Fused-Safe Nutrients™

Evaluation of FŪSN™ (26-0-0-14) on Ranger Russet Potato Production

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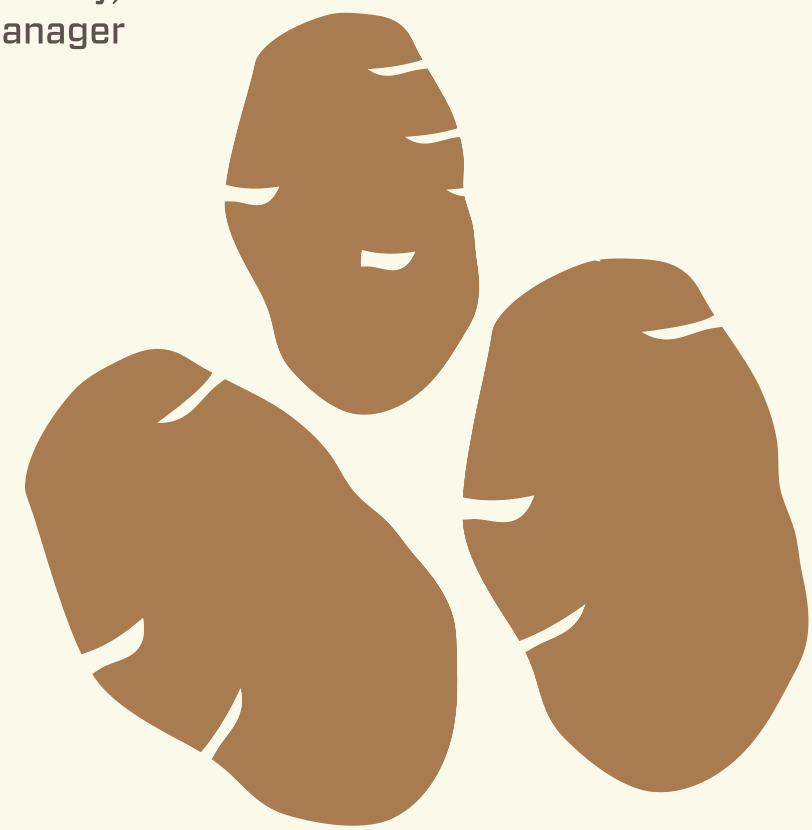

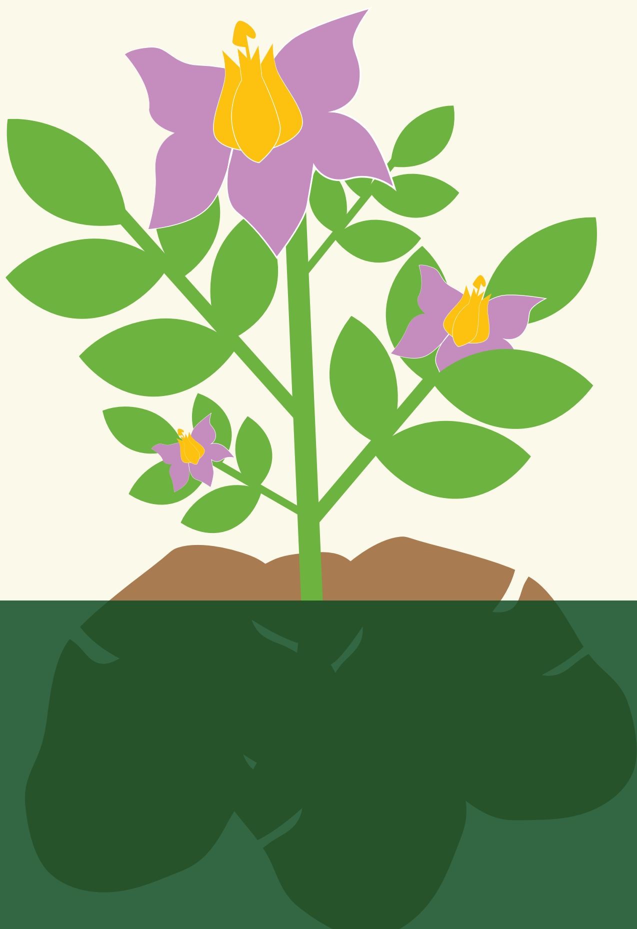

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Figure 1. Comparison of tubers from four random potato plants comparing the topdress application of FŪSN to ammonium sulfate (100 lbs N/ac). Photo taken August 8, 2014.

FŪSN™ (26-0-0-14) is a new nitrogen fertilizer that is being manufactured at the Simplot Lathrop California plant. FŪSN is a 2:1 salt of ammonium to nitrate nitrogen forms that has some unique characteristics such as decreased ammonia volatility. FŪSN is a safe nitrogen replacement for ammonium nitrate and it has potential in commercial potato production systems in Idaho. As such there is a need for evaluation of this new nitrogen fertilizer in potato production and how it may affect not only potato yields but also potato quality factors.

