

Determining Fertilizer Levels for Muskmelons

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Interpretative Summary

Results of 4 years of fertility/plasticulture studies (1998-2001) with muskmelons (cantaloupes) are briefly reported here. Plasticulture technology is very favorable for cantaloupe production. Under plant spacings compared in these studies, approximately the same number of fruits per plant was produced under all spacings, but number of fruits per unit area increased as the plants were spaced closer together. However, as would be expected, fruits tended to be smaller with closer plant spacings. The cultivar, 'Athena,' performs quite well under Tennessee conditions. Good pest control practices are essential for optimum yields.

Introduction

In the state of Tennessee an increasing percentage of the muskmelons (cantaloupes) are being grown under plasticulture. Therefore to maximize production potential for this crop under this system of culture, fertility and other cultural recommendations must be established and/or modified over those existing for conventional culture. Studies with these objectives were conducted from 1998 through 2001 at The University of Tennessee Knoxville Experiment Station.

Materials and Methods

1998 Study-

Field plots were established in a split-plot design with three replications. Main plots were the four fertility levels, 1/2X, 1X, 1X + Foliar, and 2X. Muskmelon cultivar subplots were randomized within the main plots. Cultivars evaluated were 'Athena,' and 'Eclipse.' Rows were 50 ft long on 8 ft centers and were equipped with trickle irrigation. Two cultivars were planted per row in 20 ft plots with 10 ft alleys between cultivars. Seed of the cultivars were planted in the greenhouse on April 27, 1998 and transplanted to the field on May 20, 1998. Plants were spaced 24 in. apart on the plastic with 5 plants per plot. Plots which received the 1X fertility level were fertigated with KNO_3 and NH_4NO_3 rotations at the equivalent of 1 lb N/A day beginning May 28.

1999 Study-

Field plots were established in a split-plot design with three replications. Main plots were the two fertility levels, 1 X, and 2X. Muskmelon cultivar and spacing subplots were randomized within the main plots. Cultivars evaluated were 'Athena,' and 'Primo.' Plant spacings were 18, 36, and 48 inches. Rows were 50 ft long on 8 ft centers and were

covered with black plastic mulch equipped with trickle irrigation. Two plots were planted per row in 20 ft plots with 10 ft alleys between plots. Seed of the cultivars were planted in the greenhouse on April 28, 1999 and transplanted to the field on May 28, 1999.

Plots which received the 1 X fertility level were fertigated with Pro-Sol 20-20- 20, KNO_3 , CaNO_3 , and NH_4NO_3 combinations beginning May 25, 1999 and continuing until final melon harvest for a total of 65 lbs N/A as 92 lbs Pro- Sol/A, 60 lbs CaNO_3 /A, 43 lbs KNO_3 /A and 94 lbs NH_4NO_3 /A. The 2X treatment was provided by two trickle irrigation lines per row and received a total of 130 lbs N/A. Muskmelons were harvested six times beginning July 19 and ending August 6. Random melons from the first three harvests were selected from each treatment and measured for sugar content. All data were analyzed by ANOV A methods and means of significant treatment differences were separated using Fisher's Protected LSD at the 0.05 level of probability.

2000 Study-

Field plots were established in a split-plot design with three replications. Main plots were the two fertility levels, 1X, and 2X. Muskmelon cultivar and spacing subplots were randomized within the main plots. Cultivars evaluated were 'Athena', , and 'Primo.' Plant spacings were 18, 36, and 48 inches. Rows were 50 ft long on 8 ft centers and were covered with black plastic mulch equipped with trickle irrigation. Two plots were planted per row in 20 ft plots with 10 ft alleys between plots. Seed of the cultivars were planted in the greenhouse on April 5, 2000 and transplanted to the field on May 11, 2000. Plots which received 400 lbs/A of 10-10-10 fertilizer prior to bedding and plastic mulch installation. The 2X treatment was provided by two trickle irrigation lines per row and received a total of 170 lbs N/A while the 1X treatment received a total of 85 lbs N/ A. Muskmelons were harvested six times beginning July 10 and ending August 1. Random melons from the first three harvests were selected from each treatment and measured for sugar content. All data were analyzed by ANOV A methods and means of significant treatment differences were separated using Fisher's Protected LSD at the 0.05 level of probability.

