KANSAS SOYBEAN COMMISSION FINAL REPORT OF PROGRESS

Title: "Develop valuable soybean varieties and germplasm for use as genetic resources for companies and for direct on-farm production"

Accomplishments for FY2022 (March 1, 2021 – February 28, 2022)

Variety Development

Population Development

- About 103 new populations were created in 2021 using over 40 different parents.
- Twenty-one of the single cross populations involved **drought resistant** parents.
- About 1/3 of the single cross populations involved parents tolerant to **STS** herbicides.
- Over 1/3 of the single cross populations involved at least one parent resistant to **soybean nematodes**.
- Twenty-six single cross populations involved at least one parent that possessed genes from a plant introduction that has not contributed to the genetic improvement of US northern soybean varieties to increase the **genetic diversity** of US germplasm to increase, or at least, maintain genetic gain.
- Six populations involved incorporating **glyphosate tolerance** into a new GT line.
- Forty-nine populations involved parents with above average **seed protein**.
- Eleven populations were developed to incorporate the n**on-nodulating** trait into adapted germplasm to better characterize the importance of nitrogen fixation and nitrogen fertility in modern soybean varieties.
- Nine populations were created to incorporate **high oleic and low linolenic acid** traits into elite germplasm.

Yield Trials and Progeny Rows

- We completed evaluations of over 11,000 **genotypes** in over 19,000 plots in Kansas.
- Over 7000 F4:5 lines were evaluated in progeny rows, including 479 high oleic progeny.
- Over 1400 K-lines were evaluated in our preliminary trials, including 314 high oleic lines.
- Over 190 K-lines were evaluated in our KS advanced yield trials, including 20 high oleic lines.
- Over 500 (including 20 K-lines) breeding lines from programs across the country were evaluated in our KS Uniform Tests and Uniform Preliminary yield trials, including one high oleic line.
- Over 8,900 genotypes, (experimental breeding lines and **plant introductions**) were evaluated in our drought, remote sensing, and diversity yield trials.

Releases

- This project enabled the development and release of KS4822NS in FY22. Description of the line is shown in Appendix 1. The lince is being licensed for commercial production.

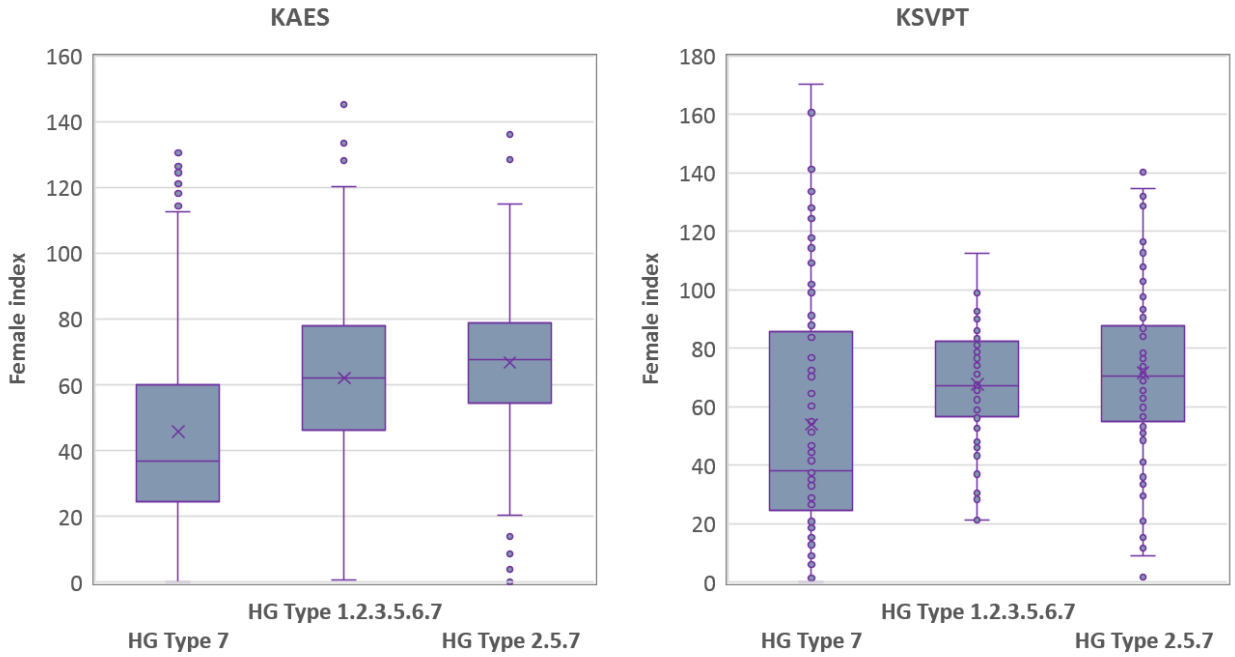
SCN Screening Populations

Primary soybean cyst nematode (SCN) screening populations included HG Types 7, 2.5.7, and 1.2.3.5.6.7. Female indices (FI) on the HG Type 1.2.3.5.6.7 population were >10% on all indicator lines except PI 437654 (line 4), while female indices on the HG Type 7 population were <10% on all indicator lines except PI 548316 (line 7). The third screening population, HG Type 2.5.7, is characterized by female indices >10% on PI88788 (line 2), PI209332 (line 5) and PI 548316 (line 7). Variation in female indices on PI 88788 (line 2) is of particular importance, since this line is the most common source of deployed SCN resistance.

SCN Resistance Screening

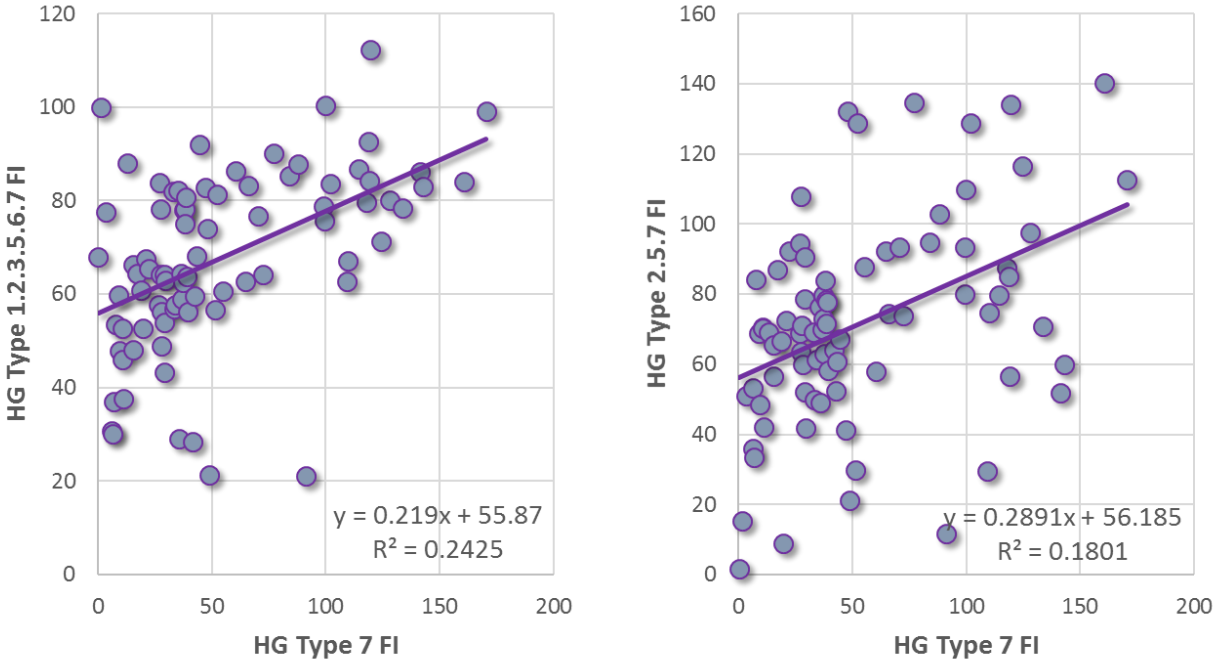
Breeding lines: Soybean resistance to HG Types 7, 2.5.7, and 1.2.3.5.6.7 was evaluated in replicated screening trials for ~240 preliminary and advanced breeding lines. Approximately 40% of breeding lines displayed moderate or better levels of resistance (FI ≤ 30) to the HG Type 7 population, while only 3-8% of breeding lines displayed moderate or better levels of resistance (FI ≤ 30) to HG Type 2 populations (Figure 1 - left panel). Seven lines (~3%) were resistant or moderately resistant to all screening populations, and female indices for two of these averaged < 5.

Figure 1.



