

**SOIL/WATER RESEARCH**  
*South Dakota State University*  
**2008 Progress Report**  
 Agricultural Experiment Station  
 Plant Science Department  
 South Dakota State University, Brookings, SD 57007

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**Nitrogen response from four corn hybrids near White SD in 2008. (42508)**

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**Introduction**

Recent studies from Illinois have suggested that corn hybrids containing corn root worm

resistance are more N efficient when compared with their hybrid iso-line without corn root worm resistance. Corn hybrids with the Roundup Ready gene (RR), corn bore resistance (Bt), and the corn root worm resistance (CRW) are known as VT3. Monsanto initiated a regional research project to investigate whether VT3 hybrids are more N use efficient.

**Materials and Methods**

<b>Item</b>	<b>Description</b>
Location	I-29 and Highway 30, 1 mile east, south side
Hybrids (iso-line pairs)	DKC 44-92 and DKC 46-60 VT3 DKC 52-63 and DKC 52-59 VT3
Insecticide	Force 3G at 5 oz/1000 ft of row applied in-furrow to the DKC 44-92 and DKC 52-63
Previous Crop / Tillage	Corn, Conventional
N source / Placement	Urea - Surface Broadcast incorporate
N rates (lbs N/a)	0, 60, 120, 180, 240
Measured parameters	Ear leaf, R1 whole plant, R6 whole plant, grain yield plant population, pre-plant and post-harvest soil N root node injury score, ear damage, stalk lodging
Total N analyzed	Ear leaf, R1 whole plant, R6 whole plant, and grain
Other Crop Nutrients	Applied according to soil tests.
Statistics (4 replications)	RCBD, N rate main blocks with hybrid sub-plots.
Planting date	May 15
Harvest date	November 5

**Results and Discussion**

Very little or no corn bore and root worm pressure was measured at this site (data not shown). The project was purposely planted on a site which had non-Bt corn grown previously. Planting was somewhat delayed by very wet soil conditions from above normal precipitation during the Fall of 2007 and 9 inches of precipitation received during May and June of 2008 which may have produced leaching conditions for soil nitrate-N. The growing

season was cool which delayed plant growth and grain maturity, especially for the DKC 52-63 and DKC 52-59 hybrids which have a relative maturity of 102 days. The DKC 44-92 and DKC 46-60 hybrids have relative maturities of 94 and 96 days, respectively. Pre-plant soil Nitrate-N showed 80 to 123 lbs N/a (0-3ft). Post harvest soil Nitrate-N was much lower and trended higher with higher N rates for both sampling depths (Table 1). Hybrid significantly influenced ear leaf total N (%) and R6 growth stage total N uptake (Table 2). Applied N rate significantly

influenced all measure parameters. The hybrid by N rate interaction had no significant influence on measured parameters. Ear leaf N concentration (%) and R1 growth stage N uptake (lbs N/a) increased with higher applied N rates up to 120-180 lbs N/a and then somewhat leveled (Figures 1 and 2). R6 growth stage N uptake (lbs N/a) and grain N concentration (%) increased with each applied N rate (Figures 3 and 4). Grain yield was maximized with 120 lbs N/a for the DKC 44-92, DKC 52-63 and DKC 52-59 hybrids (Figure 5). However, grain yield for the DKC 46-60 hybrid was maximized with 60

lbs N/a and is statistically different when compared to the other hybrids at this rate. The DKC 46-60 hybrid could be exhibiting higher nitrogen use efficiency (NUE), but more research needs to be conducted to verify this result.

