

RESULTS OF AMERICAN CRYSTAL SUGAR COMPANY'S 2023 CODED OFFICIAL VARIETY TRIALS

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American Crystal Sugar Company's coded Official Variety Trials (OVT) are designed to provide an unbiased evaluation of the genetic potential of sugarbeet variety entries under several different environments. The two-year averages of these evaluations are then used to establish a list of approved varieties which ensures the use of high quality, productive varieties to maximize returns for growers and the cooperative as a whole.

This report presents data from the 2023 American Crystal Sugar Company (ACSC) OVTs and describes the procedures and cultural practices utilized in the trials.

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Procedures and cultural practices

All official trials utilize seed identified by code numbers which prevents ACSC personnel from knowing variety names when conducting trials. All entries were assigned code numbers by KayJay Ag Services. The seed then was sent to ACSC Technical Services Center at Moorhead for official testing.

Sugarbeet official variety yield trials and disease nurseries were conducted across the ACSC growing region of the Red River Valley with additional disease nurseries conducted by third party cooperators. The 2023 official coded variety performance trials included 13 yield trials and 10 disease nurseries planted at a total of 18 sites by ACSC personnel. Seven additional disease/insect nurseries were planted by third party cooperators.

Results from the Official Variety Trial sites were excellent overall. Planting dates were around ten days later than typical but stands in the trials were good at most locations. Eleven sites were used for variety approval calculations. The Averill, MN site was abandoned due to very poor stand establishment from soil crusting. Results from Humboldt were not used in approval numbers due to harvest loss. *Rhizoctonia* crown and root rot was minimal in 2023. Revenue calculations in 2023 are based on a hypothetical \$50.09 payment (5-year rolling average) assuming 17.5% sugar and 1.5% SLM, not considering hauling or production costs.

Aphanomyces root rot ratings are from the naturally infested nursery at Shakopee, MN (KWS). The Red River Valley sites were too dry to develop *Aphanomyces* disease pressure. As a result, there are no yield results under *Aphanomyces* conditions for 2023. *Cercospora* leafspot ratings are from inoculated nurseries at Foxhome and Randolph (KWS), MN and Saginaw, MI (BSDF) as well as a non-inoculated nursery at East Grand Forks, MN. *Cercospora* ratings from all four sites were highly correlated, but ratings from Randolph were not included in approval numbers as hail damage put an end to the plot in late July before severity of disease could increase. *Rhizoctonia* crown and root rot ratings are from inoculated nurseries at Crookston, MN and Saginaw, MI (BSDF). *Fusarium* ratings are from naturally infested sites at Moorhead and Sabin, MN. Root aphid ratings are from a greenhouse assay at Shakopee, MN (KWS). The Longmont, CO (Magno) root aphid nursery had high rainfall and soil moisture resulting in little to no root aphid pressure.

2023 harvest conditions were challenging at some locations, but roots dug well at most locations. Soil moisture levels were dry throughout most of the growing season and at the beginning of harvest, but widespread rainfall in late September made conditions more difficult at later harvested sites. Wet, heavy soil conditions at Humboldt would not allow the lifter to dig deep enough to get smaller roots present at that site leading to harvest loss.

The 2023 data have been combined with previous years' data for several tables. Bolter data is presented as the number of bolters observed at a location for each variety. Results from 2023 for the yield trials from individual sites are included in this report and available on the internet at www.crystalsugar.com/agronomy/crystal-beet-seed/official-coded-trials/.

Conventional trials were not planted in the 2023 OVT trials. Conventional varieties tested in 2017-2019 that were approved for 2020-2023 sales are permitted to continue in 2024 sales.

Yield trials were planted to stand at 4.5 inches. Starter fertilizer (10-34-0, 3 GPA) and AZteroid fungicide (5.7 fl oz/A) were applied in-furrow (6 GPA total volume) in all yield trials. Counter 20G (8.9 lb/A) was applied in a band after planting at all yield trial sites. Plots were planted perpendicular to the cooperators' normal farming operations, where possible. Plot row lengths for all official trials were maintained at 46 feet with about 40 feet harvested (25 feet harvested at Climax due to removal of gaps from a planter malfunction). Planting was performed with a 12-row SRES vacuum planter. The GPS controlled planter gave good single seed spacing which facilitated emergence counting. Seed companies had the option of treating seed with an Aphanomyces seed treatment, insecticide and a Rhizoctonia seed treatment fungicide. Emergence counts were taken on 24 feet of each plot. Multiple seedlings were counted as a single plant if they emerged less than one inch apart. The stands in all yield trials were refined by removing doubles (multiple seedlings less than 1.5 inch apart) by hand but were not further reduced.

Roundup Powermax 3 with Class Act (surfactant) and full rates of fungicides were applied by ACSC technical staff using a pickup sprayer driven down the alleys. Two applications of Roundup (25 and 21 oz/A, respectively) were made at the 2-4 and 6-10 leaf stages in 10 GPA using 50-60 psi. A third application of Roundup (20 oz/A) was made at Reynolds, ND and Foxhome, MN at row closure. Hand weeding was used where necessary. In addition to AZteroid at planting (see above), all yield trials were treated with Quadris in a band during the 6-10 leaf stage (10 oz/A) for Rhizoctonia control. Treatments used for Cercospora control in 2023 included Inspire XT/Manzate Max, Agri Tin/T-Methyl, Proline/Manzate Max, Manzate Max, and Priaxor/Agri Tin. Cercospora fungicides were applied in 20 GPA using 75-80 psi.

Roundup Ready (RR) entries with commercial seed available were planted in four-row plots with six replicates. The RR experimental entries were planted in two-row plots with four replicates.

All plot rows were measured for total length after approximately 3.5 feet at each end were removed at the end of August, with skips greater than 60 inches being measured for adjustment purposes. Harvest was performed with one custom six-row harvester with increased cleaning capacity. All harvested beets of each plot were used for yield determination while one sample (approximately 20 lbs) was obtained from each plot for sugar and impurity analysis. Quality analysis was performed at the ACSC Technical Services Quality Lab in Moorhead, MN.

Varieties were planted in nurseries in Minnesota, Michigan, and Colorado to evaluate varieties for disease and insect susceptibility. ACSC adjusts the Aphanomyces, Cercospora, Rhizoctonia, and Fusarium nursery data each year to provide a consistent target for variety approval criteria.

Acknowledgements

Thanks to the sugarbeet seed companies for their participation in the official variety testing program and to the grower-cooperators. Thanks are extended to the dedicated Technical Services staff (Jon Hickel, Earl Hodson, Nick Weller, Gary Hamann, Luke Mitchell, and Barry McRaith) for official trial planting, plot care, data collection, and harvest. Thanks to Nick Moritz and the Quality Lab at the Technical Services Center for quality sample analysis. Thanks to Dr. Mohamed Khan and Peter Hakk for Cercospora inoculation at Foxhome, MN, Maureen Aubol and the Northwest Research and Outreach Center for hosting a Rhizoctonia nursery, Randy Nelson for RRV disease ratings, USDA staff in Michigan for Cercospora and Rhizoctonia nursery data, Magno Seed staff for running Aphanomyces and root aphid nurseries, KWS staff for Aphanomyces and Cercospora nursery data, and KayJay Ag Services for sampling and coding all variety entries.

Table 1. Varieties Meeting ACSC Approval Criteria for the 2024 Sugarbeet Crop

Roundup Ready®	<u>Full Market</u>	<u>Aph Spec</u>	<u>Rhc Spec</u>	<u>High Rzm</u>	2019 Conventional	<u>Full Market</u>	<u>High Rzm</u>
BTS 8018	Yes	Yes		Hi Rzm	Crystal R761	Yes	Hi Rzm
BTS 8034	Yes	Yes		Hi Rzm	Crystal 620	Yes	Hi Rzm
BTS 8156	Yes	Yes		Hi Rzm	Crystal 840	Yes	Hi Rzm
BTS 8205	New	New	New	Hi Rzm	Crystal 950	Yes	Hi Rzm
BTS 8226	New	New	New	Hi Rzm	Hilleshög HM3035Rz	Yes	Rzm
BTS 8242	New			Hi Rzm	SX 8869 Cnv	Yes	Hi Rzm
BTS 8270	New	New		Hi Rzm	SV 48777	Yes	Hi Rzm
BTS 8927	Yes	Yes		Hi Rzm			
Crystal 022	Yes	Yes	Yes	Hi Rzm			
Crystal 130	Yes	Yes		Hi Rzm			
Crystal 137	Yes	Yes		Hi Rzm			
Crystal 138	Yes	Yes	Yes	Hi Rzm			
Crystal 260	New	New	New	Hi Rzm			
Crystal 262	New	New	New	Hi Rzm			
Crystal 269	New	New		Hi Rzm			
Crystal 793	Yes	Yes		Hi Rzm			
Crystal 912	Yes	Yes	Yes	Hi Rzm			
Crystal 913	Yes	Yes		Hi Rzm			
Hilleshög HIL2317	Yes	Yes+		Hi Rzm			
Hilleshög HIL2366	Yes			Rzm			
Hilleshög HIL2368	Yes		Yes	Hi Rzm			
Hilleshög HIL2386	Yes		New	Hi Rzm			
Hilleshög HIL2389	Yes	Yes		Hi Rzm			
Hilleshög HIL2441	No	New	New	Hi Rzm			
Hilleshög HIL2442	New		New	Hi Rzm			
Hilleshög HIL2487 (MA942)	New	New		Hi Rzm			
Hilleshög HIL9920	Yes	Yes+		Hi Rzm			
Maribo MA717	Yes			Hi Rzm			
Maribo MA902	Yes		Yes	Hi Rzm			
Maribo MA943	New			Hi Rzm			
SV 203	Yes	Yes+		Hi Rzm			
SV 265	Yes			Hi Rzm			
SV 285	Yes	Yes+		Hi Rzm			
SX 1815	Yes			Hi Rzm			
SX 1818	Yes			Hi Rzm			
SX 1898	Yes	Yes+		Hi Rzm			

Aph Spec = variety meets Aphanomyces specialty requirements Rhc Spec = variety meets Rhizoctonia specialty requirements Hi Rzm = may perform better under severe Rhizomania.

New = newly approved

Created 11/03/2023

Roundup Ready® is a registered trademark of Bayer Group.