Methods

A suitable location for this study was identified in a JRS commercial potato production field (38 acres) in Arena Valley near Wilder, ID. The field had been in alfalfa for many years and the soil test recommendation called for 268 lb of N/ac along with other nutrients required for potato production. The preplant fertilizer applications were exactly the same across the entire field and the starter bands application as also the same. Grower Standard Practice (GSP) on the south half of the field received 100 lb of N/ac as ammonium sulfate (AMS=21-0-0-24) in a topdress application. The north half of the field received 100 lb of N/ac as FŪSN (26-0-0-14) in a topdress application. The whole field was managed and irrigated as a single field. Petiole samples were taken at approximately two week intervals starting June 5 and ending August 5 from each half of the field. The field was commercially harvested on September 18. During commercial harvest a crossover potato digger (four rows wide) lifted four rows of potatoes and laid then on top of the ground before a second potato digger dug four rows plus the four rows (eight total) and loaded potatoes into a field truck. Ten hand samples (4 rows 10 feet long=40 linear feet of row=100 ft^2) were collected from each half of the field behind the crossover digger. The field was harvested with a harvester that was equipped with yield monitor system; the hand samples were located with a

GPS coordinate and used as calibration samples to evaluate the yield monitor system. Hand samples were hand graded and divided into size categories. Composite samples from each half were submitted to the JRS Project Idaho plant for Federal/State inspection. Information from the inspection report was applied to the JRS contract 2014 Ranger Russet potato contract to establish net grower returns of the comparison of FŪSN to AMS.

Results

In-season potato petiole samples were very similar for both topdress nitrogen applications (Figure 2). Petiole nitrate concentrations started out at about 20,000 ppm and decreased to about 15,000 by the last sampling in August. No visible differences due to nitrogen source on topdress N application were observed during the growing season. The potatoes looked very good throughout the season.

