

**Studies on slow-release liquid fertilizers applied at low rates  
as a foliar application on North Dakota spring wheat/winter wheat  
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Two foliar experiments were conducted to determine the degree of effectiveness of timing and rate of N-Pact® (UAP product, Greeley, CO) on yield and quality of spring wheat. The experiments were: 1. N-rate and timing study on preplant urea and post-N applied at 5-6 leaf stage with N-Pact® at 2 or 3 g/acre rates; 2. N-rate and post-N study with urea applied preplant and N-Pact® applied at 3 g/a rate immediately after flowering.

**Experiment 1 - N-Rate Study with N-Pact® applied at 5-6 leaf spring wheat stage.**

This experiment was conducted in a field of spring wheat following barley in Barnes county, T139N, R57W, section 30, in the SW ¼ of the SW ¼. The soils were Barnes loam (fine-loamy, mixed, superactive, frigid, calcic Hapludolls). Preplant urea treatments were applied 4/17. The plots were seeded by the grower-cooperator 4/30 with Glenn wheat at 1 million live seeds/a. A starter fertilizer of 11-23-0-7.5S was applied with the seed at planting. Soil tests were obtained a week before treatments were applied. The soil test results are shown below.

**Preplant Soil tests for the N-Pact at 5-6 leaf spring wheat experiment, April, 2008.**

<b>Nitrate-N, lb/a</b>	<b>P, ppm</b>	<b>K, ppm</b>	<b>pH</b>	<b>OM, %</b>	<b>Cu, ppm</b>	<b>Cl, lb/a 2-feet</b>
78	13	265	7.0	3.6	0.6	23

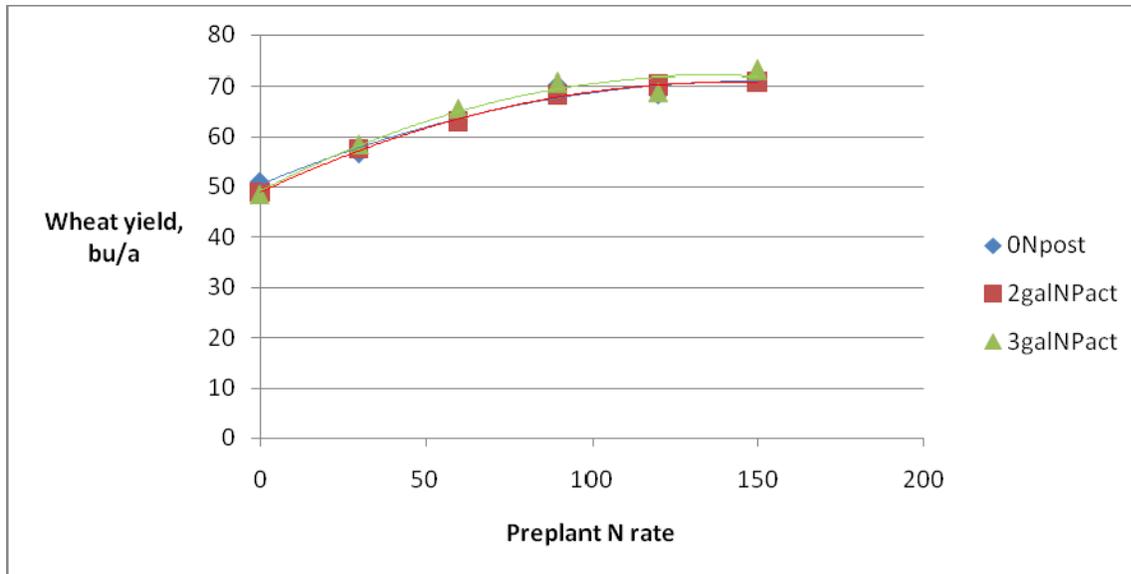
The experimental design was a randomized complete block, with 18 treatments and 4 replications. The treatments are as follows:

- 1-Check
- 2-Check + 2 g/a+N-Pact
- 3- Check + 3 g/a N-Pact
- 4-30 lb N
- 5-30 lb N + 2g/a N-Pact
- 6-30 lb N + 3 g/a N-Pact
- 7-60 lb N
- 8-60 lb N + 2 g/a N-Pact
- 9-60 lb N + 3 g/a N-Pact
- 10-90 lb N
- 11-90 lb N + 2 g/a N-Pact
- 12-90 lb N + 3 g/a N-Pact
- 13-120 lb N
- 14-120 lb N + 2 g/a N-Pact
- 15-120 lb N + 3 g/a N-Pact
- 16-150 lb N
- 17-150 lb N + 2 g/a N-Pact
- 18-150 lb N + 3 g/a N-Pact

Bronate Advanced at 0.8 pt/a and Rimfire at 2.25 oz/a were applied by the grower when the wheat was about 3-leaf. Post application N-Pact treatments were made on 6/10 using 8001 nozzles to deliver a total of 10 g/a of mix at about 40 psi broadcast. The treatments were made from 9AM until Noon. Wind was NE at 10 mph. Temperature was 55 degrees F. Flag-leaf samples were obtained 7/10 from each plot by obtaining 20 flag leaves randomly from the center of each plot. The leaf samples were oven-dried, ground and analyzed for total N. The plots were harvested 8/18 using a plot combine with a 4-foot head. Alleyways were mowed about 8/4 to define plot end points without affecting wheat growth and development at the plot ends.

