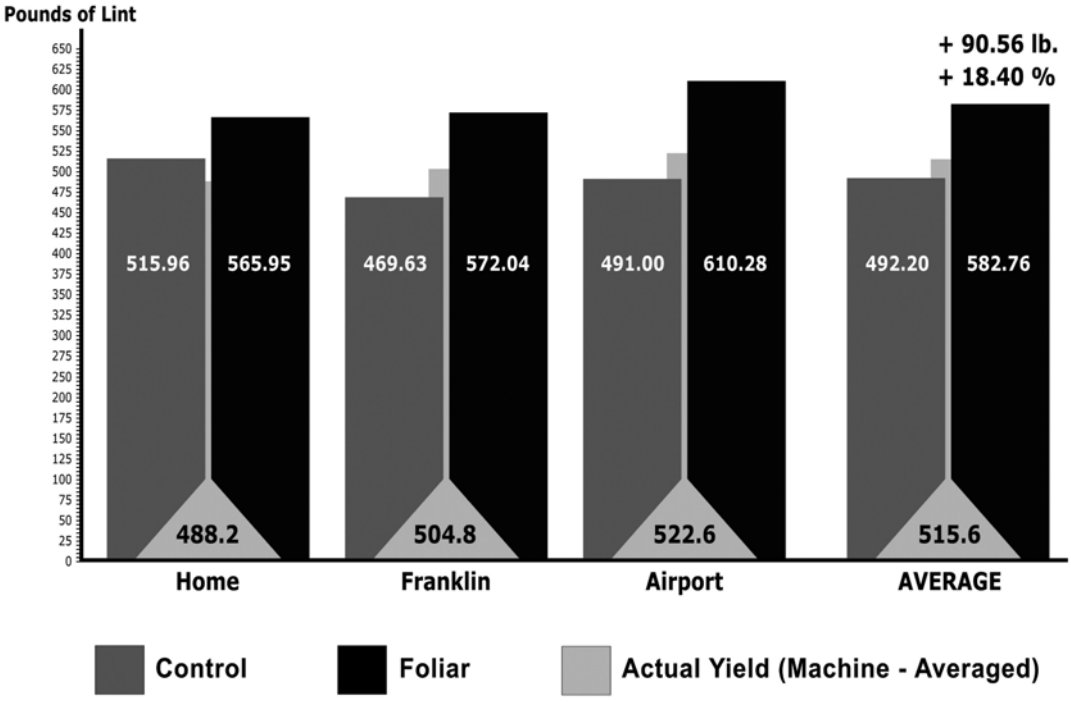
Cooperators: Bruce Inman, Grower
Tim Trimble, TAEX County Agent, Childress County, TX

Table 1. Individual Yields of Specific Replications by Field (Pounds Lint/Acre).

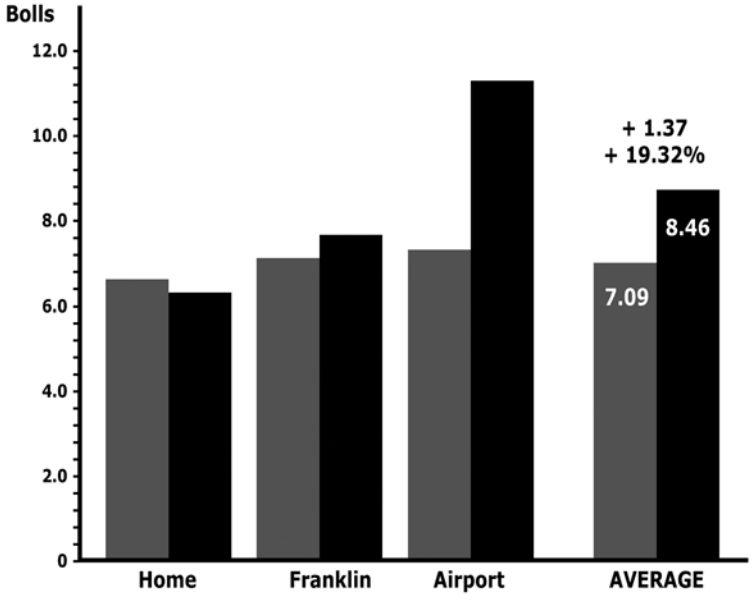
Field & Treatment	Rep #1	Rep #2	Rep #3	Rep #4	Rep #5	Rep #6	Rep #7
Home – Control	494.46	441.16	315.14	515.64	633.80	689.92	520.21
Home – Foliar	471.82	524.47	596.86	596.89	634.07	555.86	581.69
Franklin – Control	515.14	604.28	395.16	363.95			
Franklin – Foliar	494.87	796.34	386.71	610.24			
Airport – Control	537.60	601.40	525.66	299.34			
Airport – Foliar	682.23	594.50	668.29	496.08			

Table 2. Mapping Data, Franklin Field.

