RESULTS OF AMERICAN CRYSTAL SUGAR COMPANY'S 2019 CODED OFFICIAL VARIETY TRIALS

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American Crystal Sugar Company's (ACSC) coded Official Variety Trials (OVT) are designed to provide an unbiased evaluation of the genetic potential of sugar beet variety entries under several different environments. The two-year average 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 2019 American Crystal OVTs and describes the procedures and cultural practices involved in the trials.

Table	Information in the Table
1	ACSC approved varieties for 2020
2	Multi-year performance of approved varieties (all locations combined)
3	Performance of ACSC Aphanomyces specialty varieties
4	Performance data of approved conventional varieties (all locations combined)
5	Disease ratings for ACSC tested varieties (multiple diseases)
6	Root Aphid Ratings
7	Official trial sites, cooperators, plant and harvest dates, soil types and disease notes
8	Seed treatments applied to seed used in the OVTs
9-16	2019 Roundup Ready variety trials and combined trials
17-20	2019 Conventional variety trials and combined trials
21-24	Approval calculations for ACSC market
25	Aphanomyces disease nursery ratings
26	Cercospora disease nursery ratings
27	Rhizoctonia disease nursery ratings
28	Fusarium disease nursery ratings
29	Herbicides and fungicides applied to official trials

Procedures and Cultural Practices

Sugarbeet official variety tests were conducted at the ACSC growing region areas of the Red River Valley by ACSC personnel at the Technical Services Center.

All entries were assigned a code number by KayJay Ag Services. The seed then was sent to ACSC Technical Services Center at Moorhead for official testing.

Thirteen official yield trial sites were planted in the ACSC area with seven harvested. Plant-to-stand trials (4.5 inch spacing) were used to evaluate the commercial, experimental and conventional varieties. Seed companies had the option of treating seed with Tachigaren, insecticide and a Rhizoctonia seed treatment fungicide. The treatments used on the seed planted in the official variety yield trials can be found in table 8.

All seven sites were used for variety approval calculations. One site was abandoned due to erratic emergence (St. Thomas) and two locations were slated to be used for Aphanomyces Specialty (Climax and Perley). However, there was not enough disease pressure to warrant Aphanomyces Specialty evaluation. Rhizoctonia was not prevalent in 2019 compared to 2018 in yield trials. Seed treatments and two applications of Quadris were used to control Rhizoctonia. Based upon susceptible plot observations, root aphids were present in low levels at eleven (11) sites. Preliminary root aphid evaluations are presented in table 6.

2019 harvest conditions were challenging and unprecedented. Soil moisture levels remained above average throughout the months of September, October, and into November, combined with snow and freezing conditions…creating difficult harvest conditions in all five Factory Districts for all involved. Taking the adverse weather conditions into consideration, our OVT Harvest Staff were quite fortunate to have completed harvest at seven (7) OVT locations, those sites included Argyle, Bathgate, Casselton, Kennedy, Climax, Glyndon, Scandia and Grand Forks (Conventional Trial Only). OVT site locations remaining too wet for harvest, and therefore abandoned were Grand Forks, Halstad, Hillsboro, Perley, and Northcote.

Yield trials were planted to stand at 4.5 inches. Plots were planted crosswise (90°) to the cooperators' normal farming operations, where possible. Plot row lengths for all official trials were maintained at 46 feet with about 39 feet harvested. 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 Tachigaren, 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 with Event and full rates of fungicides were applied using a pickup sprayer driven down the alleys. Hand weeding was used where necessary. The micro rate program was used on conventional trials. All yield trials were treated with Quadris in a band during the 2 leaf (9 oz) and 6-10 leaf stage (14 oz) for Rhizoctonia control. Azteroid was applied at plant at Casselton and Grand Forks. Treatments used for Cercospora control in 2019 included Inspire XT/Penncozeb, Agri Tin/Incognito, Proline/Penncozeb, and Headline/Agri Tin. Ground spraying was conducted by ACSC technical staff.

RR varieties with commercial seed were planted in four-row, six replication trials. The RR experimental entries were planted in smaller two-row, four replication trials. Two applications of Roundup were made in the 4-6 (32 oz) and 8 – 12 (22 oz) leaf stages.

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 customized six row harvester. All harvested beets of each plot were used for yield determination while one sample (approx 25 lbs) for sugar and impurity analysis was obtained from each plot. Quality analysis was performed at the ACSC Technical Services quality lab in Moorhead.

Varieties were planted in disease nurseries in North Dakota, Minnesota and Michigan to evaluate varieties for disease tolerance.

ACSC adjusts the Cercospora, Aphanomyces, Rhizoctonia and Fusarium nursery data each year to provide a consistent target for variety approval criteria.

Acknowledgements

Thanks to the beet seed companies for their participation in the official variety testing program and to all grower-cooperators, dedicated Technical Services staff involved in the official trial plot care, harvest, and data analysis. Special thanks are extended to Dr. Mohamed Khan for Cercospora nursery infection, Dr. Albert Sims for hosting a Rhizoctonia nursery, Randy Nelson for RRV disease ratings, USDA staff in Michigan for Cercospora and Rhizoctonia nursery ratings. The Betaseed staff for Aphanomyces and Cercospora ratings in the Shakopee area, and Kay Jay Ag Services for sampling and coding all variety entries.

Table 1.
Varieties Meeting ACSC Approval Criteria for the 2020 Sugarbeet Crop ++

Roundup Ready ®	Full Market	Aph Spec	Rhc Spec	High Rzm
BETA8337	Yes	Yes		Hi Rzm
BETA8500	Yes	Yes		Hi Rzm
BETA8524	Yes	Yes		Hi Rzm
BETA8606	Yes			Hi Rzm
BETA8629	Yes	Yes		Hi Rzm
BETA8735	Yes	Yes		Hi Rzm
BETA8749	Yes	Yes	New	Hi Rzm
BETA8767	Yes	New		Hi Rzm
BETA8784	Yes	New		Hi Rzm
BETA8815	New			Hi Rzm
BETA8882	New			Hi Rzm
Crystal 093RR	Yes	Yes		Hi Rzm
Crystal 247RR	Yes			Hi Rzm
Crystal 355RR	Yes		Yes	Hi Rzm
Crystal 572RR	Yes			Hi Rzm
Crystal 574RR	Yes	Yes		Hi Rzm
Crystal 578RR	Yes	Yes		Hi Rzm
Crystal 684RR	Yes	Yes		Hi Rzm
Crystal 793RR	Yes	Yes		Hi Rzm
Crystal 796RR	Yes	Yes		Hi Rzm
Crystal 803RR	New	New		Hi Rzm
Crystal 804RR	New	New		Hi Rzm
Crystal 808RR	New	New		Hi Rzm
Hilleshög HM4302RR	Yes		Yes	Rzm
Hilleshög HM4448RR +	Yes			Rzm
Hilleshög HM9528RR	Yes			Hi Rzm
Hilleshög HIL9708	Yes		New	Hi Rzm
Hilleshög HIL9920	Yes			Hi Rzm
Maribo MA109	Yes		Yes	Hi Rzm
Maribo MA504	Yes			Hi Rzm
Maribo MA717	Yes	New		Hi Rzm
Seedex Bronco RR (1863)	Yes			Hi Rzm
Seedex Canyon RR(844TT)	Yes	Yes		Hi Rzm
Seedex Marathon (856)	Yes			Hi Rzm
Seedex RR1887	New			Hi Rzm
Seedex RR1888	New	New		Hi Rzm
SESVdh RR265	Yes			Hi Rzm
SESVdh RR268	Yes	Yes		Hi Rzm
SESVdh RR333	Yes	Yes		Hi Rzm
SESVdh RR351	Yes			Hi Rzm
SESVdh RR371	Yes			Hi Rzm
SESVdh RR375	Yes			Hi Rzm
SESVdh RR285	New	New		Hi Rzm
SESVdh RR289	New			Hi Rzm

Conventional	Full Market	High Rzm
Crystal R761	Yes	Hi Rzm
Crystal 620	Yes	Hi Rzm
Crystal 840	Yes	Hi Rzm
Crystal 950	New	Hi Rzm
Hilleshög HM3035Rz	Yes	Rzm
Seedex 8869 Cnv	Yes	Hi Rzm
SESVanderhave 48777	Yes	Hi Rzm

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

+ Previously approved varieties not meeting current approval standards. According to Approval Policy, may be sold in 2020

Created 11/25/2019

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

Table 2. Performance Data of RR Varieties During 2017, 2018, 2019 Growing Seasons (All Locations Combined) +++