Roundup Ready® sugarbeets are subject to the ACSC RRSB Bolter Destruction Policy

++ 2nd Year of not meeting Specialty Approval of previously approved Specialty variety. According to Approval Policy, may be sold as Specialty in 2024

+ 1st Year of not meeting Specialty Approval of previously approved Specialty variety. According to Approval Policy, may be sold as Specialty in 2024

Table 4. Performance Data of Conventional Varieties During 2017, 2018, 2019 Growing Seasons (All Locations Combined) +++

Variety	Yrs	Rev/Ton ++					Rev/Acre ++					Rec/Ton		Rec/Acre		Sugar		Yield		Molasses		Emergence *		Bolters ^		Cerc. *		Aphan. *		Rhizoc. *		Fusarium *		Rzm *
		19	2 Yr	2Y%	3Yr	3Y%	19	2 Yr	2Y%	3Yr	3Yr%	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19	2 Yr	19
Com		3	8	14		3	8	14	3Yr%		3	8	3	8	3	8	3	8	3	8	3	8	3	8	3	6	2	3	3	6	2	4		
Number of locations →		3	8	14		3	8	14			3	8	3	8	3	8	3	8	3	8	3	8	3	8	3	6	2	3	3	6	2	4		
Crystal 620	NC	41.74	47.24	97	49.48	99	1394	1631	118	1656	104	311	326	10403	11312	16.59	17.38	33.7	34.9	1.07	1.06	54	67	0	0	3.95	4.13	4.7	4.2	5.1	4.6	2.5	3.0	Hi
Crystal R761	10	38.62	43.53	89	46.06	92	1375	1582	115	1618	101	299	313	10742	11457	16.18	16.86	36.0	36.7	1.21	1.19	61	72	0	0	4.98	4.85	4.4	4.3	4.9	4.6	3.0	3.6	Hi
Crystal 840	NC	39.30	45.48	93	30.32	60	1288	1585	115	NA	--	302	320	9916	11173	16.23	17.10	33.1	35.1	1.15	1.10	52	65	0	0	4.18	4.25	4.0	3.9	4.7	4.4	2.7	3.1	Hi
Hilleshög HM3035Rz	13	43.77	49.17	101	50.89	101	1294	1379	100	1405	88	318	333	9439	9422	16.91	17.65	29.9	28.5	1.02	1.00	72	71	0	0	4.42	4.32	5.1	5.2	4.4	4.2	4.1	4.3	Rzm
Seedex 8869 Cnv	NC	40.88	45.47	93	48.33	96	1374	1617	117	1658	104	307	320	10388	11418	16.40	17.00	33.9	35.8	1.02	1.00	64	74	0	1	4.52	4.59	4.8	4.8	5.1	4.9	3.5	3.7	Hi
SV 48777	NC	45.18	50.25	103	52.63	105	1452	1634	118	1656	104	323	337	10342	10954	17.08	17.78	31.8	32.5	0.94	0.93	63	73	0	0	4.10	4.33	4.9	5.0	5.0	4.7	4.3	4.4	Hi
Crystal 950	NC	41.21	--	--	--	--	1430	--	--	--	--	309	--	10719	--	16.49	--	34.7	--	1.06	--	62	--	0	--	4.72	--	4.8	--	4.8	--	2.9	--	Hi
Benchmark var. mean		44.35	48.87		50.20		1427	1381		1595		320	332	10330	10887	17.07	17.68	32.4	33.0	1.08	1.09	66	75											

+++ 2019 Sites include Grand Forks, Scandia, and Bathgate

+++ 2018 Sites include Casselton, Ada, Grand Forks, Scandia, and St. Thomas

+++ 2017 Sites include Casselton, Hendrum, Grand Forks, Scandia, St. Thomas, and Humboldt

++ 2019 Revenue estimate is based on a \$44.38 beet payment (5-yr ave) at 17.5% sugar and 1.5% loss to molasses. 2018 Revenue estimate is based on a \$46.40 beet payment and 2017 Revenue estimate is based on a \$48.49 beet payment.

+ Emergence is % of planted seeds producing a 4 leaf beet.

^ Number of bolters observed across locations.

* 2019 Aphanomyces ratings from Shakopee MN (res<4.4, susc>5.0). Cercospora ratings from Randolph MN, Foxhome MN & Saginaw MI (res<4.5, susc>5.0). Fusarium ratings from Moorhead MN (res<3.0, susc>5.0).

Rhizoctonia from Moorhead MN, Crookston MN, and Saginaw MI (res<3.8, susc>5). Hi may perform better under severe Rzm.

* 2018 Aphanomyces ratings from Shakopee MN and Georgetown MN (res<4.4, susc>5.0). Cercospora ratings from Randolph MN, Foxhome MN & Saginaw MI (res<4.5, susc>5.0). Fusarium ratings from Moorhead MN (res<3.0, susc>5.0).

Rhizoctonia from Moorhead MN and Saginaw MI (res<3.8, susc>5).

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Table 5. ACSC Official Trial Disease Nurseries 2021-2023 (Varieties tested in 2023) Cercospora, Aphanomyces, Rhizoctonia & Fusarium

Code	Description	< 4.5 Cercospora > 5.0					< 4.2 Aphanomyces > 4.8					< 3.82 Rhizoctonia > 5.0					< 3.0 Fusarium > 5.0					High Rzm
		23 Mean	22 Mean	21 Mean	2 Yr Mean	3 Yr Mean	23 Mean	22 Mean	21 Mean	2 Yr Mean	3 Yr Mean	23 Mean	22 Mean	21 Mean	2 Yr Mean	3 Yr Mean	23 Mean	22 Mean	21 Mean	2 Yr Mean	3 Yr Mean	
Previously Approved																						
550	BTS 8018	2.42	2.03	2.31	2.23	2.25	3.95	4.00	4.52	3.97	4.16	4.06	3.93	3.83	4.00	3.94	3.20	2.98	3.22	3.09	3.13	Hi Rzm
558	BTS 8034	2.54	2.28	2.56	2.41	2.46	3.80	3.89	3.24	3.84	3.64	4.09	4.49	3.88	4.29	4.15	2.72	2.16	2.71	2.44	2.53	Hi Rzm
538	BTS 8156	2.53	2.43	2.48	2.48	2.48	3.97	4.21	3.64	4.09	3.94	3.93	4.24	3.81	4.08	3.99	2.80	2.30	2.72	2.55	2.61	Hi Rzm
528	BTS 8927	4.38	4.42	4.48	4.40	4.43	3.26	4.00	4.51	3.63	3.93	3.98	4.13	3.68	4.06	3.93	3.08	3.11	4.00	3.10	3.40	Hi Rzm
521	Crystal 022	4.97	4.60	4.97	4.79	4.85	3.66	4.03	4.79	3.84	4.16	3.85	4.10	3.53	3.98	3.83	3.43	3.22	3.50	3.32	3.38	Hi Rzm
510	Crystal 130	2.60	2.10	2.38	2.35	2.36	4.00	3.57	4.23	3.78	3.93	3.69	4.08	3.57	3.88	3.78	3.55	3.22	3.22	3.38	3.33	Hi Rzm
552	Crystal 137	2.65	2.57	2.53	2.61	2.58	4.21	4.25	3.13	4.23	3.86	4.01	4.18	3.53	4.09	3.91	2.78	2.35	2.25	2.57	2.46	Hi Rzm
502	Crystal 138	4.77	4.87	4.74	4.82	4.79	4.06	3.87	4.19	3.97	4.04	3.81	3.81	3.52	3.81	3.71	3.76	3.16	3.75	3.46	3.55	Hi Rzm
509	Crystal 793	4.20	4.10	4.13	4.15	4.15	4.31	3.82	3.74	4.07	3.96	4.35	4.73	4.36	4.54	4.48	3.40	3.03	2.80	3.22	3.08	Hi Rzm
547	Crystal 912	5.00	4.81	5.13	4.91	4.98	3.41	3.44	3.95	3.43	3.60	3.50	3.28	3.77	3.39	3.52	3.82	3.66	4.11	3.74	3.86	Hi Rzm
549	Crystal 913	3.91	3.73	4.10	3.82	3.92	4.05	3.79	4.39	3.92	4.08	4.19	4.23	3.94	4.21	4.12	3.37	3.13	3.68	3.25	3.39	Hi Rzm
563	Hilleshög HIL2317	4.84	5.13	4.57	4.89	4.85	5.22	3.91	5.01	4.56	4.71	4.44	4.71	4.76	4.57	4.64	5.83	5.65	6.06	5.74	5.85	Hi Rzm
520	Hilleshög HIL2366	5.02	5.00	5.01	5.01	5.01	4.68	4.32	5.81	4.50	4.94	3.99	3.92	3.98	3.95	3.96	5.07	4.83	4.65	4.95	4.85	Hi Rzm
511	Hilleshög HIL2368	4.41	4.56	4.66	4.48	4.54	5.02	4.63	5.25	4.83	4.97	3.55	3.46	2.92	3.51	3.31	4.26	4.33	4.44	4.29	4.34	Hi Rzm
542	Hilleshög HIL2386	4.23	4.54	4.30	4.39	4.36	4.21	4.31	5.98	4.26	4.83	3.91	3.51	4.20	3.71	3.87	3.99	3.73	4.26	3.86	3.99	Hi Rzm
522	Hilleshög HIL2389	4.51	4.69	4.85	4.60	4.68	5.42	3.78	3.86	4.60	4.35	4.45	3.92	3.99	4.19	4.12	5.50	4.34	4.75	4.92	4.86	Hi Rzm
507	Hilleshög HIL9920	5.15	4.92	4.75	5.04	4.94	5.49	4.33	4.65	4.91	4.82	4.42	4.58	4.70	4.50	4.57	6.03	5.66	5.45	5.84	5.71	Hi Rzm
504	Maribo MA717	5.04	5.05	4.68	5.05	4.92	4.61	4.39	6.75	4.50	5.25	4.10	3.92	4.31	4.01	4.11	4.53	4.87	5.11	4.70	4.84	Hi Rzm
539	Maribo MA902	4.66	4.95	4.63	4.80	4.75	5.77	4.59	6.96	5.18	5.77	3.87	3.57	3.80	3.72	3.75	4.37	4.30	4.50	4.33	4.39	Hi Rzm
543	SV 203	4.78	4.74	4.75	4.76	4.76	7.15	4.24	4.35	5.70	5.25	4.25	4.19	4.34	4.22	4.26	5.20	5.55	5.99	5.38	5.58	Hi Rzm
503	SV 265	4.65	4.46	4.30	4.56	4.47	7.47	4.30	4.95	5.89	5.58	3.86	3.96	4.17	3.91	4.00	5.92	6.08	5.65	6.00	5.89	Hi Rzm
515	SV 285	4.83	4.72	4.78	4.78	4.78	7.39	4.35	4.48	5.87	5.41	4.28	4.53	4.26	4.40	4.36	5.82	5.47	6.26	5.65	5.85	Hi Rzm
554	SX 1815	4.74	5.07	4.78	4.91	4.86	6.15	4.28	4.19	5.22	4.88	4.35	4.12	4.40	4.24	4.29	5.60	5.32	4.82	5.46	5.25	Hi Rzm
530	SX 1818	4.53	4.72	4.86	4.63	4.71	7.09	4.82	5.56	5.95	5.82	4.06	4.16	4.41	4.11	4.21	4.59	4.54	5.26	4.56	4.80	Hi Rzm
537	SX 1898	4.88	4.72	4.76	4.80	4.79	6.70	4.25	4.97	5.47	5.31	4.15	4.12	4.34	4.13	4.20	5.47	5.38	5.67	5.42	5.51	Hi Rzm
Newly Approved																						
540	BTS 8205	4.69	4.27	--	4.48	--	3.67	3.69	--	3.68	--	3.77	3.82	--	3.80	--	3.10	2.85	--	2.97	--	Hi Rzm
527	BTS 8226	2.33	2.00	--	2.17	--	3.72	3.79	--	3.76	--	3.78	3.74	--	3.76	--	3.85	3.47	--	3.66	--	Hi Rzm
561	BTS 8242	4.48	4.35	--	4.41	--	4.25	4.47	--	4.36	--	4.07	4.00	--	4.04	--	3.95	3.42	--	3.69	--	Hi Rzm
533	BTS 8270	2.43	1.97	--	2.20	--	3.90	3.87	--	3.88	--	3.67	4.33	--	4.00	--	3.46	3.06	--	3.26	--	Hi Rzm
529	Crystal 260	2.15	2.05	--	2.10	--	3.84	3.89	--	3.86	--	3.46	3.70	--	3.58	--	3.38	3.06	--	3.22	--	Hi Rzm
555	Crystal 262	4.36	4.43	--	4.39	--	4.61	3.42	--	4.01	--	3.31	3.38	--	3.35	--	3.83	3.27	--	3.55	--	Hi Rzm
557	Crystal 269	4.38	4.60	--	4.49	--	3.62	3.48	--	3.55	--	3.90	4.20	--	4.05	--	4.11	3.36	--	3.74	--	Hi Rzm
541	Hilleshög HIL2441**	3.85	4.01	--	3.93	--	4.18	3.91	--	4.05	--	3.89	3.62	--	3.75	--	4.11	4.00	--	4.05	--	Hi Rzm
526	Hilleshög HIL2442	4.10	4.39	--	4.24	--	4.73	4.83	--	4.78	--	3.90	3.70	--	3.80	--	4.43	4.68	--	4.55	--	Hi Rzm
536	Hilleshög HIL2487 (MA942)	4.74	4.57	--	4.65	--	4.06	4.20	--	4.13	--	4.29	4.18	--	4.24	--	4.72	5.01	--	4.86	--	Hi Rzm
562	Maribo MA943	4.44	4.28	--	4.36	--	4.80	4.21	--	4.50	--	4.18	4.04	--	4.11	--	4.55	4.18	--	4.36	--	Hi Rzm