2001 Study-

Field plots were established in a split-plot design with three replications. Main plots were the three fertility levels, 1X, 2X, and 3X. Spacing subplots were randomized within the main plots. The cultivar evaluated was 'Athena'. Plant spacings were 18 and 36, inches. Rows were 25 ft long on 7 ft centers and were covered with black plastic mulch equipped with trickle irrigation. Two plots were planted per row in 20 ft plots with 10 ft alleys between plots. Seed of the Athena were planted in the greenhouse on April 04, 2001 and transplanted to the field on May 03, 2001. Plots which received the 1X fertility level were fertigated with Pro-Sol 20-20-20, KNO_3 , CaNO_3 , and NH_4NO_3 combinations beginning June 01, 2001 and continuing until final melon harvest for a total of 65 lbs N/A

as 92 lbs Pro-Sol/A, 60 lbs CaNO₃/A, 43 lbs KNO₃/A and 94 lbs NH₄NO₃/A. The 2X treatment was provided by two trickle irrigation lines per row and received a total of 130 lbs N/A. The 3X treatment consisted of 1X treatment until early flowering plus the 2X level for the remainder of the growing and harvest season. Muskmelons were harvested seven times beginning July 05 and ending July 30 6. Random melons from each harvest were selected from each treatment and measured for sugar content. All data were analyzed by ANOVA methods and means of significant treatment differences were separated using Duncan's Multiple Range Test LSD at the 0.05 level of probability.

Results and Discussion

1998 Study-

Fertility levels did not influence muskmelon yields (Table 2). Cultivar differences were apparent for melon yield, and melon weight, by not for weight yield. In all fertility treatments, the 'Athena' cultivar produced more melons per acre while the 'Eclipse' cultivar produced larger melons. No differences were observed in sugar content. Athena was slightly earlier maturing than Eclipse. Fruit appearance of Athena, perhaps, was also a little more desirable than that of Eclipse.

1999 Study-

Fertility levels did not influence muskmelon yields at the individual harvest dates. However, total yields (number and weight) were enhanced by the 2X fertility treatment (Table 3) No impact on melon weight or sugar content was observed by harvest date or mean with respect to fertility level. No significant differences were found in total yield, mean melon weight, or mean sugar content with respect to cultivar (Table 3). Cultivar differences were apparent for yield number, yield weight, and melon weight at individual harvest dates. 'Athena' was the earlier variety and produced a greater quantity and larger melons for the first two harvests. 'Primo' was a later variety and outperformed 'Athena' in the middle harvest dates. Closer plant spacing resulted in significant increases in yield number and yield weight, but reduced individual melon weight and sugar content (Table 3).

2000 Study-

Fertility levels did not influence muskmelon yields at the individual harvest dates. However, total yields (number and weight) were enhanced by the 2X fertility treatment (Table 4). No impact on melon weight or sugar content was observed by harvest date or mean with respect to fertility level. No significant differences were found in total yield, mean melon weight, or mean sugar content with respect to cultivar (Table 4). Cultivar differences were apparent for yield number, yield weight, and melon weight at individual harvest dates. 'Athena' was the earlier variety and produced a greater

quantity and larger melons for the first two harvests. 'Primo' was a later variety and outperformed 'Athena' in the middle harvest dates. Closer plant spacing resulted in significant increases in yield number and yield weight, but reduced individual melon weight and sugar content (Table 3).

2001 Study-

Results from the 2001 study were inconclusive. Neither fertility levels nor plant spacing had significant influence on melon yield (fruit numbers and individual fruit weights) or fruit sugar content (Table 5). Fruit numbers from 2001 study were comparable to those reported in previous years, however, fruit size and fruit quality in general were considerably lower in the 2001 study than in previous years' studies. During the later part of the harvesting period, more than optimum precipitation occurred, increasing the incidence of foliage diseases and fruit cracking and rot. This is reflected in both marketable fruit number, size and sugar content.