	Yrs	Rev/Ton ++			Rev/Acre ++			Rec/Ton		Rec/Acre		Sugar		Yield		Molasses		Emerg		Bolter / Ac		CR +		Aph Root+		Rhizoc.+		Fusarium+		Rzm+
Variety	Com	19	2 Yr	2Y%	19	2 Yr	2Y%	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	
Previous Approved # locations		7	17		7	17		7	17	7	17	7	17	7	17	7	17	7	17	7	17	3	6	1	3	3	6	2	4	
BTS 8337	5	46.23	51.58	104	1442	1531	102	327	342	10204	10207	17.34	18.08	31.3	30.1	1.00	0.99	69	75	0	0	4.40	4.52	3.4	3.6	3.6	3.8	3.6	3.9	Hi
BTS 8500	3	41.85	47.52	95	1418	1569	105	311	327	10588	10915	16.64	17.41	34.2	33.7	1.09	1.04	65	77	0	0	4.00	4.20	4.3	4.4	4.3	4.3	2.3	2.4	Hi
BTS 8524	3	39.93	45.11	91	1408	1533	102	304	319	10742	10913	16.28	17.00	35.4	34.4	1.08	1.07	70	75	0	0	4.52	4.51	4.5	4.3	4.0	4.1	3.1	3.5	Hi
BTS 8606	2	43.24	49.09	99	1404	1544	103	316	333	10275	10543	16.82	17.63	32.6	31.9	1.02	0.99	63	73	0	0	4.69	4.74	5.1	4.8	4.6	4.4	2.7	3.2	Hi
BTS 8629	2	41.33	47.19	95	1445	1599	107	309	326	10814	11126	16.52	17.33	35.0	34.3	1.07	1.02	65	69	0	0	4.66	4.59	5.3	4.6	3.9	4.0	3.7	4.1	Hi
BTS 8735	1	42.11	49.11	99	1413	1551	103	312	333	10500	10635	16.58	17.61	33.8	32.3	0.99	0.96	63	74	0	0	4.15	4.18	4.5	4.3	4.0	4.0	3.3	3.7	Hi
BTS 8749	1	43.77	49.04	98	1393	1495	100	318	333	10122	10206	16.99	17.69	31.9	30.9	1.10	1.06	57	71	3	2	3.95	4.02	3.0	2.9	3.6	3.7	3.0	3.4	Hi
BTS 8767	1	43.65	48.57	97	1447	1556	104	317	331	10546	10678	16.90	17.56	33.3	32.5	1.03	1.00	68	78	0	0	4.26	4.29	4.3	4.3	4.1	4.1	2.4	2.9	Hi
BTS 8784	1	46.43	51.83	104	1409	1538	103	327	343	9923	10203	17.35	18.09	30.3	29.9	0.98	0.96	54	69	0	0	3.84	3.78	4.4	4.3	4.3	4.4	2.8	3.3	Hi
Crystal 093RR	8	45.71	51.22	103	1470	1568	105	325	340	10460	10495	17.26	18.04	32.3	31.0	1.02	1.02	72	79	0	0	5.09	4.98	5.2	4.8	4.1	4.4	3.1	3.7	Hi
Crystal 247RR	6	42.12	47.90	96	1330	1500	100	312	329	9838	10332	16.57	17.39	31.5	31.6	0.98	0.97	67	76	0	0	4.50	4.52	4.8	4.9	4.3	4.4	2.5	2.9	Hi
Crystal 355RR	4	45.84	50.44	101	1321	1423	95	325	338	9413	9592	17.31	17.94	29.0	28.6	1.05	1.05	72	80	0	0	4.68	4.60	5.0	4.7	3.7	3.7	2.5	3.1	Hi
Crystal 572RR	3	47.63	51.97	104	1476	1597	106	332	343	10286	10584	17.55	18.13	31.0	31.0	0.97	0.97	69	76	0	0	4.68	4.56	5.0	4.7	4.1	4.3	2.4	3.0	Hi
Crystal 574RR	3	42.50	47.67	96	1436	1585	106	313	328	10623	10977	16.72	17.43	34.0	33.7	1.06	1.04	72	77	0	0	4.28	4.35	4.0	4.2	4.5	4.4	2.0	2.5	Hi
Crystal 578RR	2	42.81	48.40	97	1417	1531	102	314	330	10420	10529	16.75	17.53	33.2	32.1	1.03	1.01	72	79	0	0	4.64	4.69	4.9	4.5	4.2	4.3	2.5	2.9	Hi
Crystal 684RR	1	41.68	47.25	95	1429	1593	106	310	326	10675	11077	16.58	17.36	34.5	34.2	1.07	1.05	64	76	0	0	4.12	4.27	4.3	4.1	4.0	4.2	2.1	2.5	Hi
Crystal 793RR	1	45.92	51.40	103	1555	1680	112	326	341	11046	11209	17.21	17.98	34.0	33.0	0.93	0.92	64	74	0	0	4.04	4.15	3.7	3.5	4.2	4.1	2.7	3.2	Hi
Crystal 796RR	NC	42.94	48.32	97	1530	1637	109	315	330	11210	11258	16.77	17.50	35.6	34.3	1.01	0.99	78	83	0	0	4.74	4.74	4.0	3.8	3.9	3.9	2.5	2.9	Hi
Hilleshög HM4302RR	6	41.96	47.59	96	1271	1422	95	311	328	9439	9840	16.57	17.36	30.3	30.2	1.00	0.98	56	69	0	0	3.93	4.09	5.2	4.9	4.0	3.8	4.3	4.6	Rzm
Hilleshög HM4448RR	6	43.13	48.60	98	1455	1588	106	316	331	10659	10896	16.75	17.52	33.8	33.1	0.98	0.97	69	77	3	2	5.48	5.37	4.9	4.7	4.0	4.2	4.8	5.0	Rzm
Hilleshög HM9528RR	4	43.73	48.58	97	1455	1544	103	318	331	10587	10595	16.85	17.51	33.4	32.2	0.96	0.95	66	72	0	1	4.93	4.86	4.6	4.4	4.1	4.1	4.2	4.6	Hi
Hilleshög HIL9708	2	43.37	48.74	98	1433	1559	104	316	332	10459	10654	16.80	17.55	33.1	32.3	0.98	0.97	72	79	0	0	4.96	4.83	4.6	4.4	3.9	3.8	3.9	4.3	Rzm
Hilleshög HIL9920	1	45.83	51.14	103	1430	1563	104	325	340	10172	10458	17.23	17.96	31.3	30.9	0.97	0.96	70	78	0	0	4.95	4.87	5.1	4.6	4.7	4.7	5.4	5.5	Hi
Maribo MA109	4	46.11	51.17	103	1321	1422	95	326	340	9339	9501	17.28	17.98	28.6	28.1	0.97	0.97	52	64	0	0	4.07	4.20	5.3	4.8	3.7	3.7	4.0	4.5	Hi
Maribo MA504	3	40.79	46.89	94	1420	1584	106	307	325	10694	11050	16.35	17.25	34.8	34.2	1.00	1.00	69	77	0	0	5.34	5.16	6.2	5.7	4.7	4.5	4.6	4.7	Hi
Maribo MA717	1	44.33	50.27	101	1476	1571	105	320	337	10682	10627	16.98	17.83	33.5	31.8	0.99	0.98	70	78	0	0	5.11	4.95	4.4	4.3	4.2	4.2	4.8	4.8	Hi
SX Bronco RR	2	44.88	49.79	100	1415	1531	102	322	335	10119	10354	17.11	17.76	31.4	31.0	1.02	0.99	58	68	0	0	4.77	4.71	5.4	4.7	4.7	4.7	5.4	5.5	Hi
SX Canyon RR	4	44.10	48.97	98	1434	1554	104	319	333	10396	10614	16.94	17.60	32.7	32.1	0.99	0.97	67	74	0	1	4.58	4.69	5.0	4.7	3.9	4.1	4.7	4.8	Hi
SX Marathon RR	3	43.87	49.04	98	1380	1549	103	318	333	10028	10546	16.90	17.60	31.6	31.8	0.99	0.97	55	69	0	0	4.79	5.03	5.1	4.9	4.4	4.3	5.7	5.6	Hi
SV RR265	2	44.31	48.76	98	1422	1543	103	320	332	10280	10552	16.94	17.53	32.2	32.0	0.96	0.95	63	73	0	0	4.28	4.38	5.5	4.8	4.3	4.3	5.6	5.5	Hi
SV RR268	2	44.33	49.71	100	1408	1544	103	320	335	10166	10467	16.96	17.72	31.9	31.5	0.97	0.97	63	72	0	0	4.82	4.76	5.1	4.6	4.2	4.2	4.9	5.0	Hi
SV RR333	4	45.19	50.26	101	1408	1525	102	323	337	10086	10285	17.10	17.80	31.3	30.7	0.96	0.96	70	72	0	0	4.49	4.64	4.7	4.4	4.1	4.2	4.7	4.9	Hi
SV RR351	3	44.56	49.40	99	1401	1531	102	321	334	10132	10424	17.02	17.66	31.8	31.4	0.99	0.96	65	72	0	0	4.90	4.76	5.7	5.1	4.1	4.1	5.1	5.2	Hi
SV RR371	1	44.55	49.20	99	1377	1500	100	321	333	9920	10214	16.98	17.61	31.0	30.8	0.95	0.95	55	69	0	0	4.34	4.52	5.0	4.8	4.0	4.1	5.2	5.3	Hi
Newly Approved																														
BTS 8815	NC	45.96	50.63	102	1458	1564	104	326	338	10338	10510	17.27	17.89	31.8	31.2	0.98	0.97	67	75	0	0	4.61	4.63	5.2	4.6	4.0	4.0	2.7	3.2	Hi
BTS 8882	NC	43.24	48.45	97	1445	1577	105	316	331	10550	10823	16.88	17.58	33.3	32.9	1.07	1.04	58	67	0	0	4.18	4.35	5.2	5.1	4.3	4.3	2.9	3.1	Hi
Crystal 803RR	NC	47.10	51.34	103	1493	1610	107	329	341	10472	10736	17.45	18.00	31.8	31.6	0.96	0.95	76	83	0	0	3.88	3.95	4.5	4.2	4.5	4.6	2.7	3.4	Hi
Crystal 804RR	NC	44.15	48.64	98	1472	1602	107	319	331	10684	10988	16.99	17.59	33.6	33.4	1.03	1.02	62	72	0	0	4.46	4.44	4.3	3.9	3.7	3.9	2.3	2.7	Hi
Crystal 808RR	NC	43.05	48.71	98	1456	1614	108	315	332	10711	11059	16.83	17.61	34.1	33.6	1.05	1.03	73	80	0	0	4.78	4.82	3.6	3.6	4.1	4.0	2.4	2.8	Hi
SX 1887	NC	46.26	50.42	101	1421	1540	103	327	338	10046	10352	17.31	17.84	30.8	30.8	0.97	0.96	62	70	0	0	4.89	4.89	4.7	4.6	4.2	4.2	4.7	5.0	Hi
SX 1888	NC	45.30	50.04	100	1475	1587	106	323	336	10543	10719	17.13	17.77	32.6	32.0	0.96	0.95	61	70	0	0	4.89	4.90	4.6	4.3	4.2	4.4	5.5	5.5	Hi
SV 285	NC	45.58	49.76	100	1422	1528	102	324	335	10125	10344	17.19	17.72	31.2	31.0	0.97	0.96	59	71	0	0	4.84	4.68	4.5	4.2	4.4	4.4	4.8	5.1	Hi
SV 289	NC	45.57	50.45	101	1376	1533	102	324	338	9838	10313	17.18	17.84	30.5	30.7	0.96	0.95	54	68	0	0	4.59	4.62	5.3	4.9	4.1	4.2	5.8	5.6	Hi
SV RR375	NC	45.40	49.79	100	1431	1540	103	324	335	10195	10410	17.13	17.72	31.5	31.1	0.95	0.95	63	74	0	0	4.11	4.54	5.0	4.4	4.0	4.1	5.0	5.2	Hi
Benchmark var. mean		45.00	49.83		1394	1500		322	336	10011	10166	17.16	17.81	31.2	30.5	1.05	1.03	65	74											

3 Yr is mean of 3 years data, 3 Y% is 3-Yr mean as % of benchmark varieties. 2 Yr is mean of 2 years data, 2 Y% is 2-Yr mean as % of benchmark varieties. Emergence is % of planted seeds producing a 4 leaf beet. Created 11/25/2019

++2019 Revenue estimate based on a $44.38 beet payment (5-yr ave) at 17.5% crop with a 1.5% loss to molasses, 2018 Revenue estimate based on a $46.40 beet payment and 2017 Revenue estimate based on a $48.49 beet payment. Revenue does not consider hauling or production costs.

+ Aph ratings from RRV & Shakopee (res.<4.4, susc>5.0). CR from Randolph MN, Foxhome MN & Michigan (res.<4.4, susc>5.0). Fusarium from RRV (res.<3.0, susc>5.0). Rhizoc. from Mhd, NWROC & Mich (res.<3.8, susc>5). Hi may perform better under severe Rzm.

Bolters /Ac are based upon a plant stand of 60,000.

-- indicates data not available.

+++ Sites include Felton, Georgetown, Hillsboro, Climax, Grand Forks, Stephen, Scandia, St. Thomas, Hendrum, Bathgate in 2017.

+++ Sites include Casselton, Bathgate, Scandia, East Grand Forks, St. Thomas, Ada, Glyndon, Hillsboro, Grand Forks, Stephen in 2018

+++ Sites include Casselton, Glyndon, Scandia, Bathgate, Kennedy, Climax, Argyle in 2019

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Table 3. Performance Data of RR Aphanomyces Specialty Varieties - Under Aphanomyces Conditions (Relative to Susceptible Checks) approved for 2020 Growing Season +++

	Years	Rev/Ton			Rev/Acre			Rec/Ton		Rec/Acre		Sugar		Yield		CR Rating +		Aph Root +		Fusarium +		Rhizoctonia +	
Description	Comm	2019#	2018	%Sus	2019#	2018	%Sus	2019#	2018	2019#	2018	2019#	2018	2019#	2018	19	2Yr	19	2 Yr	19	2Yr	19	2Yr
# of locations		0	2	2	0	2	2	0	2	0	2	0	2	0	2	3	6	2	3	2	4	3	4
Previously Approved																							
BTS 8337	5	--	44.69	112	--	1240	130	--	314.0	--	8719	--	16.83	--	27.8	4.40	4.52	3.4	3.6	3.6	3.9	3.6	3.8
BTS 8500	3	--	39.44	99	--	1309	137	--	295.7	--	9794	--	15.97	--	33.1	4.00	4.20	4.3	4.4	2.3	2.4	4.3	4.3
BTS 8524	3	--	35.94	90	--	1185	124	--	283.5	--	9388	--	15.40	--	33.2	4.52	4.51	4.5	4.3	3.1	3.5	4.0	4.1
BTS 8629	2	--	38.57	97	--	1286	135	--	292.7	--	9772	--	15.82	--	33.4	4.66	4.59	5.3	4.6	3.7	4.1	3.9	4.0
BTS 8735	1	--	40.15	101	--	1215	127	--	298.2	--	9035	--	16.04	--	30.4	4.15	4.18	4.5	4.3	3.3	3.7	4.0	4.0
BTS 8749	1	--	39.62	100	--	1201	126	--	296.4	--	9005	--	16.02	--	30.5	3.95	4.02	3.0	2.9	3.0	3.4	3.6	3.7
Crystal 093RR	8	--	40.91	103	--	1244	130	--	300.8	--	9138	--	16.27	--	30.3	5.09	4.98	5.2	4.8	3.1	3.7	4.1	4.4
Crystal 574RR	3	--	38.17	96	--	1282	134	--	291.3	--	9778	--	15.75	--	33.6	4.28	4.35	4.0	4.2	2.0	2.5	4.5	4.4
Crystal 578RR	2	--	39.56	99	--	1156	121	--	296.1	--	8661	--	15.96	--	29.3	4.64	4.69	4.9	4.5	2.5	2.9	4.2	4.3
Crystal 684RR	1	--	37.30	94	--	1295	135	--	287.9	--	10015	--	15.60	--	34.9	4.12	4.27	4.3	4.1	2.1	2.5	4.0	4.2
Crystal 793RR	1	--	42.26	106	--	1317	138	--	305.8	--	9553	--	16.37	--	31.3	4.04	4.15	3.7	3.5	2.7	3.2	4.2	4.1
Crystal 796RR	NC	--	38.87	98	--	1288	135	--	293.5	--	9735	--	15.82	--	33.2	4.74	4.74	4.0	3.8	2.5	2.9	3.9	3.9
SX Canyon RR	4	--	40.07	101	--	1199	125	--	297.9	--	8884	--	16.05	--	29.7	4.58	4.69	5.0	4.7	4.7	4.8	3.9	4.1
SV RR268	2	--	41.55	104	--	1236	129	--	303.1	--	9007	--	16.28	--	29.8	4.82	4.76	5.1	4.6	4.9	5.0	4.2	4.2
SV RR333	4	--	41.41	104	--	1172	123	--	302.6	--	8553	--	16.25	--	28.2	4.49	4.64	4.7	4.4	4.7	4.9	4.1	4.2
Newly Approved																							
BTS 8767	1	--	37.52	94	--	1130	118	--	288.7	--	8730	--	--	--	30.4	4.26	4.29	4.3	4.3	2.4	2.9	4.1	4.1
BTS 8784	1	--	42.98	108	--	1253	131	--	308.4	--	9015	--	16.57	--	29.3	3.84	3.78	4.4	4.3	2.8	3.3	4.3	4.4
Crystal 803RR	NC	--	42.04	106	--	1330	139	--	305.0	--	9661	--	16.35	--	31.8	3.88	3.95	4.5	4.2	2.7	3.4	4.5	4.6
Crystal 804RR	NC	--	37.17	93	--	1266	132	--	287.4	--	9823	--	15.60	--	34.3	4.46	4.44	4.3	3.9	2.3	2.7	3.7	3.9
Crystal 808RR	NC	--	40.06	101	--	1301	136	--	297.9	--	9778	--	16.13	--	33.1	4.78	4.82	3.6	3.6	2.4	2.8	4.1	4.0
Maribo MA717	1	--	42.64	107	--	1186	124	--	307.1	--	8578	--	16.43	--	28.1	5.11	4.95	4.4	4.3	4.8	4.8	4.2	4.2
SX 1888	NC	--	41.59	105	--	1254	131	--	303.4	--	9156	--	16.26	--	30.3	4.89	4.90	4.6	4.3	5.5	5.5	4.2	4.4
SV 285	NC	--	40.91	103	--	1217	127	--	300.9	--	8981	--	16.19	--	30.0	4.84	4.68	4.5	4.2	4.8	5.1	4.4	4.4
Aph Susc Checks		--	39.78		--	956		--	296.9	--	7123	--	16.04	--	24.0								
Mean of Aph Specialty Varieties		--	40.32		--	1226		--	298.2	--	9250	--	16.09	--	31.1								

%Susc = % of susceptible varieties.

Created 11/6/2019

+ Aph ratings from Shakopee (res.<4.4, susc>5.0). CR from Randolph MN, Foxhome MN & Michigan (res.<4.4, susc>5.0). Fusarium from RRV (res.<3.0, susc>5.0). Rhizoc. from Mhc NWROC & Mich (res.<3.8, susc>5).