** Does not meet full market approval. Meets Aphanomyces and/or Rhizoctonia Specialty approval.
 Green font ratings indicate specialty or good resistance.
 Red font ratings indicate level of concern for some fields.
 -- indicates data not available

Table 6. Root Aphid Ratings for RR Varieties During 2021-2023 Growing Seasons (All Locations Combined)
Approved for Sale to ACSC Growers in 2024

Shakopee, MN ^x
(1=Exc - 4=Poor)

Longmont, CO ^y
(% Infested Plants)

Code	Variety										
713	BTS 8018	1.00	1.00	1.16	1.08	1.05	67.94	--	--	--	--
703	BTS 8034	1.32	1.00	1.28	1.14	1.20	68.72	--	--	--	--
725	BTS 8156	--	1.00	1.20	1.10	--	--	--	--	--	--
720	BTS 8205	--	--	1.12	--	--	--	--	--	--	--
731	BTS 8217	--	--	1.04	--	--	--	--	--	--	--
718	BTS 8226	--	--	1.00	--	--	--	--	--	--	--
726	BTS 8242	--	--	1.20	--	--	--	--	--	--	--
712	BTS 8270	--	--	1.08	--	--	--	--	--	--	--
728	BTS 8927	1.16	1.04	1.12	1.08	1.11	76.97	--	--	--	--
722	Crystal 022	1.00	1.00	1.04	1.02	1.01	68.23	--	--	--	--
724	Crystal 130	--	1.13	1.00	1.06	--	--	--	--	--	--
733	Crystal 137	--	1.12	1.00	1.06	--	--	--	--	--	--
734	Crystal 138	--	1.00	1.04	1.02	--	--	--	--	--	--
710	Crystal 260	--	--	1.12	--	--	--	--	--	--	--
737	Crystal 262	--	--	1.04	--	--	--	--	--	--	--
723	Crystal 269	--	--	1.04	--	--	--	--	--	--	--
721	Crystal 793	1.08	1.04	1.08	1.06	1.07	84.86	--	--	--	--
727	Crystal 912	1.24	1.00	1.04	1.02	1.09	64.72	--	--	--	--
736	Crystal 913	1.12	1.04	1.24	1.14	1.13	62.18	--	--	--	--
704	Hilleshög HIL2317	3.41	3.48	3.32	3.40	3.40	76.15	--	--	--	--
715	Hilleshög HIL2366	3.72	3.36	3.48	3.42	3.52	73.41	--	--	--	--
714	Hilleshög HIL2368	3.54	3.44	3.32	3.38	3.43	73.23	--	--	--	--
709	Hilleshög HIL2386	--	3.32	3.44	3.38	--	--	--	--	--	--
717	Hilleshög HIL2389	--	2.00	2.04	2.02	--	--	--	--	--	--
730	Hilleshög HIL2441	--	--	2.24	--	--	--	--	--	--	--
729	Hilleshög HIL2442	--	--	3.16	--	--	--	--	--	--	--
706	Hilleshög HIL2487 (MAR942)	--	--	3.24	--	--	--	--	--	--	--
701	Hilleshög HIL9920	3.58	3.48	3.24	3.36	3.43	74.56	--	--	--	--
702	Maribo MA717	3.68	3.56	3.40	3.48	3.55	68.33	--	--	--	--
735	Maribo MA902	3.75	3.36	3.32	3.34	3.48	73.70	--	--	--	--
708	Maribo MA943	--	--	2.96	--	--	--	--	--	--	--
732	SV 203	2.32	2.00	2.20	2.10	2.17	70.81	--	--	--	--
705	SV 265	3.65	3.36	3.16	3.26	3.39	70.81	--	--	--	--
711	SV 285	2.28	2.24	1.80	2.02	2.11	66.81	--	--	--	--
719	SX 1815	--	2.40	2.36	2.38	--	--	--	--	--	--
716	SX 1818	--	2.00	2.08	2.04	--	--	--	--	--	--
707	SX 1898	2.21	2.32	2.20	2.26	2.24	54.21	--	--	--	--
738	Root Aphid Res CK#3	1.36	1.00	1.08	1.04	1.15	70.65	--	--	--	--
739	Root Aphid Susc CK#4	3.48	3.48	3.52	3.50	3.49	71.31	--	--	--	--
740	Root Aphid Susc CK#6	--	3.48	3.20	3.34	--	--	--	--	--	--

Created 1/25/2024

^x Greenhouse assay based on a 1-4 rating scale (1 = no aphids, 4 = very susceptible), Shakopee, MN, KWS

^y Field trial based on incidence (% infested plants), Longmont, CO, Magno Seed, LLC

* No data available due to low emergence

** No data available due to wet conditions and low root aphid levels

Table 7. Planting & Harvest Dates, Previous Crop and Disease Levels for 2023 ACSC Official Trial Sites +

Yield Trials Location	District / Trial Type	Cooperator	Planting Date	Harvest Date	Preceding Crop	Soil Type	Diseases Present *						Comments
							Aph	Rhc	Rzm	Fus	Maggot	Rt Aphid	
Casselton ND	Mhd/Hlb	Todd Weber Farms	5/5	9/12	Wheat	Medium/Light	N	L	N	N	N	N	Planting errors, some gappy stands from crusting
Averill MN	Mhd/Hlb	Tang Farms	5/18	Abandon	Wheat	Medium/Light	N	N	N	N	N	N	Abandoned due to very poor stand
West of Perley MN (ND)	Mhd/Hlb	TD Hoff Partnership	5/22	9/8 & 9/11	Soybean	Heavy	L	M-V	N	N	N	N	Some cutworm and Rhizoctonia damage
Halstad MN	Mhd/Hlb	Peter Steen	5/15	10/12	Wheat	Medium	N	N	L	N	N	L-M	Excellent overall
Reynolds ND	Mhd/Hlb	Hong Farms	5/13	9/13	Wheat	Medium/Light	N	N	N	N	N	L	Some gappy stands
Climax MN	EGF/Crk	Knutson Farms	5/4	9/14	Wheat	Medium/Light	N	L	N	N	N	N	Planter gaps near ends of plots removed prior to harvest
Grand Forks ND	EGF/Crk	Drees Farming Association	5/12	9/18	Wheat	Medium/Light	N	N	N	N	L	N	Moisture stress across trial area
Scandia MN	EGF/Crk	Deboer Farms	5/14	10/9	Wheat	Medium	N	N	N	N	N	N	Hail damage even across trial area
East Grand Forks MN	EGF/Crk	Mark Holy	5/15	9/15	Fallow	Medium	N	N	N	N	N	N	On fallow ground, some light late Cercospora
Stephen MN	Dtn	Jensen Farms	5/11	10/3	Wheat	Medium/Heavy	N	N	N	N	N	N	
St Thomas ND	Dtn	Baldwin Farms	5/16	9/27	Wheat	Medium/Light	N	N	N	N	L	N	~7 inches of rainfall June 24-25
Humboldt MN	Dtn	Prosser/Kuznia Beets	5/10	9/30	Wheat	Heavy	N	L	N	N	N	N	Abandoned due to harvest loss
Bathgate ND	Dtn	Shady Bend Farm	5/16	9/29	Wheat	Medium	N	N	N	N	N	N	

