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Evaluation of Foliar-Applied Controlled-Release Nitrogen Fertilizer in Muskmelon Production 99-09

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Purpose

This study was conducted to evaluate foliar-applied nitrogen solutions in muskmelon production. Various rates, timings and nitrogen sources were compared.

Material and Methods

Plots were established in a Lakeland fine sand located at the Suwannee Valley Research and Education Center near Live Oak, FL. Pre-plant soil test analysis (Mehlich 1 extractant) results were: 76 ppm P, 21 ppm K, 24 ppm Mg, 335 ppm Ca, 1.66 ppm Zn, 0.18 ppm Cu, and 5.24 ppm Mn. Soil pH was 5.9 using a 1:2 (soil:water) mixture.

Soil was prepared and pre-plant fertilizer treatments (Table 1) were applied to plots. All pre-plant fertilizer treatments were made with 13-4-13 (N-P_2O_5-K_2O) including micronutrients. Pre-plant fertilizer was incorporated into the soil with a rototiller. Beds were formed on 5 ft centers and were fumigated with a mixture of methyl bromide and chloropicrin (98:2) at a broadcast rate of 400 lbs per acre. Drip tape was applied to the center of the beds and the beds were covered with black polyethylene mulch. The final beds were 24 inches wide and 6 inches high.

Two-week old muskmelon transplants, cultivar 'Athena', were transplanted on April 9, 1999. One row per bed was established with a 24 inch spacing between plants in a row. Each plot had 13 plants. All plots received fertigations of N and K_2O using a commercial 8-0-8 (N-P_2O_5-K_2O) solution. The first fertigation was on April 23, 1999. Early season fertigations were at a rate of 1.0 lbs N per acre per day. Mid season fertigations were at a rate of 2.0 lbs N per acre per day.

Treatments with foliar-applied nitrogen were applied using a CO_2 backpack sprayer with 8004 flat fan nozzles. Treatments were applied with water a spray volume of 39 gallons per acre. Application dates are listed in Table 2.

Two petiole-sap analyses for nitrate-nitrogen were conducted (May 25 and June 14). Fruits were harvested on nine dates, from June 18 to July 8, and graded into

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categories of marketable and cull. Counts and weights of each grade were recorded. Data was subjected to analysis of variance.

Results & Observations

Early season (first three harvests) marketable yields ranged from 91 to 145 cwt/A with no significant differences among treatments (Table 3). Total season marketable yields ranged from 280 to 414 cwt/A. This yield range is good and is in the expected range for North Florida. Treatment 9 resulted in the highest yield of 414 cwt/A, but was not significantly different from any treatment except Treatment 1. The lowest yield from Treatment 1 was expected due to the lowest nitrogen rate total. Cull yield was very low in all treatments with no significant difference among any treatments. Foliar-applied nitrogen treatments (Treatment 2-7) did not result in higher yield over Treatment 8. Treatment 8 received pre-plant and fertigated nitrogen, but no foliar-applied nitrogen. Pre-plant fertilizer applications appeared to be important to high yields as long as fertigations followed.

Plant petiole-sap nitrate-nitrogen levels are reported in Table 4. Nitrate-N levels on May 25 ranged from 468 to 649 ppm, but no significant differences were found between levels. These levels were similar, but just below the reported sufficiency range at that stage of growth. Likewise, petiole-sap nitrate-N levels on June 14 were not significantly different among treatments. Levels on June 14 ranged from 564 to 666 ppm which was also similar, but slightly below the reported sufficiency range (700-800 ppm) at that stage.

Table 1. Description of muskmelon fertilizer programs for each treatment including pre-plant, fertigated, and foliar-applied nitrogen sources, rates and timing.

Treatment	Pre-Plant N (lbs/A)	Fertigated N (lbs/A)	Foliar Applied N[z]		
			Source[y]	Rate (quart/A)	Timing Interval (wks)
1	0	75	None	-	-
2	25	75	Urea Solution	3.0	2
3	25	75	HM9310	2.5	2
4	25	75	HM9716	2.0	2
5	25	75	Urea Solution	6.0	3
6	25	75	HM9310	5.0	3
7	25	75	HM9716	4.0	3
8	25	75	None	-	-
9	75	75	None	-	-

[z] Foliar treatments began four weeks after transplanting, resulting in 6 applications for treatments 2, 3, and 4; and 3 applications for treatments 5, 6, and 7.

[y] Urea stock solution was 3.4 lbs of urea per gallon of water, HM9310 was 25-0-0 and HM9716 was 28-0-0 (N-P2O5-K2O). HM9310 and HM9716 were solutions of controlled release nitrogen from Helena Chemical Company.

Table 2. Schedule for foliar-applied nitrogen treatments to muskmelon.

Date of Applications	Treatments Applied[z]
6 May	2, 3, 4, 5, 6, 7
18 May	2, 3, 4
27 May	5, 6, 7
4 June	2, 3, 4
18 June	2, 3, 4, 5, 6, 7
1 July	2, 3, 4
15 July	2, 3, 4

[z] See Table 1 for complete description of treatments.

Table 3. Effects of several nitrogen fertilizer treatments on yield and quality of muskmelon in Live Oak, FL.

	Yield (cwt/A)			
	Marketable			
Treatment[z]	Early[y]	Total Mkt		Total Cull
1	103	280	b	5
2	121	385	ab	7
3	122	350	ab	0
4	145	346	ab	8
5	120	366	ab	9
6	140	335	ab	17
7	138	318	ab	12
8	133	324	ab	5
9	91	414	ab	9
Signifance (P=.05)[x]	NS	*		NS

[z] Treatments are listed and described in detail on Table 1.
[y] Early yield was calculated using the first three harvests.
[x] Treatments were not significantly different (NS) from each other at the 5% level or significant at the 5% level (*).

Table 4. Muskmelon plant petiole sap nitrate-nitrogen levels on May 25 and June 14 for several nitrogen treatments.

	Nitrate-Nitrogen (ppm)	
Treatment[z]	25-May	14-Jun
1	615	592
2	519	581
3	502	564
4	649	637
5	615	615
6	468	660
7	592	626
8	497	654
9	603	666
Sufficiency Range[y]	800-1000	700-800
Significance (P=.05)[x]	NS	NS

[z] Treatments are listed and described in detail on Table 1.

[y] Guidelines for fresh petiole sap nitrate-nitrogen for muskmelon at these stages of growth as reported by G. Hochmuth, Plant Petiole Sat-Testing, University of Florida Circular 1144.

[x] Significance reported at the 5% level (*) or not significant (NS).