Kansas Soybean Performance Test: Soybean resistance to SCN was evaluated in replicated screening trials for 81 entries in the Kansas Soybean Variety Performance Test (KSVPT). Only 37% of KSVPT entries could be classified as resistant to moderately resistant to the HG Type 7 population, while only 5-10% could be classified as resistant or moderately resistant to the HG Type 2 populations (Figure 1 - right panel). Four of the ten entries with the lowest female indices for the HG Type 7 population were KAES entries. No entries were resistant or moderately resistant to all SCN screening populations. Female indices for the HG Type 7 population were reasonably predictive of FI for the HG Type 2 populations (Figure 2), confirming that most KSVPT entries shared a common source of resistance (PI 88788).

Figure 2.



Related Projects

The SCN Coalition free soil-testing program for Kansas soybean producers was continued in 2021. Of the 211 samples received, 28% were positive for SCN, with an average egg density of 1,439 eggs per 100 cm^3 soil.

Breeding Technologies

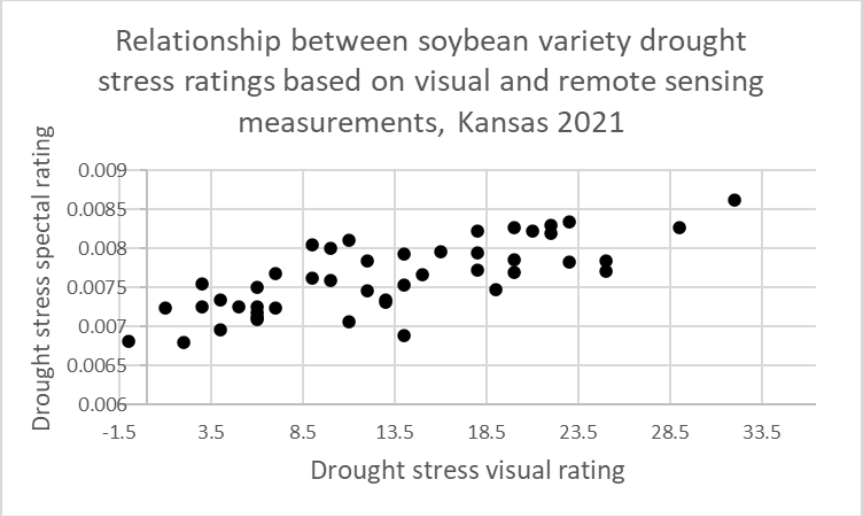
- **Genetic gain.** In 2021, we used genomic predictions for yield, genetic variation, and seed composition to select, intermate and rapidly cycle F1 plants to achieve three cycles of selection in one calendar year. Progeny from the initial base population and the rapid cycling generations are now being increased in a winter nursery to produce seed for planting in replicated field trials to characterize the effectiveness of the genomic selection and rapid cycling methodology. We also used the same genomic prediction model to create

populations from elite public breeding lines that are predicted to produce superior progeny and have a negligible negative correlation between seed yield and seed protein content. The progeny of these crosses will be compared with progeny produced from our standard selection process in the future.

- **High-throughput phenotyping to increase genetic gain and improve evaluations in stress environments.** We continue to develop models utilizing canopy reflectance and canopy thermal properties to estimate relative soybean maturity, seed yield, drought stress, and disease resistance. Entries in our 2017, 2018 and 2019 progeny rows selected based on remote sensing criteria where slightly higher yielding than random selections in our 2018, 2019 and 2020 preliminary yield trials. This information is being summaried and will be submitted for publication.

  In 2021, all trials experienced drought stress through August and September. Significant differences in wilting ratings in our breeding material were noted among the test entries. Phenotypic differences in wilting ratings will support the development of drought tolerance varieties and further our understanding of the genetic basis of drought stress. In additional to taking visual wilting ratings, efforts continue to refine techniques to characterize drought stress using high throughput phenotyping with drones. Below, Figure 3 illustrates the relationship observed between reflectance values collected from a drone, and visual ratings collected on breeding lines in 2021.

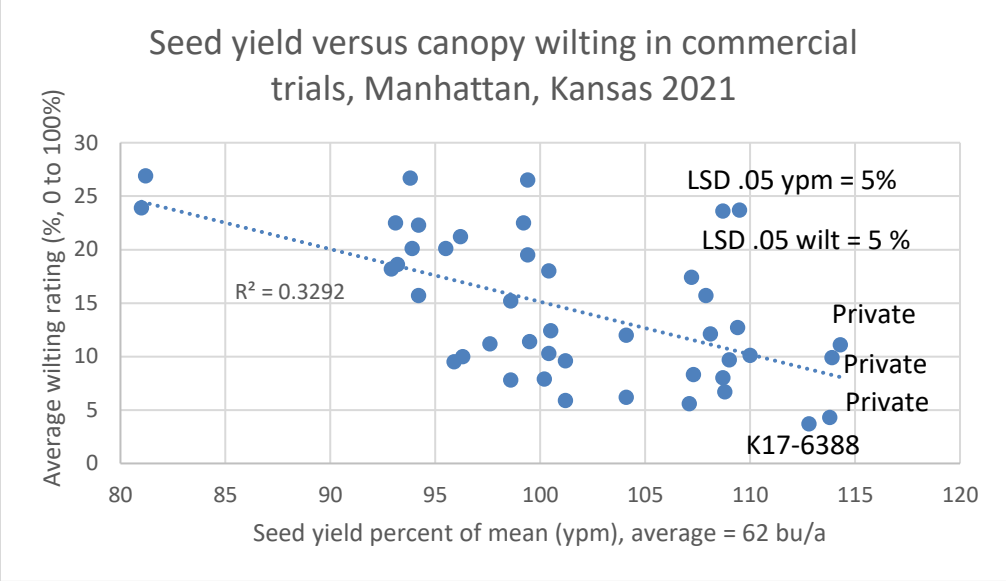
  Figure 3.



  Wilting ratings in 2021 on commercial cultivars occurred over the longest time, and were the most severe at our Manhattan location. Average wilting scores (average of 4 wilting ratings during reproductive growth) along with seed yield as a percent of the mean are shown in Figure 4.. Several entries possessed good yields and exhibited limited levels of wilting. One of the entries is a KS developed line, K17-6388, which possessed the lowest

average wilting rating. An entry exhibiting the most severe levels of wilting possessed a yield of only 81 percent of the test average.

Figure 4.



Dectes Stem Borer

Over 700 soybean germplasm accessions were evaluated for response to Dectes stem borer by evaluating stem breakage, presence of stem girdling and presence of stem borer larva for the second year in a row at Manhattan. Similar evaluations were conducted at the Univ. of Nebraska. Response to the insect varied widely among accessions and molecular marker analysis of this preliminary data has identified significant regions within the genome that were associated with stem breakage and presence of larva in the stem. These evaluations will be the basis for more detailed evaluations of specific germplasm assessions in the future.

Integration of Transgenic Events into Elite Germplasm

Transgenic lines expressing the Y25 and PrP17 silencing traits for SCN resistance have been introduced independently into Kansas adapted germplasm (Table 1). K11-2363 and K12-2333 were used as females and the transgenic lines were used as the pollinators. Additionally reciprocal crosses were made between the Y25 and Prp17 lines to combine these traits. Currently the crossings are at the F_3 thru F_5 generations. We have also crossed a previous transgenic line expressing the MSPi for SCN resistance into a maturity group IV line. These crosses are continuing in the greenhouse.

Table 1.

Crossing (Female X pollinator)	Crossing results
K11-2363 X hpRNAi-Y25	F_4 generation
K11-2363 X hpRNAi-Prp17	F_5 generation
K12-2333 X hpRNAi-Y25	F_4 generation
K12-2333 X hpRNAi-Prp17	F_5 generation
hpRNAi-Y25 X hpRNAi-Prp17	F_3 generation
hpRNAi-Prp17 X hpRNAi-Y25	F_3 generation
K11-2363 is susceptible and K12-2333 is moderately resistant to SCH Hg type 7	

Opportunities for Training and Professional Development

One graduate student working on objectives related to this project in Agronomy completed his M.S. degree in 2020, and one additional student in Bio and Ag Engineering worked cooperatively using the field plots developed and evaluated through this project also completed an M.S. degree. Currently, one student in Agronomy is pursuing a Ph.D. degree focusing on the application of remote sensing technology in breeding and one M.S. student in Plant Pathology is evaluating the use of transgenic material for Dectes control.

Dissemination of Results

Extension publications, news releases, radio interviews, experiment station reports, field days, extension meetings and tours are used to share the results of this project. Web pages have been developed to disseminate information on new releases and germplasm and pests. Distribution of results of genotype characterization for resistance published online. Distribution of SCN survey results to cliental will provide much-needed information for making informed decisions by producers regarding variety selections for SCN management and by soybean breeders for the development of varieties with improved levels of resistance. Effects of high temperature stress on soybean, and evaluations of host plant resistance were published at scientific conferences and published in peer-reviewed publications.

