

## 2014 Evaluation of SCN Resistant Soybean Varieties in Nebraska

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Soybean cyst nematode (SCN) is the pest that causes the single largest loss to soybean producers in both Nebraska and the U.S. each year. Chemical treatment to the soil and/or soybean seed to control SCN has not achieved consistent economic success. Resistant varieties are the most effective way to maintain high yields in SCN-infested soybean fields. This report summarizes soybean variety testing from three SCN-infested locations in Nebraska. All of the soybean varieties in these tests were resistant to SCN with the exception of four susceptible "standards." The majority of varieties have the PI 88788 source of SCN resistance. However, additional varieties with Cyst-X or Peking resistance were also included in the trials.

The three locations used for testing were all on producers' fields located throughout Nebraska. Sites near the towns of Battle Creek, Columbus and Plattsmouth were selected based on geographical location in the state and adequately high populations of SCN (Figure 1).

A non-infested control site was also planted near Mead at the Agricultural Research and Development Center (ARDC) to test SCN resistant soybean variety yields in the absence of SCN. All entries in the trial were replicated 4 times at each location. Each individual plot was 4 rows (10 feet) wide by 17 feet long. The spacing between rows was 30 in. Soil samples were collected from each plot in the spring shortly after soybean emergence. These samples were then processed in the lab to determine the number of SCN eggs per 100 cc's soil. These spring samples established the initial SCN count for each plot. Soil sampling was repeated in the fall following harvest to determine the final SCN population density. By comparing the final (fall) SCN population to the initial (spring) population a Reproduction Factor (Rf) was calculated. The Rf is calculated by dividing the final SCN count (plus minimum detectable level) by the initial SCN count (plus minimum detectable level). This number will indicate how much the population increased or decreased during the growing season. An Rf of 1.0 means there was no change in the SCN population. Any Rf value above 1 indicates the population increased, and any value below 1 means it decreased. The graphs below, which report soybean yield (bu/A) and SCN reproduction (Rf), indicate SCN reproduction in terms of the Rf.

### Battle Creek

The Battle Creek site was located in a center pivot irrigated field with loamy sand soils. The soil pH was 7.0 (Table 1). Soil organic matter (OM) was 1.1 % (Table 1). Rainfall totaled 21.9 inches and approximately 5.0 inches of irrigation were applied throughout the growing season. Battle Creek had the lowest initial SCN population with an average of 1,077 eggs per 100 cc's soil (Table 1). SCN varieties

with PI 88788 resistance were not very effective, allowing an average Rf of 3.6. Varieties with Peking resistance had a Rf of 1.4 and Cyst-X had an Rf of 5.9. Hoegemeyer 2993NRR with PI 88788 resistance exhibited the best control with an Rf of 0.7. The average Rf for susceptible varieties was 10.4. Yields were fair with the highest yield being Channel 2808R2 with 63.4 bu/A. The lowest yielding variety was Asgrow 2431 an SCN susceptible variety with 47.5 bu/A. The average yield for this location was 55.7 bu/A. The 5 top yielding varieties in descending order were Channel 2808R2 [63.4 bu/A], Stine 29RE22 [62.5 bu/A], NK 35 A8 [62.1 bu/A], LG C3070R2 [61.9 bu/A], and Latham L2884R2 [61.9 bu/A]. There was statistical variance exhibited between yields producing an LSD (P = 0.10) of 7.8.

### **Columbus**

The Columbus site was located in a center pivot irrigated field with loamy sand soils. The soil pH was 7.4 (Table 1). Soil organic matter (OM) was 3.0 % (Table 1). Rainfall totaled 27.5 inches throughout the growing season. Columbus had an intermediate initial SCN population with an average of 3,359 eggs per 100 cc's soil (Table 1). SCN varieties with PI 88788 resistance were effective, only allowing an average Rf of 0.9. Varieties with Peking resistance had an Rf of 1.2 and Cyst-X had an Rf of 0.5. Latham L3184R2 with PI 88788 resistances was the variety that exhibited the best control with an Rf of 0.3. Average Rf for susceptible varieties was 4.2. Yields were lower at this location with the highest being Mycogen 5N284R2 with 48.6 bu/A. The lowest yielding variety was LG 2916R2 a SCN resistant variety with Cyst-X resistance which yielded 30.0 bu/A. The average yield for this location was 41.0 bu/A. The 5 top yielding varieties in descending order were Mycogen 5N284R2 [49.5 bu/A], Stine 30RE02 [49.1 bu/A], Mycogen 5N275R2 [47.6 bu/A], LG C2605 [47.2 bu/A], and Producers 2408NR2 [47.1 bu/A]. There was statistical variance exhibited between yields producing an LSD (P = 0.10) of 9.9.