++ 2019 Revenue estimates based on a $44.38 beet payment at 17.5% sugar and 1.5% loss to molasses. 2018 Revenue estimate based on $46.40 beet payment. Revenue does not consider hauling or production costs.

+++ 2018Data from Climax and Georgetown.

Lack of Aphanomyces pressure at any of the OVT sites prevented collection of Aphanomyces Yield Data for 2019.

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

	Yrs	Rev/Ton ++					Rev/Acre ++					Rec/Ton		Rec/Acre		Sugar		Yield		Molasses		Emerg		Bolter / Ac		CR +		Aph Root+		Rhizoc.+		Fusarium+		Rzm+
Variety @	Com	19	2 Yr	2Y%	3Yr#	3Y%	19	2 Yr	2Y%	3Yr#	3Y%	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	
Previous Approved # location		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	5	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
Newly Approved																																		
Crystal 950	NC	41.21	--	--	--	--	1430	--	--	--	--	309	--	10719	NA	16.49	NA	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											

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

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

+ Aph ratings from Shakopee (res<4.4, susc>5.0). CR from Randolph MN, Foxhome MN & Michigan (res<4.5, susc>5.0). Fusarium from RRV (res<3.0, susc>5.0). Rhizoc. from Mhd, NWROC & Mich (res<3.8, susc>5). Hi may perform better under severe Rzm.

Bolters /Ac are based upon a planting base of 60,000 seeds.

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

+++ Sites include Scandia, Bathgate, Grand Forks in 201

Table 5. ACSC Official Trial Disease Nurseries 2017 - 2019 (Varieties tested in 2019)

Cercospora, Aphanomyces, Rhizoctonia & Fusarium

		< 4.5 CR > 5.0					< 4.4 Aph > 5.0					< 3.82 Rhizoctonia > 5.0					< 3.0 Fusarium > 5.0					High Rzm
		19	18	17	2 Yr	3 Yr	19	18	17	2 Yr	3 Yr	19	18	17	2 Yr	3 Yr	19	19	17	2 Yr	3 Yr	
Code	Description	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	Mean	
	Previously Approved																					
130	BTS 8337	4.40	4.64	4.36	4.52	4.47	3.45	3.74	3.78	3.59	3.65	3.62	4.07	4.30	3.84	3.99	3.57	4.18	3.83	3.87	3.86	Hi Rzm
577	BTS 8500	4.00	4.40	4.29	4.20	4.23	4.30	4.43	4.52	4.37	4.42	4.28	4.36	4.57	4.32	4.40	2.27	2.46	2.14	2.37	2.29	Hi Rzm
503	BTS 8524	4.52	4.50	4.38	4.51	4.47	4.51	4.08	4.49	4.29	4.36	4.00	4.23	4.41	4.12	4.21	3.14	3.93	3.24	3.54	3.44	Hi Rzm
576	BTS 8606	4.69	4.80	4.73	4.74	4.74	5.11	4.43	4.91	4.77	4.81	4.60	4.24	5.00	4.42	4.61	2.68	3.66	2.81	3.17	3.05	Hi Rzm
527	BTS 8629	4.66	4.52	4.29	4.59	4.49	5.32	3.89	4.68	4.61	4.63	3.89	4.02	4.21	3.96	4.04	3.71	4.40	4.20	4.05	4.10	Hi Rzm
521	BTS 8735	4.15	4.21	4.22	4.18	4.19	4.53	4.00	4.74	4.27	4.42	3.95	4.12	4.38	4.04	4.15	3.27	4.04	3.93	3.65	3.75	Hi Rzm
512	BTS 8749	3.95	4.10	4.05	4.02	4.03	2.97	2.79	3.53	2.88	3.10	3.58	3.88	3.95	3.73	3.81	3.04	3.79	3.28	3.41	3.37	Hi Rzm
568	BTS 8767	4.26	4.32	4.16	4.29	4.24	4.32	4.28	4.80	4.30	4.46	4.14	4.10	4.75	4.12	4.33	2.45	3.41	2.71	2.93	2.86	Hi Rzm
572	BTS 8784	3.84	3.73	3.65	3.78	3.74	4.38	4.22	4.59	4.30	4.40	4.29	4.60	4.64	4.44	4.51	2.80	3.76	2.63	3.28	3.07	Hi Rzm
530	Crystal 093RR	5.09	4.88	4.49	4.98	4.82	5.22	4.38	4.43	4.80	4.68	4.14	4.59	4.50	4.37	4.41	3.09	4.28	3.48	3.68	3.61	Hi Rzm
542	Crystal 247RR	4.50	4.54	4.55	4.52	4.53	4.84	5.02	5.35	4.93	5.07	4.32	4.56	4.49	4.44	4.45	2.48	3.34	3.00	2.91	2.94	Hi Rzm
562	Crystal 355RR	4.68	4.52	4.36	4.60	4.52	5.02	4.42	4.84	4.72	4.76	3.67	3.66	4.09	3.66	3.81	2.48	3.73	2.76	3.11	2.99	Hi Rzm
518	Crystal 572RR	4.68	4.45	4.27	4.56	4.47	4.98	4.47	4.69	4.72	4.71	4.14	4.54	4.47	4.34	4.38	2.39	3.70	2.64	3.04	2.91	Hi Rzm
575	Crystal 574RR	4.28	4.42	4.35	4.35	4.35	3.99	4.32	4.72	4.16	4.34	4.45	4.36	4.16	4.41	4.32	2.03	2.87	2.23	2.45	2.38	Hi Rzm
508	Crystal 578RR	4.64	4.74	4.91	4.69	4.76	4.88	4.21	4.56	4.54	4.55	4.21	4.30	4.40	4.25	4.30	2.48	3.36	2.41	2.92	2.75	Hi Rzm
545	Crystal 684RR	4.12	4.41	4.34	4.27	4.29	4.33	3.83	4.31	4.08	4.16	4.01	4.39	4.57	4.20	4.32	2.10	2.96	2.01	2.53	2.36	Hi Rzm
557	Crystal 793RR	4.04	4.26	3.93	4.15	4.08	3.72	3.32	3.02	3.52	3.35	4.18	4.11	4.26	4.15	4.18	2.71	3.59	2.95	3.15	3.09	Hi Rzm
574	Crystal 796RR	4.74	4.74	4.85	4.74	4.78	3.97	3.61	3.11	3.79	3.56	3.85	3.97	4.23	3.91	4.02	2.45	3.36	2.34	2.91	2.72	Hi Rzm
580	Hilleshög HM4302RR	3.93	4.26	3.93	4.09	4.04	5.20	4.65	6.66	4.93	5.50	3.97	3.71	3.60	3.84	3.76	4.25	5.02	5.09	4.64	4.79	Rzm
510	Hilleshög HM4448RR	5.48	5.26	5.28	5.37	5.34	4.86	4.53	6.29	4.70	5.23	4.04	4.38	4.63	4.21	4.35	4.80	5.23	5.35	5.02	5.13	Rzm
543	Hilleshög HM9528RR	4.93	4.79	4.99	4.86	4.90	4.56	4.22	5.63	4.39	4.80	4.10	4.04	4.21	4.07	4.12	4.16	4.95	4.25	4.56	4.45	Hi Rzm
533	Hilleshög HIL9708	4.96	4.71	4.61	4.83	4.76	4.61	4.25	5.94	4.43	4.93	3.87	3.71	4.21	3.79	3.93	3.89	4.61	4.61	4.25	4.37	Hi Rzm
525	Hilleshög HIL9920	4.95	4.79	4.89	4.87	4.88	5.05	4.09	4.94	4.57	4.70	4.68	4.65	4.48	4.67	4.60	5.42	5.51	5.92	5.47	5.62	Hi Rzm
541	Maribo MA109	4.07	4.33	4.14	4.20	4.18	5.28	4.38	5.06	4.83	4.91	3.73	3.69	3.63	3.71	3.69	4.04	4.95	4.23	4.49	4.41	Hi Rzm
504	Maribo MA504	5.34	4.98	5.50	5.16	5.27	6.17	5.30	6.20	5.73	5.89	4.69	4.25	4.37	4.47	4.43	4.61	4.80	4.52	4.70	4.64	Hi Rzm
567	Maribo MA717	5.11	4.78	4.85	4.95	4.91	4.42	4.15	5.31	4.29	4.63	4.15	4.35	4.28	4.25	4.26	4.81	4.86	4.95	4.84	4.88	Hi Rzm
569	SX Bronco RR	4.77	4.65	4.08	4.71	4.50	5.38	4.05	4.88	4.71	4.77	4.71	4.73	4.23	4.72	4.56	5.44	5.52	6.04	5.48	5.67	Hi Rzm
551	SX Canyon RR	4.58	4.79	4.92	4.69	4.76	4.99	4.34	4.33	4.67	4.55	3.89	4.36	4.51	4.12	4.25	4.71	4.93	5.12	4.82	4.92	Hi Rzm
528	SX Marathon RR	4.79	5.27	4.54	5.03	4.87	5.15	4.72	4.52	4.94	4.80	4.36	4.19	4.40	4.28	4.32	5.70	5.51	4.84	5.61	5.35	Hi Rzm
552	SV RR265	4.28	4.48	5.19	4.38	4.65	5.47	4.16	5.35	4.81	4.99	4.25	4.32	4.42	4.29	4.33	5.64	5.44	5.32	5.54	5.47	Hi Rzm
548	SV RR268	4.82	4.70	5.06	4.76	4.86	5.08	4.21	4.71	4.65	4.67	4.21	4.21	4.57	4.21	4.33	4.92	5.12	5.01	5.02	5.02	Hi Rzm
537	SV RR333	4.49	4.78	4.84	4.64	4.70	4.70	4.06	4.99	4.38	4.58	4.08	4.23	4.44	4.16	4.25	4.74	5.14	5.35	4.94	5.08	Hi Rzm
544	SV RR351	4.90	4.61	4.41	4.76	4.64	5.65	4.50	4.18	5.07	4.77	4.09	4.16	4.25	4.12	4.16	5.10	5.30	4.96	5.20	5.12	Hi Rzm
582	SV RR371	4.34	4.71	4.59	4.52	4.55	4.99	4.51	4.55	4.75	4.69	3.97	4.19	4.31	4.08	4.16	5.16	5.36	4.91	5.26	5.14	Hi Rzm
	Newly Approved																					
529	BTS 8815	4.61	4.65	--	4.63	--	5.24	3.97	--	4.60	--	4.03	3.88	--	3.95	--	2.69	3.64	--	3.16	--	Hi Rzm
535	BTS 8882	4.18	4.53	--	4.35	--	5.17	4.98	--	5.07	--	4.27	4.37	--	4.32	--	2.91	3.39	--	3.15	--	Hi Rzm
558	Crystal 803RR	3.88	4.01	--	3.95	--	4.45	3.86	--	4.16	--	4.54	4.67	--	4.60	--	2.70	4.11	--	3.40	--	Hi Rzm
517	Crystal 804RR	4.46	4.42	--	4.44	--	4.30	3.58	--	3.94	--	3.72	4.02	--	3.87	--	2.28	3.05	--	2.66	--	Hi Rzm
547	Crystal 808RR	4.78	4.86	--	4.82	--	3.57	3.60	--	3.58	--	4.09	3.83	--	3.96	--	2.39	3.12	--	2.75	--	Hi Rzm
559	SX 1887	4.89	4.89	--	4.89	--	4.67	4.49	--	4.58	--	4.18	4.16	--	4.17	--	4.68	5.35	--	5.01	--	Hi Rzm
546	SX 1888	4.89	4.92	--	4.90	--	4.65	4.03	--	4.34	--	4.19	4.57	--	4.38	--	5.51	5.47	--	5.49	--	Hi Rzm
561	SV 285	4.84	4.52	--	4.68	--	4.47	3.98	--	4.23	--	4.38	4.35	--	4.37	--	4.76	5.42	--	5.09	--	Hi Rzm
523	SV 289	4.59	4.65	--	4.62	--	5.30	4.42	--	4.86	--	4.06	4.37	--	4.22	--	5.78	5.45	--	5.61	--	Hi Rzm
555	SV RR375	4.11	4.96	5.08	4.54	4.72	5.03	3.83	4.54	4.43	4.47	4.05	4.13	4.25	4.09	4.14	4.97	5.51	5.44	5.24	5.31	Hi Rzm

Created 11/26/2019

Green highlighted ratings indicate specialty or good resistance.

Red highlighted ratings indicate level of concern for some fields.