Publications for FY22

- **Journal article**

  Aguirre-Rojas, L.M.; Buschman, L.L.; McCornack, B.; Schapaugh, W.T.; Scully, E.D.; Zhu, K.Y.; Trick, H.N.; Smith, C.M. 2021. Inheritance of Antibiosis Resistance to the *Dectes* Stem Borer, *Dectes texanus,* in Soybean PI165673. *Agronomy* **2021**, *11*, 738. https://doi.org/10.3390/agronomy11040738.

- **Thesis**
  Walta, Dylan. 2021. Evaluation of drone imagery as a method for selection criteria in soybean breeding. M.S. Thesis, Kansas State University.

- **Book chapter**
  Singh, Asheesh K., Arti Singh, Soumik Sarkar, Baskar Ganapathysubramanian, William Schapaugh, Fernando E. Miguez, Clayton N. Carley et al. "High-Throughput Phenotyping in Soybean." In *High-Throughput Crop Phenotyping*, pp. 129-163. Springer, Cham, 2021.

Acknowledgment

The faculty, graduate students and staff cooperating in this project greatly appreciate the opportunity to interact with the Kansas Soybean Commission. We also appreciate the financial support of the Kansas Soybean farmer to develop new varieties, germplasm and information that supports the improvement of soybean production.

Appendix 1: Release of KS4822NS, Kansas Agricultural Experiment Station

KS4822NS is an F4 single plant selection from the cross KS5004N by 435.TCS. KS4822NS has white flowers, grey pubescence, brown pods at maturity, determinate growth habit, and seeds with light brown hila. K15-1874 is a late maturity group 4 variety (4.8). It is well adapted to a wide range of soil types and climates throughout Kansas and where other late maturity group 4 varieties are grown.

KS4822NS was tested as experimental line K15-1874 in Kansas and the Southern Regional Uniform Soybean Tests since 2017. In 2017, K15-1874 performed well in the Southern Uniform Preliminary IV late tests (Tables 1 and 2). The yield of K15-1874 was similar to the early maturity check (Ellis). K15-1874 possessed better Soybean Cyst Nematode (SCN) resistance than Ellis (Table 1), better Stem Canker resistance than AG 4632RR2Y (Table 1), and performed well in other states (Table 2). Following 2017, the entry continued to be evaluated in Kansas and the Uniform Tests (Tables 3-6). Compositional characteristics of the seed (protein and oil) are competitive with commercial checks (Tables 2, 3 and 5). K15-1874 possesses SCN resistance similar to KS4919N for Race 1. However, it has better resistance to Race 3, than KS4919N (Table 7). K15-1874 performed well compared with commercial varieties in 2018-2021 with an average relative yield of 108%, 98%, 104% and 97% compared with all entries in the respective locations in the Kansas Soybean Performance Tests (Tables 8-11). In head-to-head comparisons with KS4919N (Table 12) in Kansas, K15-1874 had similar seed yield to KS4919N. The maturity of K15-1874 is two day earlier than KS4919N and about 6 days earlier than KS5120NS. Plant lodging resistance of K15-1874 was superior to and plant height was shorter than KS4919N (Table 12). K15-1874 is not resistant to glyphosate herbicide (Table 13), but does possess resistance to Stem Canker and SCN. K15-1874 also possesses tolerance to specific STS® herbicides (Table 13).

K15-1874 has been named ‘KS4822NS’. The ‘48’ refers to the relative maturity (4.8), ‘22’ refers to the year of release, ‘N’ refers to nematode resistance and the ‘S’ refers to tolerance to specific STS® herbicides.

The Foundation Seed Program, Department of Agronomy, Kansas State University will maintain breeder’s seed of this cultivar. Information on licensing for commercialization can be obtained from Christopher D. Brandt, President/CEO, Kansas State University Research Foundation, 2005 Research Park Circle, Suite 105, Manhattan, KS 66502-5020 (phone: 785-532-5720; email: tech.transfer@k-state.edu).

Information about the variety or requests for small quantities of seed for research purposes can be obtained from William Schapaugh (phone: 785-770-7906; email: wts@ksu.edu) or Addie Clary, (phone: 620-222-6115; email: addierclary@ksu.edu) Department of Agronomy, Kansas State University, Manhattan, KS.

Table 1. General summary of performance, preliminary Test IV-Late, 2017 Results.

Strain	Yield	Rank	Maturity Index	Lodging Score	Height In.	SCN Cyst Score (1-5)[a] Race 3	SCN Cyst Score (1-5)[a] Race 5	SC[b] Rating	SC Score
Ellis	63.9	11	0	1.3	28	4	5	R	5
AG 4632RR2Y	66.0	10	-6	2.2	36	4	4	MR	2
AG 4835	63.0	13	-3	2.0	36	4	4	R	1
DA1133-038F	55.4	26	-4	2.8	29	4	5	R	1
DA1134-015F	64.1	10	4	2.5	32	4	4	R	1
DA1137-007F	54.5	26	2	2.1	31	5	4	R	1
DA1137-026F	50.5	28	-2	1.8	27	.	4	SS	3
K15-1681	63.1	15	-8	3.2	27	4	4	R	1
K15-1755	61.8	14	-6	3.1	32	1	3	R	1
K15-1874	64.2	11	-4	1.6	30	1	2	R	1
K15-1891	57.8	22	-6	1.2	28	3	4	R	1
K15-1992	56.3	24	-8	1.7	28	3	4	R	1
LW13-4302	43.9	33	-14	2.6	34	5	5	SS	3
R14-2090	60.0	18	-6	2.7	30	5	5	MS	4
R14-2765	62.6	13	-1	2.0	30	3	4	R	1
R14-691	61.9	15	-4	2.1	31	1	1	R	1
R14-4187RY	60.9	16	-1	2.4	32	3	5	S	5
R14-14635	61.2	16	-2	2.3	30	4	5	S	5
S15-3772R	63.7	11	0	2.5	35	3	4	S	5
S15-3847R	65.2	10	-3	2.4	38	3	4	R	1
S15-4892R	54.2	25	-3	3.1	36	2	5	S	5
S15-7174R	62.4	12	0	2.2	38	3	4	R	1
S15-8839R	62.2	15	0	2.2	34	1	1	SS	3
S15-10710C	50.6	30	-3	2.7	27	1	1	MS	4
S15-10743C	58.5	21	-6	2.7	28	2	.	S	5
S15-17875R	49.6	31	-11	2.2	38	2	4	R	1
TN14-5542R2	59.5	19	1	1.6	31	1	1	MS	4
TN15-4009	62.8	14	-1	2.3	30	2	1	S	5
TN15-4302	58.6	21	-4	3.1	31	4	4	MS	4
TN15-4545	59.7	18	-4	1.7	37	1	1	MS	4
TN15-5007	61.5	14	-3	1.6	30	4	3	R	1
TN15-5015	61.8	13	-2	1.5	30	2	2	S	5
TN16-619	63.8	11	0	2.0	32	5	5	R	1
V14-4140	64.3	11	3	2.5	31	4	4	S	5
Mean	59.7	-	-3	2.2	32	-	-	-	-
LSD (0.05)	5.5	-	3	-	3	-	-	-	-
CV(%)	11.1	-	89	-	12	-	-	-	-

[a]The race 3 and 5 SCN populations used in these tests were typed as HG (*Heterodera glycines*) Type 5.7, and HG Type 2.5.7, respectively.

[b]Stem Canker

Table 1. General summary of performance, preliminary Test IV-Late, 2017 results (continued).