### **Plattsmouth**

The Plattsmouth site was located in a non-irrigated field with silty clay loam soils. The soil pH was 7.3 (Table 1). Soil organic matter (OM) was 3.1 % (Table 1). Rainfall totaled 28.2 inches throughout the growing season. Plattsmouth had the highest initial SCN population with an average of 6,003 eggs/100 cc's soil (Table 1). SCN varieties with PI 88788 resistance were effective, allowing an average Rf of 0.8. Varieties with Peking resistance had an Rf of 0.5 and Cyst-X had an Rf of 0.5. Latham L3184R2 with PI 88788 resistance exhibited the best control with an Rf of 0.4. Average Rf for susceptible varieties was 3.6. Yields were fair with the highest being NK 34 Z1 with 69.6 bu/A. The lowest yielding variety was Producers 2408R2 an SCN susceptible variety which yielded 28.5 bu/A. The average yield for this location was 51.0 bu/A. The 5 top yielding varieties in descending order were NK 34 Z1 [69.6 bu/A], Latham L2948R2 [61.3 bu/A], NK 35 A8 [57.9 bu/A], Latham L3184R2 [57.7 bu/A] and Stine 29RD22 [57.1 bu/A]. There was statistical variance exhibited between yields producing an LSD (P = 0.10) of 17.4.

### Statistics

A statistical analysis was performed on the yield (bu/A) at each location. LSD's were calculated at the 90% confidence level. An LSD (Least Significant Difference) indicates how much difference there has to be between two entries before they are considered statistically different from each other and not due to natural variations in the test data. The 90% confidence level means there is a 90% probability the difference between two yields or reproductive factors is significant and only a 10% chance the difference was due to random variability. Lower confidence levels will result in smaller differences required for significance, while higher confidence levels will make the LSDs larger. The LSDs in the charts below are intended to help visualize differences between varieties.

**Table 1:** Miscellaneous trial information.

Location	Soil Texture	pH	OM <sup>1</sup> (%)	Average Spring SCN Population	HG Type <sup>2</sup>	Planting Date	Harvest Date
				All Plots (eggs/100 cc's soil)			
Battle Creek	Loamy Sand	7.0	1.1	1,077	1.3.6.7	5/23/2014	10/27/2014
Columbus	Loamy Sand	6.8	1.1	3,359	2.5.7	5/30/2014	10/29/2014
Plattsmouth	Silty Clay Loam	7.0	7.7	6,003	0	5/21/2014	10/21/2014

<sup>1</sup>OM = Organic Matter (%)

<sup>2</sup>See explanation of HG Type in Table 2



**Table 2:** HG Types and sources of resistance. (ie, if SCN is HG type 1 then it will reproduce on soybeans with Peking resistance, if SCN is HG type 1.2 then it will reproduce on soybeans with Peking or PI 88788 resistance. If a number is not listed in the HG type, that source of resistance held SCN reproduction to 10% or less of the reproduction that occurred on a standard susceptible variety.)

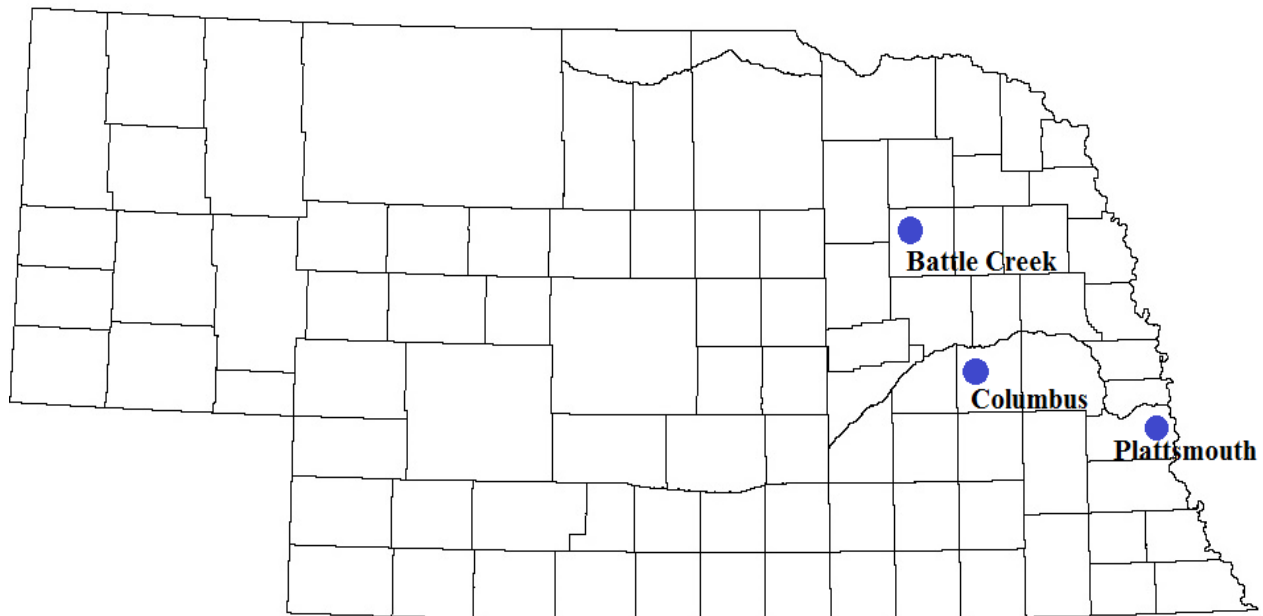
<b>HG Type</b>	<b>Source of Resistance</b>
1	PI 548402 (Peking)
2	PI 88788
3	PI 90763
4	PI 437654
5	PI 209332
6	PI 89772
7	PI 5484316 (Cloud)