### Acknowledgments

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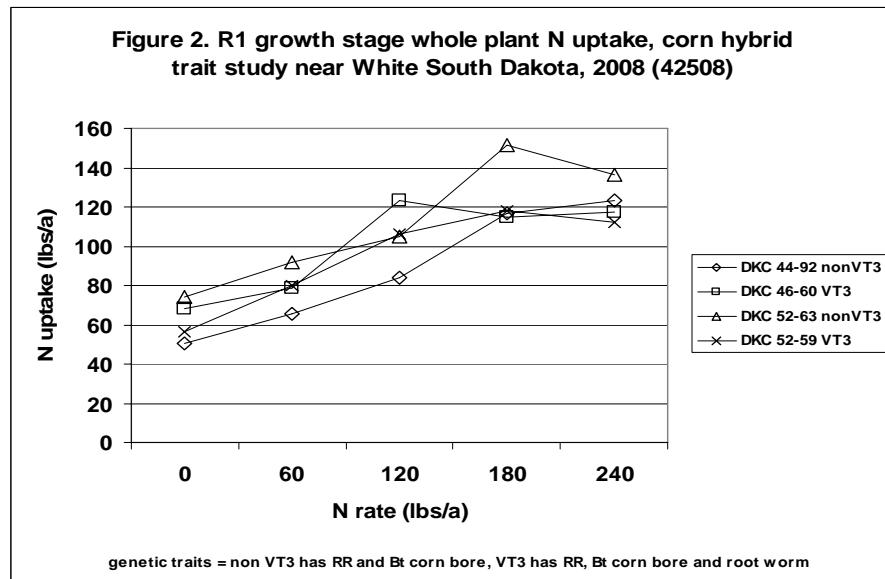
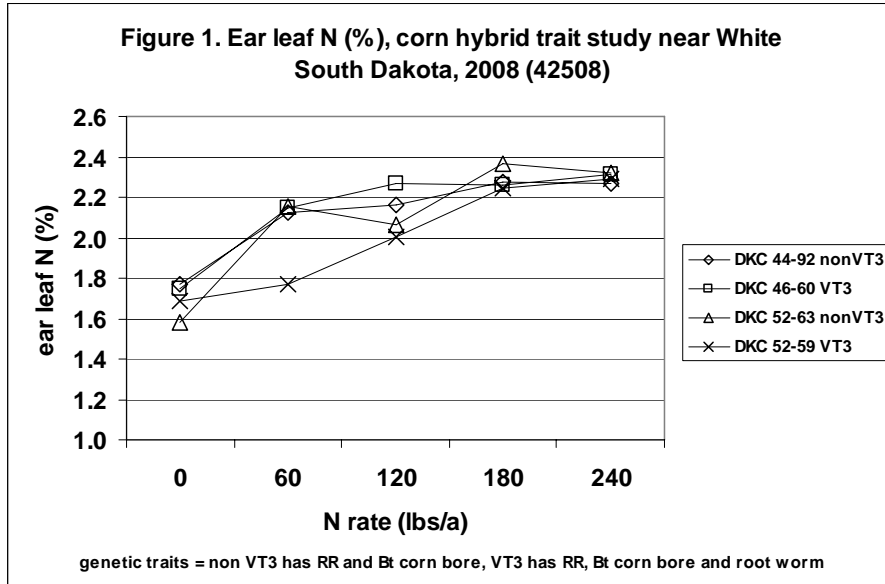
Table 1. Post harvest soil Nitrate-N, corn hybrid trait study near White SD in 2008. (42508)

Hybrid	Applied N rate <sup>A</sup>	Post Harvest Soil Nitrate-N	
		0-24 inch	0-48 inch
		----- lbs/a -----	
DKC 44-92 (non VT3)	0	20	39
	60	21	47
	120	25	49
	180	36	63
DKC 46-60 (VT3)	0	17	36
	60	21	42
	120	32	63
	180	38	66

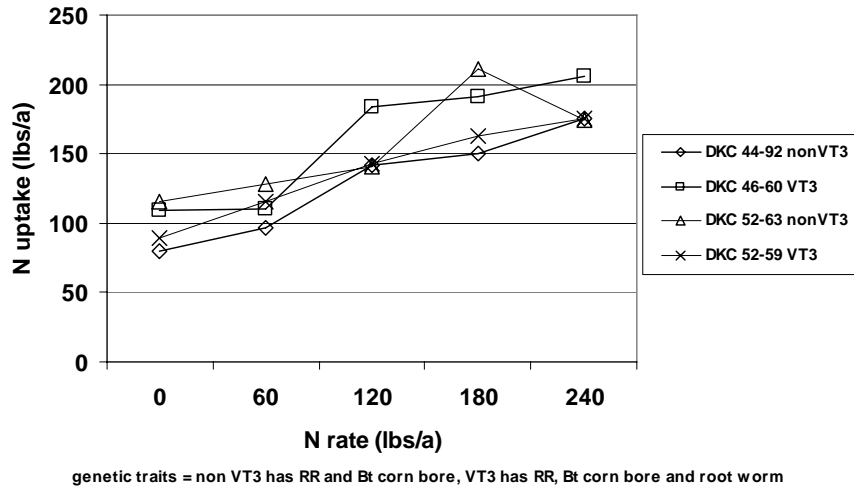
<sup>A</sup> Pre-plant broadcast incorporated urea.

Table 2. ANOVA for dependent variables from the corn hybrid trait and N rate study near White SD in 2008 (42508)

Source of Variation	Ear Leaf	R1 Growth stage	R6 Growth stage	Grain	
	N (%)	N uptake (lbs/a)	N uptake (lbs/a)	Total N (%)	Yield
	----- Pr>F -----				
Hybrid (H)	0.03	0.10	0.08	0.48	0.38
N rate (NR)	0.01	0.01	0.01	0.01	0.01
H x NR	0.35	0.37	0.37	0.71	0.64



**Figure 3. R6 growth stage whole plant N Uptake, corn hybrid trait study near White South Dakota, 2008 (42508)**



**Figure 4. Grain N concentration (%), corn hybrid trait study near White South Dakota, 2008 (42508)**

