FŪSN

Fused-Safe Nutrients™

Response of Warm-Season Vegetables to FŪSN™ in the Desert Southwest

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Introduction

Due to threats of terrorism and accidents, the fertilizer ammonium nitrate is facing increasing scrutiny and regulation. FŪSN™ is a Honeywell proprietary technology currently marketed by J.R. Simplot Company whereby ammonium nitrate is fused with ammonium sulfate. This product is easier to handle and store and has a lower detonation potential than ammonium nitrate. FŪSN is classified as a non-oxidizer and non-explosive by the U.S. Department of Transportation. The objective of these experiments was to evaluate FŪSN and a nitrogen (N) fertilizer source for warm-season vegetables.

Materials and Methods

Studies were conducted during the spring and summer of 2015 to evaluate the response of sweet corn (*Zea mays*), cantaloupes (*Cucumis melo*), and chili peppers (*Capsicum annuum*) to FŪSN fertilizer. The soil used in all experiments was a Superstition loamy sand (sandy, mixed, hyperthermic Typic Calciorthid). Sweet corn (cv. BS5082) was seeded on 42-inch beds and cantaloupes (cv. Oro Rico) were seeded on 84-inch beds on March 31, 2015. Chili pepper (cv. Big Jim) transplants previously grown in the greenhouse were set out in 42-inch beds using a mechanical transplanter on April 7, 2015. The N rates were 0, 100, 200, and 300 lbs N/ac as FŪSN and urea. We applied 50% of the N at planting and the remaining 50% midseason. The plots were irrigated by sub-surface drip.

Sweet corn yields were collected June 27, 2015, by harvesting all marketable ears. Cantaloupe yields were collected July 2, 2015, by harvesting all marketable fruit. Chili pepper yields were collected June 22 and June 28, 2015, by harvesting all mature fruit. All marketable yields were determined after grading.

Results

Sweet corn yields were not high due to heat stress and the impact on pollination. Soil tests showed nitrate-N increased to N rate and FŪSN had soil nitrate-N slightly higher than urea (Table 1). There were no significant differences in soil ammonium-N, although the urea plots had higher residual ammonium. There were few consistent or meaningful differences in leaf N concentration. Yields significantly increased by N rate. Although not statistically significant at $P < .05$, there was a trend for FŪSN to produce higher yields compared to urea that would be significant at $P < .10$.

In the melon experiment, soil nitrate-N levels increased with N rate (Table 2). Yields were also significantly increased by N rate. Although FŪSN yields averaged 18% greater than those with urea, the differences were not statistically significant. We had bird damage in these plots. We tried to select harvest areas of uniform stand but we did not entirely overcome the variation.

Although pepper leaf tissue N was lower for the control compared to all treatments receiving N fertilizer, the effect was not statistically significant (Table 3). Chili pepper yields were increased by N rate during the first harvest but yields seemed to compensate during the second harvest and total yields were similar regardless of N rate or source at $P < .05$. For the final harvest, yield effects to rate and source would be significant at $P < .10$.

Treatment	N Rate (kg/ha)	N Source	Soil NH_4-N (mg/kg)	Soil NO_3-N (mg/kg)	Leaf N (%)	Yield (Mt/ha)
1	0	-	3.2	7.0	1.1	0.2
2	100	Urea	4.1	14.3	1.1	1.4
3	200	Urea	13.7	30.0	1.0	0.9
4	300	Urea	10.2	34.0	1.1	2.1
5	100	FŪSN	4.8	38.6	1.0	1.1
6	200	FŪSN	7.4	42.8	1.0	1.8
7	300	FŪSN	4.1	37.7	1.2	4.3
Stat.	N Rate		NS	L**	Q*	L**
	N Source		NS	*	NS	NS

Table 1. Sweet corn response to FŪSN and urea during spring and summer 2015 (* = P < .10, ** = P < .05).

Treatment	N Rate (kg/ha)	N Source	Soil NH_4-N (mg/kg)	Soil NO_3-N (mg/kg)	Midrib nitrate-N (mg/kg)	Yield (Mt/ha)
1	0	-	3.8	35.5	30207	9.7
2	100	Urea	4.2	32.7	36593	10.2
3	200	Urea	4.3	37.7	34363	8.2
4	300	Urea	5.0	43.8	45735	8.1
5	100	FŪSN	4.1	32.3	44188	9.1
6	200	FŪSN	4.6	30.3	26365	11.2
7	300	FŪSN	1.0	50.0	28967	10.7
Stat.	N Rate		NS	L*Q*	NS	NS
	N Source		NS	NS	NS	NS

Table 2. Cantaloupe response to FŪSN and urea during spring and summer 2015 (* = P < .10).

	N Rate (kg/ha)	N Source	Soil NH_4-N (mg/kg)	Soil NO_3-N (mg/kg)	Leaf N (%)	Yield (Mt/ha)		
						6/22	6/28	Total
1	0	-	3.8	2.4	2.18	3.1	3.3	6.3
2	100	Urea	3.7	3.2	2.37	2.7	4.0	6.7
3	200	Urea	8.7	15.1	2.41	5.3	2.6	7.9
4	300	Urea	4.1	5.3	2.32	3.2	3.3	6.5
5	100	FŪSN	3.8	3.8	2.25	4.3	3.4	7.7
6	200	FŪSN	4.1	3.7	2.25	4.3	2.9	7.3
7	300	FŪSN	4.4	4.9	2.25	4.6	3.5	8.1
Stat.	N Rate		NS	NS	NS	L*	NS	NS
	N Source		NS	NS	NS	NS	NS	NS

Table 3. Chili pepper response to FŪSN and urea during spring and summer 2015 (* = P < .10).

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