Disease Trials Location	District / Trial Type	Cooperator	Planting Date	Rating Date	Preceding Crop	Soil Type	Diseases Present *						Comments
							Aph	Rhc	Rzm	Fus	Maggot	Rt Aphid	
Moorhead Fus-N MN	Fus Nurs	Nelson Farms	5/23	Multiple	Wheat	Medium/Heavy	N	N	N	M-V	N	N	Moderate Fusarium
Sabin Fus-S MN	Fus Nurs	Krabbenhoft & Sons Farm	5/17	Multiple	Wheat	Medium/Light	N	N	N	V	L	N	Heavy Fusarium pressure
Mhd Rhc-E MN	Rhc Nurs	Jon Hickel	5/23	Abandon	Soybean	Heavy	N	L	N	L-M	N	N	Abandoned due to lack of Rhizoctonia severity
Mhd Rhc-W MN	Rhc Nurs	Jon Hickel	5/23	Abandon	Soybean	Heavy	N	L	N	L-M	N	N	Abandoned due to interference from Fusarium
NWROC MN	Rhc Nurs	Maureen Aubol	5/17	8/7	Soybean	Medium/Heavy	N	M	N	N	N	N	Nice range of Rhizoctonia symptoms
Saginaw MI	Rhc Nurs	Linda Hanson	5/10	8/29-9/1	--	--	N	V	N	N	N	N	Severe Rhizoctonia pressure
Shakopee MN	Aphanomyces	Patrick O'Boyle	5/10	8/29	--	--	M-V	L	N	N	N	N	Nice range of moderate Aphanomyces symptoms
Glyndon MN	Aphanomyces	Ryan Brady	5/23	Abandon	--	Light	N-L	L	N	M	N	N	Lack of soil moisture to develop Aphanomyces
West of Perley MN (ND)	Aphanomyces	TD Hoff Partnership	5/22	Abandon	Soybean	Heavy	L	M-V	N	N	N	N	Lack of soil moisture to develop Aphanomyces
Climax MN	Aphanomyces	Knutson Farms	5/17	Abandon	Wheat	Medium/Light	N	N	N	N	N	N	Lack of soil moisture to develop Aphanomyces
Longmont CO	Root Aphids	Ryan Brady	--	Abandon	--	--	--	--	--	--	--	--	Lack of root aphid pressure from excess soil moisture
Foxhome MN	Cercospora	NDSU/Kevin Etzler	5/18	Multiple	Wheat	Medium	N	N	N	N	N	N	Moderate to severe Cercospora pressure
Saginaw MI	Cercospora	Linda Hanson	4/27	Multiple	--	--	N	N	N	N	N	N	Very nice Cercospora pressure
Randolph MN	Cercospora	Patrick O'Boyle	5/3	Multiple	--	--	N	N	N	N	N	N	Five ratings through July 20 and hail damage in late July; not used for approval numbers
Averill MN	Cercospora	Tang Farms	5/18	Abandon	Wheat	Medium/Light	N	N	N	N	N	N	Abandoned due to very poor stand
East Grand Forks MN	Cercospora	Mark Holy	5/15	Multiple	Fallow	Medium	N	N	N	N	N	N	Non-inoculated trial, used for approval numbers

+ Fertilizer applied in accordance with cooperative recommendations.

* Disease notes for Aphanomyces, Rhizoctonia, Rhizomania, Fusarium, Root Maggot and Root Aphids were based upon visual evaluations (N=none, L=light, M=moderate, V=severe, NA=not observed)

Created 10/27/2023

Table 8. Seed Treatments Used on Varieties in Official Variety Trials in 2023

Description	Years in Trial	Years Comm.	Fungicide Seed Treatment			Insecticide (Springtails & Maggots)	Priming (Emergence)
			(Damping-off)	(Rhizoctonia)	(Aphanomyces)		
ACSC Commercial							
BTS 8018	4	2	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8034	4	2	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8156	3	1	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8927	5	3	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
Crystal 022	4	2	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 130	3	1	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 137	3	1	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 793	7	5	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 912	5	2	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 913	5	3	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Hilleshög HIL2317	5	3	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2366	4	2	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2368	4	1	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2386	3	1	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2389	3	1	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL9920	7	5	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Maribo MA717	7	5	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Maribo MA902	5	3	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
SV 203	4	2	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SV 265	8	6	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SV 285	6	3	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SX 1815	3	1	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SX 1818	3	1	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SX 1898	5	3	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
BTS 8337 (Check)	11	9	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
Crystal 578RR (Check)	9	6	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
BTS 8815 (Check)	6	4	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
Crystal 803 (Check)	6	3	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
BTS 8927 (Check)	5	3	Allegiance Thiram	Vibrance	Tach 35	Poncho Beta	Xbeet ®
AP CK MOD SUS RR#5	8	6	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
AP CK MOD SUS RR#6	9	7	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
RA CK SUS RR#7	9	6	Apron XL Maxim	Vibrance	Tach 45	--	Xbeet ®
ACSC Experimental							
BTS 8205	2	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8217	2	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8226	2	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8242	2	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8270	2	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8303	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8311	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8328	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8341	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8349	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8359	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
BTS 8365	1	NC	Allegiance Thiram	Kabina	Tach 35	Poncho Beta	Ultipro
Crystal 138	3	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 260	2	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 262	2	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 269	2	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 360	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 361	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 363	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 364	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 367	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 368	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 369	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Crystal 371	1	NC	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
Hilleshög HIL2441	2	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2442	2	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2477	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2478	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2479	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2480	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Hilleshög HIL2487 (MA942)	2	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Maribo MA943	2	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Maribo MA945	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
Maribo MA946	1	NC	Apron XL Maxim	Vibrance	Tach 45	Cruiser Maxx	Xbeet ®
SV 231	1	NC	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SV 232	1	NC	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SX 1835	1	NC	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
SX 1836	1	NC	Apron XL Maxim	Zeltera	Int Sol	Nipsit	Xbeet ®
BTS 8337 (Check)	11	9	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
Crystal 578RR (Check)	9	6	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
BTS 8815 (Check)	6	4	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
Crystal 803 (Check)	6	3	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
BTS 8927 (Check)	5	3	Allegiance Thiram	Vibrance	Tach 35	Poncho Beta	Xbeet ®
AP CK MOD SUS RR#5	8	6	Allegiance Thiram	Systiva	Tach 35	Poncho Beta	Ultipro
AP CK MOD SUS RR#6	9	7	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
RA CK SUS RR#7	9	6	Apron XL Maxim	Vibrance	Tach 45	--	Xbeet ®
AP CK MOD RES RR#7	5	2	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®
AP CK MOD SUS RR#8	4	2	Allegiance Thiram	Kabina	Tach 45	Poncho Beta	Xbeet ®

Table 21. Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2024

Description	Approval Status	Rec/Ton				Rev/Acre++				R/T + \$/A Bench	Cercospora Rating *				
		2022	2023	2 Yr	% Bench	2022	2023	2 Yr	% Bench		2021	2022	2023	2 Yr Mean	3 Yr Mean
Previously Approved (3 Yr)															
BTS 8018	Approved	328.6	348.4	338.5	100.2	1447	1960	1704	106.0	206.3	2.31	2.03	2.42	2.23	2.25
BTS 8034	Approved	315.1	338.6	326.9	96.8	1362	1896	1629	101.4	198.2	2.56	2.28	2.54	2.41	2.46
BTS 8156	Approved	327.5	348.1	337.8	100.0	1410	1890	1650	102.7	202.7	2.48	2.43	2.53	2.48	2.48
BTS 8927	Approved	338.8	353.5	346.2	102.5	1452	1948	1700	105.8	208.3	4.48	4.42	4.38	4.40	4.43
Crystal 022	Approved	339.2	358.1	348.7	103.2	1449	1975	1712	106.6	209.8	4.97	4.60	4.97	4.79	4.85
Crystal 130	Approved	332.3	353.3	342.8	101.5	1436	2009	1723	107.2	208.7	2.38	2.10	2.60	2.35	2.36
Crystal 137	Approved	324.6	349.6	337.1	99.8	1390	1922	1656	103.1	202.9	2.53	2.57	2.65	2.61	2.58
Crystal 138	Approved	332.5	349.4	341.0	101.0	1471	1983	1727	107.5	208.4	4.74	4.87	4.77	4.82	4.79
Crystal 793	Approved	330.6	349.4	340.0	100.7	1476	1981	1729	107.6	208.3	4.13	4.10	4.20	4.15	4.15
Crystal 912	Approved	312.6	340.3	326.5	96.7	1433	2025	1729	107.6	204.3	5.13	4.81	5.00	4.91	4.98
Crystal 913	Approved	329.1	349.9	339.5	100.5	1458	2042	1750	108.9	209.4	4.10	3.73	3.91	3.82	3.92
Hilleshög HIL2317	Approved	326.8	347.5	337.2	99.8	1371	1862	1617	100.6	200.4	4.57	5.13	4.84	4.99	4.85
Hilleshög HIL2366	Approved	319.3	333.3	326.3	96.6	1351	1751	1551	96.5	193.2	5.01	5.00	5.02	5.01	5.01
Hilleshög HIL2368	Approved	329.1	349.1	339.1	100.4	1154	1737	1446	90.0	190.4	4.66	4.56	4.41	4.48	4.54
Hilleshög HIL2386	Approved	322.3	342.7	332.5	98.5	1424	1836	1630	101.4	199.9	4.30	4.54	4.23	4.39	4.36
Hilleshög HIL2389	Approved	326.8	349.2	338.0	100.1	1407	1948	1678	104.4	204.5	4.85	4.69	4.51	4.60	4.68
Hilleshög HIL9920	Approved	324.5	347.4	336.0	99.5	1383	1878	1631	101.5	201.0	4.75	4.92	5.15	5.04	4.94
Maribo MA717	Approved	318.6	343.0	330.8	98.0	1397	1871	1634	101.7	199.7	4.68	5.05	5.04	5.05	4.92
Maribo MA902	Approved	321.2	339.1	330.2	97.8	1310	1730	1520	94.6	192.4	4.63	4.95	4.66	4.80	4.75
SV 203	Approved	322.0	350.6	336.3	99.6	1296	1972	1634	101.7	201.3	4.75	4.74	4.78	4.76	4.76
SV 265	Approved	318.1	342.7	330.4	97.8	1321	1859	1590	99.0	196.8	4.30	4.46	4.65	4.56	4.47
SV 285	Approved	322.6	346.2	334.4	99.0	1276	1909	1593	99.1	198.1	4.78	4.72	4.83	4.78	4.78
SX 1815	Approved	328.4	350.9	339.7	100.6	1403	1996	1700	105.8	206.4	4.78	5.07	4.74	4.91	4.86
SX 1818	Approved	321.4	345.0	333.2	98.7	1361	1958	1660	103.3	202.0	4.86	4.72	4.53	4.63	4.71
SX 1898	Approved	320.4	345.9	333.2	98.7	1297	1927	1612	100.3	199.0	4.76	4.72	4.88	4.80	4.79
Candidates for Approval (2 Yr)															
BTS 8205	Approved	325.1	351.1	338.1	100.1	1426	1981	1704	106.0	206.1	--	4.27	4.69	4.48	--
BTS 8217	Not Approved	323.1	347.7	335.4	99.3	1373	1924	1649	102.6	201.9	--	2.25	2.27	2.26	--
BTS 8226	Approved	343.0	355.3	349.2	103.4	1521	1945	1733	107.9	211.2	--	2.00	2.33	2.17	--
BTS 8242	Approved	340.4	356.3	348.4	103.2	1441	1940	1691	105.2	208.4	--	4.35	4.48	4.41	--
BTS 8270	Approved	333.6	352.3	343.0	101.6	1472	1966	1719	107.0	208.5	--	1.97	2.43	2.20	--
Crystal 260	Approved	333.9	348.0	341.0	101.0	1488	1962	1725	107.4	208.3	--	2.05	2.15	2.10	--
Crystal 262	Approved	325.3	345.7	335.5	99.3	1463	1932	1698	105.6	205.0	--	4.43	4.36	4.39	--
Crystal 269	Approved	333.8	358.1	346.0	102.4	1466	1932	1699	105.7	208.2	--	4.60	4.38	4.49	--
Hilleshög HIL2441	Not Approved	327.0	347.3	337.2	99.8	1312	1797	1555	96.7	196.6	--	4.01	3.85	3.93	--
Hilleshög HIL2442	Approved	331.7	348.8	340.3	100.8	1312	1761	1537	95.6	196.4	--	4.39	4.10	4.24	--
Hilleshög HIL2487 (MA942)	Approved	328.8	346.8	337.8	100.0	1310	1794	1552	96.6	196.6	--	4.57	4.74	4.65	--
Maribo MA943	Approved	326.3	350.7	338.5	100.2	1333	1810	1572	97.8	198.0	--	4.28	4.44	4.36	--
Benchmark Varieties															
BTS 8572 (Check)	Benchmark	336.2				1367									
BTS 8337 (Check)	Benchmark	337.6	334.8	358.3		1408	1322	1837							
Crystal 578RR (Check)	Benchmark	328.7	313.1	342.4		1524	1339	1838							
BTS 8815 (Check)	Benchmark	336.9	324.9	343.9		1461	1320	1733							
Crystal 803 (Check)	Benchmark	331.6	352.6			1433	2033								
Benchmark mean		334.9	326.1	349.3		1440	1353	1860							
					2yr	3yr					2yr	3yr			
					337.7	336.8	1440	1353	1860		1607	1551			