**Results of 5-leaf foliar N-Pact® application on spring wheat after preplant N application, Valley City, ND, 2008.**

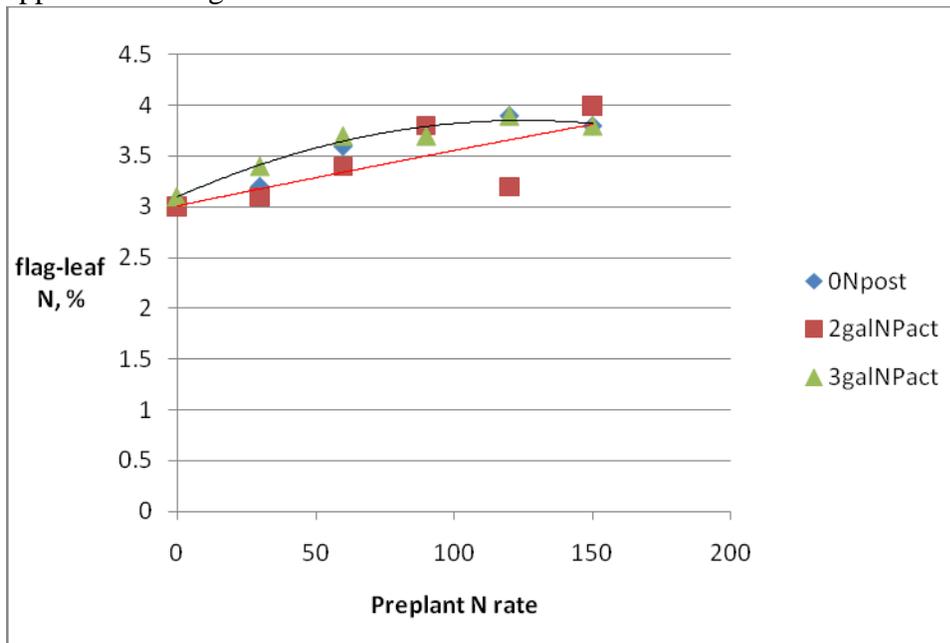
Treatment	Yield, bu/a	Test Weight, lb/bu	Leaf N, %	Protein, %
Check	51.0 a	61.6	3.0 a	13.1 a
Check +2	48.9 a	61.6	3.0 a	13.2 a
Check +3	48.6 a	61.4	3.1 ab	13.2 a
30 lb N	56.6 ab	61.5	3.2 ab	13.4 a
30 lb N +2	57.5 b	61.8	3.1 ab	13.6 b
30 lb N +3	58.5 b	61.6	3.4 ab	13.9 bc
60 lb N	63.1 bc	61.3	3.6 b	14.2 c
60 lb N +2	63.1 bc	61.1	3.4 ab	14.4 c
60 lb N +3	65.6 cd	61.1	3.7 b	14.3 cd
90 lb N	70.3 cd	61.4	3.8 b	14.8 d
90 lb N +2	68.4 cd	60.9	3.8 b	14.7 d
90 lb N +3	70.7 d	62.1	3.7 b	14.7 d
120 lb N	68.4 cd	61.5	3.9 b	15.3 e
120 lb N +2	70.2 cd	61.5	3.2 ab	15.0 e
120 lb N +3	68.8 cd	61.6	3.9 b	15.1 e
150 lb N	71.5 d	61.4	3.8 b	15.3 e
150 lb N +2	70.8 d	61.4	4.0 b	15.2 e
150 lb N +3	73.2 d	61.9	3.8 b	15.3 e
LSD 5%	6.5	NS	0.5	0.5



