

Factsheet: Increasing Wheat Protein with a Post Emergent Application of UAN



Objective:

The objectives of this study were to demonstrate:

- the potential of post-anthesis applied UAN (30 lbs/ac N) to increase wheat grain protein and to demonstrate that improvements in grain protein with in-season nitrogen (N) are more likely to occur for more nitrogen deficient wheat (ie: base levels of 70 and 100 lbs/ac of N for comparison).
- greater crop safety (less leaf burn) and potentially greater wheat yields when post-anthesis N is applied in a dribble band vs foliar broadcast (flat fan) sprays.
- the potential for a better yield and protein response to post-emergent N when applied earlier in the season (pre-boot versus anthesis)
- the overall risks and benefits of split-applications versus applying all N at seeding.

Methodology:

A study was conducted at 7 locations across Saskatchewan (Yorkton, Indian Head, Melfort, Redvers, Outlook, Swift Current and Scott) to determine if wheat yield or protein could be increased by applying 30 lb N/ac of UAN later in the season. UAN was applied to base rates of 70 or 100 lb N/ac of side-banded urea. It was either dribble banded pre-boot or post-anthesis or foliar sprayed post-anthesis.

Table 1: Treatment list for Increasing wheat protein with a post emergent application of UAN

Treatment #	Nitrogen rate (lbs N/ac)	Placement
1	70 lbs N/ac	side-banded urea
2	100 lbs N/ac	side-banded urea
3	130 lbs N/ac	side-banded urea
4	70 lbs N/ac 30 lbs N/ac	side-banded urea pre-boot surface dribble-band UAN ^{1,3}
5	100 lbs N/ac 30 lbs N/ac	side-banded urea pre-boot surface dribble-band UAN ^{1,3}
6	70 lbs N/ac 30 lbs N/ac	side-banded urea post-anthesis foliar spray UAN ^{2,4}
7	100 lbs N/ac 30 lbs N/ac	Side-banded urea post-anthesis foliar spray UAN ^{2,4}
8	70 lbs N/ac 30 lbs N/ac	side-banded urea post-anthesis surface dribble-band UAN ^{2,3}
9	100 lbs N/ac 30 lbs/ac N	side-banded urea post-anthesis surface dribble-band UAN ^{2,3}
¹ Applied late-herbicide timing, pre-boot stage ² Applied 7-10 days post-anthesis ³ Sprayed with dribble band nozzle at 20 ga/ac (10 ga/ac UAN + 10 ga/ac water) ⁴ Sprayed with 02 flat fan nozzles at 20 ga/ac (10 ga/ac UAN + 10 ga/ac water)		

The full report is available on www.warc.ca. This project was funded by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Growing Forward 2 bilateral agreement.

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Key Findings:

- Leaf burning was most severe with the foliar spray application and dribble banding pre-boot provided the least amount of crop damage.
- On average, the supplemental application of 30 lb N/ac increased grain protein by 0.8 and 0.6% when applied to base rates of 70 and 100 lb N/ac, respectively. This supports the hypothesis that supplemental N can increase grain protein more when N deficiency is greater.
- While applying supplemental N increased protein it did not increase either yield or protein compared to side banding all N at seeding.
- In some instances, split applications resulted in less yield and/or protein.
- In other words, nitrogen use efficiency was better when all the nitrogen was side-banded at seeding.
- Foliar UAN and dribble band applications were both diluted to 50:50 with water. Current recommendations would now suggest that dribble band applications should not be diluted. Diluted dribble band applications may increase the level of crop injury from dribble banded UAN by reducing surface tension and decreasing the number of droplets that roll off leaf surfaces.
- Therefore, applying an additional 30 lb N/ac late in the season to base rates of 70 and 100 lb N/ac of side-banded urea significantly increased grain protein by 0.8% and 0.6%, respectively when averaged over location and method of application.

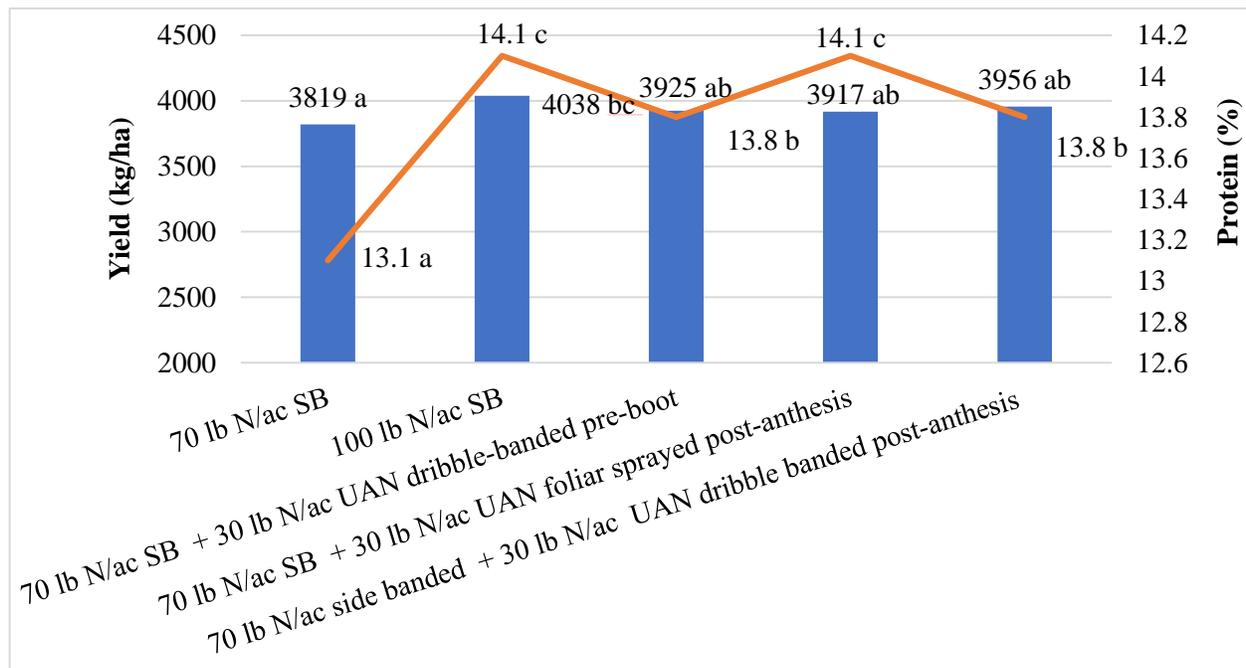


Figure 1: Impact of late season nitrogen on wheat yield and protein, averaged over total N and locations for Increasing wheat protein with a post emergent application of wheat

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