Strain	Seed Quality	Seed Size	% Protein[a]	% Oil	Flower Color	Pubescence Color	Pod Color
Ellis	1.9	13.0	35.1	18.3	W	G	T
AG 4632RR2Y	2.7	14.9	33.0	19.7	P	G	Br
AG 4835	1.7	13.4	35.0	18.7	P	G	Br
DA1133-038F	2.0	15.5	33.7	20.0	W	G	T
DA1134-015F	2.0	13.8	34.5	19.2	P	T	T
DA1137-007F	1.9	13.7	34.3	19.2	W	T	T
DA1137-026F	1.9	11.6	34.6	18.8	P	T	T
K15-1681	1.9	14.1	35.6	19.6	P	G	Br
K15-1755	1.9	13.6	34.7	19.6	P	G	Br
K15-1874	2.0	13.2	34.8	19.6	W	G	Br
K15-1891	1.8	13.7	36.4	18.9	P	G	Br
K15-1992	2.0	11.6	35.1	19.2	P	G	Br
LW13-4302	2.3	14.3	36.8	17.3	W	G	T
R14-2090	1.8	12.9	35.5	18.4	P	G	T
R14-2765	2.3	15.3	34.6	18.9	S	T	T
R14-691	1.9	12.2	34.5	19.2	P	T	T
R14-4187RY	2.0	13.3	33.9	18.8	P	G	T
R14-14635	1.8	13.1	33.8	19.1	P	T	T
S15-3772R	2.3	15.2	34.2	20.3	P	G	Br
S15-3847R	2.0	14.1	34.4	19.1	W	G	Br
S15-4892R	2.4	13.2	33.7	19.7	W	T	Br
S15-7174R	2.1	17.6	34.7	19.3	W	T	T
S15-8839R	2.1	13.4	33.8	20.0	P	T	T
S15-10710C	2.2	14.3	35.9	19.2	W	G	T
S15-10743C	2.1	14.0	36.4	18.7	W	G	Br
S15-17875R	2.5	14.5	35.2	19.0	P	G	-
TN14-5542R2	1.8	14.4	35.0	18.1	P	T	T
TN15-4009	2.2	13.4	32.8	19.7	W	T	T
TN15-4302	2.0	12.8	37.2	17.8	W	G	T
TN15-4545	2.0	12.5	33.0	19.1	P	Lt	T
TN15-5007	2.2	13.7	38.7	17.3	W	G	T
TN15-5015	2.0	14.8	34.8	19.5	S	T	T
TN16-619	1.8	11.3	34.8	18.5	W	G	T
V14-4140	2.0	14.0	34.6	19.5	W	T	T
Mean	2.0	13.7	34.9	19.0	-	-	-
LSD(0.05)	0.4	1.0	0.8	0.4	-	-	-
CV(%)	19.4	7.0	2.1	2.0	-	-	-

[a]Protein percentage and oil percentage are reported on a 13% moisture basis.

Table 2. Seed yield (bu/ac), preliminary Test IV-Late, 2017 across location.

Strain	Jackson, TN	Keiser, AR	Knoxville, TN	Pittsburg, KS	Portageville, MO(B)	Stoneville, MS	Stuttgart, AR	**Test Mean**
Ellis	60.6	80.6	55.8	62.6	42.1	70.8	74.6	63.9
AG 4632RR2Y	57.1	73.9	77.9	60.8	41.5	75.5	75.1	66.0
AG 4835	59.8	74.3	63.5	65.9	42.2	64.2	71.0	63.0
DA1133-038F	48.2	72.8	50.7	51.5	33.7	65.0	65.7	55.4
DA1134-015F	57.3	78.5	65.7	68.2	45.2	61.9	72.0	64.1
DA1137-007F	55.3	66.7	48.9	47.5	43.7	61.2	58.1	54.5
DA1137-026F	44.9	56.5	43.8	42.5	42.4	68.4	55.0	50.5
K15-1681	64.0	70.5	71.8	60.7	39.9	70.2	64.9	63.1
K15-1755	59.5	73.7	58.1	58.5	47.2	68.0	67.8	61.8
K15-1874	53.3	76.8	64.6	71.0	40.4	72.7	70.3	64.2
K15-1891	55.4	64.5	56.8	55.9	37.9	67.9	66.0	57.8
K15-1992	48.9	63.8	57.2	56.4	35.7	65.0	67.4	56.3
LW13-4302	26.4	57.1	42.4	50.7	25.7	48.1	53.2	43.9
R14-2090	61.8	69.3	50.8	57.1	46.8	69.5	64.4	60.0
R14-2765	56.6	79.7	56.9	57.9	49.1	71.3	66.7	62.6
R14-691	54.5	68.9	55.9	63.9	47.7	69.2	73.4	61.9
R14-4187RY	49.5	71.3	61.8	57.4	44.8	74.7	66.6	60.9
R14-14635	47.3	73.5	60.0	59.9	49.7	71.1	67.1	61.2
S15-3772R	56.0	79.3	53.3	63.6	43.7	77.2	72.7	63.7
S15-3847R	67.8	78.8	57.5	63.7	41.9	72.1	74.4	65.2
S15-4892R	52.5	75.3	47.6	46.9	35.5	68.2	53.2	54.2
S15-7174R	52.8	75.5	59.0	64.6	44.3	72.1	68.1	62.4
S15-8839R	61.1	74.8	62.5	71.4	34.2	67.5	63.5	62.2
S15-10710C	44.3	62.3	47.5	56.2	37.3	55.8	50.8	50.6
S15-10743C	48.3	74.5	61.2	60.0	37.7	67.1	60.9	58.5
S15-17875R	34.2	61.3	54.3	50.2	30.2	54.2	59.9	49.6
TN14-5542R2	47.8	74.7	64.2	67.7	41.1	57.5	63.4	59.5
TN15-4009	51.8	76.9	67.0	69.1	41.2	61.2	70.6	62.8
TN15-4302	57.1	70.5	50.2	55.6	34.4	78.4	63.8	58.6
TN15-4545	39.3	69.0	59.5	72.1	45.5	67.1	65.3	59.7
TN15-5007	57.7	81.3	51.3	58.4	44.2	72.8	64.9	61.5
TN15-5015	58.1	75.0	60.4	62.6	48.4	57.9	70.1	61.8
TN16-619	57.7	79.1	57.8	61.0	40.6	75.1	75.1	63.8
V14-4140	49.7	85.6	66.2	56.9	50.2	64.9	76.5	64.3
Mean	52.8	72.5	57.7	59.6	41.4	67.2	66.3	59.7
LSD(0.05)	16.6	9.9	16.1	5.1	12.3	12.7	5.9	5.5
CV(%)	14.8	6.7	13.5	4.2	14.6	9.3	4.4	11.1

Table 3. General summary of performance, Uniform Test IV-Late, 2018 Results.

						SCN Cyst Score (1-5)[a]			
Strain	Yield	Rank	Maturity Index	Lodging Score	Height In.	Race 3	Race 5	SC[b] Rating	SC Score
Ellis	58.7	2	0	2	27	4	4	R	1.0
AG 4632RR2Y	54.1	14	-3	2	36	2	4	MR	2.0
AG 4835	52.5	17	-1	2	38	2	.	R	1.0
AG 46X7	53.7	15	-2	2	36	3	5	R	1.0
DA10x30-09F	58.5	4	0	2	34	1	3	R	1.0
DA10x30-48F	59.1	1	0	2	33	1	3	R	1.0
K15-1681	50.7	18	-7	2	24	4	5	R	1.0
K15-1874	54.9	12	-1	2	26	2	1	R	1.0
S14-9051R	57.6	5	-4	2	33	4	1	R	1.0
S14-15138R	56.3	10	-1	2	33	4	5	R	1.0
S15-3772RY	58.5	3	1	2	39	4	5	R	1.0
S15-3847RY	57.4	6	-5	2	40	4	4	S	5.0
S15-5904RY	57.0	8	-3	2	36	4	4	R	1.0
TN14-5021	57.1	7	1	2	27	2	1	R	1.0
TN15-4009	54.7	13	-1	2	28	1	1	S	5.0
TN15-5007	56.8	9	-2	2	29	4	5	R	1.0
TN16-520R1	55.7	11	2	2	28	4	5	R	1.0
V13-0116	48.3	19	-6	2	38	4	3	R	1.0
V14-4140	53.2	16	1	2	29	4	5	SS	3.0

[a]The race 3 and 5 SCN populations used in these tests were typed as HG (*Heterodera glycines*) Type 5.7, and HG Type 2.5.7, respectively.

[b]Stem Canker

Table 3. General summary of performance, Uniform Test IV-Late, 2018 results (continued).

Strain	Seed Quality	Seed Size	% Protein[a]	% Oil	Flower Color	Pubescence Color	Pod Color
Ellis	2.0	12.7	34.6	19.5	W	G	T
AG 4632RR2Y	2.7	14.6	33.1	20.6	P	G	Br
AG 4835	2.5	12.9	34.0	19.5	P	G	Br
AG 46X7	2.7	13.9	33.5	20.4			
DA10x30-09F	2.4	11.5	36.4	18.4	P	T	T
DA10x30-48F	2.0	11.8	36.5	19.1	P	T	T
K15-1681	2.6	13.9	36.0	20.4	P	G	Br
K15-1874	2.1	12.9	35.1	19.8	W	G	Br
S14-9051R	3.4	14.5	33.1	21.6	W	G	T
S14-15138R	2.9	15.7	34.7	20.3	W	T	T
S15-3772RY	3.0	16.0	34.5	20.9	P	G	T
S15-3847RY	2.5	13.3	33.7	20.2	W	G	Bl
S15-5904RY	2.8	15.5	35.3	20.2	W	G	T
TN14-5021	2.3	12.8	34.8	20.0	W	G	T
TN15-4009	2.8	13.6	33.5	20.7	W	T	T
TN15-5007	2.0	12.7	37.9	18.5	W	G	T
TN16-520R1	1.7	11.5	35.0	19.5	W	G	-
V13-0116	2.9	13.6	35.7	19.8	P	T	-
V14-4140	2.4	13.5	35.4	20.0	W	T	-
Mean	2.5	13.7	34.9	20.0	-	-	-
LSD(0.05)	0.5	1.0	0.8	0.4	-	-	-
CV(%)	26.0	7.0	2.6	2.1	-	-	-

[a] Protein percentage and oil percentage are reported on a 13% moisture basis.