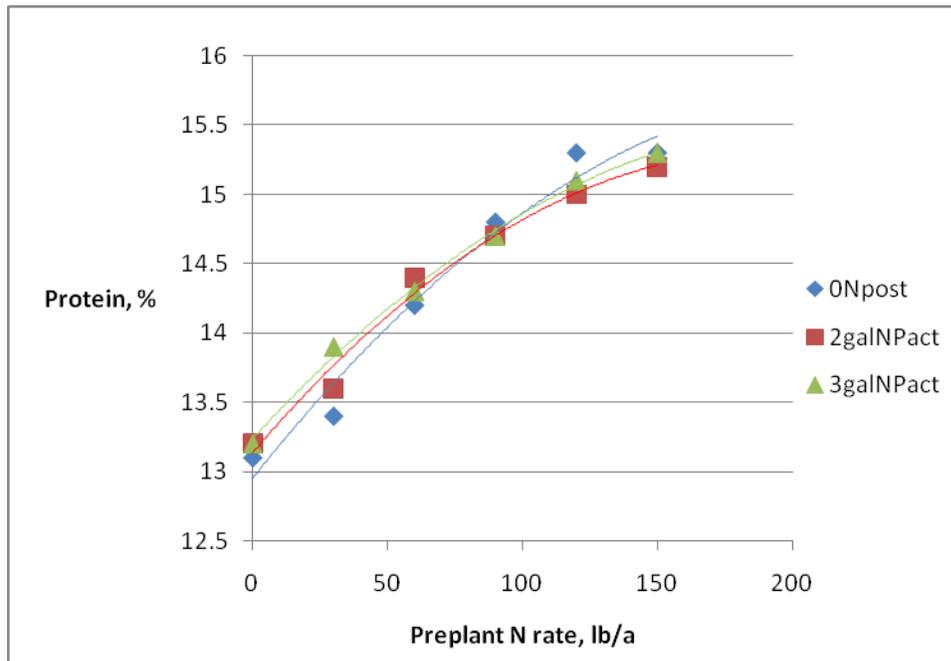
**Wheat yield with preplant N rate and foliar N-Pact® applied at 5-6 leaf stage.**

There was an increase in wheat yield with N rate. There was not an increase in wheat yield with the addition of 2-3 g/a of N-Pact at any N rate. The graph of preplant N rate and yield shows that the response curves for the without, 2 and 3 g/a N-Pact post at 5 leaf are very similar. There is a slight visual separation between the 3 g/a curve and the other curves, but these differences are not significant.

In support of the wheat response, the flag-leaf N response and protein response is similar. There are increases in flag-leaf N and protein with N rate, but there is no added effect of the N-Pact application in significant differences within N-rate treatment.



**Flag-leaf N response to preplant N and post application of N-Pact®.**



**Protein response to preplant N and post application of N-Pact® at the 5 leaf stage.**

**Experiment 2. Application of N-Pact® at flowering at 3 gal/acre rate.**

This experiment, which tested the effect of N-Pact at the 3 g/a rate applied immediately after flowering, was conducted in Barnes county in the same area as the first study. The soils were similar, also a Barnes loam on 2007 barley stubble. Soil tests are shown below-

**Soil tests for the N-Pact immediately after spring wheat flower experiment, April, 2008.**

Nitrate-N, lb/a	P, ppm	K, ppm	pH	OM, %	Cu, ppm	Cl, lb/a 2-feet
37	13	265	7.0	3.6	0.6	23

Preplant treatments were applied 4/16. The plots were seeded by the grower-cooperator 4/30 using Glenn spring wheat at 1 million live seeds/a. Bronate Advanced at 0.8 pt/a and Rimfire at 2.24 oz/a were applied for weed control at the 3-leaf stage. Weed control was excellent throughout the season. The N-Pact treatment of 3 g/a was applied to a total mix with water to equal a 10 g/a application rate. The application was made on 7/10 from noon to 3 PM, with a west wind at 5-10 mph. Individual plot size was 8 feet wide and 20 feet long. A 5-foot alleyway separated blocks of treatments in the randomized complete block design. There were 12 treatments and 4 replications.

Treatments are as follows-

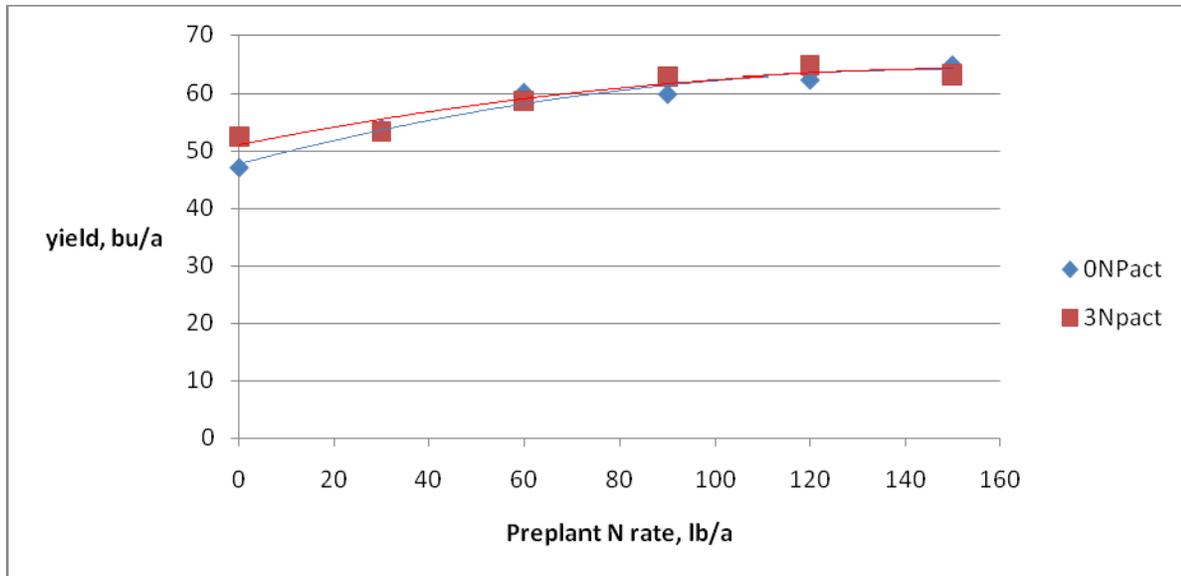
Check  
Check + N-Pact  
30 lb N  
30 lb N + N-Pact  
60 lb N  
60 lb N + N-Pact  
90 lb N  
90 lb N + N-Pact  
120 lb N  
120 lb N + N-Pact  
150 lb N  
150 lb N + N-Pact