Item (Average)	Control	Foliar
Plant Height	25.83"	29.33"
# of Vegetative Nodes	4.83	5.00
# of Total Nodes	16.33	16.89
Node Spacing (Inches)	1.29"	1.47"
% of First Position Fruit Set	34.04%	39.89%
Bolls Per Plant	7.28	7.67
Boll Weight (Grams)	3.51	3.65



Graph 1. Yield in Pounds of Lint per Acre, by Individual Fields and Overall Average. (In addition, the actual yield from each field is also shown from gin recap records, Childress Farmers Co-op Gin, Childress,TX).



Graph 2. Average Number of Bolls Per Plant.

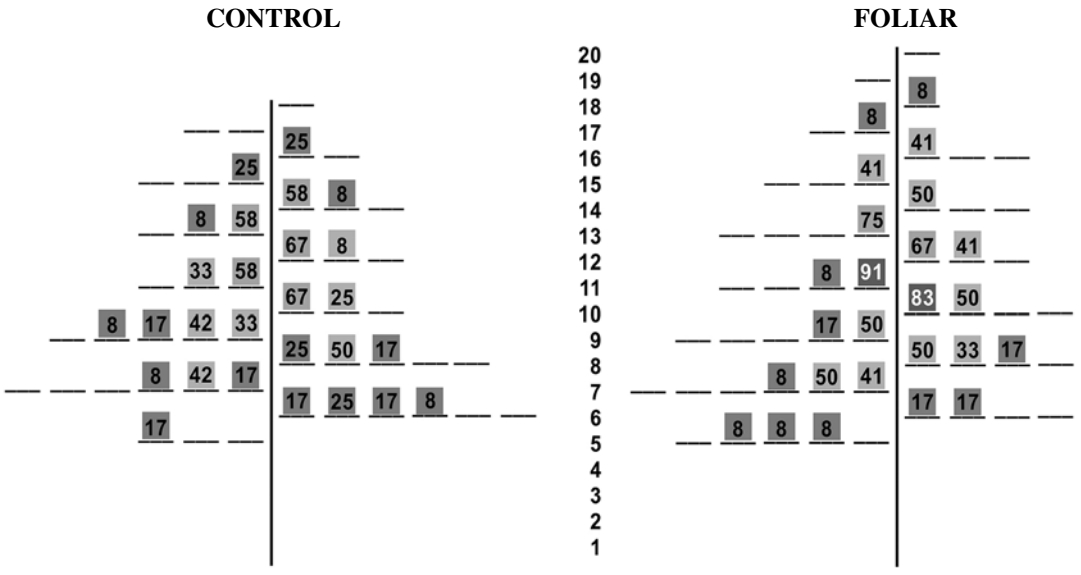
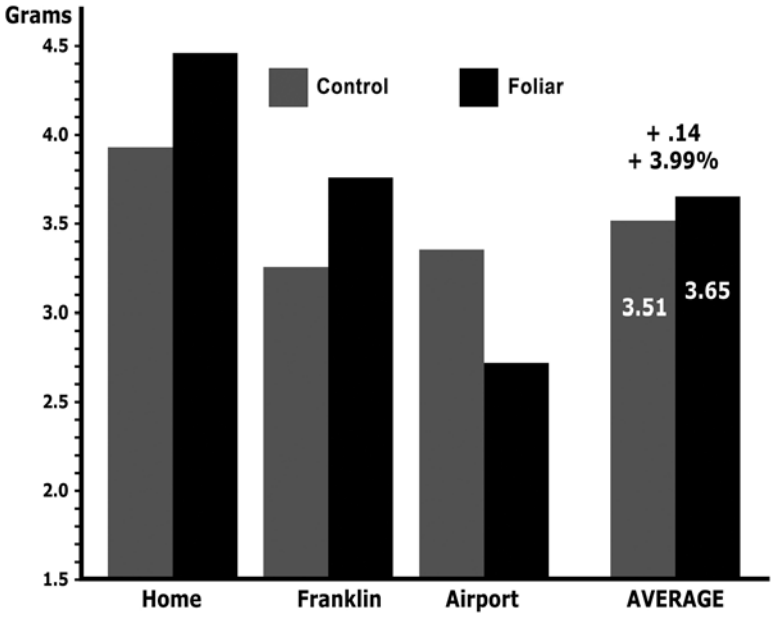


Figure 1. Percentage of Fruit Set by Node and Position, (Franklin Field).



Graph 3. Average Boll Weights (grams).