Variety approval criteria include: 1) Two years of official trial data, 2) Cercospora rating must not exceed 5.00 (1982 adjusted data), AND 3a) R/T >= 100% of Bench OR 3b) R/T >= 97% and R/T + \$/A >= 202% of Bench. Three years of data may be considered for initial approval. To maintain approval, the three-year Cercospora rating must not exceed 5.30 (1982 adjusted data).

Created 10/31/2023

++2023 Revenue estimate based on a \$50.09 beet payment (5-yr ave) at 17.5% crop with a 1.5% loss to molasses and 2022 Revenue estimate based on a \$46.80 beet payment. Revenue does not consider hauling or production costs.

* All Cercospora ratings 2021-2023 were adjusted to 1982 basis.

Table 22. 2023 First Year Experimental Varieties
New Benchmark Comparison
Projected Calculation for Approval of Sugarbeet Varieties for ACSC Market

Description	Likely	Approval ^	Rec/Ton		Rev/Acre		R/T + \$/A	CR Rating ^
			%		%		Bench	2023
			2023	Bench	2023**	Bench		
Candidates for Retesting (1 Yr)								
BTS 8303	On Track		355.3	101.7	1879	100.1	201.8	4.46
BTS 8311	On Track		364.3	104.3	1866	99.4	203.7	2.39
BTS 8328	On Track		356.1	101.9	1961	104.4	206.4	4.54
BTS 8341	Not On Track		348.2	99.7	1407	74.9	174.6	2.52
BTS 8349	Not On Track		336.4	96.3	1827	97.3	193.6	2.27
BTS 8359	On Track		350.9	100.5	1957	104.2	204.7	2.26
BTS 8365	On Track		362.2	103.7	1980	105.5	209.1	4.15
Crystal 360	On Track		351.2	100.5	1963	104.6	205.1	2.17
Crystal 361	On Track		357.9	102.5	2012	107.2	209.6	2.24
Crystal 363	On Track		358.1	102.5	1918	102.2	204.7	3.16
Crystal 364	On Track		342.5	98.0	2000	106.5	204.6	4.26
Crystal 367	Not On Track		342.2	98.0	1860	99.1	197.0	2.39
Crystal 368	On Track		350.4	100.3	1906	101.5	201.8	4.11
Crystal 369	On Track		354.6	101.5	1984	105.7	207.2	3.78
Crystal 371	On Track		360.6	103.2	1883	100.3	203.5	2.00
Hilleshög HIL2477	Not On Track		333.1	95.4	1696	90.3	185.7	4.29
Hilleshög HIL2478	Not On Track		334.6	95.8	1821	97.0	192.8	5.03
Hilleshög HIL2479	On Track		353.0	101.1	1861	99.1	200.2	4.09
Hilleshög HIL2480	On Track		349.4	100.0	1817	96.8	196.8	4.00
Maribo MA945	Not On Track		339.4	97.2	1848	98.4	195.6	4.62
Maribo MA946	Not On Track		347.9	99.6	1864	99.3	198.9	4.25
SV 231	On Track		346.4	99.2	1965	104.7	203.8	4.83
SV 232	Not On Track		345.4	98.9	1884	100.3	199.2	4.31
SX 1835	On Track		347.3	99.4	1968	104.8	204.2	4.55
SX 1836	Not On Track		344.6	98.6	1886	100.5	199.1	4.33
Benchmarks Varieties*								
Crystal 578RR (Check)			346.1	99.1	1907	101.6		
BTS 8815 (Check)			344.7	98.7	1703	90.7		
Crystal 803 (Check)			350.5	100.3	2003	106.7		
BTS 8927 (Check)			356.0	101.9	1897	101.0		
Benchmark Mean			349.3		1877			

Variety approval criteria include: 1) Two years of official trial data, 2) Cercospora rating must not exceed 5.00 (1982 adjusted data), AND 3a) R/T >= 100% of Bench OR 3b) R/T >= 97% and R/T + \$/A >= 202% of Bench.

Created 10/31/2023

** 2023 Revenue estimate based on a \$50.09 beet payment (5-yr ave) at 17.5% crop with a 1.5% loss to molasses.

Revenue does not consider hauling or production cost

* 2023 benchmark varieties for first year entries dropped BTS 8337 and added BTS 8927

^^ All Cercospora ratings from 2023 were adjusted to 1982 basis.

^ Not on Track = data is not tracking for potential approval. On Track = data is tracking for potential approval.

**Table 23. Calculation for Approval of Sugarbeet Varieties for ACSC
Aphanomyces Specialty Market for 2024**

Description	Approval Status	Aphanomyces R					Cercospora Rating *					
		2021	2022	2023	2 Yr	3 Yr	2021	2022	2023	2 Yr	3 Yr	
Previously Approved (3 Yrs)							<=4.50					<=5.30
BTS 8018	Approved	4.52	4.00	3.95	3.98	4.16	2.31	2.03	2.42	2.23	2.25	
BTS 8034	Approved	3.24	3.89	3.80	3.85	3.64	2.56	2.28	2.54	2.41	2.46	
BTS 8156	Approved	3.64	4.21	3.97	4.09	3.94	2.48	2.43	2.53	2.48	2.48	
BTS 8927	Approved	4.51	4.00	3.26	3.63	3.92	4.48	4.42	4.38	4.40	4.43	
Crystal 022	Approved	4.79	4.03	3.66	3.85	4.16	4.97	4.60	4.97	4.79	4.85	
Crystal 130	Approved	4.23	3.57	4.00	3.79	3.93	2.38	2.10	2.60	2.35	2.36	
Crystal 137	Approved	3.13	4.25	4.21	4.23	3.86	2.53	2.57	2.65	2.61	2.58	
Crystal 138	Approved	4.19	3.87	4.06	3.97	4.04	4.74	4.87	4.77	4.82	4.79	
Crystal 793	Approved	3.74	3.82	4.31	4.07	3.96	4.13	4.10	4.20	4.15	4.14	
Crystal 912	Approved	3.95	3.44	3.41	3.43	3.60	5.13	4.81	5.00	4.91	4.98	
Crystal 913	Approved	4.39	3.79	4.05	3.92	4.08	4.10	3.73	3.91	3.82	3.91	
Hilleshög HIL2317	Not Approved	5.01	3.91	5.22	4.57	4.71	4.57	5.13	4.84	4.99	4.85	
Hilleshög HIL2389	Approved	3.86	3.78	5.42	4.60	4.35	4.85	4.69	4.51	4.60	4.68	
Hilleshög HIL9920	Not Approved	4.65	4.33	5.49	4.91	4.82	4.75	4.92	5.15	5.04	4.94	
SV 203	Not Approved	4.35	4.24	7.15	5.70	5.25	4.75	4.74	4.78	4.76	4.76	
SV 285	Not Approved	4.48	4.35	7.39	5.87	5.41	4.78	4.72	4.83	4.78	4.78	
SX 1898	Not Approved	4.97	4.25	6.70	5.48	5.31	4.76	4.72	4.88	4.80	4.79	
Candidates for Approval (2 Yrs)							<=4.20					<=5.00
BTS 8205	Approved	--	3.69	3.67	3.68	--	--	4.27	4.69	4.48	--	
BTS 8217	Not Approved	--	4.07	4.35	4.21	--	--	2.25	2.27	2.26	--	
BTS 8226	Approved	--	3.79	3.72	3.76	--	--	2.00	2.33	2.17	--	
BTS 8242	Not Approved	--	4.47	4.25	4.36	--	--	4.35	4.48	4.42	--	
BTS 8270	Approved	--	3.87	3.90	3.89	--	--	1.97	2.43	2.20	--	
Crystal 260	Approved	--	3.89	3.84	3.87	--	--	2.05	2.15	2.10	--	
Crystal 262	Approved	--	3.42	4.61	4.02	--	--	4.43	4.36	4.40	--	
Crystal 269	Approved	--	3.48	3.62	3.55	--	--	4.60	4.38	4.49	--	
Hilleshög HIL2366	Not Approved	5.81	4.32	4.68	4.50	4.94	5.01	5.00	5.02	5.01	5.01	
Hilleshög HIL2368	Not Approved	5.25	4.63	5.02	4.83	4.97	4.66	4.56	4.41	4.49	4.54	
Hilleshög HIL2386	Not Approved	5.98	4.31	4.21	4.26	4.83	4.30	4.54	4.23	4.39	4.36	
Hilleshög HIL2441	Approved	--	3.91	4.18	4.05	--	--	4.01	3.85	3.93	--	
Hilleshög HIL2442	Not Approved	--	4.83	4.73	4.78	--	--	4.39	4.10	4.25	--	
Hilleshög HIL2487 (MA942)	Approved	--	4.20	4.06	4.13	--	--	4.57	4.74	4.66	--	
Maribo MA717	Not Approved	6.75	4.39	4.61	4.50	5.25	4.68	5.05	5.04	5.05	4.92	
Maribo MA902	Not Approved	6.96	4.59	5.77	5.18	5.77	4.63	4.95	4.66	4.81	4.75	
Maribo MA943	Not Approved	--	4.21	4.80	4.51	--	--	4.28	4.44	4.36	--	
SV 265	Not Approved	4.95	4.30	7.47	5.89	5.57	4.30	4.46	4.65	4.56	4.47	
SX 1815	Not Approved	4.19	4.28	6.15	5.22	4.87	4.78	5.07	4.74	4.91	4.86	
SX 1818	Not Approved	5.56	4.82	7.09	5.96	5.82	4.86	4.72	4.53	4.63	4.70	
Approval Criteria for New Varieties					4.20							5.00
Criteria to Maintain Approval										4.50		5.30