The plots were harvested 8/18 using a combine with a 4-foot header.

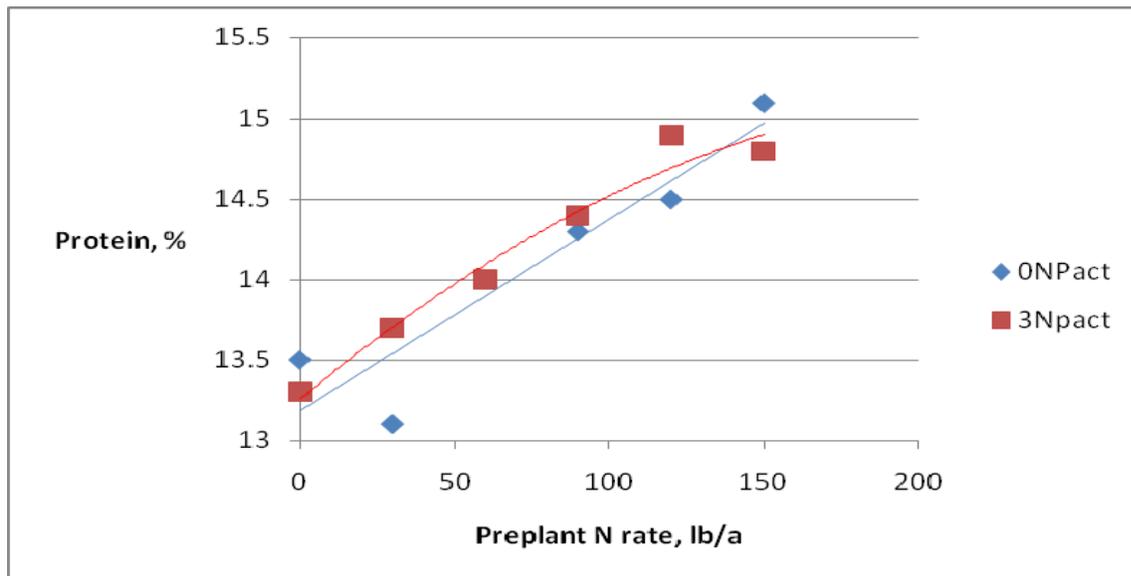
The application of N-Pact at 3 g/a increased wheat yield at the check level and at the 90 lb N level. The increase was not consistent across N rates. N rate itself increased yield consistent with each incremental increase up to the 120 lb N/a rate. Protein also increased with N-rate to the 120 lb N/a treatment. N-Pact application increased protein within N rate at the 30 lb N/a rate and the 120 lb N/a rate.

**Results of post-flower treatment with 3 g/a N-Pact® on spring wheat, Valley City, ND, 2008.**

Treatment	Yield, bu/a	Test Weight, lb/bu	Protein, %
Check	47.0 a	61.0	13.5 a
Check +NP	52.4 b	61.0	13.3 a
30 lb N	53.9 b	61.6	13.1 a
30 lb N + NP	53.4 b	61.8	13.7 ab
60 lb N	60.1 c	61.6	14.0 b
60 lb N + NP	58.7 c	61.5	14.0 b
90 lb N	59.8 c	60.4	14.3 bc
90 lb N + NP	62.8 d	60.3	14.4 c
120 lb N	62.3 d	61.3	14.5 c
120 lb N + NP	64.8 d	60.7	14.9 d
150 lb N	64.7 d	60.6	15.1 d
150 lb N + NP	63.2 d	60.3	14.8 d
LSD 5%	4.5	NS	0.3



Response of spring wheat to preplant N rate and application of 3 g/a N-Pact immediately after flowering. There is a small yield advantage of N-Pact at lower N rates, but not at preplant N rates above 60 lb N/a.