Table 1. Cantaloupe Fertility Recommendations for Tennessee from Extension Publication PB962, "**Producing Cantaloupes in Tennessee**".

Soil Fertility	Phosphorus	Potassium
	P205 lb/a	K20lb/a
Low	90	60
Med	45	30
High	0	0

Nitrogen: At planting, apply 30 to 40 pounds of nitrogen per acre and sidedress with an additional 15-30 pounds when runners are 12 inches long or at early bloom.

Table 2. Influence of fertility levels on two cantaloupe cultivars at The University of Tennessee Knoxville Experiment Station, 1998.

Fertility Level	Number (acre)	Melon Wt. (Lbs)	Sugar Content (°Brix)
1/2x	4447a	5.47a	10.1a

1x	4356a	5.91a	9.8a
1x foliar	3675a	5.80a	10.0a
2x	5173a	6.28a	9.6a
Cultivar			
Athena	4969a	4.41b	9.9a
Eclipse	3857b	6.34a	9.9a

Data (Cultivar) represent means taken across the cultivars, Athena and Eclipse. Data (Fertility Level) represent means taken across the fertility levels. Means followed by the same letter are not statistically different according to Fisher's Protected LSD at P=0.05.

Table 3. Influence of fertility levels on two cantaloupe cultivars planted at three plant spacing at The University of Tennessee Knoxville Experiment Station, 1999.

Fertility Level	Number (acre)	Melon Wt. (Lbs.)	Sugar Content (°Brix)
1x	5799b	4.8b	10.4a
2x	6289a	5.0a	10.6a
Cultivar			
Athena	5935a	5.0a	10.6a
Primo	6153a	4.8a	10.3a
Plant Spacing			
18 inches	7405a	4.3c	9.8c
36 inches	6071b	5.0b	10.7b
48 inches	4683c	5.4a	11.1a

Data (Fertility Level) represent means taken across the cultivars, Athena and Eclipse. Data (Cultivar) represent means taken across the fertility levels and plant spacings. Data (Plant Spacing) represent means across fertility levels and cultivars. Means followed by the same letter are not statistically different according to Fisher's Protected LSD at P=0.05.

Table 4. Influence of fertility levels on two cantaloupe cultivars planted at three plant spacing at The University of Tennessee Knoxville Experiment Station, 2000.

Fertility Level	Number (acre)	Melon Wt. (Lbs.)	Sugar Content (°Brix)
1x	5278a	4.4a	10.1a
2x	6837a	4.5a	10.8a
Cultivar			
Athena	5884a	4.5a	11.1a
Primo	6232a	4.3a	9.8b
Plant Spacing			
18 inches	7464a	3.9b	9.9a
36 inches	5059b	4.6a	11.1a
48 inches	5693b	4.9a	10.4a

Data (Fertility Level) represent means taken across the cultivars, Athena and Eclipse. Data (Cultivar) represent means taken across the fertility levels and plant spacings. Data (Plant Spacing) represent means across fertility levels and cultivars. Means followed by the same letter are not statistically different according to Fisher's Protected LSD at P=0.05.

Table 5. Influence of fertility levels on cantaloupe cultivar 'Athena' planted at two plant spacings at The University of Tennessee Knoxville Experiment Station, 2001.

Fertility Level	Number (acre)	Melon Wt. (Lbs)	Sugar Content (°Brix)
1x	5476a	3.4a	7.8a
2x	5725a	3.4a	7.9a
3x	5252a	3.5a	8.3a
Plant Spacing			
18 inches	5742a	3.4a	8.0a
36 inches	5227a	3.5a	8.1a

Data (Fertility Level) represent means taken across plant spacings. Data (Plant Spacing) represent means taken across the fertility levels. Means followed by the same letter are not statistically different according to Duncan's Multiple Range Test at P=0.05.

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This research represents one season's data and does not constitute recommendations. After sufficient data is collected over the appropriate number of seasons, final recommendations will be made through research and extension publications.