Table 4. Seed yield (bu/ac), Uniform Test IV-Late by location in 2018.

Strain	Belle Mina, AL	Bossier City, LA	Jackson, TN	Keiser, AR	Knoxville, TN	McCune, KS	Orange, VA	Tallassee, AL	Warsaw, VA
Ellis	53.3	47.8	62.8	75.6	79.2	57.5	58.6	35.2	71.9
AG 4632RR2Y	46.6	35.7	52.4	88.4	73.0	.	36.2	16.7	63.2
AG 4835	48.1	46.2	54.6	84.3	76.2	.	37.1	12.3	63.3
AG 46X7	54.2	49.8	65.8	82.9	76.9	.	29.7	18.0	62.7
DA10x30-09F	62.7	66.3	63.3	81.4	80.7	60.6	44.8	44.4	63.5
DA10x30-48F	57.1	61.5	62.4	87.9	78.6	60.2	41.5	42.1	64.0
K15-1681	44.2	48.7	45.7	63.3	64.9	51.9	50.4	33.3	63.1
K15-1874	48.5	56.0	48.4	70.9	64.7	61.2	47.8	33.4	65.9
S14-9051R	57.2	34.4	43.4	85.1	61.4	57.4	49.2	13.5	65.2
S14-15138R	53.4	52.8	54.3	85.9	67.3	50.9	43.8	20.0	68.3
S15-3772RY	63.4	87.2	55.8	102.9	71.1	60.1	51.6	35.0	62.1
S15-3847RY	55.4	43.5	48.4	89.6	77.2	56.8	52.8	5.5	65.1
S15-5904RY	59.3	49.0	58.5	94.7	72.6	53.9	44.8	29.9	57.7
TN14-5021	50.7	47.9	55.7	74.0	60.6	61.9	60.9	14.6	71.1
TN15-4009	54.7	55.4	51.8	78.1	62.6	59.0	41.8	36.8	45.0
TN15-5007	50.7	36.0	50.8	75.5	61.0	57.3	57.1	8.9	68.1
TN16-520R1	45.3	50.7	56.9	69.5	55.8	57.6	55.2	36.5	67.6
V13-0116	44.3	27.0	60.3	82.7	65.2	53.9	37.4	3.7	63.5
V14-4140	41.8	47.5	59.5	77.6	73.8	55.3	48.0	14.7	60.3
Mean	52.2	49.6	55.3	81.6	69.6	57.2	46.8	23.9	63.8
LSD(0.05)	12.8	20.7	8.8	8.1	18.8	7.4	11.9	10.3	6.7
CV(%)	14.8	22.8	9.7	6.0	16.3	7.8	15.3	25.7	6.3

Table 4. Seed yield (bu/ac), Uniform Test IV-Late by location in 2018 (continued).

Strain	Pittsburg, KS	Portageville, MO(A)	Portageville, MO(B)	Springfield, TN	Stoneville, MS	**Test Mean**
Ellis	54.4	59.5	53.0	34.7	64.9	58.7
AG 4632RR2Y	.	48.4	51.1	29.0	72.0	54.1
AG 4835	.	31.1	47.8	36.7	70.0	52.5
AG 46X7	.	38.5	53.8	31.9	64.5	53.7
DA10x30-09F	60.1	48.9	49.1	37.5	71.0	58.5
DA10x30-48F	60.6	52.8	49.6	40.3	73.3	59.1
K15-1681	52.6	52.2	49.8	33.0	51.5	50.7
K15-1874	58.8	57.9	42.3	38.9	63.4	54.9
S14-9051R	54.4	62.4	51.9	42.4	64.5	57.6
S14-15138R	53.1	53.2	51.8	37.5	67.2	56.3
S15-3772RY	51.1	54.3	45.9	31.8	64.2	58.5
S15-3847RY	54.9	60.8	46.2	37.2	64.3	57.4
S15-5904RY	49.7	56.5	54.2	31.8	66.2	57.0
TN14-5021	58.2	57.5	46.3	43.0	49.2	57.1
TN15-4009	65.3	61.5	52.3	41.5	50.6	54.7
TN15-5007	49.8	59.6	52.4	32.5	70.6	56.8
TN16-520R1	49.6	59.3	47.4	36.1	68.0	55.7
V13-0116	41.6	27.3	37.6	35.6	46.8	48.3
V14-4140	51.0	46.3	49.0	31.5	64.9	53.2
Mean	54.1	52.0	49.0	35.9	63.5	55.5
LSD(0.05)	4.8	9.3	5.6	8.4	11.5	5.6
CV(%)	5.4	10.8	6.9	13.9	10.9	14.3

Table 5. General summary of performance, Uniform Test IV-Late, 2019 Results.

			Maturity	Lodging	Height	SCN Cyst Score (1-5)[a]			SC[b]	SC
Strain	Yield	Rank	Index	Score	In.	Race 2	Race 3	Race 5	Rating	Score
Ellis	57.2	11	0	1	24	3	4	3	R	1.0
AG 4632RR2Y	.	.	.	.	.	.	1	3	MR	2.0
AG 46X7	.	.	.	.	.	.	1	.	R	1.0
AG49X6	63.8	2	-1	2	34	3	1	2	R	1.0
DA10x30-09F	64.0	1	-2	2	32	2	1	1	R	1.0
DA10x30-48F	60.2	6	-1	2	30	4	1	2	R	1.0
DA1221-01-597	54.5	16	-1	2	31	3	2	4	R	1.0
DA1239-09-E	54.5	17	-2	2	28	4	3	4	R	1.0
DA1241-01	58.6	7	-2	2	28	3	3	3	R	1.0
Ellis-HOln	56.6	12	-1	1	23	4	3	5	R	1.0
K15-1874	58.3	8	-2	1	25	2	1	1	R	1.0
S15-3772RY	57.6	10	1	2	34	2	2	2	R	1.0
S16-7875C	60.6	5	0	2	29	2	1	1	SS	3.0
S16-7922C	61.7	4	0	2	30	2	2	2	R	1.0
S16-11644C	62.5	3	0	2	28	1	2	2	MS	4.0
S16-14379C	55.1	15	-1	2	34	2	2	4	R	1.0
S16-16641R	55.4	14	-2	2	30	1	1	1	SS	3.0
S16-16814R	57.7	9	0	1	27	1	1	1	MS	4.0
TN14-5021	56.4	13	-1	2	26	1	1	1	R	1.0
Mean	58.3	-	-1	2	29	-	-	-	-	-
LSD (0.05)	6.0	-	1	0	2	-	-	-	-	-
CV(%)	12.6	-	235	-	11	-	-	-	-	-

[a]The race 3 and 5 SCN populations used in these tests were typed as HG (*Heterodera glycines*) Type 5.7, and HG Type 2.5.7, respectively.

[b]Stem Canker

Table 5. General summary of performance, Uniform Test IV-Late, 2019 Results (continued).

Strain	Seed Quality	Seed Size	% Protein[a]	% Oil	Flower Color	Pubescence Color	Pod Color
Ellis	1.6	12.2	35.8	18.9	W	G	T
AG 4632RR2Y	.	.	.	.	P	G	Br
AG 46X7	.	.	.	.			
AG49X6	1.9	13.6	35.0	19.8			
DA10x30-09F	1.8	10.9	37.4	17.8	P	T	T
DA10x30-48F	1.6	11.4	37.8	18.4	P	T	T
DA1221-01-597	2.0	12.6	37.4	19.4	P	T	T
DA1239-09-E	1.6	14.5	37.3	18.7	W	G	T
DA1241-01	2.0	13.5	36.6	19.7	W	G	T
Ellis-HOln	1.5	12.1	36.2	19.2			
K15-1874	1.8	12.9	35.7	19.5			
S15-3772RY	2.4	15.2	35.4	20.2	P	G	T
S16-7875C	1.8	14.5	34.8	19.9	W	T	T
S16-7922C	1.8	12.9	35.5	19.6	W	T	T
S16-11644C	1.8	12.7	35.7	19.3	W	T	T
S16-14379C	2.0	15	35.3	19.6	P	Lt	T
S16-16641R	1.7	11.9	37.1	19.6	W	T	T
S16-16814R	1.8	12.9	37.0	19.5	W	G	T
TN14-5021	1.6	12.4	35.8	19.5	W	T	
V14-3508	1.9	13.5	37.6	17.9	W	T	
Mean	1.8	13	.	.	.	.	.
LSD(0.05)	0.4	0.7	.	.	.	.	.
CV(%)	29.0	8.4	.	.	.	.	.

