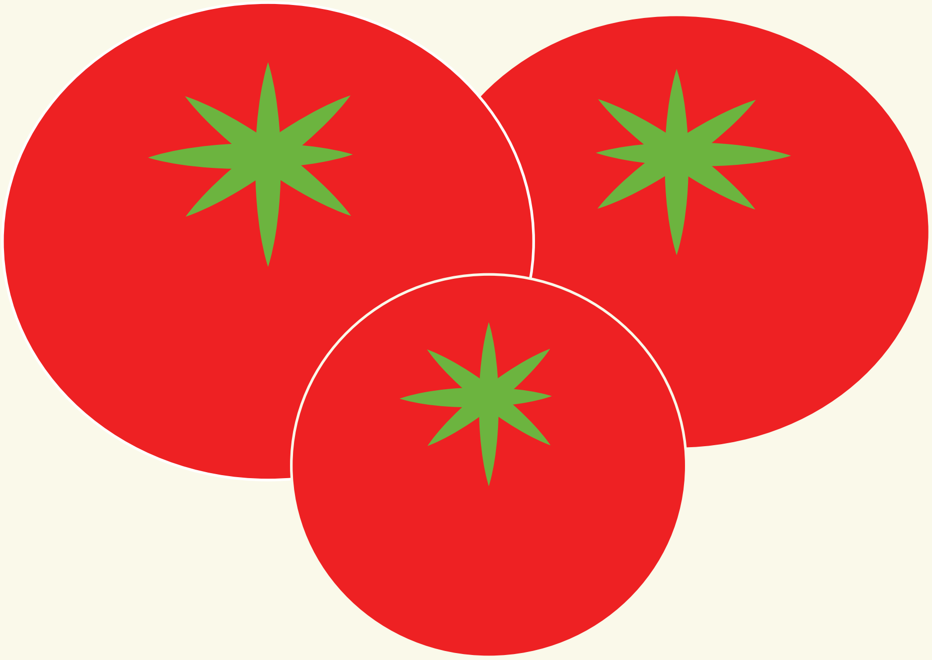
Fūsn

Fused-Safe Nutrients™

Vegetable Production with FŪSN™ A JRS Advanced Nitrogen Source

2014–2015



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Due to serious challenges associated with the threat of terrorism and accidents associated with ammonium nitrate fertilizers, a greater number of regulations are being passed that restrict the use of this source of nitrogen fertilizer. As a result, the J.R. Simplot Company has been working with Honeywell to create a replacement for ammonium nitrate (AN) that fuses both ammonium nitrate with ammonium sulfate to create a more stable form of nitrogen (N) that is less of a security or safety concern, but provides N in the forms that are used by growing, developing plants. This material is being introduced as Fused Safe Nutrients (FŪSN™). FŪSN is classified as a non-oxidizer and low detonable by the U.S. Department of Transportation. It has a guaranteed analysis of 26-0-0-14 (S). Field trials were conducted to evaluate FŪSN on vegetables being produced in Arizona and California. These evaluations were conducted in 2014 and 2015.

Studies were conducted in the spring and summer of 2015 to evaluate the responses of cantaloupes and chili peppers as well as bell peppers and tomatoes during the 2014 and 2015 growing seasons. All of these trials were conducted under irrigation in the southwest desert of Arizona or coastal areas of California. Soils in the Arizona studies were all classed as loamy sand with high levels of calcium. Cantaloupes were seeded on 42-inch beds and chili peppers, bell peppers, and tomatoes were all transplanted from plants produced in greenhouse conditions. Fifty percent of the nitrogen fertilizer was applied at transplanting or seeding with the rest being applied midway through the growing season. All the field trials were irrigated using drip irrigation.

Cantaloupe melon production was increased by as much as 18% when FŪSN was the source of N when compared to urea. These positive yield increases should relate to positive environmental and economic improvements when FŪSN is used as a source of N fertilizer compared to urea (Table 1).