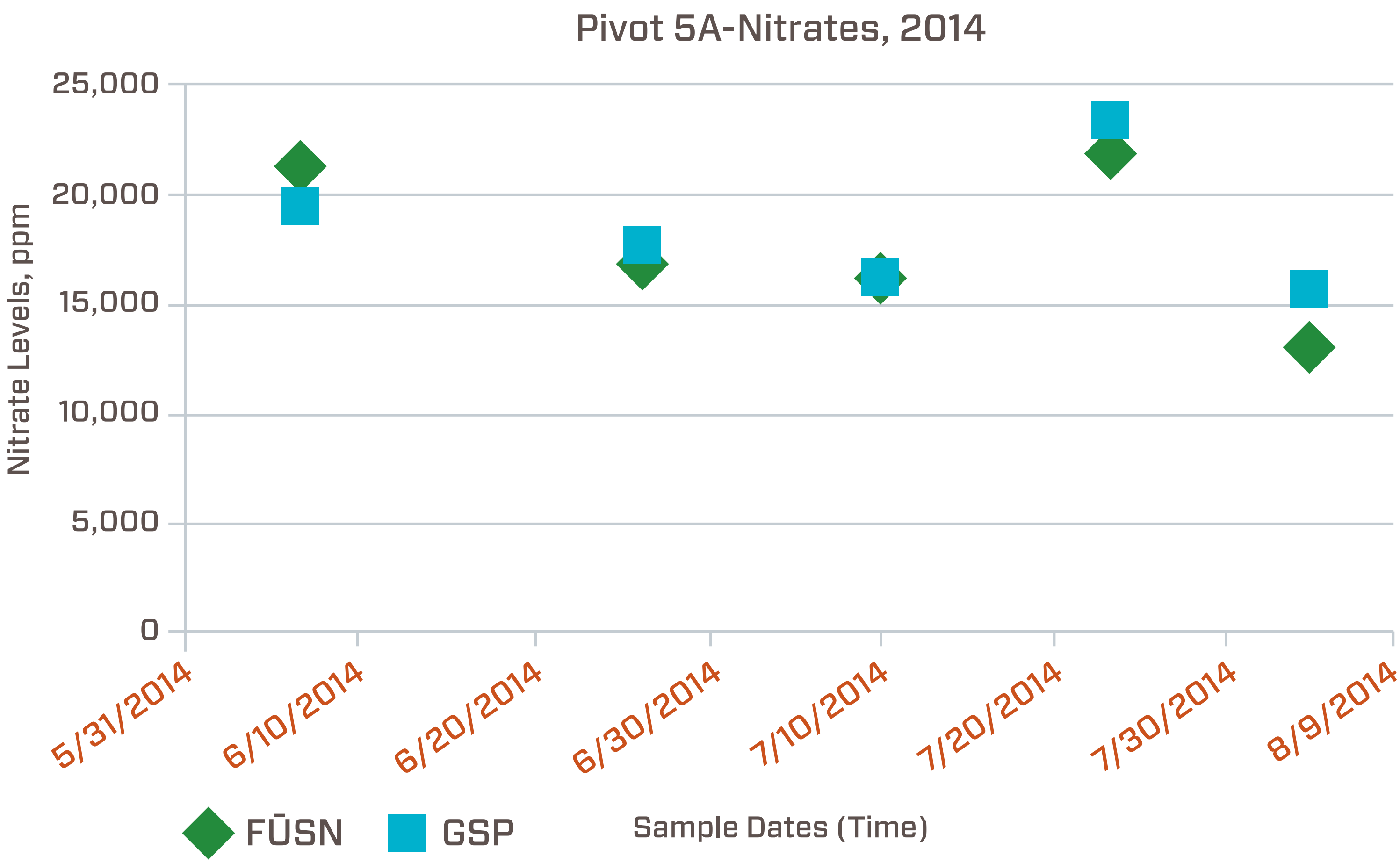

Figure 2. Comparison of potato petiole nitrate concentrations for FŪSN vs. AMS during the growing season.

An average of 2,900 lb/ac increase in total potato yield was observed for the 10 hand samples for the north half of the field topdressed with FŪSN compared to the south half samples that were topdressed with ammonium sulfate (figure 3). There was an increase in the yield of 6–10 oz. and greater than 10 oz. tubers for potatoes topdressed with FŪSN (409 vs 350 cwt). There was an 11 cwt decrease in the 4–6 oz. size fraction for potatoes topdressed with FŪSN. US#2 and cull potatoes were also reduced by the topdress application of FŪSN.

