

VARIABLE RATE NITROGEN (VRN) APPLICATION ON WHEAT USING THE GREENSEEKER ON A FIELD BASIS

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OBJECTIVE

The objective of this experiment is to determine if the algorithms for variable rate nitrogen applications found from small plot research in Kentucky will result in improved nitrogen applications and yield when plant sensors are used on a commercial applicator in a large wheat field.

The Greenseeker is a real-time, on-the-go sensor/applicator that senses the health of the wheat crop at the time nitrogen is applied and then simultaneously adds the precise amount of nitrogen that is determined to be needed by the machine. The sensing and application technology part of the machine has been very accurate and reliable. The weak part of the process has been the algorithm (formula) that is placed in the software of the machine to tell it how much nitrogen to add based on the plant health Normalized Difference Vegetation Index (NDVI) readings. Basic field research has resulted in reliable algorithms for use on field application.

METHODS

In 2011 two replicated field trials (6 total replications) were done with the Greenseeker on 2 large fields in cooperation with Phillip Needham, Brandon Hunt and Nick Ricks. The 4 Greenseeker sensor units were distributed across a 60 foot boom. The units were rigged to give an average NDVI reading across the 60 foot boom and N rates changed across the entire boom as called for by the averaged NDVI readings. The algorithm used was the one averaged across 2008, 2009 and 2010 on the Pembroke soil type at Feekes 6. The applicator only used pressure to change the 32% UAN liquid volume. So the

change was limited to a 50 lb/a N range (30 to 80 lb/ac N) at 12 mph while depending on pressure changes to change volume flow, the rate changes are slow.

RESULTS

The Greenseeker treatment (VRN) was consistently higher in yield for the 2 fields (Table 1, 2011). The yield increases were about 5 bu/ac in one field and 2 bu/ac in the other for an average of about 3.5 bu/ac.

The average N rate applied was about the same for the VRN and the flat rate treatments. This meant that the yield gains were due to the N being applied according to the plant needs.

The returns (\$/a) for the use of the VRN was about \$30/ac in one field and \$11/ac in the other for an average of \$20.50/ac. This does not consider the initial cost of the greenseeker system.

The use of this technology shows promise for the second year in a row.

TWO YEAR SUMMARY

This is the second year the VRN technology using the Greenseeker has been scientifically tested on a field basis. The results have been positive for VRN in each field test (table 1).

The yield increase has averaged about 4 bu/ac with a range from 2 to 5 bu/ac and has been statistically significant at the 0.1 level each time.

The N rates are similar between the treatments with average of about 8 lb/ac more N used in the VRN treatment.

The economic returns for using VRN have averaged about \$20/ac more than the flat rate method and ranged from \$11 to \$30/acre. This does not consider the initial cost of the Greenseeker units.

THANKS

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Table 1. Two Year Field Trial Summary for Greenseeker Vs. Flat Rate N							
		Greenseeker			Flat Rate		
Field	Year	Yield Bu/ac	N Lb/ac	Returns \$/ac	Yield Bu/ac	N Lb/ac	Returns \$/ac
Hunt	2010	84.2	69.0	390	79.3	45.0	376
Home1	2011	97.4	51.1	559	92.5	52.3	529
Smith	2011	84.2	54.1	478	82.2	53.2	467
Avg		88.6	58.1	476	84.7	50.2	457

<p align="center"> Effect of Greenseeker (VRN) on Wheat Yield = +3.9 bu/ac N = -7.9 lb/ac Returns = +\$19/ac </p>
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