-- indicates data not available

Table 6
Root Aphid Ratings
Betaseed GH and Hilleshög Field Nursery from 2016 thru 2018 +

	BTS (Infection Severity)			Hilleshög (% Infected)			BTS	Hilleshög
	(1=Excellent, 5=Poor)			(<10%=Excellent, >20%Poor)			1-5	% Infect
Variety	2016	2017	2018	2016	2017	2018	Mean	Mean
BETA80RR52	1.6	2.3	1.4	9.7	10.3	12.9	1.8	11.0
BETA8337	1.4	1.2	1.0	9.1	3.8	8.5	1.2	7.1
BETA8500		1.1	1.3		4.1	6.6	1.2	5.4
BETA8524		1.2	1.0		2.0	4.1	1.1	3.1
BETA8606			1.0			1.5	1.0	1.5
BETA8629			1.1			0.6	1.1	0.6
CRYS093RR	1.3	1.0	1.0	22.3	6.4	5.1	1.1	11.3
CRYS247RR	1.1	1.1	1.0	2.8	2.2	10	1.1	5.0
CRYS355RR	2.1	1.4	1.0	4.6	4.9	3.1	1.5	4.2
CRYS467RR		1.9	1.7		10.4	35.5	1.8	23.0
CRYS572RR		1.0	1.0		2.4	2.7	1.0	2.6
CRYS573RR			1.0			6	1.0	6.0
CRYS574RR		1.0	1.0		3.0	8.7	1.0	5.9
CRYS578RR			1.0			9.8	1.0	9.8
HILL4302RR	3.0	2.6	1.6	37.4	22.4	54.2	2.4	38.0
HILL4448RR	2.8	2.9	2.2	70.2	20.3	33.8	2.6	41.4
HILL9528RR	3.2	3.0	3.3	73.2	13.7	83.2	3.2	56.7
HILL9708			1.4			42.2	1.4	42.2
MARI109	2.7	2.5	1.8	43.0	38.3	49.6	2.3	43.6
MARI305RR	2.8	2.8	1.7	72.0	15.1	26.6	2.4	37.9
MARI502		2.9	1.4		17.0	51.2	2.2	34.1
MARI504RR			1.2			62.4	1.2	62.4
SEEDAVALANCHERR		1.8	1.1		8.6	14.8	1.5	11.7
SEEDBRONCORR			1.6			51.9	1.6	51.9
SEEDCANYONRR	2.3	2.3	1.4	41.4	17.8	56.6	2.0	38.6
SEEDCRUZERR	2.2	3.4	1.9	16.4	30.4	52.5	2.5	33.1
SEEDMARATHONRR		2.7	1.4		17.9	37	2.1	27.5
SESRR265			2.5			70.2	2.5	70.2
SESRR266			1.7			46.3	1.7	46.3
SESRR268			1.7			26.2	1.7	26.2
SESRR333	3.2	3.2	1.8	36.3	23.7	20.8	2.7	26.9
SESRR351		3.2	1.7		15.0	43.9	2.5	29.5
ACRARES1 - CRYS246	1.4	1.5	1.7	7.5	7.9	15.1	1.5	10.2
ACRASUSC1 - SES36918	3.1	2.8	1.8	37.8	28.5	57.7	2.6	41.3
ACRASUSC2 - CRYS985	3.0		1.4	69.2		64.9	2.2	67.1
BTS Resistant Check	1.1	1.1	1.0				1.1	--
BTS Susceptible Check	3.5	3.0	2.6				3.0	--
HIL Segregating Check				21.5	10.4	3	--	19.0
HIL Susceptible Check				68.4	24.0	61.7	--	52.3
HIL Tolerant Check				3.8	3.9	9.9	--	3.6

Legend = Tolerant | Moderate | Susceptable

Beta rates plants on severity of infection 1-5 with 1=no aphids, 5=heavy infection.

Hilleshog rates varieties on % infected plants

+ Some varieties in 2019 OVT's were not included inb this evaluation. Refer to approval list for approval status.

Table 7. Planting & Harvest Dates, Previous Crop and Disease Levels for 2019 ACSC Official Trial Sites *

Location	District / Trial Type	Cooperator	Planting Date	Harvest Date	Preceding Crop	Soil Type	Diseases Present @						Comments
							Aph	Rhc	Rzm	Fus	Maggot	Rt Aphid	
Casselton	Mhd/Hlb	Todd Weber	5/14	9/26	Wheat	Medium/Light	M	L	N	N	N	L	Aph pressure is more on East side.
Glyndon	Mhd/Hlb	Menholt Farms	5/6	9/22	Wheat	Medium/Light	M-V	L-M	N	L	N	N	Aph pressure is moderate to severe.
Perley	Mhd/Hlb	Hoff Farms	6/7	NA+	Corn	Medium	M-V	N	N	N	N	N	Site is very wet
Halstad	Mhd/Hlb	Peter Steen	5/13	NA+	Wheat	Medium	N	N	M	N	N	L	Root Aphid in one corner
Hillsboro	Mhd/Hlb	M&R Steenson Farms	5/21	NA+	Wheat	Medium	N	L	N	N	N	L-M	Root Aphid in all four corners.
Climax	EGF/Crk	Evenson Farms	5/9	10/25	Wheat	Medium/Light	L	L	N	N	N	L	Moderate Aph in NW corner
Grand Forks	EGF/Crk	Drees Farming Association	5/10	9/28	Wheat	Medium/Light	N	L	N	N	L	L	Light Root Maggot on a few beets. RR OVT not harvested
Scandia	EGF/Crk	Dennis Deboer	5/13	9/19	Wheat	Medium	N	L	M	N	N	L	Rzm in three corners. Root aphid in three corners.
Argyle	EGF/Crk	Brent Riopelle	5/4	11/4	Wheat	Medium/Light	N	L	L	N	L	L-M	Rzm in two corners.
Kennedy	Dtn	S & O Beet Farm	5/17	11/3	Wheat	Medium	L-M	N	N	N	N	L-M	Root Aphid in three corners.
St. Thomas	Dtn	Kennelly Farms	5/5	NA+	Wheat	Medium/Light	N	N	N	N	N	L	Harvested proprietary trials only. Poor Stands
Northcote	Dtn	Jesse Strege	5/2	NA +	Wheat	Medium/Heavy	L-M	L-M	N	N	N	L-M	Root Aphid in all four corners. Moderate Aph with some Rhc as secondary infection.
Bathgate	Dtn	Shady Bend Farms	4/25	10/9	Wheat	Medium	N	N	N	N	L	L-M	Moderate Root Aphid in one corner.
Moorhead Fus-N	Fus Nurs	Nelson Farms	5/7	7/2	Soybeans	Medium/Heavy	NA	L	NA	V	NA	NA	
Moorhead Fus-S	Fus Nurs	Oberg Farms	5/15	7/18	Corn	Medium	NA	L	NA	V	NA	NA	
Mhd Rhc-E	Rhc Nurs	Jon Hickel	5/30	8/14	Corn	Heavy	NA	V	NA	L	NA	NA	
Mhd Rhc-W	Rhc Nurs	Jon Hickel	5/12	NA	Corn	Heavy	NA	V	NA	L-M	NA	NA	Excessive rain prevented evaluation.
NWROC Rhc	Rhc Nurs	Albert Sims	5/17	7/26	Soybeans	Medium	NA	M-V	NA	NA	NA	NA	
BSDF Rhc	Rhc Nurs	Mitch McGrath	5/7	8/21	NA	NA	NA	NA	NA	NA	NA	NA	
Shakopee MN	Aphanomyces	Patrick O'Boyle	5/14	8/28	NA	NA	V	NA	NA	NA	NA	NA	
Longmont CO	Root Aphids	Kara Guffey	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Foxhome CR	Cercospora	NDSU/Kevin Etzler	5/14	8/30	Wheat	Medium	NA	NA	NA	NA	NA	NA	
BSDF CR	Cercospora	Mitch McGrath	5/6	8/28	NA	NA	NA	NA	NA	NA	NA	NA	
Randolph MN CR	Cercospora	Patrick O'Boyle	5/4	8/12	NA	NA	NA	NA	NA	NA	NA	NA	

Created 11-25-2019

* Fertilizer applied in accordance to cooperative recommendations.

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

+ Not harvested due to excessive moisture and freezing.

Table 8. Seed Treatments Used on Approved Varieties in Official Variety Trials in 2019

Description	Years in Trial	Years ** Comm.	Fungicide (Rhizoctonia)	Insecticide (Spring Tails & Maggots)	Tachigaren Rate (Aphanomyces)	Priming (Emergence)	Fungicide (Damping Off)
Previous Approved							
BTS 8337	7	5	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8500	5	3	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8524	5	3	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8606	4	2	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8629	4	2	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8735	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8749	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8767	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8784	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
Crystal 093RR	10	8	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 247RR	8	6	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 355RR	7	4	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 572RR	5	3	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 574RR	5	3	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 578RR	5	2	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 684RR	4	1	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 793RR	3	1	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 796RR	3	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Hilleshög HM4302RR	9	6	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshög HM4448RR	7	6	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshög HM9528RR	6	4	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshög HIL9708	5	2	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshög HIL9920	3	1	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA109	6	4	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA504	5	3	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA717	3	1	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
SX Bronco RR	4	2	Metlock/Rizolex/Kabina	NipsIt	20	XBEET	Sebring Thiram
SX Canyon RR	6	4	Metlock/Rizolex/Kabina	NipsIt	20	XBEET	Sebring Thiram
SX Marathon RR	5	3	Metlock/Rizolex/Kabina	NipsIt	20	XBEET	Sebring Thiram
SV RR265	4	2	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV RR268	4	2	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV RR333	7	4	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV RR351	5	3	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV RR371	3	1	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
Newly Approved							
BTS 8815	2	NC	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8882	2	NC	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
Crystal 803RR	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 804RR	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 808RR	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
SX 1887	2	NC	Metlock/Rizolex/Kabina	NipsIt	20	XBEET	Sebring Thiram
SX 1888	2	NC	Metlock/Rizolex/Kabina	NipsIt	20	XBEET	Sebring Thiram
SV 285	2	NC	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV 289	2	NC	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram
SV RR375	3	NC	Metlock/Rizolex/Vibrance	NipsIt	45	XBEET	Sebring Thiram

NA indicates no treatment applied in this category.

Created 11/25/2019

Table 9. 2019 Performance of Approved RR Varieties - ACSC Official Trials

7 sites

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	326.6	101	10204	102	1.00	46.23	103	1442	103	17.34	31.31	190	1520	306	0	68.8
BTS 8500	122	310.9	96	10588	106	1.09	41.85	93	1418	102	16.64	34.24	216	1629	334	0	65.3
BTS 8524	127	304.0	94	10742	107	1.08	39.93	89	1408	101	16.28	35.40	226	1655	311	0	69.5
BTS 8606	132	315.9	98	10275	103	1.02	43.24	96	1404	101	16.82	32.57	212	1553	303	0	63.4
BTS 8629	115	309.0	96	10814	108	1.07	41.33	92	1445	104	16.52	34.99	234	1461	353	0	65.4
BTS 8735	123	311.8	97	10500	105	0.99	42.11	94	1413	101	16.58	33.81	208	1393	319	0	62.7
BTS 8749	118	317.8	99	10122	101	1.10	43.77	97	1393	100	16.99	31.86	221	1637	338	3	56.7
BTS 8767	129	317.4	99	10546	105	1.03	43.65	97	1447	104	16.90	33.29	206	1560	310	0	68.0
BTS 8784	108	327.3	102	9923	99	0.98	46.43	103	1409	101	17.35	30.33	170	1449	312	0	54.0
Crystal 093RR	110	324.8	101	10460	104	1.02	45.71	102	1470	105	17.26	32.25	170	1551	316	0	71.8
Crystal 247RR	121	311.9	97	9838	98	0.98	42.12	94	1330	95	16.57	31.52	220	1577	261	0	67.1
Crystal 355RR	119	325.2	101	9413	94	1.05	45.84	102	1321	95	17.31	29.04	190	1583	326	0	72.1
Crystal 572RR	124	331.7	103	10286	103	0.97	47.63	106	1476	106	17.55	31.03	164	1446	309	0	69.3
Crystal 574RR	104	313.3	97	10623	106	1.06	42.50	94	1436	103	16.72	34.00	207	1592	320	0	71.5
Crystal 578RR	103	314.3	98	10420	104	1.03	42.81	95	1417	102	16.75	33.18	218	1579	299	0	71.6
Crystal 684RR	133	310.3	96	10675	107	1.07	41.68	93	1429	102	16.58	34.50	227	1620	314	0	64.4
Crystal 793RR	111	325.5	101	11046	110	0.93	45.92	102	1555	112	17.21	34.00	182	1414	282	0	63.8
Crystal 796RR	243	315.0	98	11210	112	1.01	42.94	95	1530	110	16.77	35.56	202	1558	295	0	78.4
Hilleshög HM4302RR	101	311.3	97	9439	94	1.00	41.96	93	1271	91	16.57	30.34	237	1598	265	0	56.0
Hilleshög HM4448RR	109	315.5	98	10659	106	0.98	43.13	96	1455	104	16.75	33.82	190	1464	299	3	69.2
Hilleshög HM9528RR	112	317.7	99	10587	106	0.96	43.73	97	1455	104	16.85	33.38	202	1478	281	0	65.7
Hilleshög HIL9708	105	316.3	98	10459	104	0.98	43.37	96	1433	103	16.80	33.05	221	1466	289	0	71.7
Hilleshög HIL9920	106	325.2	101	10172	102	0.97	45.83	102	1430	103	17.23	31.34	195	1537	276	0	69.6
Maribo MA109	120	326.2	101	9339	93	0.97	46.11	102	1321	95	17.28	28.59	197	1509	279	0	52.0
Maribo MA504	113	307.1	95	10694	107	1.00	40.79	91	1420	102	16.35	34.83	232	1470	296	0	69.1
Maribo MA717	126	319.8	99	10682	107	0.99	44.33	99	1476	106	16.98	33.50	196	1478	301	0	69.5
SX Bronco RR	128	321.8	100	10119	101	1.02	44.88	100	1415	101	17.11	31.40	217	1553	296	0	58.1
SX Canyon RR	102	319.0	99	10396	104	0.99	44.10	98	1434	103	16.94	32.66	181	1491	304	0	67.5
SX Marathon RR	125	318.2	99	10028	100	0.99	43.87	97	1380	99	16.90	31.60	195	1527	291	0	55.3
SV RR265	131	319.7	99	10280	103	0.96	44.31	98	1422	102	16.94	32.21	189	1520	270	0	62.6
SV RR268	116	319.8	99	10166	102	0.97	44.33	99	1408	101	16.96	31.86	185	1515	283	0	63.4
SV RR333	117	322.9	100	10086	101	0.96	45.19	100	1408	101	17.10	31.31	176	1493	280	0	69.7
SV RR351	107	320.6	100	10132	101	0.99	44.56	99	1401	100	17.02	31.76	187	1511	297	0	65.4
SV RR371	114	320.6	100	9920	99	0.95	44.55	99	1377	99	16.98	30.96	181	1518	268	0	55.5
Experimental Trial (Comm status)																	
BTS 8815	202	325.5	101	10338	103	0.98	45.96	102	1458	105	17.27	31.77	196	1604	271	0	66.9
BTS 8882	228	316.0	98	10550	105	1.07	43.24	96	1445	104	16.88	33.33	219	1638	313	0	57.8
Crystal 803RR	227	329.5	102	10472	105	0.96	47.10	105	1493	107	17.45	31.85	172	1454	302	0	76.3
Crystal 804RR	237	319.2	99	10684	107	1.03	44.15	98	1472	106	16.99	33.58	206	1560	311	0	61.7
Crystal 808RR	240	315.4	98	10711	107	1.05	43.05	96	1456	104	16.83	34.07	232	1570	317	0	73.1
SX 1887	238	326.6	101	10046	100	0.97	46.26	103	1421	102	17.31	30.78	180	1520	291	0	61.8
SX 1888	236	323.2	100	10543	105	0.96	45.30	101	1475	106	17.13	32.64	179	1484	291	0	61.1
SV 285	241	324.2	101	10125	101	0.97	45.58	101	1422	102	17.19	31.25	199	1518	282	0	59.1
SV 289	223	324.2	101	9838	98	0.96	45.57	101	1376	99	17.18	30.51	182	1503	282	0	53.6
SV RR375	204	323.6	100	10195	102	0.95	45.40	101	1431	103	17.13	31.50	176	1500	282	0	63.1
Comm Benchmark Mean		322.2		10011		1.05	45.00		1394		17.16	31.15	202	1585	320		64.7
Trial Mean		317.5		10226		1.01	43.70		1404		16.89	32.27	203	1533	301		64.0
Coeff. of Var. (%)		2.9		5.6		9.3	5.8		7.6		2.5	4.8	17.6	4.6	20.1		11.8
Mean LSD (0.05)		5.8		488		0.05	1.61		82		0.27	1.38	25	47	33		4.2
Mean LSD (0.01)		7.6		644		0.07	2.12		108		0.35	1.82	33	62	43		5.5
Sig Lvl		**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from 7 sites Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 19ACSExpB