Treatment	N Rate (lb/ac)	N Source	Soil NH_4-N (ppm)	Soil NO_3-N (ppm)	Midrib nitrate N (ppm)	Yield (Tons/ac)
1	0	-	3.8	35.5	30207	4.3
2	89	Urea	4.2	32.7	36593	4.6
3	178	Urea	4.3	37.7	34363	3.7
4	267	Urea	5.0	43.8	45735	3.6
5	89	FŪSN	4.1	32.3	44188	4.0
6	178	FŪSN	4.6	30.3	26365	5.0
7	267	FŪSN	1.0	50.0	28967	4.8
Stat.	N Rate		NS	L*Q*	NS	
	N Source		NS	NS	NS	

Table 1. Cantaloupe yield production estimates and soil N levels associated with FŪSN use in Arizona—2015.

There was also a slight reduction in both residual soil ammonium and nitrate, though these are not significantly different.

Chili pepper production appeared to be positively influenced by FŪSN fertilizer materials and were increased at the highest rates of N by almost 20% with the FŪSN source of N (Table 2). This positive increase across harvesting dates provides support for continuing to promote FŪSN into chili pepper production in the irrigated southwest areas of the U.S.

	N Rate (lbs/ac)	N Source	Soil NH_4-N (ppm)	Soil NO_3-N (ppm)	Leaf N (%)	Yield (Tons/ac)		
						6/22	6/28	Total
1	0	-	3.8	2.4	2.18	1.38	1.5	2.8
2	89	Urea	3.7	3.2	2.37	1.2	1.8	3.0
3	178	Urea	8.7	15.1	2.41	2.4	1.2	3.5
4	267	Urea	4.1	5.3	2.32	1.4	1.5	2.9
5	89	FŪSN	3.8	3.8	2.25	1.8	1.5	3.4
6	178	FŪSN	4.1	3.7	2.25	1.8	1.3	3.2
7	267	FŪSN	4.4	4.9	2.25	2.0	1.6	3.6

Table 2. Chili pepper response to FŪSN N fertilizer compared to urea in 2015.

Additional field trials were conducted in California during both the 2014 and 2015 growing seasons. Targeted crops included both bell peppers and tomatoes. These trials were established in the Oxnard, California, area under a block design with six replications. Initial N was applied as preplant topdressed, followed by post-plant side-dress and followed by in-season N applied through the irrigation system. A total amount of 180 lbs N/ac was applied as the grower standard practice with urea and compared to the same amount of N as FŪSN.

Additional N sources were evaluated; however, only urea and FŪSN were used for both 2014 and 2015. Therefore, those are the only two sources of N that will be reported in this summary.

Each treatment was sampled for soil nitrates pre- and post-harvest as well as tissue N concentration. Each treatment in 2015 included a lysimeter reading to determine the amount of N being leached out below the effective root and compared back to N source.

Total yield and marketable yields were evaluated for both peppers and tomatoes. While no significant responses were recorded over grower's standard practice at the $p \leq .05$ there were numeric increases for both total and marketable yields that could be related back to economic values contributed to FŪSN over the urea treatments 26.3 versus 29.3 tons/ac (11% increase).