**Table 3:** Average SCN population for resistant and susceptible varieties.

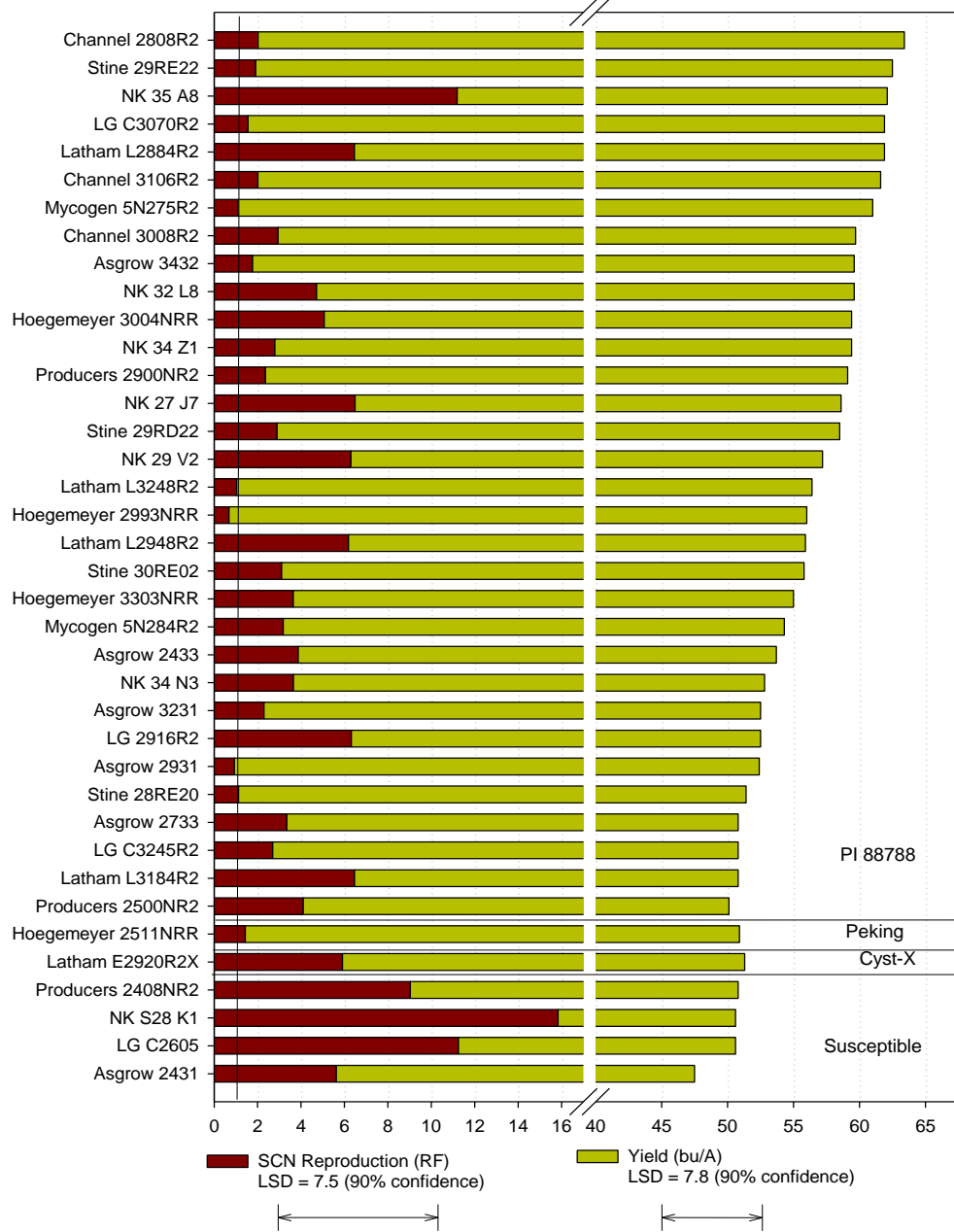
Location	Average Spring SCN Population <sup>1</sup>	Average Fall SCN Population <sup>1</sup>	Average Spring SCN Population <sup>1</sup>	Average Fall SCN Population <sup>1</sup>
	Resistant Varieties		Susceptible Varieties	
Battle Creek	991	1,609	1,600	3,970
Columbus	3,390	2,365	2,457	8,793
Plattsmouth	6,344	4,051	4,590	11,129

