RESEARCH REPORT
SUWANNEE VALLEY AREC 92-5
August, 1992

COMPARISON OF VARIOUS N SCHEDULING METHODS FOR SNAPBEANS

George Hochmuth[1]
Bob Hochmuth[2]
Ed Hanlon[3]

INTRODUCTION

Snapbean is an important crop to the Florida vegetable industry accounting for about 4 percent of the value of vegetables from about 21,000 harvested acres in 1990-1991 (Fla. Agric. Stats., 1992). Fertilizer makes up about 8 percent of the $2,300 total production and marketing costs for snapbeans in southern Florida (Smith and Taylor, 1992). High land costs in southern Florida probably result in slightly higher costs than northern Florida. Limited information has been published regarding fertilizer management for snapbeans in Florida. Current recommendations are based on research reported in 1966 where variable responses were obtained to rates of mixed fertilizer and to various fertilizer placements (Nettles and Hulbert, 1966). The research reported here was conducted to more fully test nitrogen (N) placement for snapbeans. One aspect of particular interest was to test broadcast placement of postemergence split applications of N to simulate use of center pivot irrigation for N applications.

MATERIALS AND METHODS

Plots were established on a Klej fine sand at the Live Oak, AREC. Preplant soil tests showed high phosphorus (105 ppm P) and low potassium (30 ppm K) by Mehlich-I extractant. Soil pH was 6.6 using a 1:2 (soil:water) mixture. All plots received 50

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[1] Associate Professor, Horticultural Sciences Dept., Gainesville, FL 32611
[2] Multicounty Agent, Suwannee Valley Agricultural Research and Education Center, Live Oak, FL 32060
[3] Associate Professor, Soil and Water Science Department, Gainesville FL 32611

pounds per acre P_2O_5 (triple super phosphate), 80 pounds per acre K_2O (potassium magnesium sulfate) and 50 pounds per acre of a complete micronutrient mix (3.25% B, 1.0% Cu, 15.0% Mn, and 6.0% Zn) as a banded application at planting. The experiment was a factorial with 2 levels of N (60 and 100 lbs per acre) and 5 N application schedules (Table 1). Plots were arranged in a randomized, complete-block design with four replicates. Bands were placed 2 inches to the side of the seed and 3 inches below the seed level. N was supplied from dry ammonium nitrate which was manually applied. All N applications were immediately followed by ½ inch of water by sprinkle irrigation.

Plots were established on April 19, 1989 and N application #1 was applied at planting on that date. Subsequent N applications were applied on the following dates: #2 at 1st tri-foliate leaf stage (May 8), #3 at 1st bud stage (May 17), and #4 at 1st bloom stage (May 26).

The snapbean cultivar "Podsquad' was seeded on April 19 in all plots using Planet Jr. planter units. Seeds were place ¾" deep at an average seed rate of 8 seeds per foot. Each plot consisted of 2 rows 30 inches apart and 20 feet long. The herbicide metalochlor was applied at a rate of 1 ½ lbs per acre to the soil surface after planting and was irrigated into the soil with ½ inch of water. Plots were maintained free of insects and disease with insecticide and fungicide applications. Leaf samples (most-recently-matured tri-foliate leaf) were collected at early bloom for N analyses (one week after all fertilizer had been applied).

One subplot, six feet in length, was harvested from each of two rows in each plot on June 12, 1989. All beans from the harvested subplot were graded into three categories: (1) marketable, (2) broken and small (pin), and (3) rotted or diseased. A plant lodging rating was also made for each plot with a rating scale of 1 to 5. A rating of 1 was assigned to plots with no lodging and 5 to plots were essentially all plants exhibited severe lodging. A sample of 5 randomly selected marketable beans was measured for average pod length.

Leaf tissue was digested and analyzed for N colorimetrically (Hanlon and DeVore, 1989). All data were subjected to analysis of variance and means were separated by Fisher's LSD (.05) values.

RESULTS

N rate and N scheduling had few significant effects on major snapbean growth and yield variables (Table 2). There were no significant rate by schedule interactions so that average effects are presented.

N rate had no effect on the variables pod straightness, average pod length, broken pods and pins, or marketable yield (Table 3). Marketable yields were 266 and 287 bu per acre at 60 or 100 lb N per acre, respectively. N rate above current recommendations of 60 lb N per acre did not increase yield.