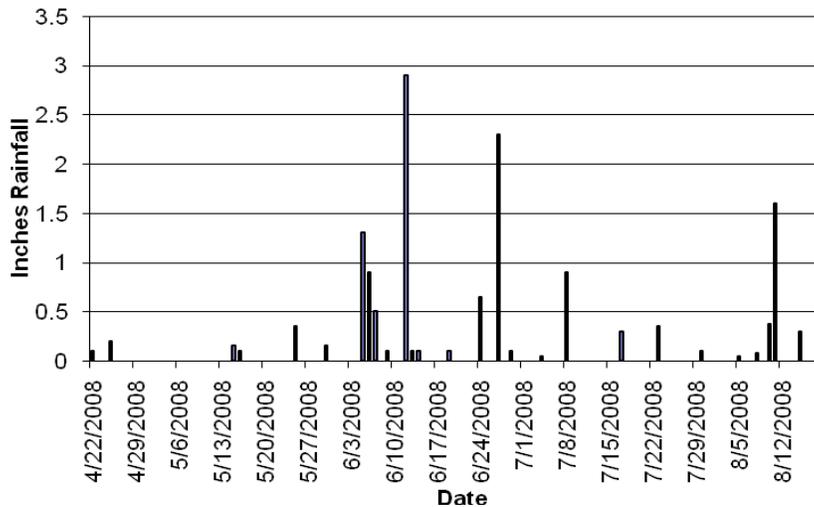


**Protein response of spring wheat to preplant N rate and application of 3 g/a N-Pact® immediately after flowering.**

The graph of protein vs N rate at 0 and 3 g/a N-Pact immediately after flowering shows a small advantage to N-Pact over preplant only at nearly all N-rates. However, the average incremental increase over each N-rate is about 0.1 %. The current NDSU recommendation for protein enhancement is the application of 30 lb N/a immediately following flowering for a protein

enhancement average of 0.5%. This increase with the amount of N applied is close to that recommendation scale.

**Daily Precipitation, Valley City Research Sites, 2008**



**Summary of N-Pact® studies, 2008-**

N-Pact® at 5-leaf stage- There were no significant differences within N level for the application of 2-3 g/a N-Pact at the 5-leaf stage. No differences were observed in yield, flag-leaf N or protein.

N-Pact® immediately after flowering- There were significant differences in both yield and protein at lower N rates. Impact on yield was seen in lower N rates. Protein response averaged about 0.1% for the 3 g/a rate applied, which is within the range of expectations based on 28% post-anthesis research recently conducted at Carrington, Minot and Langdon.

**Foliar Treatment of Spring Barley with 30-0-0 GP Liquid Fertilizer**

This experiment was conducted southeast of Valley City, ND in T139N, R58W, section 12, the NW ¼ of the NE ¼ on Glyndon soils (coarse-silty, mixed, superactive, frigid Aeric calciaquolls). The variety Lacey was seeded May 5. Nitrogen and phosphate were applied at rates to support 80 bu/a malting barley by the cooperator. Bronate Advanced at 0.8 pt/a and Axial at 8.2 oz/a with its adjuvant partner were applied to the crop at the 4-leaf stage. The experiment was staked out 5/22 when the barley was in the tillering stage at 2.5 leaf. The experimental design was a randomized complete block with five treatments and four replications. This provided twelve degrees of freedom in the error term of analysis of variance. Individual plots were 8-feet wide and 20-feet long. A 5-foot alleyway was present between blocks. Alleyways and end turnways were mowed following pollination to minimize end effects. Treatments were as follows. All treatments consisted of broadcast sprays of 2 gallon/a GP 30-0-0 mixed with 8 gallon/a water for a total application rate of 10 gallon/a.

- 1- Check (no post-treatment)

- 2- Tillering stage (2.5-leaf)
- 3- Early joint (1<sup>st</sup> joint)
- 4- Early boot
- 5- Flowering

The 2.5-leaf application was made on 5/22 with wind speed from 5-10 mph from the east, 10AM  
 Early joint application was made on 6/9, with NW wind at 15 mph, 2PM.

The early boot application was made on 6/19 with calm winds and heavy dew, 8AM.

The flowering application was made on 6/30 with a west wind at 5-10 mph, 10AM.

Plots were harvested 8/8. Protein and plump characteristics were analyzed by the NDSU barley quality laboratory. Statistical analysis was conducted within SAS 9.1 for Windows, using the GLM procedure for yield, test weight and plump, and the PROC MIXED with spatial variability considered (using parameters determined within GS+7 for Windows) for protein.

### Results-

There were differences between the check and treatment in both yield and test weight, but not in protein and plump.

Treatment	Yield, bu/a	Test weight, lb/bu	Protein, %	Plump, %
Check	117	45.9	13.4	81.9
Early tiller	125	46.9	12.8	84.7
Early join	116	46.5	13.3	84.6
Boot	109	45.4	13.3	86.7
Flowering	119	46.4	13.2	86.1
LSD 5%	6	1.2 (10% LSD)	NS	NS

Highest yield and test weight was achieved with the early tillering application. It is likely that this application stimulated tillering, increasing the number of heads in many barley plants. The strategy of early N application to stimulate tillering is practiced in small grain production in Europe and also in winter wheat production in southern US states. Application of 30-0-0 at the rate used in the experiment was not effective in increasing yield, test weight, protein or plump at any of the other barley growth stages.

### Summary of GP product application on barley, 2008-

The foliar application of 2 gallon/a 30-0-0 resulted in an 8 bu/a yield increase and 1 lb/bu test weight in barley. This practice could be used to enhance productivity of thin stands, or fields with higher yield potential than originally anticipated.