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 10. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Casselton ND

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	294.4	102	10032	101	1.35	37.26	105	1268	103	16.08	34.12	220	1776	496	0	66.4
BTS 8500	122	269.3	93	10518	105	1.44	30.27	85	1181	96	14.91	39.13	253	1971	501	0	62.7
BTS 8524	127	273.0	95	10701	107	1.39	31.29	88	1228	100	15.04	39.21	256	1955	463	0	66.8
BTS 8606	132	284.1	99	10021	100	1.26	34.39	97	1212	99	15.47	35.28	252	1860	391	0	58.9
BTS 8629	115	262.3	91	9729	98	1.50	28.31	80	1047	85	14.61	37.22	296	1812	575	0	65.1
BTS 8735	123	280.4	97	10379	104	1.29	33.36	94	1235	101	15.31	37.02	233	1624	483	0	64.1
BTS 8749	118	283.0	98	10426	105	1.37	34.07	96	1255	102	15.53	36.76	227	1933	467	0	59.4
BTS 8767	129	277.8	96	10443	105	1.34	32.62	92	1224	100	15.23	37.65	266	1845	455	0	67.0
BTS 8784	108	298.0	103	10434	105	1.26	38.26	108	1343	109	16.15	34.94	195	1689	456	0	56.4
Crystal 093RR	110	283.0	98	9579	96	1.42	34.09	96	1157	94	15.57	33.78	216	1878	522	0	67.8
Crystal 247RR	121	271.5	94	9484	95	1.34	30.87	87	1078	88	14.91	34.87	300	1950	407	0	64.1
Crystal 355RR	119	292.2	101	9681	97	1.32	36.64	103	1210	98	15.93	33.28	226	1824	456	0	67.4
Crystal 572RR	124	295.6	102	9975	100	1.31	37.60	106	1268	103	16.09	33.80	191	1759	476	0	66.1
Crystal 574RR	104	273.4	95	10547	106	1.38	31.41	88	1210	98	15.05	38.64	240	1899	474	0	62.8
Crystal 578RR	103	283.6	98	9923	99	1.27	34.25	96	1198	98	15.45	35.01	271	1868	386	0	68.9
Crystal 684RR	133	270.2	94	10704	107	1.43	30.50	86	1214	99	14.94	39.42	272	1928	495	0	58.1
Crystal 793RR	111	294.2	102	11196	112	1.23	37.19	104	1416	115	15.94	38.17	216	1742	414	0	61.1
Crystal 796RR	243	289.0	100	10369	104	1.19	35.77	100	1284	105	15.65	35.85	218	1827	363	0	69.8
Hilleshög HM4302RR	101	272.7	95	8737	88	1.34	31.22	88	1006	82	14.97	31.84	287	1932	415	0	54.7
Hilleshög HM4448RR	109	267.2	93	8878	89	1.36	29.68	83	985	80	14.73	33.27	271	1766	488	0	63.8
Hilleshög HM9528RR	112	279.5	97	9733	98	1.30	33.10	93	1155	94	15.28	34.70	249	1770	446	0	58.8
Hilleshög HIL9708	105	275.1	95	8994	90	1.28	31.88	90	1043	85	15.03	32.52	262	1708	443	0	67.1
Hilleshög HIL9920	106	281.2	97	9383	94	1.29	33.59	94	1119	91	15.35	33.40	255	1837	419	0	62.7
Maribo MA109	120	289.3	100	8807	88	1.32	35.84	101	1092	89	15.79	30.39	257	1820	449	0	45.0
Maribo MA504	113	262.1	91	9177	92	1.34	28.25	79	989	80	14.44	35.00	293	1730	472	0	68.6
Maribo MA717	126	283.9	98	9725	98	1.34	34.33	96	1175	96	15.54	34.28	240	1754	486	0	72.9
SX Bronco RR	128	277.3	96	9044	91	1.40	32.48	91	1059	86	15.26	32.67	298	1909	470	0	47.3
SX Canyon RR	102	275.1	95	9393	94	1.39	31.88	90	1091	89	15.15	34.14	238	1873	494	0	62.7
SX Marathon RR	125	267.5	93	8570	86	1.44	29.77	84	955	78	14.82	31.96	313	1913	498	0	44.5
SV RR265	131	281.0	97	9656	97	1.23	33.53	94	1151	94	15.29	34.51	241	1842	377	0	51.1
SV RR268	116	281.8	98	9589	96	1.31	33.74	95	1150	94	15.41	34.00	225	1890	433	0	53.7
SV RR333	117	286.0	99	9534	96	1.26	34.91	98	1161	95	15.55	33.36	223	1823	407	0	62.1
SV RR351	107	279.4	97	9320	93	1.34	33.07	93	1104	90	15.31	33.34	237	1836	467	0	56.6
SV RR371	114	287.9	100	9181	92	1.27	35.43	100	1128	92	15.67	32.03	218	1811	426	0	44.1
Experimental Trial (Comm status)																	
BTS 8815	202	289.9	101	10015	100	1.30	36.00	101	1245	101	15.79	34.50	262	1882	415	0	57.8
BTS 8882	228	276.3	96	9630	97	1.35	32.26	91	1125	92	15.18	34.84	291	1961	428	0	45.9
Crystal 803RR	227	295.3	102	10923	110	1.15	37.48	105	1388	113	15.91	36.95	200	1674	374	0	66.3
Crystal 804RR	237	270.5	94	10398	104	1.38	30.64	86	1178	96	14.91	38.44	266	1841	483	0	53.0
Crystal 808RR	240	267.3	93	9862	99	1.49	29.78	84	1098	89	14.86	36.89	324	1857	540	0	68.0
SX 1887	238	287.4	100	9227	93	1.32	35.33	99	1134	92	15.69	32.11	232	1830	449	0	52.3
SX 1888	236	289.5	100	9466	95	1.21	35.88	101	1172	95	15.69	32.74	222	1793	389	0	54.2
SV 285	241	282.0	98	9437	95	1.35	33.83	95	1131	92	15.46	33.49	267	1844	462	0	51.0
SV 289	223	279.9	97	9818	98	1.36	33.24	93	1164	95	15.35	35.13	265	1829	474	0	42.5
SV RR375	204	294.0	102	9554	96	1.16	37.12	104	1207	98	15.86	32.46	228	1779	345	0	52.2
Comm Benchmark Mean		288.4		9973		1.34	35.59		1229		15.76	34.63	239	1848	458		60.7
Trial Mean	5001	279.4		9712		1.34	33.08		1150		15.31	34.76	250	1838	456		59.4
Coeff. of Var. (%)	5002	3.7		5.4		7.2	8.7		9.8		3.0	3.5	16.0	4.2	12.3		13.4
Mean LSD (0.05)	5004	12.3		634		0.12	3.44		134		0.54	1.53	49	97	68		9.2
Mean LSD (0.01)	5005	16.3		837		0.16	4.54		177		0.71	2.01	65	128	90		12.2
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Casselton ND Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198301

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 11. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Glyndon MN

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	314.5	100	8254	102	0.94	42.85	99	1123	101	16.66	26.33	302	1174	302	0	48.2
BTS 8500	122	295.5	94	8263	102	1.07	37.56	87	1047	94	15.85	28.02	358	1317	351	0	47.1
BTS 8524	127	299.5	95	8432	104	0.95	38.67	90	1095	98	15.93	27.92	289	1278	293	0	58.3
BTS 8606	132	300.8	95	8174	101	0.95	39.04	90	1069	96	15.99	26.97	324	1255	284	0	42.7
BTS 8629	115	292.9	93	8689	107	1.07	36.84	85	1104	99	15.72	29.32	381	1262	357	0	48.6
BTS 8735	123	294.9	93	8337	103	1.01	37.41	87	1053	95	15.76	28.45	352	1129	356	0	42.4
BTS 8749	118	304.9	97	7806	96	1.07	40.19	93	1034	93	16.32	25.51	382	1304	344	0	31.6
BTS 8767	129	302.4	96	8181	101	0.89	39.48	91	1074	97	16.00	26.91	291	1264	244	0	51.2
BTS 8784	108	317.8	101	7079	87	1.01	43.76	101	995	89	16.89	21.87	248	1222	364	0	30.1
Crystal 093RR	110	320.5	102	8342	103	0.85	44.53	103	1159	104	16.88	26.00	222	1266	246	0	56.0
Crystal 247RR	121	292.4	93	6865	85	0.92	36.69	85	867	78	15.54	23.33	327	1271	254	0	53.5
Crystal 355RR	119	317.8	101	7911	97	0.92	43.78	101	1096	98	16.81	24.74	257	1221	292	0	50.6
Crystal 572RR	124	322.6	102	8168	101	0.85	45.10	104	1155	104	16.98	25.11	208	1176	270	0	51.1
Crystal 574RR	104	297.3	94	8431	104	0.94	38.07	88	1078	97	15.80	28.33	323	1221	281	0	60.8
Crystal 578RR	103	301.7	96	8232	101	0.96	39.30	91	1078	97	16.04	27.15	317	1281	285	0	58.2
Crystal 684RR	133	291.3	92	8039	99	1.01	36.38	84	1004	90	15.58	27.56	348	1297	313	0	55.6
Crystal 793RR	111	315.0	100	9221	114	0.90	42.98	100	1254	113	16.65	29.41	289	1126	296	0	45.9
Crystal 796RR	243	307.6	97	9343	115	0.90	40.84	95	1236	111	16.24	30.46	243	1234	275	0	58.3
Hilleshög HM4302RR	101	308.6	98	8027	99	0.88	41.22	95	1064	96	16.31	26.20	307	1244	237	0	47.6
Hilleshög HM4448RR	109	312.3	99	9322	115	0.85	42.24	98	1255	113	16.47	30.03	244	1144	266	21	57.2
Hilleshög HM9528RR	112	318.7	101	9951	123	0.82	44.02	102	1374	123	16.76	31.20	269	1096	249	0	55.5
Hilleshög HIL9708	105	303.5	96	9023	111	0.85	39.79	92	1182	106	16.03	29.72	336	1105	245	0	61.4
Hilleshög HIL9920	106	322.8	102	8603	106	0.79	45.18	105	1213	109	16.94	26.53	249	1055	243	0	61.5
Maribo MA109	120	325.5	103	7889	97	0.87	45.91	106	1119	101	17.14	23.95	266	1178	259	0	39.8
Maribo MA504	113	289.4	92	8898	110	0.93	35.87	83	1102	99	15.40	30.75	375	1089	290	0	58.8
Maribo MA717	126	323.0	102	9245	114	0.84	45.23	105	1282	115	17.00	28.87	260	1134	261	0	59.2
SX Bronco RR	128	310.1	98	8108	100	0.90	41.63	96	1101	99	16.41	25.84	314	1092	292	0	46.9
SX Canyon RR	102	325.4	103	9229	114	0.84	45.89	106	1308	118	17.12	28.29	218	1160	265	0	57.6
SX Marathon RR	125	318.1	101	8827	109	0.84	43.85	102	1217	109	16.74	27.70	229	1128	264	0	40.0
SV RR265	131	316.9	100	9012	111	0.82	43.52	101	1240	111	16.66	28.39	242	1157	239	0	53.0
SV RR268	116	313.0	99	8377	103	0.88	42.43	98	1143	103	16.53	26.68	250	1147	280	0	54.1
SV RR333	117	316.9	100	8639	106	0.82	43.53	101	1175	106	16.67	27.46	236	1149	246	0	57.1
SV RR351	107	316.9	100	8991	111	0.90	43.52	101	1231	111	16.75	28.43	241	1188	296	0	55.7
SV RR371	114	319.4	101	8579	106	0.83	44.22	102	1189	107	16.80	26.81	221	1179	247	0	50.8
Experimental Trial (Comm status)																	
BTS 8815	202	323.9	103	8900	110	0.93	45.53	105	1226	110	17.08	27.97	266	1374	258	0	46.0
BTS 8882	228	296.7	94	8347	103	1.03	37.71	87	1047	94	15.85	28.09	300	1396	310	0	49.7
Crystal 803RR	227	318.6	101	8947	110	0.92	44.01	102	1211	109	16.81	28.44	268	1181	296	0	62.8
Crystal 804RR	237	320.7	102	9503	117	0.87	44.61	103	1331	120	16.89	29.32	249	1182	267	0	43.7
Crystal 808RR	240	320.4	101	10150	125	0.85	44.55	103	1416	127	16.86	31.40	250	1173	254	0	62.2
SX 1887	238	317.6	101	7827	96	0.94	43.71	101	1072	96	16.81	24.48	257	1238	299	0	38.9
SX 1888	236	328.2	104	9628	119	0.87	46.78	108	1345	121	17.26	29.67	244	1150	278	0	42.4
SV 285	241	313.6	99	7718	95	0.98	42.57	99	1068	96	16.64	24.32	277	1266	315	0	31.2
SV 289	223	327.5	104	8411	104	0.81	46.58	108	1178	106	17.13	26.16	211	1123	250	0	46.6
SV RR375	204	320.0	101	8546	105	0.81	44.41	103	1187	107	16.79	26.66	216	1086	258	0	42.3
Comm Benchmark Mean		315.7		8116		0.97	43.18		1113		16.75	25.68	293	1237	309		46.1
Trial Mean	5001	309.3		8386		0.92	41.40		1124		16.38	27.07	290	1199	285		50.1
Coeff. of Var. (%)	5002	3.6		6.8		9.8	7.5		9.5		3.1	5.8	19.4	6.1	17.0		13.7
Mean LSD (0.05)	5004	13.8		738		0.11	3.84		139		0.63	2.03	71	88	60		8.4
Mean LSD (0.01)	5005	18.2		974		0.15	5.06		183		0.83	2.68	94	116	79		11.1
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Glyndon MN Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198302

