

EVALUATION OF MINOLTA K ION METER ON COTTON PETIOLE SAMPLES

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ABSTRACT: The Minolta K Ion meter has been on the market for over a decade. We have used it in previous potash studies with very erratic results. This study focused on evaluating the reliability of the Minolta K meter to determine if a producer could use it with any rate of confidence in the field to ascertain potassium needs for cotton. From previous field experience we were certain the meter would not give reliable results from the tailgate of a pickup truck. However, we were uncertain whether different results were possible when the meter was used for plant analysis in a controlled temperature and sunlight environment. Furthermore, field extraction of plant sap from the petioles has been very difficult over past years. In many cases the extraction of twenty petioles resulted in a drop or two of sap. We found that freezing the petioles after collection for a few hours resulted in more sap, easier extraction, and more representative samples of the twenty petioles. In this study, using the best procedures of sap extraction, meter calibration, and meter environment control no conclusion could be drawn from our results in predicting K levels in cotton plants at different times during the fruiting period.

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MATERIALS AND METHODS: The experiment was located on a Grenada Silt loam soil with less than 2% slope. The experimental design was a RCB with four replications. Plots were four rows spaced 38 in apart and 50 ft long. Treatments were 0, 30, 60, 90, 120, 150, 180, and 210 lbs K₂O/ac. The plot area was disked in late March and redisked in the second week of April before the plots were hipped. Two hundred pounds 0-47-0 /ac of phosphorus was broadcast across the entire plot area in April prior to hipping. Three hundred pounds of ammonia nitrate was broadcast over the plot area before planting.

Sure grow 241 BG/RR cotton was planted the first week of May at approximately four seed per foot of row. Terrachlor Super X 18.8G (Pentachloronitrobenzene) 1.5 lb ai/ac + Temik 15G (aldicarb) 0.75 lb ai/ac was applied as granules in furrow at planting. Cotoran (fluometuron) 1.0 lb ai/ac was broadcast over the plot area. Roundup at 1.0 lb ai/ac was sprayed over the entire plot area two weeks after emergence. CyPro (cyanazine) at 0.75 lb ai/ac was direct sprayed over the plot area as a lay by treatment. Twenty petioles were collected from the each plot in each replication these were collected at first week, second week, and fourth week of bloom.

Petioles were collected from the fifth fully expanded leaf on the main stem below the plant terminal. Petioles were frozen immediately after collection. Analysis was conducted in an air-conditioned laboratory twenty-four hours after collection. This hopefully eliminated a variation

in the meter reading from exposure to sunlight or temperature variation. Petiole sap was extracted by thawing the petioles under an infrared light for five minutes before the stems were cut into lengths of approximately one inch. Petiole sap was extracted by placing the cut petiole stems into a garlic press and squeezing out the petiole. One milliliter of sap was squeezed into a test tube representing a composite of the twenty petioles of each plot. Two or three drops of sap from each test tube were placed on the calibrated meters. Running a standard at the start of each test period and after every twenty samples checked Minolta hand held potassium meter calibration. Cotton was defoliated the first week of October with Superboll (ethephon) 1.5 lb ai/ac + DEF 6 (tribufos) 1.5 lb ai/ac and picked the third week of October.

RESULTS AND DISCUSSION: We have tried the Minolta K meter in the field for several years with no success. We attributed the erratic readings of the meter in the field to sunlight and temperature and a good petiole sap sampling. Often the petioles produced very little sap in the field. For a time we felt we were not getting a representative sap sample. We found that by freezing the petioles we were able to extract sap much better from the thawed petioles. In this study with the Minolta meter, all readings were conducted in a laboratory with controlled light and temperature. Meter readings were extremely variable from replication to replication within potassium rates, even though each replication contained a composite of twenty petioles. From our experience on cotton petioles, the Minolta K meter readings are erratic and meter calibration was unreliable. There were difference between treatments with the Minolta meter at the first week of bloom; (Table 1) but the difference only indicated potassium rates below 60 lb K₂O/ac were different from levels above 90 lb K₂O/ac. At the fourth week of bloom there was no difference between the 0 lb K₂O/ac and rates up to 150 lb K₂O/ac levels. At cutout we found no difference in Minolta reading between any levels of K₂O/acre. All K₂O levels above 60 lb K₂O were higher than the 0 and 30 lb K₂O/acre. There was no yield difference between any of the levels above 60lb K₂O/acre. Yields ranged from 1700 lb/ac of seedcotton for 0 K₂O/ac to 2491 lb/ac for 210 lb K₂O/ac.

TABLES:

Table 1. Minolta K cotton leaf petiole sap reading in PPM.

<u>K₂O lbs/Acre</u>	<u>First week of bloom</u>	<u>Fourth week of bloom</u>	<u>Cut-out</u>
0	2400	2575	2400
30	2525	3275	2150
60	3800	2650	3000
90	6700	3725	3150
120	6375	3150	2975
150	6375	3675	2500
180	7425	4100	2650
210	7300	4075	3350
LSD 0.05	2812	1313	1206

Table 2. Cotton yield response to Potassium.

K ₂ O rates in lbs/ac	<u>Lb Seedcotton/ac</u>
0	1700
30	1835
60	2356
90	2563
120	2231
150	2602
180	2432
210	2491
LSD 0.05	371