### Foliar Treatment of Spring Wheat with 30-0-0 GP Liquid Fertilizer, 2008

An experiment was established in the spring of 2008 on established and previously fertilized spring wheat in a field southeast of Valley City, ND. The location was Barnes County, T139N, R58W, NW ¼ of SW ¼ of section 5. The soils were Lanona fine sandy loams (coarse loamy, mixed, superactive, frigid calcic Hapludolls). The field was seeded by the grower April 23 to Faller spring wheat at 900,000 live seeds/acre. Soil test at the site in the fall of 2007 indicated nitrate-N to 2 ft of 82 lb/a; P 15 ppm; K 335 ppm; pH 6.5; organic matter in the 0-6 inch depth 3.9%, and the 6-12 inch depth 2.4%; Cu 0.8 ppm; Cl to 2 ft, 33 lb/a. The field was

fertilized in the spring with an additional 80 lb N/a. Weed control was provided by the grower with an application of Bronate Advanced at 8/10 pt/a and Rimfire at 2.25 oz/a on June 1. Weed control in the field and plot area was excellent. An application of Headline at 3 oz/a with Newton surfactant at 8/10 gal/100 gal mix was also applied a little later in the season.

The experiment was set up as a randomized complete block design with 9 treatments and 4 replications. Individual plots were 8-ft wide and 20-ft long. Blocks were separated by a 5-ft alleyway that was not mowed until after flowering to minimize border effects.

### **Treatments-**

Check

3.5 leaf (tillering) 1 gal/a, applied 5/28

3.5 leaf (tillering) 3 gal/a

First joint 1 gal/a, applied 6/16

First joint 3 gal/a,

Early boot 1 gal/a, applied 6/23

Early boot 3 gal/a

Flowering 1 gal/a, applied 6/30

Flowering 3 gal/a

All treatments were applied at 10 gal/a total mix using 8001 low drift nozzles at 40 psi using a bicycle sprayer moving at about 3 mph. The boom height was adjusted to produce a continuous pattern across 80 inches of treatment area. Wheat was harvested using a plot combine with a 4-ft wide head on August 15.

### **Results of GP 30-0-0 application to spring wheat, 2008-**

There were no differences between treatments in yield, test weight or protein in this study. Apparently the residual N, the release of N during the season by the soil and the N applied by the grower preplant were sufficient for the requirements of the variety. The protein of the wheat was quite low, suggesting that some use of the applications might have been useful to the quality of the crop, but this is not reflected in treatment differences.

### **Effect of foliar treatment of spring wheat near Valley City, on yield, test weight and protein, 2008**

<b>Treatment</b>	<b>Yield, bu/a</b>	<b>Test weight, lb/bu</b>	<b>Protein, %</b>
Check	68.3	58.2	12.5
3.5 leaf 1 gal/a	65.7	58.0	11.9
3.5 leaf 3 gal/a	66.3	57.9	12.5
Early joint 1 gal/a	60.2	57.7	13.0
Early joint 3 gal/a	57.5	57.0	11.2
Early boot 1 gal/a	67.3	58.2	13.4
Early boot 3 gal/a	62.2	57.3	11.8
Flowering 1 gal/a	59.0	57.4	11.9
Flowering 3 gal/a	65.5	57.5	12.5
LSD 5%	NS	NS	NS

### **Effect of GP 30-0-0 Foliar Application on Soybean Yield and Quality.**

A experiment to test the effects of 30-0-0 foliar application soybean yield and quality was established in the spring, 2008 on a field southeast of Valley City, ND.

The experiment was established on an existing field seeded to soybeans about 5/10. The experimental design was a randomized complete block with five treatments and four replications. The treatments were 2 gal/a 30-0-0 mixed with 8 gal/a water to produce an application of 10 gal/a total mix using 8001 low drift nozzles at 40 psi on a bicycle sprayer boom for 80 inch coverage within the plot area. Each plot was 8-ft wide and 20-ft long. The soybeans were seeded in 30-inch rows. Two rows were harvested in each plot September 29. Oil and protein were analyzed by the NDSU soybean quality laboratory.

Treatments-

Check

V3 (6/30)

V5 (7/10)

R1 (7/15)

R3 (7/25)

### **Results of GP 30-0-0 foliar treatment of soybean at several growth stages-**

There were no differences between treatments in yield, test weight, protein or oil.

#### **Effect of foliar 30-0-0 at 2 gal/a at four growth stages on yield and quality of soybean at Valley City, ND, 2008.**

<b>Treatment</b>	<b>Yield, bu/a</b>	<b>Test weight, lb/bu</b>	<b>Protein, %</b>	<b>Oil, %</b>
Check	36.8	56.5	31.6	18.8
V3	35.9	56.5	32.0	18.3
V5	36.5	56.5	32.0	18.5
R1	38.2	56.3	32.4	18.3
R3	36.8	56.4	32.1	18.5
LSD 5%	NS	NS	NS	NS

### **Summary of GP studies on barley, spring wheat and soybean**

There were no increases in yield or quality of spring wheat and soybean with the application of GP 30-0-0 at any tested growth stage. There was an increase in barley yield with the application of 2 gal/acre of 30-0-0 at the 2.5 leaf stage, probably from stimulation of barley tillering with a less than adequate stand for yield potential.