Aphanomyces approval criteria include: 1) Cercospora rating two-year mean must not exceed 5.00 and
2) Aphanomyces root rating two-year mean <= 4.20.

Three years of data may be considered for initial approval.

To maintain Aphanomyces approval, criteria include: 1) Cercospora three-year mean must not exceed 5.30 and
2) Aphanomyces root rating three-year mean <= 4.50.

Previously approved varieties not meeting current approval standards may be sold in 2024.

* Aphanomyces ratings adjusted to 2003 basis.

Cercospora ratings were adjusted to 1982 basis.

Created 11/01/2023

Table 24. Calculation for Approval of Sugarbeet Varieties for ACSC
Rhizoctonia Specialty Market for 2024

Description	Approval Status	Rhizoctonia Rating*					Cercospora Rating*					
		2021	2022	2023	2 Yr Mn	3 Yr Mn	2021	2022	2023	2 Yr Mn	3 Yr Mn	
Previously Approved (3 Yr)		<=4.12					<=5.30					
Crystal 022	Approved	3.53	4.10	3.85	3.98	3.83	4.97	4.60	4.97	4.79	4.85	
Crystal 138	Approved	3.52	3.81	3.81	3.81	3.71	4.74	4.87	4.77	4.82	4.79	
Crystal 912	Approved	3.77	3.28	3.50	3.39	3.52	5.13	4.81	5.00	4.91	4.98	
Hilleshög HIL2368	Approved	2.92	3.46	3.55	3.51	3.31	4.66	4.56	4.41	4.49	4.54	
Maribo MA902	Approved	3.80	3.57	3.87	3.72	3.75	4.63	4.95	4.66	4.81	4.75	
Candidates for Approval (2 Yr)		<=3.82					<=5.00					
BTS 8018	Not Approved	3.83	3.93	4.06	4.00	3.94	2.31	2.03	2.42	2.23	2.25	
BTS 8034	Not Approved	3.88	4.49	4.09	4.29	4.15	2.56	2.28	2.54	2.41	2.46	
BTS 8156	Not Approved	3.81	4.24	3.93	4.09	3.99	2.48	2.43	2.53	2.48	2.48	
BTS 8205	Approved	--	3.82	3.77	3.80	--	--	4.27	4.69	4.48	--	
BTS 8217	Not Approved	--	4.14	3.90	4.02	--	--	2.25	2.27	2.26	--	
BTS 8226	Approved	--	3.74	3.78	3.76	--	--	2.00	2.33	2.17	--	
BTS 8242	Not Approved	--	4.00	4.07	4.04	--	--	4.35	4.48	4.42	--	
BTS 8270	Not Approved	--	4.33	3.67	4.00	--	--	1.97	2.43	2.20	--	
BTS 8927	Not Approved	3.68	4.13	3.98	4.06	3.93	4.48	4.42	4.38	4.40	4.43	
Crystal 130	Not Approved	3.57	4.08	3.69	3.89	3.78	2.38	2.10	2.60	2.35	2.36	
Crystal 137	Not Approved	3.53	4.18	4.01	4.10	3.91	2.53	2.57	2.65	2.61	2.58	
Crystal 260	Approved	--	3.70	3.46	3.58	--	--	2.05	2.15	2.10	--	
Crystal 262	Approved	--	3.38	3.31	3.35	--	--	4.43	4.36	4.40	--	
Crystal 269	Not Approved	--	4.20	3.90	4.05	--	--	4.60	4.38	4.49	--	
Crystal 793	Not Approved	4.36	4.73	4.35	4.54	4.48	4.13	4.10	4.20	4.15	4.14	
Crystal 913	Not Approved	3.94	4.23	4.19	4.21	4.12	4.10	3.73	3.91	3.82	3.91	
Hilleshög HIL2317	Not Approved	4.76	4.71	4.44	4.58	4.64	4.57	5.13	4.84	4.99	4.85	
Hilleshög HIL2366	Not Approved	3.98	3.92	3.99	3.96	3.96	5.01	5.00	5.02	5.01	5.01	
Hilleshög HIL2386	Approved	4.20	3.51	3.91	3.71	3.87	4.30	4.54	4.23	4.39	4.36	
Hilleshög HIL2389	Not Approved	3.99	3.92	4.45	4.19	4.12	4.85	4.69	4.51	4.60	4.68	
Hilleshög HIL2441	Approved	--	3.62	3.89	3.76	--	--	4.01	3.85	3.93	--	
Hilleshög HIL2442	Approved	--	3.70	3.90	3.80	--	--	4.39	4.10	4.25	--	
Hilleshög HIL2487 (MA942)	Not Approved	--	4.18	4.29	4.24	--	--	4.57	4.74	4.66	--	
Hilleshög HIL9920	Not Approved	4.70	4.58	4.42	4.50	4.57	4.75	4.92	5.15	5.04	4.94	
Maribo MA717	Not Approved	4.31	3.92	4.10	4.01	4.11	4.68	5.05	5.04	5.05	4.92	
Maribo MA943	Not Approved	--	4.04	4.18	4.11	--	--	4.28	4.44	4.36	--	
SV 203	Not Approved	4.34	4.19	4.25	4.22	4.26	4.75	4.74	4.78	4.76	4.76	
SV 265	Not Approved	4.17	3.96	3.86	3.91	4.00	4.30	4.46	4.65	4.56	4.47	
SV 285	Not Approved	4.26	4.53	4.28	4.41	4.36	4.78	4.72	4.83	4.78	4.78	
SX 1815	Not Approved	4.40	4.12	4.35	4.24	4.29	4.78	5.07	4.74	4.91	4.86	
SX 1818	Not Approved	4.41	4.16	4.06	4.11	4.21	4.86	4.72	4.53	4.63	4.70	
SX 1898	Not Approved	4.34	4.12	4.15	4.14	4.20	4.76	4.72	4.88	4.80	4.79	
Approval Criteria for New Varieties					3.82							
Criteria to Maintain Approval								5.00			5.30	

Rhizoctonia approval criteria include: 1) Cercospora rating two-year mean must not exceed 5.00 and 2) Rhizoctonia root rating two-year mean <= 3.82.

Three years of data may be considered for initial approval.

To maintain Rhizoctonia approval, criteria include: 1) Cercospora three-year mean must not exceed 5.30 and 2) Rhizoctonia rating three-year mean <= 4.12.

Previously approved varieties not meeting current approval standards may be sold in 2024.

* Rhizoctonia ratings adjusted to 2009 basis

Cercospora ratings adjusted to 1982 basis

Created 11/01/2023

Table 25. 2023 Aphanomyces Ratings for Official Trial Entries

KWS (Shakopee, MN)