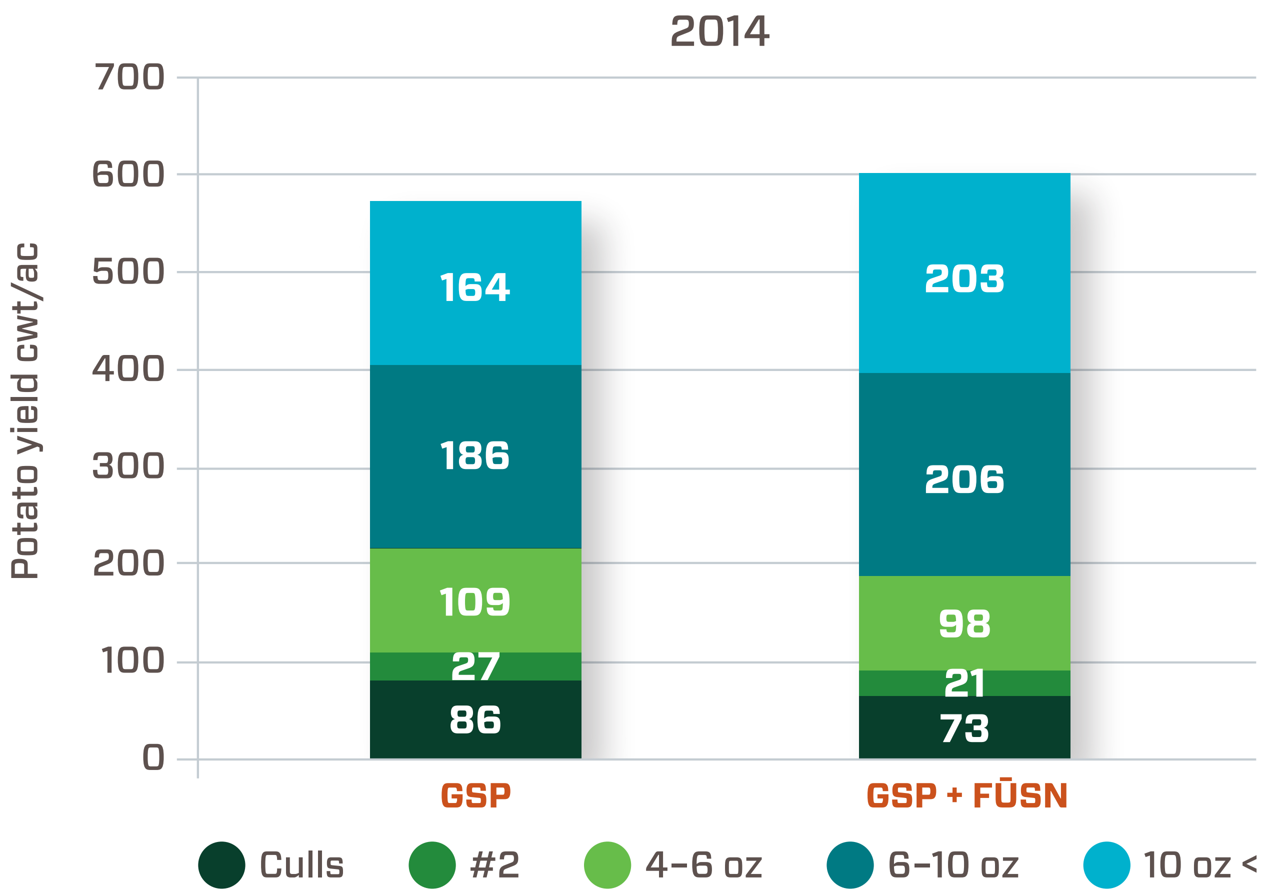

Figure 3. Comparison of FŪSN vs. ammonium sulfate on potato size fraction yield. Results are based on 10 random hand samples (100 ft^2) per treatment.

Composite samples (approximately 100 lb.) from each half of the field were retained and delivered to the JRS potato processing plant for evaluation by the Federal/State of Idaho Inspection Service. Grower returns are based on the grade of the potatoes and the JRS contract. Topdressed FŪSN increased the percentage of US#1 potatoes by 3%. Greater than 6 oz potatoes were increased by 7% and process undersize decreased from 9% to 7% with FŪSN, resulting in a higher payout to the grower. Bruise-free potatoes decreased from 70% to 62% with FŪSN which needs to be further evaluated. The sugar ends percentage also slightly increased with FŪSN. N topdress source had no effect on fry color or specific gravity, both important potato quality traits. Based on the yields from the hand samples and the inspection report potatoes topdressed with FŪSN resulted in a $205/ac increase in revenue back to the grower under the terms of the JRS contract for Ranger Russet potatoes.

Based on the yield samples taken at harvest, and then evaluated by the inspection service, FŪSN increased grower returns by $205/ac. based on JRS contract pricing.

Potato Quality Traits	GSP	GSP + FŪSN
US #1	77%	80%
6+ oz. <	61%	68%
Process undersize	9%	7%
Unusable	17%	13%
Bruise free	70%	62%
Specific gravity	1.086	1.086
Fry color 0	100%	98%
Sugar ends	11%	16%
JRS Ranger contract return, $/ac.	$3,845	$4,050

Figure 3. Potato Quality Traits and Net Returns for Ranger Russet potatoes as affected by topdress N applications.

Ten hand samples (from each half of the field) that were collected behind the crossover potato harvester were GPS referenced. Hand sample yield data and GPS references were superimposed over the yield monitor map that was created from the yield monitor data. The yield monitor map does report more green and yellow coloration in the north half of the field topdressed with FŪSN. There appears to be more brown area (lower yielding) in the south half of the field topdressed with ammonium nitrate. Unfortunately as GPS referenced yields are superimposed over the yield map there does not seem to be a high correlation between the yield map and GPS calibration samples. Further evaluation of yield monitors for potato harvest is necessary with GPS referenced calibration samples.

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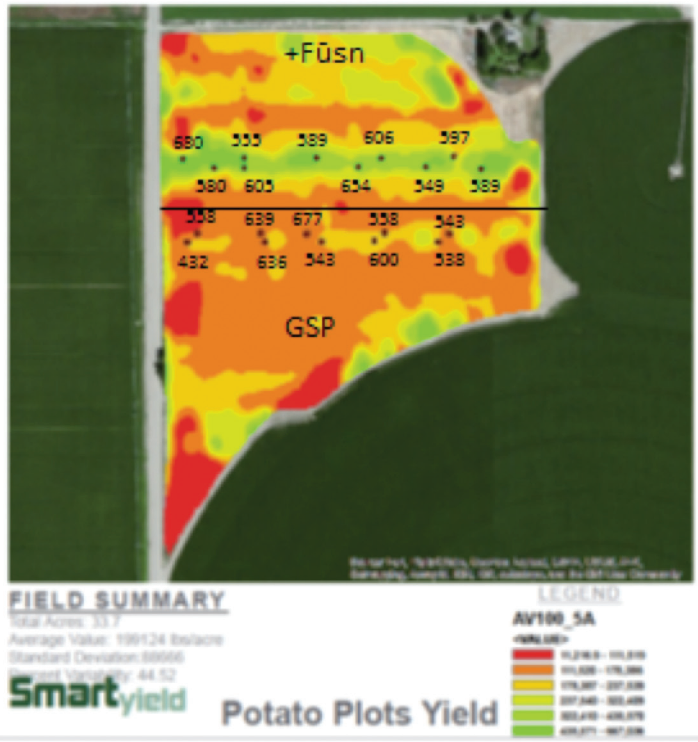

Figure 5. Potato yield map based on yield monitor technology with GSP coordinate hand collected samples (cwt/ac) for calibration of the yield map.

Simplot

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