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 12. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Climax MN

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	323.6	101	11781	103	1.00	45.38	101	1652	104	17.19	36.40	157	1437	337	0	80.7
BTS 8500	122	309.2	96	12999	114	1.07	41.39	92	1738	109	16.53	42.07	158	1495	372	0	82.3
BTS 8524	127	303.7	94	12646	111	1.06	39.84	89	1660	104	16.23	41.62	166	1585	341	0	84.9
BTS 8606	132	312.3	97	12307	108	1.03	42.25	94	1667	105	16.63	39.34	169	1450	346	0	74.7
BTS 8629	115	309.4	96	13284	116	1.04	41.44	92	1778	112	16.51	42.97	188	1333	382	0	83.3
BTS 8735	123	305.7	95	12732	111	0.96	40.39	90	1684	106	16.25	41.61	153	1295	340	0	75.8
BTS 8749	118	322.5	100	12200	107	1.01	45.07	101	1706	107	17.13	37.82	158	1522	325	0	73.4
BTS 8767	129	316.3	98	12488	109	1.04	43.36	97	1714	108	16.86	39.43	151	1388	379	0	82.6
BTS 8784	108	326.5	102	12116	106	0.94	46.20	103	1714	108	17.26	37.11	130	1330	328	0	66.4
Crystal 093RR	110	321.9	100	12668	111	1.04	44.91	100	1767	111	17.14	39.37	136	1468	363	0	86.5
Crystal 247RR	121	314.0	98	11514	101	0.88	42.72	95	1565	98	16.59	36.71	161	1411	246	0	85.2
Crystal 355RR	119	326.8	102	10337	90	1.03	46.29	103	1461	92	17.38	31.66	143	1488	348	0	90.4
Crystal 572RR	124	326.1	101	12118	106	0.93	46.07	103	1711	107	17.23	37.23	144	1289	322	0	86.5
Crystal 574RR	104	312.0	97	12986	114	1.05	42.15	94	1754	110	16.64	41.65	156	1445	370	0	86.5
Crystal 578RR	103	315.3	98	12143	106	1.06	43.07	96	1659	104	16.82	38.48	157	1437	386	0	88.3
Crystal 684RR	133	311.3	97	12641	111	1.00	41.95	94	1703	107	16.56	40.60	158	1482	325	0	85.2
Crystal 793RR	111	328.8	102	13277	116	0.88	46.84	104	1893	119	17.32	40.34	134	1282	294	0	81.8
Crystal 796RR	243	316.4	98	13458	118	0.89	43.34	97	1837	115	16.70	42.88	158	1373	267	0	92.8
Hilleshög HM4302RR	101	319.3	99	11920	104	0.89	44.20	99	1649	104	16.85	37.35	176	1432	245	0	70.3
Hilleshög HM4448RR	109	315.4	98	13002	114	0.98	43.11	96	1777	112	16.75	41.21	139	1348	348	0	82.3
Hilleshög HM9528RR	112	321.0	100	12705	111	0.95	44.67	100	1768	111	17.00	39.59	156	1334	330	0	82.6
Hilleshög HIL9708	105	312.8	97	12554	110	0.93	42.38	95	1699	107	16.57	40.18	178	1335	300	0	83.6
Hilleshög HIL9920	106	329.0	102	12375	108	0.89	46.90	105	1764	111	17.34	37.62	147	1361	274	0	84.1
Maribo MA109	120	331.0	103	12152	106	0.90	47.46	106	1742	109	17.45	36.71	148	1344	284	0	70.3
Maribo MA504	113	307.8	96	12926	113	1.04	40.98	91	1720	108	16.41	42.04	177	1402	370	0	85.2
Maribo MA717	126	311.1	97	12689	111	0.98	41.90	93	1709	107	16.54	40.83	155	1348	349	0	80.7
SX Bronco RR	128	334.3	104	12907	113	0.92	48.37	108	1867	117	17.65	38.62	148	1387	296	0	78.4
SX Canyon RR	102	316.2	98	12844	112	0.97	43.33	97	1760	111	16.79	40.61	153	1364	339	0	84.1
SX Marathon RR	125	318.9	99	12415	109	0.95	44.07	98	1716	108	16.91	38.93	161	1395	307	0	75.0
SV RR265	131	321.8	100	12623	110	0.86	44.89	100	1762	111	16.95	39.22	128	1319	269	0	80.7
SV RR268	116	321.1	100	12172	106	0.91	44.69	100	1694	106	16.98	37.92	137	1341	297	0	82.0
SV RR333	117	320.1	100	11833	103	0.93	44.41	99	1640	103	16.92	37.02	139	1333	315	0	86.7
SV RR351	107	319.9	99	12319	108	0.89	44.36	99	1707	107	16.91	38.50	149	1369	274	0	87.8
SV RR371	114	316.7	98	12384	108	0.92	43.47	97	1700	107	16.76	39.08	156	1390	288	0	69.3
Experimental Trial (Comm status)																	
BTS 8815	202	327.8	102	12032	105	0.97	46.57	104	1722	108	17.34	36.62	163	1467	301	0	76.4
BTS 8882	228	317.4	99	13165	115	1.02	43.64	97	1807	113	16.90	41.65	159	1479	342	0	72.3
Crystal 803RR	227	322.0	100	11167	98	0.97	44.94	100	1538	97	17.07	35.23	138	1311	355	0	92.1
Crystal 804RR	237	314.2	98	12601	110	1.10	42.75	95	1701	107	16.81	40.75	160	1453	413	0	79.9
Crystal 808RR	240	316.0	98	11774	103	1.06	43.24	96	1603	101	16.87	37.42	194	1443	365	0	85.7
SX 1887	238	322.1	100	11769	103	1.00	44.98	100	1643	103	17.11	36.46	143	1347	363	0	73.5
SX 1888	236	323.0	100	12990	114	0.91	45.23	101	1823	115	17.06	40.46	155	1398	280	0	77.2
SV 285	241	316.5	98	11658	102	0.93	43.38	97	1593	100	16.75	37.22	162	1327	308	0	78.5
SV 289	223	324.6	101	12024	105	0.96	45.64	102	1683	106	17.18	37.43	141	1348	332	0	71.0
SV RR375	204	317.0	99	11634	102	0.95	43.54	97	1588	100	16.80	37.20	153	1339	329	0	81.6
Comm Benchmark Mean		321.6		11437		1.03	44.83		1592		17.11	35.61	160	1480	344		79.5
Trial Mean	5001	317.7		12332		0.97	43.73		1696		16.86	38.85	156	1402	326		79.9
Coeff. of Var. (%)	5002	2.5		5.8		8.6	5.1		7.4		2.2	5.3	10.3	4.8	17.1		8.9
Mean LSD (0.05)	5004	9.8		885		0.10	2.74		154		0.45	2.51	20	84	71		8.1
Mean LSD (0.01)	5005	13.0		1168		0.14	3.62		203		0.59	3.31	27	111	93		10.6
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Climax MN Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198306

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 13. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Scandia MN

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	334.0	105	10538	104	1.05	48.29	110	1520	109	17.76	31.49	228	1459	349	0	80.2
BTS 8500	122	310.0	98	11201	111	1.16	41.61	95	1501	108	16.66	36.16	246	1623	376	0	71.5
BTS 8524	127	299.3	94	10453	103	1.28	38.61	88	1346	97	16.27	34.67	361	1630	427	0	76.9
BTS 8606	132	315.3	99	10900	108	1.21	43.07	98	1490	107	16.96	34.63	279	1536	426	0	77.1
BTS 8629	115	307.7	97	11078	109	1.12	40.95	93	1478	106	16.51	35.90	319	1427	374	0	70.7
BTS 8735	123	310.1	98	10826	107	1.13	41.64	95	1452	104	16.63	34.90	273	1357	418	0	72.8
BTS 8749	118	311.1	98	10166	100	1.28	41.89	96	1365	98	16.84	32.62	317	1636	446	0	71.8
BTS 8767	129	317.4	100	11256	111	1.16	43.67	100	1550	111	17.04	35.38	270	1540	395	0	79.3
BTS 8784	108	321.4	101	10159	100	1.11	44.76	102	1414	101	17.17	31.54	214	1459	390	0	63.7
Crystal 093RR	110	324.6	102	10547	104	1.12	45.67	104	1480	106	17.35	32.71	216	1525	387	0	78.7
Crystal 247RR	121	308.6	97	10254	101	1.12	41.22	94	1370	98	16.55	33.28	278	1578	344	0	73.2
Crystal 355RR	119	316.6	100	9649	95	1.20	43.45	99	1324	95	17.03	30.61	260	1557	416	0	84.0
Crystal 572RR	124	334.0	105	10480	103	1.04	48.29	110	1520	109	17.73	31.48	201	1431	353	0	79.9
Crystal 574RR	104	312.8	98	11044	109	1.16	42.38	97	1498	107	16.80	35.43	262	1618	379	0	84.8
Crystal 578RR	103	305.7	96	10601	105	1.26	40.41	92	1404	101	16.55	34.36	303	1565	447	0	81.1
Crystal 684RR	133	304.3	96	11109	110	1.24	40.02	91	1462	105	16.46	36.29	315	1558	428	0	74.8
Crystal 793RR	111	324.0	102	10994	108	1.00	45.49	104	1543	111	17.21	33.95	237	1390	318	0	72.3
Crystal 796RR	243	301.2	95	10651	105	1.32	38.87	89	1380	99	16.43	35.28	289	1619	476	0	91.6
Hilleshög HM4302RR	101	304.0	96	9691	96	1.20	39.92	91	1273	91	16.39	31.91	353	1643	365	0	62.8
Hilleshög HM4448RR	109	314.8	99	10988	108	1.08	42.92	98	1500	108	16.83	34.66	248	1414	373	0	84.9
Hilleshög HM9528RR	112	313.2	99	10570	104	1.11	42.49	97	1432	103	16.77	33.86	278	1504	358	0	73.1
Hilleshög HIL9708	105	315.0	99	10638	105	1.08	43.00	98	1452	104	16.84	33.68	306	1440	346	0	79.5
Hilleshög HIL9920	106	317.1	100	10417	103	1.11	43.59	100	1431	103	16.96	32.95	281	1530	348	0	77.0
Maribo MA109	120	321.5	101	9378	93	1.13	44.80	102	1303	93	17.19	29.34	292	1487	372	0	56.9
Maribo MA504	113	307.9	97	11132	110	1.14	41.00	94	1481	106	16.53	36.26	305	1514	366	0	75.1
Maribo MA717	126	314.2	99	10738	106	1.17	42.76	98	1460	105	16.88	34.38	297	1491	401	0	76.5
SX Bronco RR	128	315.4	99	10369	102	1.07	43.10	98	1416	102	16.84	32.90	271	1532	325	0	65.2
SX Canyon RR	102	314.5	99	10623	105	1.06	42.84	98	1450	104	16.78	33.98	248	1456	344	0	75.2
SX Marathon RR	125	318.7	100	10647	105	1.05	44.01	100	1469	105	16.99	33.37	246	1522	318	0	62.4
SV RR265	131	310.4	98	10026	99	1.15	41.70	95	1347	97	16.67	32.20	274	1552	376	0	63.6
SV RR268	116	318.8	100	10307	102	1.10	44.05	101	1418	102	17.05	32.26	282	1493	352	0	75.1
SV RR333	117	325.1	102	10395	103	1.06	45.80	105	1458	105	17.32	31.99	248	1466	336	0	82.3
SV RR351	107	315.5	99	10737	106	1.08	43.12	98	1469	105	16.86	34.04	258	1499	343	0	73.3
SV RR371	114	320.7	101	10362	102	1.09	44.57	102	1441	103	17.11	32.37	241	1547	349	0	63.0
Experimental Trial (Comm status)																	
BTS 8815	202	315.8	99	10176	100	1.15	43.16	99	1388	100	16.96	32.36	272	1660	359	0	84.8
BTS 8882	228	306.3	96	10746	106	1.22	40.39	92	1415	101	16.57	35.23	294	1654	404	0	66.9
Crystal 803RR	227	333.2	105	10916	108	1.02	48.29	110	1579	113	17.64	32.88	193	1438	343	0	82.2
Crystal 804RR	237	325.9	103	11323	112	1.02	46.14	105	1603	115	17.28	34.93	251	1529	306	0	75.2
Crystal 808RR	240	309.5	97	10847	107	1.21	41.30	94	1438	103	16.68	35.44	326	1606	386	0	81.9
SX 1887	238	329.7	104	10668	105	1.04	47.27	108	1527	109	17.50	32.46	221	1509	335	0	77.4
SX 1888	236	321.1	101	10707	106	1.03	44.73	102	1496	107	17.07	33.32	231	1533	324	0	72.5
SV 285	241	316.7	100	9910	98	1.10	43.45	99	1357	97	16.95	31.39	279	1477	362	0	74.3
SV 289	223	311.1	98	9961	98	1.06	41.77	95	1340	96	16.61	31.99	260	1532	324	0	61.6
SV RR375	204	320.1	101	9706	96	1.04	44.44	101	1348	97	17.03	30.41	235	1499	335	0	73.1
Comm Benchmark Mean		317.9		10136		1.19	43.80		1395		17.08	32.03	268	1571	404		76.2
Trial Mean	5001	314		10456		1.14	42.72		1421		16.84	33.32	276	1523	376		72.9
Coeff. of Var. (%)	5002	3.1		4.0		7.5	6.2		6.5		2.6	3.1	17.1	4.5	12.5		9.8
Mean LSD (0.05)	5004	12.1		517		0.11	3.36		116		0.54	1.17	60	82	60		8.2
Mean LSD (0.01)	5005	15.9		683		0.14	4.43		153		0.71	1.55	79	108	79		10.9
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Scandia MN Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198308