[a] Protein percentage and oil percentage are reported on a 13% moisture basis.

Table 6. Seed yield (bu/ac), Uniform Test IV-Late by location in 2019.

Strain	Belle Mina, AL	Bossier City, LA	Jackson, TN	Kibler, AR	Knoxville, TN	Orange, VA	Pittsburg, KS
Ellis	26.2	30.1	57.1	64.7	79.5	37.7	47.7
AG 4632RR2Y	.	.	.	.	.	.	.
AG 46X7	.	.	.	.	.	.	.
AG49X6	30.1	32.7	49.2	63.4	90.0	40.2	59.8
DA10x30-09F	23.9	48.9	66.5	69.8	84.9	36.0	55.7
DA10x30-48F	27.9	42.2	62.3	67.2	76.2	35.3	49.9
DA1221-01-597	31.2	44.2	58.6	61.7	68.8	33.4	43.7
DA1239-09-E	26.9	51.6	42.6	61.8	74.6	33.9	48.7
DA1241-01	32.5	31.1	57.4	62.6	79.1	32.6	47.1
Ellis-HOln	23.0	39.1	61.3	60.4	86.0	30.9	44.7
K15-1874	21.2	35.0	47.9	68.9	87.3	29.4	55.3
S15-3772RY	33.5	29.2	50.0	69.8	80.8	27.4	49.6
S16-7875C	28.9	57.1	56.7	70.6	76.9	31.4	53.8
S16-7922C	26.6	49.5	61.7	72.4	87.5	29.2	55.8
S16-11644C	25.9	34.8	60.6	79.4	76.5	28.8	54.3
S16-14379C	24.2	48.8	51.4	53.4	86.8	26.3	47.2
S16-16641R	31.1	36.6	41.8	68.1	75.5	27.4	58.2
S16-16814R	23.7	64.9	59.3	70.6	77.6	28.9	51.4
TN14-5021	20.5	32.3	63.2	70.7	76.1	28.3	56.8
V14-3508	24.6	50.0	59.9	54.4	76.4	34.3	46.2
Mean	26.8	42.1	56.0	66.1	80.0	31.7	51.4
LSD(0.05)	7.4	25.1	8.8	8.7	15.5	10.8	4.5
CV(%)	16.7	35.9	9.5	7.4	11.7	20.6	5.3

Table 6. Seed yield (bu/ac), Uniform Test IV-Late by location in 2019 (continued).

Strain	Portageville, MO(A)	Portageville, MO(B)	Springfield, TN	Tallassee, AL	Warsaw, VA	Test Mean
Ellis	52.5	37.6	43.3	32.3	61.0	57.2
AG 4632RR2Y	.	.	.	.	.	.
AG 46X7	.	.	.	.	.	.
AG49X6	58.9	59.9	49.6	18.1	64.3	63.8
DA10x30-09F	52.3	58.5	57.9	25.6	60.1	64.0
DA10x30-48F	57.8	48.0	51.2	29.6	60.2	60.2
DA1221-01-597	49.9	44.2	48.6	34.6	54.8	54.5
DA1239-09-E	50.1	46.4	52.5	36.6	57.3	54.5
DA1241-01	53.1	51.0	48.7	27.2	59.7	58.6
Ellis-HOln	48.8	32.9	44.5	29.3	61.4	56.6
K15-1874	47.5	45.0	52.3	14.7	56.2	58.3
S15-3772RY	56.6	38.1	47.9	13.7	59.3	57.6
S16-7875C	49.3	54.4	62.9	27.3	62.5	60.6
S16-7922C	43.8	48.5	46.4	28.6	62.2	61.7
S16-11644C	53.0	55.2	57.8	16.2	60.3	62.5
S16-14379C	51.5	39.1	43.2	14.6	56.6	55.1
S16-16641R	49.3	43.5	58.6	17.8	51.1	55.4
S16-16814R	52.4	49.5	49.3	18.7	43.5	57.7
TN14-5021	46.3	28.7	56.2	15.4	54.2	56.4
V14-3508	48.3	33.8	48.2	19.1	58.9	54.0
Mean	51.2	45.2	51.1	23.3	58.0	
LSD(0.05)	7.6	10.7	16.7	17.7	6.4	6.0
CV(%)	9.0	14.2	19.7	41.0	6.7	12.6

†Data not included in the mean:

Table 7. Summary of SCN reactions for entries in the Kansas Soybean Performance tests from 2018 through 2021.

	2021 SCN Female Index*			2020 SCN Female Index			2019 SCN Female Index			2018 SCN Female Index		
Strain	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)
19MG3.1	71	38	81	60	11	31	40	9	44	-	-	-
19MG3.9	63	33	82	50	20	45	40	32	49	-	-	-
19MG4.8	75	38	78	53	30	42	30	5	1.4	-	-	-
K15-1809	55	43	68	32	17	51	43	11	46	83	38	100
K15-1874	13	1	100	19	7	44	23	2	55	12	0.4	69
KS4919N	11	91	21	16	55	60	48	13	8	37	64	23
KS5120NS	18	49	21	27	63	47	51	20	21	42	25	45
CV	40	27	44	55	49	51	57	80	33	42	51	47
GRAND MEAN	54	68	65	48	45	49	55	25	43	58	28	59
LSD	35	29	46	36	30	34	52	34	25	49	24	47
No. of Reps	3	3	3	3	3	3	3	3	3	3	3	3

* SCN Female Index = Soybean Cyst Nematode female index, where the female index (FI) = (mean # of cysts on tested variety/mean # of cysts on susceptible checks) x 100. A low FI (<10) means that the SCN population was not able to reproduce well on the differential line, and a high FI means that the SCN population was able to reproduce well. Reproduction rates were measured on plants grown in the greenhouse.

Table 8. Yield as a percentage of test average from 2018 Soybean Variety Performance Tests.

		Kiro	Ottawa		Parsons		McCune		Erie		Pittsburg		Belle-			
Strain	Emmet	dry	MG4	MG5	MG4	MG5	MG4	MG5	MG4	MG5	MG5	Scandia	ville	Assaria	Colby	Avg
K13-1830	-	-	-	107	-	111	-	94	-	102	104	-	-	-	-	104
K15-1303	96	103	89		-	-	-	-	-	-	-	114	93	92	-	98
K15-1310	98	97	82	-	-	-	-	-	-	-	-	95	94	91	-	93
K15-1681	-	-	-	116	-	79	-	96	-	96	97	-	-	-	-	97
K15-1788	-	-	-	118	-	102	-	101	-	108	100	-	-	-	-	106
K15-1800	-	-	-	105	-	95	-	100	-	106	100	-	-	-	-	101
K15-1809	-	-	-	110	-	102	-	105	-	113	97	-	-	-	-	105
KS5120NS	-	-	-	121	-	113	-	102	-	95	101	-	-	-	-	106
K15-1874	-	-	-	98	-	94	-	100	-	98	102	-	-	-	-	98
KS3406RR	-	99	-	-	-	-	-	-	-	-	-	99	96	95	-	97
KS3618Ngr	-	96	-	-	-	-	-	-	-	-	-	106	99	101	-	100
KS4117Ns	104	103	116	-	-	-	100	-	106	-	-	104	106	107	107	106
KS4919N	-	-	-	104	-	108	-	102	-	100	106	-	-	-	-	104
KS5004N	-	-	-	92	-	98	-	87	-	108	104	-	-	-	-	98
KS5518	-	-	-	103	-	107	-	92	-	87	97	-	-	-	-	97

Table 9. Yield as a percentage of test average from 2019 Soybean Variety Performance Tests.