### **Studies on Coron® foliar application to spring wheat.**

In a spring wheat trial at Minot, ND, in 2006 Coron® (28-0-0) applied at 1, 2, or 3 gallons per acre at 5 leaf stage did not increase yield or protein (Table 2),. All treatments had received preplant N for a 50 bu wheat yield goal and yields averaged 57 bu per acre. UAN at 5, 10 or 15 gallons per acre had no effect in this trial either. Results were similar in another trial that included fungicides in both 2005 and 2006.

North Central Research Extension Center, Minot, ND 2006.  
 All plots received preplant N for 50 bu yield goal

<b>Treatment</b>	<b>Rate/A</b>	<b>Yield</b>	<b>Test Weight</b>	<b>Protein</b>
		<b>Bu/a</b>	<b>Lb/bu</b>	<b>%</b>
<b>Untreated</b>		<b>56.0</b>	<b>59.9</b>	<b>16.5</b>
<b>CoRcN</b>	<b>1 gal</b>	<b>53.2</b>	<b>59.4</b>	<b>16.7</b>
<b>CoRcN</b>	<b>2 gal</b>	<b>57.3</b>	<b>59.9</b>	<b>16.5</b>
<b>CoRcN</b>	<b>3 gal</b>	<b>56.4</b>	<b>59.8</b>	<b>16.6</b>
<b>28-0-0</b>	<b>5 gal</b>	<b>59.8</b>	<b>61.1</b>	<b>16.6</b>
<b>28-0-0</b>	<b>10 gal</b>	<b>56.3</b>	<b>60.2</b>	<b>16.8</b>
<b>28-0-0</b>	<b>15 gal</b>	<b>63.1</b>	<b>60.6</b>	<b>16.6</b>
<b>LSD 5%</b>		<b>NS</b>	<b>NS</b>	<b>NS</b>
<b>C.V.%</b>		<b>12.9</b>	<b>1.0</b>	<b>2.7</b>

**Minot- Roseglen, 2006, Kent McKay, NorthCentral R & E Center**

The trial was a randomized complete block design with four replicates. The plot area was tilled prior to the fertilizer applications. Plot size was 5 by 22 feet with an untreated fertilizer border of durum planted between all fertilizer treatments. All fertilizer treatments were spread or applied on May 17. The liquid fertilizer treatments were applied with a CO<sub>2</sub> pressurized bicycle sprayer, equipped with stream-jet nozzles. A shallow incorporation followed the fertilizer applications on May 17. Coron application was applied at flag-leaf. There were protein increases from N rate increases, but no enhanced protein from application of Coron.

**Results from preplant application of N rates of Georgia-Pacific slow-release products compared to urea and 28%; also a urea treatment supplemented with Coron® at flag-leaf.**

<b>Treatment</b>	<b>Yield</b>	<b>Protein</b>
Check	60.0	13.8 a
Urea 45	66.6	14.5 b
Urea 90	71.8	14.9 b
Urea 135	69.3	15.4 c
GP 45	71.8	14.2 ab
GP 90	69.8	14.8 b
GP 135	69.5	15.5 c
28% 45	67.6	14.0 ab
28% 90	68.7	14.3 ab
28% 135	71.1	14.6 b
GP 30% 45	70.3	13.7 a
GP 30% 90	71.6	14.7 b
GP 30% 135	67.5	15.1 bc
90 urea + 1 gpa Coron	69.1	15.1 bc
Mean	68.9	14.6
LSD 5%	NS	0.6

## Northwest R & E Center winter wheat N trials, 2007

Cooperator: Don and Edith Bauman  
Kent McKay, Area Agronomy Specialist  
Lee Novak, Research Specialist  
Blake Vandervorst, Regional Agronomist Ducks Unlimited, Inc., Bismarck, ND  
Pat Carpentier, McLean County Agent  
Jim Hennessy, Mountrail County Agent  
Mike Rose, Ward County Agent

The objectives of this trial were to evaluate nitrogen fertilizer source, rate and timing on 'Jerry' winter wheat. A fall soil test indicated that there was 62 pounds of available nitrogen in the top two feet of soil. Fertilizer treatments and the amount of nitrogen applied consisted of two yield goals of 60 and 80 bushels per acre. The trial was no-till planted September 26, 2006 with spring wheat the previous crop. Treatments were arranged in a randomized complete block and replicated four times. Border plots were planted between fertilizer treatments. The early nitrogen treatments were applied May 1 when the winter wheat was in the 3-leaf stage. The granule nitrogen products were broadcasted on the soil surface and stream bars were used for the liquid nitrogen treatments. The 5-leaf and split fertilizer treatments were applied May 16. CoRon was applied June 29 when the winter wheat was fully-headed. Plots were harvested July 23.