N rate had significant effects on amounts of rotted pods, lodging rating, and on leaf-N concentrations. Higher N resulted in more rotted pods and more lodging of plants. These two variables are related because higher amounts of N led to larger plants that lodged easier resulting in more pods contacting the soil. Leaf N content was significantly higher under 100 lb N per acre compared to 60 lb N per acre but there was no yield effect.

N scheduling had very little effect on snapbean response (Table 4). Only lodging and leaf-N variables were significant affected by N scheduling treatment. For lodging, any schedule that included broadcast application of at least one of the N split-applications let to more lodging than when all fertilizer was banded (treatment 1). The basis for this response is not known but could be due to more shallow or lesser developed root system when the fertilizer was broadcast.

The effects of N schedule on lodging and on leaf-N concentration appear not to be important in this study since marketable yield was not affected by N schedule treatment. Increased lodging however in a wet season might lead to increased pod rot. Although 6.6 inches of rain fell during this snapbean season, neither event was considered to be a leaching rainfall. Two events were more than 1.0 inch (1.8 and 1.9

inches). This research shows that lodging potential should be considered in N placement for snapbeans.

LITERATURE CITED

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ACKNOWLEDGEMENTS

Appreciation is extended to the following individuals for their valuable assistance in this study: Michael Donley, Wallace Boatwright, and Jorge Gonzales for technical assistance and to Leonard Douglass, Asgrow Seed Co. for bean seed.

Table 1. Five N scheduling treatments used in the snapbean study at Live Oak, FL, Spring 1989.

Schedule	Application 1 At planting	Application 2 1st true leaf stage	Application 3 1st bud stage	Application 4 1st bloom stage
1	33.3 % (B)[z]	33.3% (B)	33.3% (B)	-
2	33.3% (B)	33.3% (BC)	33.3% (BC)	-
3	33.3% (BC)	33.3% (BC)	33.3% (BC)	-
4	30.0% (BC)	20.0% (BC)	20.0% (BC)	30.0% (BC)
5	30.0% (B)	30.0% (BC)	20.0% (BC)	20.0% (BC)

[z]B= banded application method, BC= broadcast application method.

Table 2. Results of analysis of variance of factorial experiment with N rates and N schedules.

Variable	Probability of greater F value		
	N rate	N Schedule	Rate x Schedule
Straightness rating	.56	.60	.42
Average pod length	.08	.23	.19
Yield (bu/A)	.20	.99	.19
Broken and pins (bu/A)	.95	.07	.91
Rotted pods (bu/A)	.01	.19	.93
Lodging rating	.0001	.0002	.61
Leaf-N concentration	.0003	.03	.52

Table 3. Effects of nitrogen rates on several snapbean variables at Live Oak, FL, Spring 1989.

N rate (lb/A)	Pod Straightness rating[z]	Avg. Pod Length (in)	Mkt Yield (30-lb bu/A)	Broken pods and pins (30-lb bu/A)	Rotted pods (30-lb bu/A)	Lodging rating plants[y]	Leaf N conc. (%)	No. of obs.
60	3.93	4.68	266	39.7	22	3.1	3.25	20
100	3.85	4.79	287	39.9	38	3.8	3.76	20
F-test .05[x]	ns	ns	ns	ns	**	**	**	

[Z] 1=crooked; 5=straight

[Y] 1=No lodging; 2= 25% plants lodged; 3= 50% plants lodged; 4= 75% plants lodged; 5= 100% plants lodged.

[X] Significant at the 1% (**) level of probability or non significant (ns).

Table 4. Effects of N schedules on several snapbean variables at Live Oak FL Spring 1989.

N Schedule[z]	Pod Straightness rating[y]	Avg. Pod Length (in)	Mkt Yield (30-lb bu/A)	Broken pods and pins (30-lb bu/A)	Rotted pods (30-lb bu/A)	Lodging rating plants[x]	Leaf N conc. (%)	No. of obs.
1	4.06	4.8	272.9	37.5	20.6	2.8	3.26	8
2	3.75	4.8	284.4	33.9	23.0	3.5	3.25	8
3	3.81	4.7	277.7	47.2	33.9	3.5	3.59	8
4	3.88	4.6	272.9	33.9	37.5	3.8	3.84	8
5	3.94	4.7	274.7	46.6	35.1	3.6	3.58	8
LSD .05	ns	ns	ns	ns	ns	0.5	0.57	8

[Z] See Table 1 for description.

[Y] 1=crooked; 5=straight

[X] 1=No lodging; 2= 25% plants lodged; 3= 50% plants lodged; 4= 75% plants lodged; 5= 100% plants lodged.

[X] Significant at the 1% (**) level of probability or non significant (ns).