Chk++	Code	Description	Unadj				Adjusted ++					Trial Yrs			
			Perl NA	Clim NA	Shak ² 8/29	Glyn NA	Perl NA	Clim NA	Shak ² 8/29	Glyn NA	2023		2 Yr	3 Yr	2022
550	BTS 8018		--	--	3.17	--	--	3.95	--	3.95	3.97	4.16	4.00	4.52	4
558	BTS 8034		--	--	3.05	--	--	3.80	--	3.80	3.84	3.64	3.89	3.24	4
538	BTS 8156		--	--	3.19	--	--	3.97	--	3.97	4.09	3.94	4.21	3.64	3
540	BTS 8205		--	--	2.95	--	--	3.67	--	3.67	3.68	--	3.69	--	2
551	BTS 8217		--	--	3.49	--	--	4.35	--	4.35	4.21	--	4.07	--	2
527	BTS 8226		--	--	2.99	--	--	3.72	--	3.72	3.76	--	3.79	--	2
561	BTS 8242		--	--	3.41	--	--	4.25	--	4.25	4.36	--	4.47	--	2
533	BTS 8270		--	--	3.13	--	--	3.90	--	3.90	3.88	--	3.87	--	2
535	BTS 8303		--	--	2.56	--	--	3.19	--	3.19	--	--	--	--	1
508	BTS 8311		--	--	3.42	--	--	4.26	--	4.26	--	--	--	--	1
545	BTS 8328		--	--	2.81	--	--	3.50	--	3.50	--	--	--	--	1
517	BTS 8341		--	--	4.30	--	--	5.36	--	5.36	--	--	--	--	1
505	BTS 8349		--	--	3.67	--	--	4.57	--	4.57	--	--	--	--	1
524	BTS 8359		--	--	2.95	--	--	3.67	--	3.67	--	--	--	--	1
546	BTS 8365		--	--	2.91	--	--	3.62	--	3.62	--	--	--	--	1
528	BTS 8927		--	--	2.62	--	--	3.26	--	3.26	3.63	3.93	4.00	4.51	5
521	Crystal 022		--	--	2.94	--	--	3.66	--	3.66	3.84	4.16	4.03	4.79	4
510	Crystal 130		--	--	3.21	--	--	4.00	--	4.00	3.78	3.93	3.57	4.23	3
552	Crystal 137		--	--	3.38	--	--	4.21	--	4.21	4.23	3.86	4.25	3.13	3
502	Crystal 138		--	--	3.26	--	--	4.06	--	4.06	3.97	4.04	3.87	4.19	3
529	Crystal 260		--	--	3.08	--	--	3.84	--	3.84	3.86	--	3.89	--	2
555	Crystal 262		--	--	3.70	--	--	4.61	--	4.61	4.01	--	3.42	--	2
557	Crystal 269		--	--	2.91	--	--	3.62	--	3.62	3.55	--	3.48	--	2
534	Crystal 360		--	--	3.10	--	--	3.86	--	3.86	--	--	--	--	1
519	Crystal 361		--	--	2.77	--	--	3.45	--	3.45	--	--	--	--	1
556	Crystal 363		--	--	3.08	--	--	3.84	--	3.84	--	--	--	--	1
506	Crystal 364		--	--	3.04	--	--	3.79	--	3.79	--	--	--	--	1
523	Crystal 367		--	--	3.19	--	--	3.97	--	3.97	--	--	--	--	1
531	Crystal 368		--	--	2.87	--	--	3.57	--	3.57	--	--	--	--	1
513	Crystal 369		--	--	3.23	--	--	4.02	--	4.02	--	--	--	--	1
514	Crystal 371		--	--	2.77	--	--	3.45	--	3.45	--	--	--	--	1
509	Crystal 793		--	--	3.46	--	--	4.31	--	4.31	4.07	3.96	3.82	3.74	7
547	Crystal 912		--	--	2.74	--	--	3.41	--	3.41	3.43	3.60	3.44	3.95	5
549	Crystal 913		--	--	3.25	--	--	4.05	--	4.05	3.92	4.08	3.79	4.39	5
553	Hilleshög HIL2317		--	--	4.19	--	--	5.22	--	5.22	4.56	4.71	3.91	5.01	5
520	Hilleshög HIL2366		--	--	3.76	--	--	4.68	--	4.68	4.50	4.94	4.32	5.81	4
511	Hilleshög HIL2368		--	--	4.03	--	--	5.02	--	5.02	4.83	4.97	4.63	5.25	4
542	Hilleshög HIL2386		--	--	3.38	--	--	4.21	--	4.21	4.26	4.83	4.31	5.98	3
522	Hilleshög HIL2389		--	--	4.35	--	--	5.42	--	5.42	4.60	4.35	3.78	3.86	3
541	Hilleshög HIL2441		--	--	3.36	--	--	4.18	--	4.18	4.05	--	3.91	--	2
526	Hilleshög HIL2442		--	--	3.80	--	--	4.73	--	4.73	4.78	--	4.83	--	2
559	Hilleshög HIL2477		--	--	4.26	--	--	5.31	--	5.31	--	--	--	--	1
516	Hilleshög HIL2478		--	--	3.52	--	--	4.38	--	4.38	--	--	--	--	1
512	Hilleshög HIL2479		--	--	3.52	--	--	4.38	--	4.38	--	--	--	--	1
501	Hilleshög HIL2480		--	--	3.45	--	--	4.30	--	4.30	--	--	--	--	1
536	Hilleshög HIL2487 (MA942)		--	--	3.26	--	--	4.06	--	4.06	4.13	--	4.20	--	2
507	Hilleshög HIL9920		--	--	4.41	--	--	5.49	--	5.49	4.91	4.82	4.33	4.65	7
504	Maribo MA717		--	--	3.70	--	--	4.61	--	4.61	4.50	5.25	4.39	6.75	7
539	Maribo MA902		--	--	4.63	--	--	5.77	--	5.77	5.18	5.77	4.59	6.96	5
562	Maribo MA943		--	--	3.85	--	--	4.80	--	4.80	4.50	--	4.21	--	2
518	Maribo MA945		--	--	3.47	--	--	4.32	--	4.32	--	--	--	--	1
525	Maribo MA946		--	--	3.79	--	--	4.72	--	4.72	--	--	--	--	1
543	SV 203		--	--	5.74	--	--	7.15	--	7.15	5.70	5.25	4.24	4.35	4
548	SV 231		--	--	5.02	--	--	6.25	--	6.25	--	--	--	--	1
532	SV 232		--	--	5.12	--	--	6.38	--	6.38	--	--	--	--	1
503	SV 265		--	--	6.00	--	--	7.47	--	7.47	5.89	5.58	4.30	4.95	8
515	SV 285		--	--	5.93	--	--	7.39	--	7.39	5.87	5.41	4.35	4.48	6
554	SX 1815		--	--	4.94	--	--	6.15	--	6.15	5.22	4.88	4.28	4.19	3
530	SX 1818		--	--	5.69	--	--	7.09	--	7.09	5.95	5.82	4.82	5.56	3
560	SX 1835		--	--	4.81	--	--	5.99	--	5.99	--	--	--	--	1
544	SX 1836		--	--	5.41	--	--	6.74	--	6.74	--	--	--	--	1
537	SX 1898		--	--	5.38	--	--	6.70	--	6.70	5.47	5.31	4.25	4.97	5
1	1001 AP CK#32 CRY5981		--	--	3.29	--	--	4.10	--	4.10	3.97	4.01	3.83	4.09	15
1	1002 AP CK#43 BTS80RR32		--	--	4.15	--	--	5.17	--	5.17	4.98	4.97	4.79	4.94	14
1	1003 AP CK#44 SEEDVISION RR		--	--	4.54	--	--	5.65	--	5.65	5.59	5.11	5.53	4.14	15
1	1004 AP CK#45 CRY5986		--	--	3.22	--	--	4.01	--	4.01	4.13	4.61	4.25	5.57	15
1	1005 AP CK#51 CRY5246		--	--	3.68	--	--	4.58	--	4.58	4.69	4.63	4.81	4.50	12
1	1006 AP CK#52 HILL4094RR		--	--	4.05	--	--	5.04	--	5.04	5.01	4.99	4.98	4.94	16
1	1007 AP CK#55 CRY5247		--	--	3.58	--	--	4.46	--	4.46	4.69	4.70	4.91	4.73	12
1	1008 AP CK#56 BTS8363		--	--	4.04	--	--	5.03	--	5.03	5.00	5.17	4.98	5.49	11
1	1009 AP CK#57 CRY5578		--	--	3.48	--	--	4.33	--	4.33	4.45	4.61	4.56	4.95	9
1	1010 AP CK#58 CRY5572		--	--	3.72	--	--	4.63	--	4.63	4.56	4.64	4.49	4.79	9
1	1011 AP CK#59 BTS8606		--	--	3.56	--	--	4.43	--	4.43	4.36	4.60	4.29	5.06	8
1	1012 AP CK#61 HIL9708		--	--	3.96	--	--	4.93	--	4.93	4.69	5.24	4.45	6.34	9
1013	Crystal 684 (Filler)		--	--	NA	--	--	NA	--	--	--	--	3.81	3.60	8
12	Check Mean				3.77			4.70		4.70					
	Trial Mean				3.72			4.63		4.63					
	Coeff. of Var. (%)				13.2										
	Mean LSD (0.05)				0.62										
	Mean LSD (0.01)				0.82										
	Sig Lvl				0.01										
	Adjustment Factor							1.245							

² Trial mean and statistics for Shakopee include four extra filler entries (not shown)
 ++ Ratings adjusted to 2003 basis. (2000-2002 Aph nurseries). Ratings adjusted on the basis of checks.
 (1=healthy, 9=severe damage).
 Perley (Perl), Climax (Clim), and Glyndon (Glyn) not rated due to lack of Aphanomyces pressure
 Ratings in green font indicate good resistance.
 Ratings in red font indicate a level of concern.