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 14. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Argyle MN

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	347.2	100	10797	101	0.83	51.96	100	1617	101	18.19	31.07	156	1685	137	0	66.4
BTS 8500	122	336.3	97	10578	99	0.89	48.94	94	1537	96	17.71	31.48	188	1731	165	0	61.5
BTS 8524	127	317.8	92	11641	108	0.91	43.78	85	1603	100	16.80	36.66	192	1790	160	0	67.9
BTS 8606	132	335.6	97	9929	92	0.77	48.72	94	1442	90	17.55	29.59	164	1536	134	0	64.5
BTS 8629	115	337.9	97	11111	103	0.80	49.36	95	1625	101	17.69	32.86	193	1472	157	0	64.9
BTS 8735	123	336.8	97	9710	90	0.74	49.07	95	1413	88	17.58	28.89	158	1493	120	0	61.5
BTS 8749	118	352.1	102	10625	99	0.94	53.31	103	1618	101	18.54	29.98	172	1650	229	0	57.1
BTS 8767	129	342.5	99	11100	103	0.86	50.65	98	1641	102	17.98	32.41	188	1593	175	0	59.0
BTS 8784	108	349.8	101	9989	93	0.79	52.69	102	1505	94	18.28	28.57	155	1575	139	0	53.1
Crystal 093RR	110	346.5	100	11268	105	0.89	51.75	100	1683	105	18.21	32.52	166	1654	189	0	65.5
Crystal 247RR	121	337.8	97	11035	103	0.84	49.34	95	1613	101	17.73	32.65	180	1649	147	0	66.5
Crystal 355RR	119	354.0	102	10673	99	0.90	53.87	104	1621	101	18.60	30.19	181	1638	197	0	61.1
Crystal 572RR	124	356.6	103	10325	96	0.88	54.58	105	1580	98	18.71	28.96	182	1523	209	0	63.7
Crystal 574RR	104	340.2	98	10897	101	0.87	50.00	97	1605	100	17.88	31.93	192	1650	167	0	64.7
Crystal 578RR	103	338.1	98	11459	107	0.86	49.42	95	1675	104	17.77	33.87	191	1697	150	0	66.8
Crystal 684RR	133	330.5	95	10547	98	0.92	47.32	91	1512	94	17.44	31.89	203	1753	172	0	60.6
Crystal 793RR	111	343.7	99	11616	108	0.79	50.98	98	1723	107	17.98	33.80	170	1501	154	0	60.5
Crystal 796RR	243	343.0	99	12127	113	0.87	50.78	98	1791	112	18.03	35.47	189	1666	167	0	74.9
Hilleshög HM4302RR	101	332.0	96	9544	89	0.91	47.73	92	1375	86	17.51	28.66	219	1650	189	0	46.7
Hilleshög HM4448RR	109	333.8	96	11362	106	0.84	48.22	93	1645	103	17.53	33.96	179	1613	156	0	63.4
Hilleshög HM9528RR	112	336.9	97	11185	104	0.84	49.10	95	1628	101	17.69	33.22	183	1527	184	0	61.0
Hilleshög HIL9708	105	345.4	100	11351	106	0.83	51.47	99	1692	105	18.11	32.84	181	1601	156	0	65.5
Hilleshög HIL9920	106	349.0	101	10019	93	0.86	52.45	101	1507	94	18.31	28.66	150	1721	157	0	62.6
Maribo MA109	120	347.6	100	9836	92	0.77	52.06	100	1480	92	18.15	28.17	169	1566	118	0	51.6
Maribo MA504	113	326.5	94	10999	102	0.79	46.18	89	1560	97	17.11	33.61	179	1496	149	0	64.2
Maribo MA717	126	337.5	97	11588	108	0.78	49.27	95	1693	106	17.66	34.30	160	1582	127	0	59.7
SX Bronco RR	128	345.4	100	10391	97	0.94	51.47	99	1552	97	18.22	30.05	202	1690	208	0	48.8
SX Canyon RR	102	343.0	99	10620	99	0.81	50.79	98	1573	98	17.96	30.94	168	1557	154	0	65.3
SX Marathon RR	125	336.7	97	10241	95	0.85	49.04	95	1488	93	17.69	30.50	166	1609	175	0	50.9
SV RR265	131	343.7	99	10331	96	0.82	51.00	98	1535	96	18.01	30.01	158	1562	169	0	56.9
SV RR268	116	337.8	97	10868	101	0.81	49.34	95	1588	99	17.70	32.16	167	1639	130	0	60.4
SV RR333	117	346.3	100	10912	102	0.79	51.71	100	1628	101	18.11	31.51	160	1566	140	0	60.8
SV RR351	107	338.3	98	8648	81	0.83	49.49	96	1261	79	17.75	25.63	161	1628	156	0	55.8
SV RR371	114	342.7	99	9892	92	0.82	50.72	98	1471	92	17.96	28.69	160	1599	153	0	49.5
Experimental Trial (Comm status)																	
BTS 8815	202	349.6	101	11731	109	0.80	52.67	102	1770	110	18.27	33.52	157	1635	133	0	66.7
BTS 8882	228	352.6	102	12063	112	0.87	53.52	103	1834	114	18.51	34.16	198	1677	165	0	59.9
Crystal 803RR	227	362.7	105	11804	110	0.77	56.40	109	1837	114	18.90	32.49	143	1529	144	0	71.0
Crystal 804RR	237	341.1	98	11072	103	0.91	50.25	97	1633	102	17.96	32.40	196	1686	188	0	60.7
Crystal 808RR	240	335.0	97	12525	117	0.83	48.49	94	1811	113	17.57	37.45	197	1664	132	0	67.1
SX 1887	238	355.0	102	10501	98	0.81	54.17	105	1605	100	18.53	29.48	140	1626	143	0	60.3
SX 1888	236	330.6	95	10356	96	0.74	47.25	91	1479	92	17.26	31.37	148	1480	127	0	62.0
SV 285	241	352.3	102	11074	103	0.79	53.42	103	1684	105	18.40	31.39	147	1600	136	0	53.9
SV 289	223	353.5	102	10185	95	0.80	53.77	104	1552	97	18.46	28.81	150	1605	142	0	49.5
SV RR375	204	348.1	100	11333	106	0.86	52.23	101	1701	106	18.26	32.47	174	1682	167	0	59.9
Comm Benchmark Mean		346.6		10739		0.86	51.81		1604		18.19	30.99	175	1665	161		59.1
Trial Mean	5001	340.2		10574		0.84	50.02		1555		17.86	31.06	177	1617	161		59.2
Coeff. of Var. (%)	5002	1.8		4.8		4.1	3.4		5.6		1.6	4.5	9.0	3.0	10.6		11.8
Mean LSD (0.05)	5004	9.3		786		0.05	2.60		135		0.44	2.15	24	72	26		8.3
Mean LSD (0.01)	5005	12.3		1041		0.07	3.44		179		0.59	2.85	32	96	34		10.9
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Argyle MN Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198309

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 15. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Kennedy MN

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	327.5	100	9276	97	1.06	46.48	99	1314	97	17.40	28.43	161	1636	326	0	67.6
BTS 8500	122	324.1	99	10101	106	1.12	45.51	97	1421	105	17.30	31.15	183	1729	342	0	63.4
BTS 8524	127	307.2	94	10644	112	1.09	40.82	87	1413	104	16.47	34.65	202	1800	289	0	65.1
BTS 8606	132	326.1	99	10302	108	1.09	46.09	99	1454	107	17.38	31.66	188	1671	333	0	60.7
BTS 8629	115	321.0	98	10674	112	1.15	44.65	96	1486	110	17.19	33.22	162	1508	429	0	59.4
BTS 8735	123	323.5	99	10353	109	0.95	45.35	97	1447	107	17.10	32.10	174	1469	284	0	59.3
BTS 8749	118	322.4	98	9409	99	1.17	45.06	96	1314	97	17.26	29.25	174	1743	376	0	49.7
BTS 8767	129	326.6	99	9785	103	1.07	46.24	99	1384	102	17.40	29.97	168	1691	322	0	64.7
BTS 8784	108	334.9	102	9563	100	0.94	48.53	104	1392	103	17.64	28.47	148	1490	274	0	52.8
Crystal 093RR	110	337.0	103	10286	108	0.97	49.13	105	1492	110	17.79	30.76	140	1566	285	0	72.1
Crystal 247RR	121	322.3	98	10093	106	0.96	45.02	96	1410	104	17.11	31.27	178	1693	233	0	60.8
Crystal 355RR	119	335.1	102	8800	92	1.08	48.58	104	1274	94	17.81	26.36	151	1758	318	0	74.6
Crystal 572RR	124	348.4	106	10639	112	0.99	52.30	112	1594	118	18.39	30.60	133	1503	321	0	68.6
Crystal 574RR	104	324.7	99	10003	105	1.04	45.69	98	1404	104	17.32	30.88	171	1747	286	0	67.8
Crystal 578RR	103	323.7	99	10294	108	0.98	45.42	97	1442	106	17.15	31.91	185	1660	248	0	66.9
Crystal 684RR	133	327.2	100	10460	110	0.99	46.40	99	1479	109	17.37	32.05	194	1694	248	0	60.8
Crystal 793RR	111	336.6	102	10702	112	0.94	49.00	105	1557	115	17.76	31.79	142	1436	294	0	62.1
Crystal 796RR	243	317.8	97	12010	126	1.02	43.79	94	1658	122	16.86	37.98	174	1701	275	0	77.1
Hilleshög HM4302RR	101	317.5	97	8898	93	0.94	43.69	93	1225	90	16.82	28.01	187	1677	220	0	55.8
Hilleshög HM4448RR	109	326.3	99	10525	110	0.92	46.14	99	1488	110	17.24	32.26	155	1529	254	0	64.8
Hilleshög HM9528RR	112	321.3	98	10175	107	0.91	44.74	96	1418	105	16.97	31.64	172	1560	231	0	63.4
Hilleshög HIL9708	105	325.0	99	10581	111	1.08	45.77	98	1493	110	17.35	32.43	171	1585	353	0	68.0
Hilleshög HIL9920	106	334.2	102	9952	104	1.03	48.34	103	1435	106	17.75	29.87	172	1679	288	0	67.3
Maribo MA109	120	325.6	99	8344	87	0.93	45.95	98	1185	88	17.23	25.43	154	1557	252	0	43.5
Maribo MA504	113	321.4	98	10616	111	0.92	44.76	96	1480	109	16.99	33.01	180	1577	221	0	69.9
Maribo MA717	126	324.8	99	9855	103	0.92	45.72	98	1389	103	17.18	30.23	156	1533	247	0	61.9
SX Bronco RR	128	328.5	100	9703	102	1.03	46.76	100	1383	102	17.49	29.39	165	1674	291	0	60.6
SX Canyon RR	102	325.2	99	9836	103	1.04	45.84	98	1389	103	17.30	30.19	145	1560	340	0	63.5
SX Marathon RR	125	336.1	102	9876	104	0.92	48.87	105	1435	106	17.75	29.39	134	1589	246	0	56.5
SV RR265	131	325.0	99	9756	102	0.99	45.77	98	1378	102	17.26	29.89	167	1666	267	0	60.6
SV RR268	116	332.5	101	9663	101	0.99	47.86	102	1388	103	17.58	29.21	147	1590	292	0	55.1
SV RR333	117	330.5	101	9810	103	1.04	47.31	101	1410	104	17.62	29.45	143	1588	339	0	64.3
SV RR351	107	341.5	104	9957	104	0.99	50.38	108	1459	108	18.07	29.45	141	1553	304	0	62.0
SV RR371	114	324.5	99	9629	101	0.94	45.64	98	1358	100	17.20	29.49	175	1576	247	0	52.9
Experimental Trial (Comm status)																	
BTS 8815	202	328.2	100	9564	100	1.00	46.67	100	1367	101	17.41	29.26	154	1699	265	0	62.6
BTS 8882	228	328.6	100	10225	107	1.08	46.77	100	1446	107	17.48	31.41	173	1717	318	0	47.1
Crystal 803RR	227	336.9	103	9807	103	1.12	49.08	105	1413	104	17.95	29.34	151	1572	410	0	73.9
Crystal 804RR	237	330.6	101	10548	111	1.03	47.33	101	1492	110	17.54	32.41	191	1702	269	0	60.6
Crystal 808RR	240	332.9	101	11134	117	0.96	47.95	103	1595	118	17.57	33.66	165	1642	232	0	70.2
SX 1887	238	339.6	103	10122	106	0.95	49.85	107	1484	110	17.91	29.99	142	1544	265	0	60.0
SX 1888	236	328.9	100	10261	108	1.23	46.86	100	1461	108	17.62	31.36	140	1617	505	0	56.8
SV 285	241	341.8	104	11122	117	0.90	50.44	108	1621	120	17.91	33.04	139	1594	209	0	61.6
SV 289	223	336.5	102	9194	96	0.96	48.99	105	1330	98	17.78	27.47	133	1576	280	0	45.5
SV RR375	204	326.7	99	9848	103	1.13	46.24	99	1367	101	17.44	30.86	139	1669	400	0	65.3
Comm Benchmark Mean		328.4		9537		1.09	46.73		1354		17.51	29.14	163	1721	333		63.8
Trial Mean	5001	327		9922		1.01	46.32		1405		17.36	30.37	165	1623	292		61.2
Coeff. of Var. (%)	5002	2.9		6.8		14.7	5.6		8.4		2.5	5.9	14.7	4.8	37.0		11.2
Mean LSD (0.05)	5004	11.1		833		0.17	3.10		145		0.53	2.27	28	93	123		8.3
Mean LSD (0.01)	5005	14.7		1100		0.22	4.09		192		0.70	3.00	36	123	162		10.9
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Kennedy MN Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198310