		Kiro	Topeka	Ottawa		Columbus		Erie		Scandia	Assaria	Colby	Avg
Strain	Emmet	dry	irrig.	MG4	MG5	MG4	MG5	MG4	MG5	irrig.	dry	irrig.	
K13-1830	-	-	-	-	100	-	101	-	99	-	-	-	100
K15-1283	95	112	107	98	-	-	-	-	-	101	94	-	101
K15-1809	-	-	-	-	109	-	104	-	111	-	-	-	108
KS5120NS	-	-	-	-	101	-	102	-	99	-	-	-	101
K15-1874	-	-	-	-	97	-	100	-	96	-	-	-	98
K4117Nsgr	94	106	100	103	-	99	-	94	-	97	98	88	98
KS3618Ngr	-	-	-	-	-	-	-	-	-	91	95	-	93
KS4117Ns	101	104	104	103	-	97	-	101	-	101	103	102	102
KS4919N	-	-	-	-	94	-	97	-	98	-	-	-	96
KS5004N	-	-	-	-	88	-	89	-	94	-	-	-	90
KS5518	-	-	-	-	93	-	96	-	99	-	-	-	96

Table 10. Yield as a percentage of test average from 2020 Soybean Variety Performance Tests.

		Kiro	Topeka	Ottawa		Parsons		Parsons DC		Pittsburg		Belle-	
Strain	Riley	dry	irrig	MG4	MG5	MG4	MG5	MG4	MG5	MG5	Scandia	ville	Avg
K15-1283	96	101	107	92	-	94	-	88	-	-	83	73	91
K15-1809	-	-	-	-	121	-	106	-	108	107	-	-	111
K15-1874	-	-	-	-	103	-	100	-	100	107	-	-	104
K16-1208	98	-	-	-	-	-	-	-	-	-	-	-	98
K16-1222	95	-	-	-	-	-	-	-	-	-	-	-	95
K16-1229	102	-	-	-	-	-	-	-	-	-	-	-	102
K16-1729	95	-	-	-	-	-	-	-	-	-	-	-	95
KS4117NS	107	109	99	99	-	96	-	91	-	75	110	84	95
KS4120NSGT	107	104	105	102	-	93	-	103	-	-	92	102	99
KS4919N	-	-	-	-	95	-	88	-	101	113	-	-	102
KS5004N	-	-	-	-	90	-	103	-	81	95	-	-	93
KS5120NS	-	-	-	-	109	-	101	-	104	117	-	-	108

Table 11. Yield as a percentage of test average from 2021 Soybean Variety Performance Tests.

		Topeka	Topeka	Ottawa		Parsons	McCune	Pittsburg	Scandia	Belleville	Assaria	
Strain	Riley	dry	irrig	MG 4	MG 5	MG 3-5						Avg
K15-1809	-	-	-	-	104	-	104	106	-	-	-	105
K15-1874	-	-	-	-	94	-	102	96	-	-	-	97
K16-1729	90	98	97	96	-	101	-	-	99	93	103	97
K17-1532	99	-	-	-	-	-	-	-	-	-	105	102
K17-4406	-	-	-	-	-	-	97	101	-	-	-	99
K17-4973	-	-	-	-	-	-	95	99	-	-	-	97
K17-6185	117	-	-	-	-	-	-	-	-	-	94	105
K17-6326	98	-	-	-	-	-	-	-	-	-	97	98
K17-6388	107	-	-	-	-	-	-	-	-	-	110	109
K17-6484	101	-	-	-	-	-	-	-	-	-	96	98
K179236-1 GT	-	-	-	-	-	-	98	98	-	-	-	98
K179247-8 GT	-	-	-	-	-	-	104	102	-	-	-	103
K18-6766 GT	95	-	-	-	-	-	-	-	-	-	99	97
K18-6776 GT	107	-	-	-	-	-	-	-	-	-	104	105
K18-6777 GT	94	-	-	-	-	-	-	-	-	-	95	94
K18-6782 GT	81	-	-	-	-	-	-	-	-	-	82	82
K18-6805 GT	90	-	-	-	-	-	-	-	-	-	97	94
K18-6812 GT	95	-	-	-	-	-	-	-	-	-	104	100
K18-6860 GT	93	-	-	-	-	-	-	-	-	-	93	93
K18-6882 GT	96	-	-	-	-	-	-	-	-	-	90	93
K18-6897 GT	92	-	-	-	-	-	-	-	-	-	102	97
K18-6903 GT	93	-	-	-	-	-	-	-	-	-	92	93
K18-6908 GT	100	-	-	-	-	-	-	-	-	-	98	99
K18-6974 GT	105	-	-	-	-	-	-	-	-	-	86	96
K18-6996 GT	-	-	-	-	-	-	90	83	-	-	-	87
K18-7024 GT	-	-	-	-	-	-	98	90	-	-	-	94
K18-7069 GT	-	-	-	-	-	-	95	95	-	-	-	95
KS4117NS	102	-	-	-	-	97	-	-	-	-	-	100
KS4120NSGT	103	97	99	90	-	104	-	-	101	91	96	98
KS4520NS	90	103	108	95	-	99	99	-	93	88	99	97
KS4919N	-	-	-	-	93	-	97	99	-	-	-	96
KS5120NS	-	-	-	-	95	-	106	104	-	-	-	102

Table 12. K15-1874 head-to-head comparison with KS4919N in East Central and Southeast Kansas.

	Yield (bu/ac)	Maturity (mo/day)	Lodging (score)	Plant Height (inches)
No. of environments	14	13	12	14
Combined results (2018-2021)				
K15-1874	53.8 a†	10/15 a	1.2 a	31 a
KS4919N	53.8 a	10/17 b	1.5 b	34 b

By location	**Years**	**K15-1874**	**KS4919N**
		Seed Yield (bu/ac)	
Erie	2018-2019	58 a	56 a
Manhattan	2020	68 a	60 b
McCune	2018, 20-21	53 a	53 a
Ottawa	2018-2021	57 a	56 a
Pittsburg	2016,18,20-21	52 a	54 a
Parsons (full season)	2018-2020	54 a	54 a
Parsons (double crop)	2020	39 a	42 a

†Combined means within a column, or location means within a row followed by the same letter are not significantly different at the 0.05 level of probability.

Table 13. Roundup tolerance results from KCIA.

Seed Analysis Report

Kansas Crop Improvement Association

2000 Kimball Avenue
Manhattan, Kansas 66502
Phone (785) 532-6118
Fax (785) 532-6551 EVW

Sender's information - provided by the sender, not the laboratory

Sample Number
K-22-0214

Report Date: 2/3/2022

Variety / Kind: K15-1874 Soybean
Glycine max
Lot Number: 1RL32705 Field: A47367

Seed Enhancements: (none)

KSU AGRONOMY DEPT
2200 KIMBALL AVENUE
MANHATTAN, KS 66502

Test(s) Requested: Deluxe Test Package, Roundup Tol.

Total Charge
$74.00

Purity Analysis			Germination Analysis			Other Tests
Work Wt. 500.0 grams		%	Germ.%	Hard %	Dormant %	Moisture: 10.5 %
Soybean		99.98	94	0	--	Test Weight: 57.5 pounds / bushel
						Seed Count: 3298 seeds / pound
						TKW: 137.6 grams
						Accelerated Aging: 88 %
						Roundup Tolerance: 0 % Tolerance
	Inert Matter	0.02	Test Date:	2/1/2022		
	Other Crop	0.00	Days Tested: 7		Seed Tested: 400	Weight of Submitted Sample 5221 g.
	Weed Seed	0.00				

Other Crop Seeds	# / pound *	Common Weed Seeds	# / pound *	Noxious Weed Contaminants		
				Nox. Wt 4540 grams	# found	#/pound
None Found		None Found		None Found		

* Other Crop and Common Weed seed rates found in 4540 grams

Comments:

Carbon Copy to:

Lab Results / Reports available at https://lab.kscrop.org or link through the KCIA website www.kscrop.org

Tests were conducted according to Association of Official Seed Analysts rules where applicable. Unless otherwise stated, all other analysis were performed according to generally accepted practices. Kansas Crop Improvement Association (KCIA) warrants only that the analysis report is accurate for the sample as it was submitted to the laboratory. Unless otherwise stated, KCIA makes no claim as to the accuracy of the variety. KCIA makes no statement of fitness for any purpose of the seed represented by this analysis.