### 2007 Winter Wheat Nitrogen Source/Timing Trial Results, Roseglen, ND

N Treatment	Yield bu/A	Test Weight lb/bu	Protein %
Check O N applied	53.7	58.4	10.1 a
60 bu YG Urea 90 lbs actual N	62.1	57.7	12.0 bc
60 bu YG Urea 90 lbs actual N 5-leaf	67.9	57.0	12.8 bc
80 bu YG Urea 140 lbs actual N	62.5	57.4	12.4 bc
<b>60 bu YG Urea 90 lbs actual N + 1 gal CoRon</b>	<b>65.8</b>	<b>57.8</b>	<b>12.0 bc</b>
80 bu YG Split Urea 90 lbs actual N + UAN 50 lbs actual N 5 leaf	64.1	57.7	12.1 bc
60 bu YG UAN 90 lbs actual N	67.3	58.2	10.8 a
80 bu YG 140 lbs actual N	63.6	57.4	12.4 bc
60 bu YG UAN 90 lbs actual N 5-leaf	65.5	57.8	11.6 b
60 bu YG Agrotain 90 lbs actual N	64.8	57.6	11.7 b
80 bu YG Agrotain 140 lbs actual N	64.0	57.1	12.8 c
60 bu YG Agrium ESN 90 lbs actual N	68.8	58.4	10.8 a
LSD 5%	7.4	NS	1.1

Application of Coron did not increase protein above companion 90 lb N as urea rate.

### 2005 Northcentral R & E Center foliar N and fungicide trial.

**Kent McKay, Lee Novak, Shanna Mazurek**

Parshall spring wheat was seeded April 23 on previous wheat ground.  
Headline® treatments were applied when the wheat was 50% headed on June 28. Folicur®

treatments were applied on July 1 at Feekes 10.51 (fully headed, start of flower). Liquid N (28-0-0) and Coron® fertilizer were applied at different stages to determine the impact fertilizer timing has on increased protein content. Plots were harvested with a plot combine August 16.

Treatments-

1. Check, no fungicide, foliar fertilizer.
2. 10 gallons of 28-0-0 were applied the morning of June 28 with a CO<sub>2</sub> pressurized sprayer, equipped with StreamJet nozzles delivering 20 gpa. Headline® at 4 fl oz/acre was applied as a separate application that afternoon with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20 gpa.
3. Headline® at 4 fl oz/acre and Coron® at 1 gallon/acre were applied together with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20 gpa.
4. Headline® at 4 fl oz/acre and 10 gallons of 28-0-0 were applied together with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20gpa.
5. Headline® at 4 fl oz/acre was applied June 28 with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20 gpa. 10 gallons of 28-0-0 was applied July 13 with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20 gpa.
6. Folicur® at 4 fl oz/acre and Coron at 1 gallon/acre were applied together with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 Twin jet nozzles delivering 20 gpa.
7. Folicur® at 4 fl oz/acre was applied July 1 with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 Twin jet nozzles delivering 20 gpa. 10 gallons of 28-0-0 was applied July 13 with a CO<sub>2</sub> pressurized sprayer, equipped with 8002 flat fan nozzles delivering 20 gpa.

2005 Nitrogen Timing/Fungicide Trial Results, Minot, ND					
		Application	Flag Leaf	Yield	Protein
Treatment	Rate/A	Timing	Burn %	bu/A	%
1 Untreated	---	---	0	48.6	15.2
2 28-0-0 Stream Bar	10 gal	6/28	14.3	50.6	15.6
Headline	4 fl oz	6/28			
3 Headline + CoRon	4 fl oz + 1 gal	6/28	1.7	53.5	15.4
4 Headline + 28-0-0	4 fl oz + 10 gal	6/28	48.3	45.3	15.4
5 Headline	4 fl oz	6/28	23.3	53.7	16.0
28-0-0 Foliar	10 gal	7/13			
6 Folicur + CoRon	4 fl oz + 1 gal	7/1	1.7	54.1	15.3
7 Folicur	4 fl oz	7/1	16.7	51.9	15.8
28-0-0 Foliar	10 gal	7/13			
LSD (P=.05)			7.4	4.1	0.4
CV			4.5	27.5	1.4

Protein was increased by foliar treatments of 10 gpa of 28%, but not by low rates of Coron.

### Summary

In all foliar studies of three slow-release N products applied at low rates near, at or after flowering, there were no increases in protein when preplant N was applied at recommended

rates. It appears that the use of these kinds of products applied at lower than 10 gpa rates would not be expected to produce measureable, and certainly not economic returns to growers. At current costs of these products, a 10 gpa rate of slow-release products would probably not be economical to growers from increases in protein. The current recommendation of 10 gpa 28% mixed with 10 gpa water, applied post-anthesis at the water-ripe stage of growth in the cool of the day continues to be the best choice for enhancing protein an average of  $\frac{1}{2}$  %.