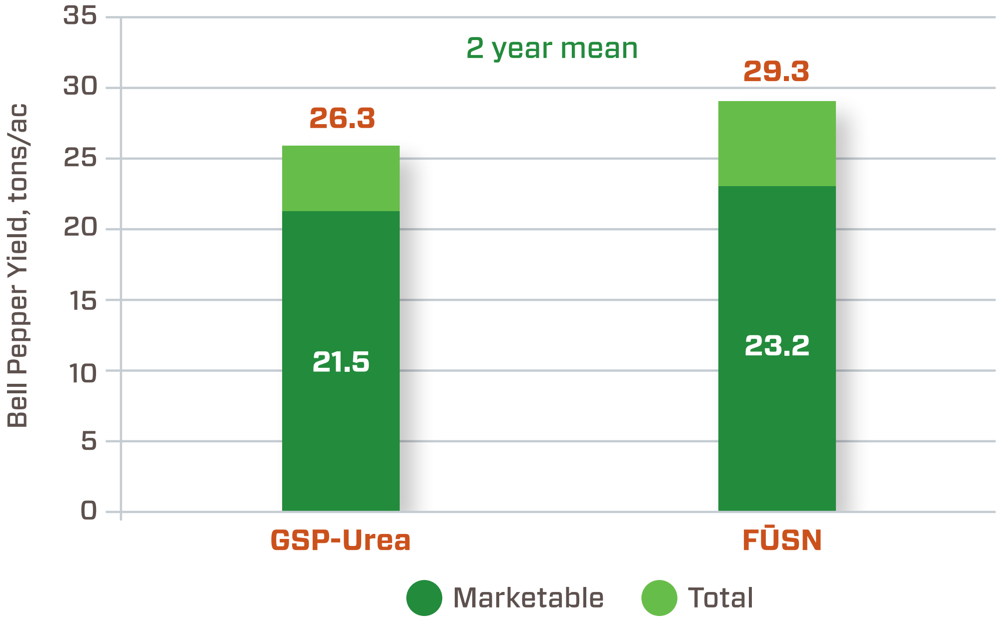

Figure 1. Bell pepper yield comparisons with FŪSN and urea (GSP)—Dave Holden, 2014–15.

Tomato field trials were also conducted over a two-year period in California on drip-irrigated fields. Dry fertilizers were applied using split applications of either urea or FŪSN applied as a topdress prior to planting and a side-dress application after planting. The remainder of N was applied through the irrigation water through drip tape. Marketable yields and total yields were improved for the two-year study by utilizing FŪSN compared to the grower standard practice of urea. Yields for marketable tomatoes improved from 55.1 to 69.1 tons/ac (25% increase) and from 66.9 to 79.1 tons/ac for total yield (Fig. 2).

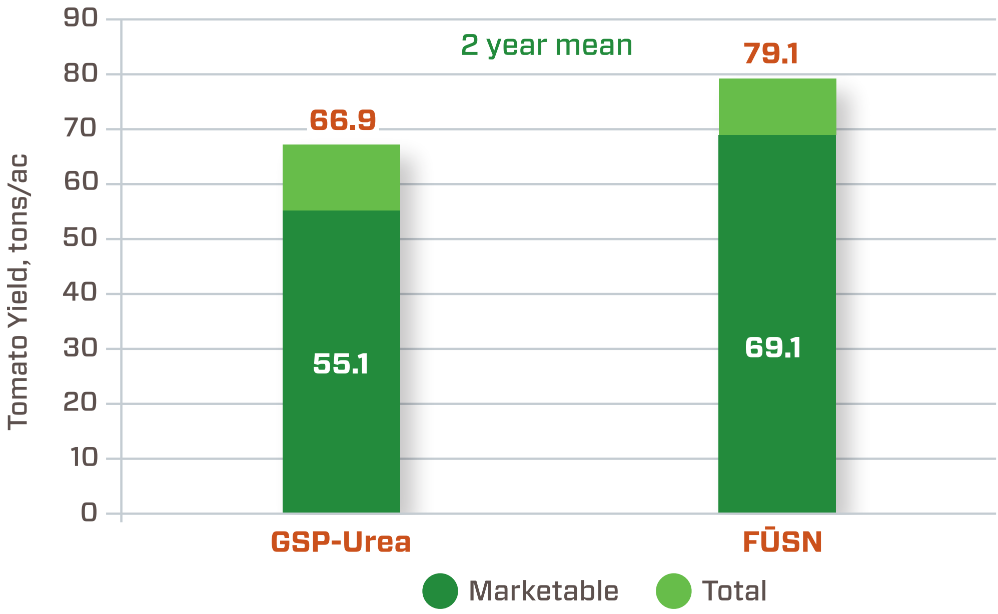

Figure 2. Processing tomato yield comparisons with FŪSN and urea (GSP)—Dave Holden, 2014–15.

Conclusions

Vegetable production within the Southwest and California is an extremely important part of U.S. and international production needs for fresh vegetables. Improving upon the fertilizer efficiencies is essential to being sustainable within these key production areas. FŪSN is a newly developed N fertilizer that can provide yield benefits for warm season vegetables being produced under irrigated conditions in the Western U.S. The uniqueness of the fertilizer combining ammonium, nitrate, and sulfate within a single molecule can provide nutritional characteristics that are unique and in a form vegetables require for yield and quality. FŪSN also addresses both environmental challenges while balancing agronomic improvements within these production areas.

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