<sup>1</sup> SCN Population = eggs/100 cc's soil

**Figure 1.** Locations of UNL SCN-resistant Soybean Variety Trial Program experiments in 2014.



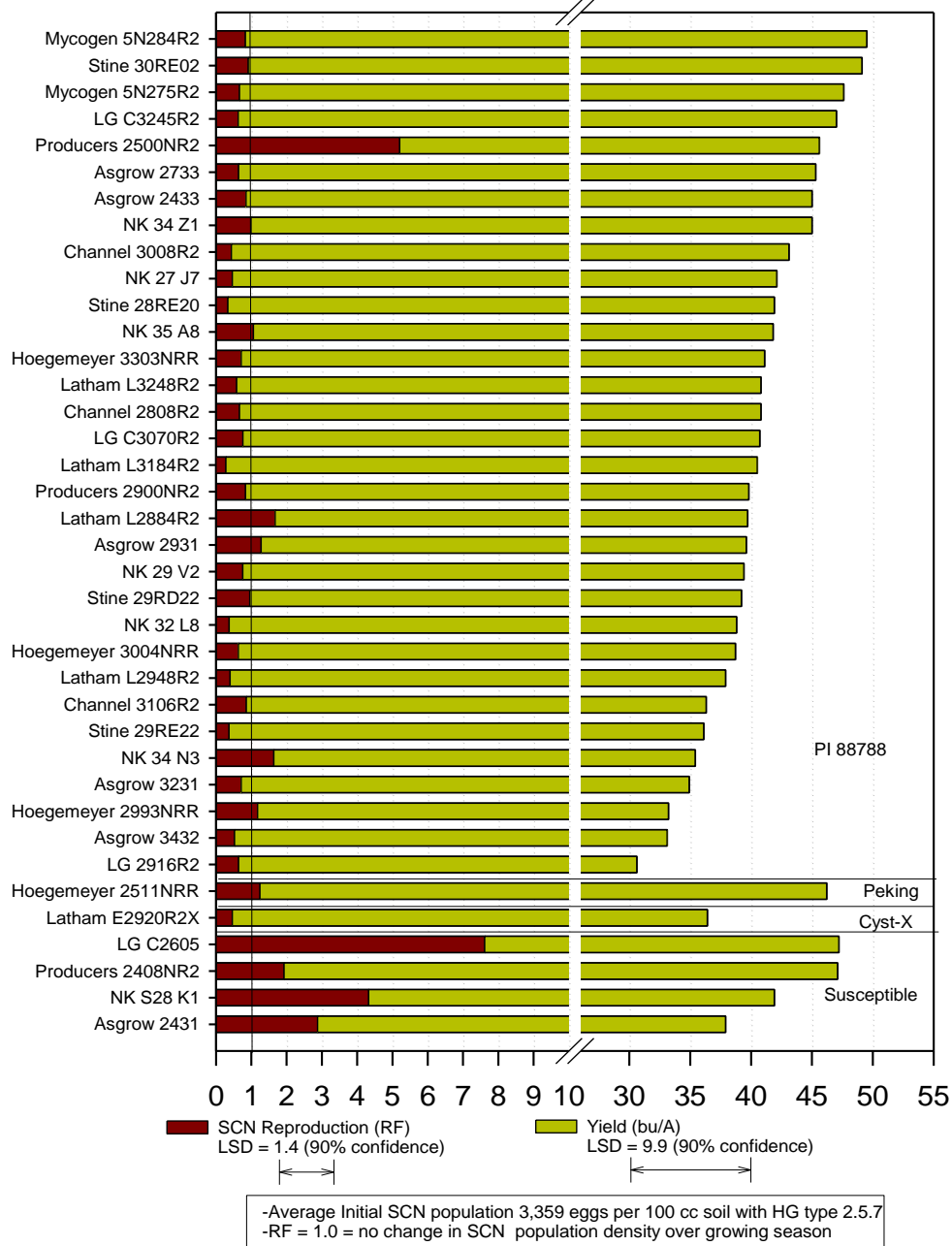
### Battle Creek, NE SCN Plot Results



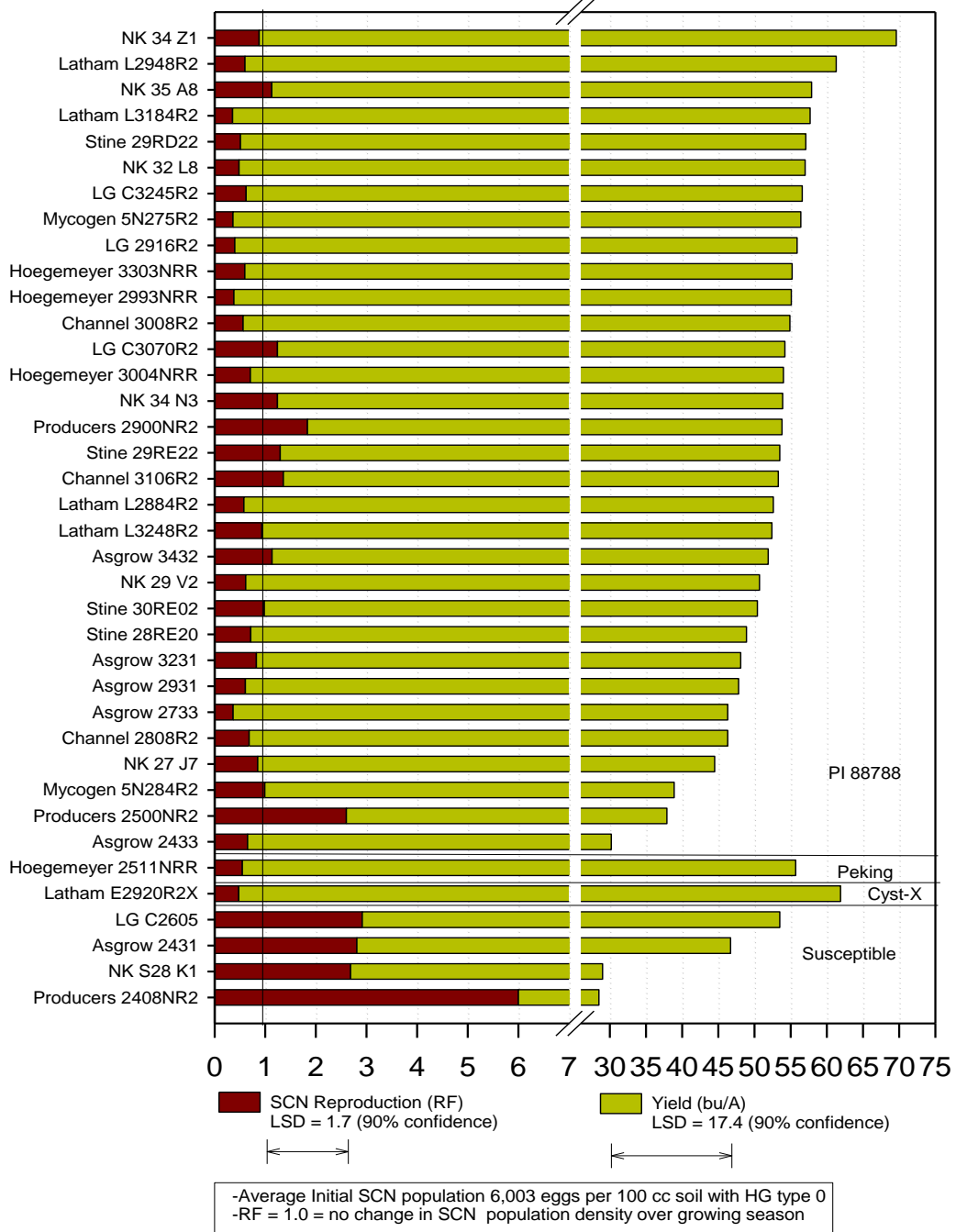
-Average Initial SCN population 1,077 eggs per 100 cc soil with HG Type 1.3.6.7  
 -RF = 1.0 = no change in SCN population density over growing season



### Columbus, NE SCN Plot Results



### Plattsmouth, NE SCN Plot Results





### Mead, NE Non-Infested SCN Plots