Table 27. 2023 Fusarium Ratings for Official Trial Entries

		ACSC (North Moorhead, MN) - ACSC (Sabin, MN)									
Chk ++	Code Description	Unadjusted		Adjusted++		2023	2 Yr	3 Yr	2022	2021	Trial Yrs
		N Mhd 4Dates+	Sab 3Dates+	N Mhd 4Dates+	Sab 3Dates+						
	550 BTS 8018	2.19	3.47	2.68	3.73	3.20	3.09	3.13	2.98	3.22	4
	558 BTS 8034	1.85	2.95	2.26	3.17	2.72	2.44	2.53	2.16	2.71	4
	538 BTS 8156	2.21	2.70	2.71	2.90	2.80	2.55	2.61	2.30	2.72	3
	540 BTS 8205	2.33	3.11	2.85	3.34	3.10	2.97	--	2.85	--	2
	551 BTS 8217	2.27	2.95	2.78	3.17	2.97	2.76	--	2.54	--	2
	527 BTS 8226	2.97	3.79	3.64	4.07	3.85	3.66	--	3.47	--	2
	561 BTS 8242	2.83	4.14	3.46	4.44	3.95	3.69	--	3.42	--	2
	533 BTS 8270	2.60	3.48	3.18	3.74	3.46	3.26	--	3.06	--	2
	535 BTS 8303	2.22	3.45	2.72	3.70	3.21	--	--	--	--	1
	508 BTS 8311	3.09	3.76	3.78	4.04	3.91	--	--	--	--	1
	545 BTS 8328	2.99	4.10	3.66	4.40	4.03	--	--	--	--	1
	517 BTS 8341	3.96	3.88	4.85	4.17	4.51	--	--	--	--	1
	505 BTS 8349	1.98	3.02	2.42	3.24	2.83	--	--	--	--	1
	524 BTS 8359	2.53	3.61	3.10	3.88	3.49	--	--	--	--	1
	546 BTS 8365	2.29	3.77	2.80	4.05	3.43	--	--	--	--	1
	528 BTS 8927	2.23	3.20	2.73	3.44	3.08	3.10	3.40	3.11	4.00	5
	521 Crystal 022	2.37	3.68	2.90	3.95	3.43	3.32	3.38	3.22	3.50	4
	510 Crystal 130	2.63	3.61	3.22	3.88	3.55	3.38	3.33	3.22	3.22	3
	552 Crystal 137	1.95	2.96	2.39	3.18	2.78	2.57	2.46	2.35	2.25	3
	502 Crystal 138	2.69	3.93	3.29	4.22	3.76	3.46	3.55	3.16	3.75	3
	529 Crystal 260	2.42	3.53	2.96	3.79	3.38	3.22	--	3.06	--	2
	555 Crystal 262	2.68	4.08	3.28	4.38	3.83	3.55	--	3.27	--	2
	557 Crystal 269	2.91	4.34	3.56	4.66	4.11	3.74	--	3.36	--	2
	534 Crystal 360	2.69	3.48	3.29	3.74	3.51	--	--	--	--	1
	519 Crystal 361	2.55	3.12	3.12	3.35	3.24	--	--	--	--	1
	556 Crystal 363	2.88	3.67	3.53	3.94	3.73	--	--	--	--	1
	506 Crystal 364	2.23	3.26	2.73	3.50	3.12	--	--	--	--	1
	523 Crystal 367	2.10	2.64	2.57	2.83	2.70	--	--	--	--	1
	531 Crystal 368	2.86	3.99	3.50	4.28	3.89	--	--	--	--	1
	513 Crystal 369	2.26	3.46	2.77	3.71	3.24	--	--	--	--	1
	514 Crystal 371	2.34	3.61	2.86	3.88	3.37	--	--	--	--	1
	509 Crystal 793	2.35	3.66	2.88	3.93	3.40	3.22	3.08	3.03	2.80	7
	547 Crystal 912	2.71	4.03	3.32	4.33	3.82	3.74	3.86	3.66	4.11	5
	549 Crystal 913	2.40	3.55	2.94	3.81	3.37	3.25	3.39	3.13	3.68	5
	553 Hilleshög HIL2317	5.00	5.15	6.12	5.53	5.83	5.74	5.85	5.65	6.06	5
	520 Hilleshög HIL2366	3.90	5.00	4.77	5.37	5.07	4.95	4.85	4.83	4.65	4
	511 Hilleshög HIL2368	3.27	4.20	4.00	4.51	4.26	4.29	4.34	4.33	4.44	4
	542 Hilleshög HIL2386	2.91	4.11	3.56	4.41	3.99	3.86	3.99	3.73	4.26	3
	522 Hilleshög HIL2389	4.47	5.14	5.47	5.52	5.50	4.92	4.86	4.34	4.75	3
	541 Hilleshög HIL2441	3.30	3.89	4.04	4.18	4.11	4.05	--	4.00	--	2
	526 Hilleshög HIL2442	3.29	4.50	4.03	4.83	4.43	4.55	--	4.68	--	2
	559 Hilleshög HIL2477	5.09	5.64	6.23	6.06	6.14	--	--	--	--	1
	516 Hilleshög HIL2478	3.18	4.55	3.89	4.88	4.39	--	--	--	--	1
	512 Hilleshög HIL2479	3.41	4.37	4.17	4.69	4.43	--	--	--	--	1
	501 Hilleshög HIL2480	2.29	3.53	2.80	3.79	3.30	--	--	--	--	1
	536 Hilleshög HIL2487 (MA942)	3.70	4.57	4.53	4.91	4.72	4.86	--	5.01	--	2
	507 Hilleshög HIL9920	5.26	5.23	6.44	5.62	6.03	5.84	5.71	5.66	5.45	7
	504 Maribo MA717	3.43	4.52	4.20	4.85	4.53	4.70	4.84	4.87	5.11	7
	539 Maribo MA902	3.22	4.46	3.94	4.79	4.37	4.33	4.39	4.30	4.50	5
	562 Maribo MA943	3.47	4.51	4.25	4.84	4.55	4.36	--	4.18	--	2
	518 Maribo MA945	2.08	3.14	2.55	3.37	2.96	--	--	--	--	1
	525 Maribo MA946	2.87	3.90	3.51	4.19	3.85	--	--	--	--	1
	543 SV 203	4.19	4.91	5.13	5.27	5.20	5.38	5.58	5.55	5.99	4
	548 SV 231	3.53	3.81	4.32	4.09	4.21	--	--	--	--	1
	532 SV 232	4.32	4.74	5.29	5.09	5.19	--	--	--	--	1
	503 SV 265	4.65	5.73	5.69	6.15	5.92	6.00	5.89	6.08	5.65	8
	515 SV 285	5.21	4.91	6.38	5.27	5.82	5.65	5.85	5.47	6.26	6
	554 SX 1815	4.83	4.93	5.91	5.29	5.60	5.46	5.25	5.32	4.82	3
	530 SX 1818	3.77	4.25	4.62	4.56	4.59	4.56	4.80	4.54	5.26	3
	560 SX 1835	3.21	3.64	3.93	3.91	3.92	--	--	--	--	1
	544 SX 1836	4.43	4.79	5.42	5.14	5.28	--	--	--	--	1
	537 SX 1898	4.55	5.00	5.57	5.37	5.47	5.42	5.51	5.38	5.67	5
	1 1201 FS CK #12 HILL4012RR	5.67	5.95	6.94	6.39	6.66	6.52	6.42	6.38	6.23	18
	1 1202 FS CK #18 CRY5768RR	3.24	4.12	3.97	4.42	4.19	4.33	4.18	4.46	3.87	15
	1 1203 FS CK #29 CRY5875RR	3.63	4.73	4.44	5.08	4.76	4.78	4.68	4.79	4.48	16
	1 1204 FS CK #30 BTS8337	2.87	3.64	3.51	3.91	3.71	3.82	3.72	3.93	3.53	11
	1 1205 FS CK #31 SXMarathon	4.21	4.75	5.15	5.10	5.13	5.07	5.29	5.01	5.72	9
	1 1206 FS CK #32 CRY5574	2.23	2.98	2.73	3.20	2.96	2.69	2.68	2.41	2.67	9
	1 1207 FS CK #33 SES375	4.41	4.76	5.40	5.11	5.25	5.34	5.58	5.43	6.05	7
	1 1208 FS CK #34 SES265	4.43	5.42	5.42	5.82	5.62	5.61	5.74	5.59	6.02	8
	1 1209 FS CK #35 SES203	4.78	4.96	5.85	5.33	5.59	5.57	5.71	5.55	5.99	4
	1 1210 FS CK #36 SES285	4.88	4.70	5.97	5.05	5.51	5.49	5.75	5.47	6.26	6
10	Check Mean	4.04	4.60	4.94	4.94	4.94					
	Trial Mean	3.23	4.07	3.95	4.37	4.16					
	Coeff. of Var. (%)	16.0	10.6								
	Mean LSD (0.05)	0.67	0.54								
	Mean LSD (0.01)	0.88	0.71								
	Sig Lvl	0.01	0.01								
	Adj Factor			1.224	1.074						

+ Average rating based upon multiple rating dates.

++ Ratings adjusted to 2007 basis. (2005-2006 FS Nurseries). Ratings adjusted on the basis of checks.

(1= healthy, 9= severe damage)

Ratings in green font indicate good resistance.

Ratings in red font indicate a level of concern.

Created 10/27/2023

Table 29. Pesticides Applied to ACSC Official Trials

<u>Herbicide Location</u>	<u>Herbicide Used</u>	<u>Spray Dates</u>	<u>Fungicide Used</u>	<u>Fungicide Spray Dates</u>
Casselton	RU1, RU2	6/1, 6/22	CR1, CR2, CR3, CR4	7/5, 7/17, 7/31, 8/15
Perley	RU1, RU2	6/6, 6/23	CR1, CR2, CR3, CR4, CR5	7/6, 7/17, 7/31, 8/15, 8/28
Halstad	RU1, RU2	6/2, 6/19	CR1, CR2, CR3, CR4, CR5	7/5, 7/17, 7/31, 8/15, 8/28
Reynolds	RU1, RU2, RU3	5/30, 6/23, 7/21	CR1, CR2, CR3, CR4, CR5	7/7, 7/17, 7/31, 8/15, 8/28
Climax	RU1, RU2	5/30, 6/29	CR1, CR2, CR3, CR4, CR5	7/7, 7/17, 7/31, 8/15, 8/28
Grand Forks	RU1, RU2	6/2, 6/29	CR1, CR2, CR3, CR4, CR5	7/6, 7/17, 7/31, 8/14, 8/28
Scandia	RU1, RU2	6/1, 6/28	CR1, CR2, CR3, CR4, CR5	7/7, 7/17, 7/31, 8/15, 8/28
East Grand Forks	RU1, RU2	5/31, 7/3	CR1, CR2, CR3, CR4, CR5	7/11, 7/18, 8/1, 8/17, 8/28
Stephen	RU1, RU2	5/31, 6/26	CR1, CR2, CR3, CR4, CR5	7/10, 7/19, 8/1, 8/17, 8/30
St. Thomas	RU1, RU2	6/5, 7/6	CR1, CR2, CR3, CR4, CR5	7/10, 7/18, 8/1, 8/17, 8/30
Bathgate	RU1, RU2	5/31, 6/28	CR1, CR2, CR3, CR4, CR5	7/10, 7/18, 8/1, 8/17, 8/30

Ground applications made by beet seed personnel from Crystal Technical Services Center Created 11/28/2023

Counter 20G applied at 8.9 lbs./A at all locations.

AZteroid in-furrow (5.7 fl oz/A) was used at all locations.

Quadris (10 fl oz./A) was applied to 6-10 leaf beets at all locations

RU1 = Roundup PowerMax 3 (25 oz./A), ClassAct (2.5 gal./100 gal. of water).

RU2 = Roundup PowerMax 3 (21 oz./A), ClassAct (2.5 gal./100 gal. of water).

RU3 = Roundup PowerMax 3 (20 oz./A), ClassAct (2.5 gal./100 gal. of water).

CR1 = Insire XT + Manzate Max

CR2 = Agritin + Incognito

CR3 = Proline + Manzate Max

CR4 = Manzate Max

CR5 = Priaxor + Agritin

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