Eric Fabritzius, Seed Lab Manager

Rayshell Colson, RST #70

Table 14. STS tolerance results from KCIA

Seed Analysis Report

Kansas Crop Improvement Association

2000 Kimball Avenue
Manhattan, Kansas 66502
Phone (785) 532-6118
Fax (785) 532-6551 EVW

Sender's information - provided by the sender, not the laboratory

Sample Number
K-22-0438

Report Date: 2/18/2022

Variety / Kind: K15-1874 Soybean
Glycine max
Lot Number: 1RL32705

Seed Enhancements: (none)

KSU AGRONOMY DEPT
2200 KIMBALL AVENUE
MANHATTAN, KS 66502

Test(s) Requested: STS

Total Charge
$24.00

Component			Germination Analysis			Other Tests
Work Wt.	grams	%	Germ.%	Hard %	Dormant %	Moisture: 10 % Test Weight: 56.9 pounds / bushel STS Tolerance: 100 % Tolerance
		**	***			
Inert Matter			Test Date:			
Other Crop			*** Germination Test not requested			Weight of Submitted Sample 1102 g.
Weed Seed			** Purity and Noxious Tests not requested			

Other Crop Seeds	# / pound	Common Weed Seeds	# / pound	Noxious Weed Contaminants			
				Nox. Wt	grams	# found	#/pound

Comments:

Carbon Copy to:

Lab Results / Reports available at https://lab.kscrop.org or link through the KCIA website www.kscrop.org

Tests were conducted according to Association of Official Seed Analysts rules where applicable. Unless otherwise stated, all other analysis were performed according to generally accepted practices. Kansas Crop Improvement Association (KCIA) warrants only that the analysis report is accurate for the sample as it was submitted to the laboratory. Unless otherwise stated, KCIA makes no claim as to the accuracy of the variety. KCIA makes no statement of fitness for any purpose of the seed represented by this analysis.

Eric Fabrizius, Seed Lab Manager

Rayshell Colson, RST #70

Appendix 2. Summary of SCN reactions for entries in the Kansas Soybean Performance tests from 2019 through 2021.

		2021 SCN Female Index*			2020 SCN Female Index*			2019 SCN Female Index		
		Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)	Race 1 (HG Type 2.5.7)	Race 3 (HG Type 7)	Race 4 (HG Type 1.2.3.5.6.7)
ARKANSAS	R15-2422	79	118	80	50	75	52	-	-	-
ARKANSAS	R13-13997	62	13	88	-	-	-	-	-	-
ARKANSAS	R15-1587	118	102	84	-	-	-	-	-	-
ARKANSAS	R16-253	100	100	100	-	-	-	-	-	-
ARKANSAS	UA46i20C	47	141	86	-	-	-	-	-	-
ARKANSAS	UA54i19GT	51	119	84	-	-	-	-	-	-
ASGROW	AS37X71	48	6	30	-	-	-	-	-	-
ASGROW	AS40XFO	38	11	38	-	-	-	-	-	-
BECKS	MG3.7	63	27	84	-	-	-	-	-	-
BECKS	MG4.2	57	27	64	-	-	-	-	-	-
BECKS	MG4.8	29	7	37	-	-	-	-	-	-
BECKS	MG5.1	62	36	64	-	-	-	-	-	-
BIOMINERAL	BIOMINERAL-SO	100	27	78	66	24	48	-	-	-
BIOMINERAL	BIOMINERAL-SS	79	17	64	-	-	-	-	-	-
BIOMINERAL	BIOMINERAL-SY	62	18	61	68	46	75	-	-	-
CHECK	21MG3.1	71	38	81	60	11	31	40	9	44
CHECK	21MG3.9	63	33	82	50	20	45	40	32	49
CHECK	21MG4.8	75	38	78	53	30	42	30	5	1
DONMARIO	DM36F62S	52	39	56	-	-	-	-	-	-
DONMARIO	DM38F42S	52	15	48	-	-	-	-	-	-
DONMARIO	DM40E62	80	55	61	-	-	-	-	-	-
DONMARIO	DM42F62	47	43	60	-	-	-	-	-	-
DONMARIO	DM46E62	125	77	90	-	-	-	-	-	-
DONMARIO	DM46F62	56	34	58	-	-	-	-	-	-
KANSAS AES	K15-1809	55	43	68	32	17	51	43	11	46
KANSAS AES	K15-1874	13	1	100	19	7	44	23	2	55
KANSAS AES	K16-1729	82	29	43	58	32	33	-	-	-
KANSAS AES	K17-1532	70	39	64	-	-	-	-	-	-
KANSAS AES	K17-4406	122	119	112	-	-	-	-	-	-
KANSAS AES	K17-4973	47	3	78	-	-	-	-	-	-
KANSAS AES	K17-6185	83	22	65	-	-	-	-	-	-
KANSAS AES	K17-6326	65	11	46	-	-	-	-	-	-
KANSAS AES	K17-6388	57	37	78	-	-	-	-	-	-
KANSAS AES	K17-6484	58	15	66	-	-	-	-	-	-
KANSAS AES	K179236-1 GT	124	48	74	-	-	-	-	-	-
KANSAS AES	K179247-8 GT	86	99	76	-	-	-	-	-	-
KANSAS AES	K179248-1 GT	92	88	88	-	-	-	-	-	-
KANSAS AES	K18-6756 GT	72	37	59	-	-	-	-	-	-
KANSAS AES	K18-6776 GT	85	70	77	-	-	-	-	-	-
KANSAS AES	K18-6777 GT	48	29	54	-	-	-	-	-	-
KANSAS AES	K18-6782 GT	67	37	62	-	-	-	-	-	-
KANSAS AES	K18-6805 GT	66	72	64	-	-	-	-	-	-
KANSAS AES	K18-6812 GT	64	21	68	-	-	-	-	-	-
KANSAS AES	K18-6860 GT	65	38	75	-	-	-	-	-	-
KANSAS AES	K18-6882 GT	87	27	58	-	-	-	-	-	-
KANSAS AES	K18-6897 GT	68	66	83	-	-	-	-	-	-
KANSAS AES	K18-6903 GT	75	8	54	-	-	-	-	-	-
KANSAS AES	K18-6908 GT	119	52	81	-	-	-	-	-	-
KANSAS AES	K18-6974 GT	105	124	71	-	-	-	-	-	-
KANSAS AES	K18-6996 GT	63	28	56	-	-	-	-	-	-
KANSAS AES	K18-7024 GT	71	114	87	-	-	-	-	-	-
KANSAS AES	K18-7069 GT	2	0	68	-	-	-	-	-	-
KANSAS AES	KS4117Ns	26	51	57	49	45	43	65	14	51
KANSAS AES	KS4120NSGT	37	30	63	30	25	57	53	18	57
KANSAS AES	KS4520NS	62	44	92	46	36	42	43	11	46
KANSAS AES	KS4919N	11	91	21	16	55	60	48	13	8
KANSAS AES	KS5120NS	18	49	21	27	63	47	51	20	21
MIDLAND	4412E3S	36	47	83	-	-	-	-	-	-
MIDLAND	4602E3S	85	128	80	-	-	-	-	-	-
MIDLAND	4621XFS	71	29	64	-	-	-	-	-	-
MIDLAND	4677NXS	82	65	63	54	46	54	54	18	35
MIDLAND	4821XFS	53	60	86	-	-	-	-	-	-
MIDLAND	4880E3S	103	170	99	90	110	63	-	-	-
MIDLAND	4922XFS	86	84	85	-	-	-	-	-	-
MISSOURI	S09-13608C	70	99	79	-	-	-	-	-	-
MISSOURI	S16-11644C	26	109	63	26	59	28	-	-	-
MISSOURI	S16-14801C	54	143	83	-	-	-	-	-	-
NK	39-62X	58	42	28	-	-	-	-	-	-
NK	39-82X	43	9	48	-	-	-	-	-	-
VIRTUE SEEDS	V 4520S	65	110	67	58	71	50	-	-	-
VIRTUE SEEDS	V 4921S	128	161	84	52	65	65	-	-	-
VIRTUE SEEDS	V4122S	78	119	93	-	-	-	-	-	-
VIRTUE SEEDS	V4720S	63	134	78	-	-	-	-	-	-
WILLCROSS	WX1038NGT/LL	54	28	49	-	-	-	42	9	21
WILLCROSS	WX1748NLL	61	9	57	-	-	-	51	13	20
WILLCROSS	WX1839NLL	63	11	53	-	-	-	-	-	-
WILLCROSS	WXE8038NS	44	33	57	-	-	-	42	5	34
WILLCROSS	WXE8043NS	43	36	29	-	-	-	69	17	24
WILLCROSS	WXE8146NS	69	35	82	-	-	-	-	-	-
WILLCROSS	WXE8148NS	32	6	31	-	-	-	-	-	-
WILLCROSS	WXR7878NS	8	19	53	-	-	-	53	5	28
CV		40	27	44	55	49	51	57	80	33
GRAND MEAN		54	68	65	48	45	49	55	25	43
LSD		35	29	46	36	30	34	52	34	25
No. of Reps		3	3	3	3	3	3	3	3	3

* SCN Female Index = Soybean Cyst Nematode female index, where the female index (FI) = (mean # of cysts on tested variety/mean # of cysts on susceptible checks) x 100. A low FI (<10) means that the SCN population was not able to reproduce well on the differential line, and a high FI means that the SCN population was able to reproduce well. Reproduction rates were measured on plants grown in the greenhouse.