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 16. 2019 Performance of Approved RR Varieties - ACSC Official Trials

Bathgate ND

Description @	Code	Rec/T lbs.	Rec/T %Bnch	Rec/A lbs.	Rec/A %Bnch	Loss Mol %	Rev/T $ ++	Rev/T %Bnch	Rev/A $ ++	Rev/A %Bnch	Sugar %	Yield T/A	Na ppm	K ppm	AmN ppm	Bolter per Ac	Emerg. %
Commercial Trial																	
BTS 8337	130	346.5	103	10641	105	0.81	51.75	105	1588	108	18.13	30.71	100	1473	198	0	70.9
BTS 8500	122	331.4	98	10398	103	0.89	47.57	96	1494	101	17.46	31.42	121	1559	231	0	67.9
BTS 8524	127	326.0	96	10725	106	0.87	46.06	93	1516	103	17.18	32.92	119	1570	215	0	67.0
BTS 8606	132	336.2	99	10074	100	0.85	48.90	99	1465	99	17.67	30.03	105	1553	211	0	65.6
BTS 8629	115	332.3	98	11111	110	0.78	47.81	97	1597	108	17.39	33.42	92	1421	195	0	67.1
BTS 8735	123	330.3	98	10784	107	0.82	47.26	96	1539	104	17.34	32.69	118	1397	224	0	64.6
BTS 8749	118	332.4	98	10279	102	0.91	47.85	97	1479	100	17.53	30.92	113	1662	222	21	55.1
BTS 8767	129	337.3	100	10437	103	0.85	49.20	100	1524	103	17.71	30.89	116	1584	196	0	71.8
BTS 8784	108	342.5	101	10023	99	0.83	50.64	103	1483	101	17.96	29.25	99	1392	240	0	56.0
Crystal 093RR	110	342.2	101	10703	106	0.84	50.58	102	1584	107	17.95	31.17	100	1501	220	0	76.1
Crystal 247RR	121	334.7	99	9769	97	0.81	48.48	98	1417	96	17.54	29.21	124	1476	190	0	65.1
Crystal 355RR	119	336.4	100	8961	89	0.91	48.94	99	1301	88	17.72	26.70	118	1580	242	0	76.0
Crystal 572RR	124	340.6	101	10290	102	0.82	50.11	101	1511	102	17.85	30.27	90	1440	219	0	67.7
Crystal 574RR	104	333.5	99	10486	104	0.89	48.15	97	1517	103	17.56	31.41	109	1563	235	0	74.3
Crystal 578RR	103	335.1	99	10372	103	0.81	48.58	98	1502	102	17.56	31.01	104	1549	179	0	71.7
Crystal 684RR	133	334.2	99	10939	108	0.88	48.34	98	1579	107	17.59	32.77	110	1627	214	0	56.8
Crystal 793RR	111	334.6	99	10136	100	0.80	48.45	98	1468	100	17.53	30.24	95	1433	206	0	62.9
Crystal 796RR	243	332.8	98	10563	105	0.86	47.85	97	1526	103	17.51	31.60	118	1497	229	0	83.9
Hilleshög HM4302RR	101	325.6	96	9404	93	0.85	45.95	93	1327	90	17.13	28.84	126	1599	191	0	52.2
Hilleshög HM4448RR	109	337.7	100	10507	104	0.82	49.32	100	1533	104	17.71	31.12	103	1445	216	0	67.1
Hilleshög HM9528RR	112	333.0	99	10098	100	0.85	48.01	97	1458	99	17.50	30.31	105	1537	211	0	65.1
Hilleshög HIL9708	105	335.1	99	10096	100	0.84	48.58	98	1465	99	17.59	30.12	117	1510	205	0	76.0
Hilleshög HIL9920	106	344.8	102	10354	102	0.84	51.29	104	1536	104	18.08	30.09	102	1585	196	0	71.4
Maribo MA109	120	341.8	101	9170	91	0.87	50.47	102	1354	92	17.96	26.85	101	1607	211	0	58.2
Maribo MA504	113	335.9	99	11196	111	0.81	48.82	99	1626	110	17.61	33.36	106	1476	200	0	62.5
Maribo MA717	126	342.6	101	11126	110	0.85	50.67	103	1642	111	17.98	32.53	100	1503	227	0	76.0
SX Bronco RR	128	341.3	101	10281	102	0.88	50.30	102	1516	103	17.95	30.17	122	1616	210	0	60.1
SX Canyon RR	102	334.7	99	10166	101	0.79	48.48	98	1471	100	17.52	30.39	97	1471	185	0	64.6
SX Marathon RR	125	329.6	98	9914	98	0.87	47.06	95	1416	96	17.35	30.02	123	1536	221	0	58.5
SV RR265	131	339.7	101	10508	104	0.80	49.88	101	1539	104	17.78	31.00	104	1518	175	0	72.1
SV RR268	116	333.0	99	10277	102	0.81	47.99	97	1485	101	17.45	30.82	99	1512	189	0	63.1
SV RR333	117	333.3	99	9951	98	0.81	48.08	97	1437	97	17.47	29.83	95	1527	188	0	74.4
SV RR351	107	332.4	98	10777	107	0.83	47.83	97	1551	105	17.45	32.41	113	1508	201	0	65.8
SV RR371	114	333.3	99	9412	93	0.80	48.09	97	1361	92	17.46	28.21	90	1522	179	0	57.9
Experimental Trial (Comm status)																	
BTS 8815	202	345.6	102	9672	96	0.80	51.61	105	1449	98	18.08	27.87	92	1540	181	0	74.9
BTS 8882	228	334.2	99	10208	101	0.88	48.27	98	1477	100	17.60	30.45	116	1571	225	0	63.0
Crystal 803RR	227	343.0	101	10542	104	0.85	50.88	103	1560	106	17.99	30.80	98	1484	229	0	85.8
Crystal 804RR	237	336.9	100	9922	98	0.89	49.05	99	1445	98	17.74	29.44	127	1506	244	0	59.6
Crystal 808RR	240	330.0	98	9129	90	0.96	47.05	95	1301	88	17.47	27.62	150	1580	264	0	76.3
SX 1887	238	340.5	101	10438	103	0.83	50.10	101	1541	104	17.84	30.60	109	1534	200	0	68.9
SX 1888	236	345.4	102	10778	107	0.77	51.54	104	1611	109	18.03	31.10	100	1415	188	0	63.8
SV 285	241	347.9	103	10122	100	0.81	52.30	106	1523	103	18.19	28.97	110	1511	187	0	62.9
SV 289	223	339.1	100	9544	94	0.81	49.71	101	1401	95	17.76	28.07	104	1535	184	0	59.1
SV RR375	204	339.2	100	10853	107	0.81	49.73	101	1591	108	17.77	31.94	101	1485	194	0	67.1
Comm Benchmark Mean		338.0		10105		0.87	49.39		1475		17.77	29.93	112	1562	220		67.3
Trial Mean	5001	335.3		10218		0.84	48.64		1482		17.61	30.48	107	1529	208		65.2
Coeff. of Var. (%)	5002	2.3		5.0		6.2	4.5		6.1		2.1	4.8	18.9	4.4	12.7		14.6
Mean LSD (0.05)	5004	9.8		652		0.07	2.72		114		0.46	1.85	24	83	33		11.6
Mean LSD (0.01)	5005	12.9		861		0.09	3.59		151		0.61	2.45	31	110	44		15.3
Sig Lvl	5007	**		**		**	**		**		**	**	**	**	**		**

* 2019 Data from Bathgate ND Bolters based upon 60,000 seed per acre. Created 11/22/2019

@ Experimental trial data adjusted to commercial status. Statistics are from commercial trial. Trial # = 198313

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 17. 2019 Performance of Approved Varieties - Conventional Official Trials

3 sites - All Characters

Unadjusted		Rec/T	Rec/T	Rec/A	Rec/A	Loss	Rev/T	Rev/T	Rev/A	Rev/A	Sugar	Yield	Na	K	AmN	Bolter	Emerg.
Description @	Code	lbs.	%Mean	lbs.	%Mean	Mol %	$ ++	%Mean	$ ++	%Mean	%	T/A	ppm	ppm	ppm	/Ac	%
Previous Approved																	
Crystal 620	807	310.5	100	10403	104	1.07	41.74	99	1394	103	16.59	33.69	271	1599	302	0	54.5
Crystal 840	802	301.7	97	9916	99	1.15	39.30	93	1288	95	16.23	33.11	317	1665	329	0	52.5
Crystal R761	806	299.3	96	10742	107	1.21	38.62	92	1375	102	16.18	35.97	359	1784	334	0	61.4
Hilleshög HM3035Rz	803	317.8	102	9439	94	1.02	43.77	104	1294	96	16.91	29.89	239	1526	297	0	72.3
Seedex 8869 Cnv	801	307.4	99	10388	103	1.02	40.88	97	1374	101	16.40	33.94	339	1553	258	0	63.7
SV 48777	805	322.8	103	10342	103	0.94	45.18	107	1452	107	17.08	31.83	236	1524	239	0	63.5
Newly Approved																	
Crystal 950	804	308.6	99	10719	107	1.06	41.21	98	1430	106	16.49	34.66	273	1591	295	0	62.2
Benchmark Mean		316.0		10330		1.08	44.35		1427		17.07	32.41	251	1600	314		65.9
Trial Mean		312.0		10047		1.08	42.16		1354		16.68	32.27	287	1616	302		62.1
Coeff. of Var. (%)		3.6		5.7		7.1	7.5		8.0		3.1	5.4	25.7	4.0	13.7		10.8
Mean LSD (0.05)		17.6		682		0.09	4.90		142		0.88	2.00	100	90	54		6.9
Mean LSD (0.01)		24.0		928		0.12	6.67		194		1.20	2.73	136	123	73		9.4
Sig Lvl		**		**		**	**		**		*	**	**	**	*		**

* 2019 Data from 3 sites

Created 11/22/2019

%Mean = percentage of trial mean.

Trial # = 19ACSConB

@ Some varieties not approved for sale. Refer to approval list for approval status.

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 18. 2019 Performance of Approved Varieties - Conventional Official Trials

Grand Forks ND - All Characters

Unadjusted		Rec/T	Rec/T	Rec/A	Rec/A	Loss	Rev/T	Rev/T	Rev/A	Rev/A	Sugar	Yield	Na	K	AmN	Bolter	Emerg.
Description @	Code	lbs.	%Mean	lbs.	%Mean	Mol %	$ ++	%Mean	$ ++	%Mean	%	T/A	ppm	ppm	ppm	/Ac	%
Previous Approved																	
Crystal 620	807	291.9	98	10800	103	1.06	36.55	96	1365	102	15.63	37.28	376	1569	258	0	49.0
Crystal 840	802	288.1	97	10474	100	1.13	35.51	93	1287	96	15.53	36.90	441	1679	266	0	43.0
Crystal R761	806	268.9	91	11146	106	1.26	30.15	79	1251	93	14.72	40.76	560	1830	292	0	49.4
Hilleshög HM3035Rz	803	306.7	103	9855	94	1.01	40.68	107	1306	98	16.33	32.91	319	1525	267	0	55.0
Seedex 8869 Cnv	801	286.1	96	10600	101	1.10	34.95	92	1292	97	15.41	37.11	448	1592	262	0	52.0
SV 48777	805	303.6	102	10890	104	0.90	39.83	105	1440	108	16.09	35.21	302	1545	173	0	54.7
Newly Approved																	
Crystal 950	804	298.6	101	11345	108	1.03	38.42	101	1444	108	15.97	38.03	356	1592	250	0	48.9
Benchmark Mean		298.8		10623		1.11	40.38		1399		16.39	34.78	364	1639	287		55.5
Trial Mean		297.1		10498		1.10	38.01		1338		15.95	35.43	392	1648	268		51.4
Coeff. of Var. (%)		3.9		5.4		7.0	8.5		7.1		3.4	6.2	16.6	3.9	12.3		14.5
Mean LSD (0.05)		18.7		910		0.13	5.19		158		0.86	3.15	109	97	55		11.3
Mean LSD (0.01)		25.2		1226		0.17	7.01		214		1.16	4.22	148	130	75		15.1
Sig Lvl		**		**		**	**		**		**	**	**	**	**		ns

* 2019 Data from Grand Forks ND

Created 11/18/2019

%Mean = percentage of trial mean.

Trial # = 198207

@ Some varieties not approved for sale. Refer to approval list for approval status.

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 19. 2019 Performance of Approved Varieties - Conventional Official Trials

Scandia MN - All Characters

Unadjusted		Rec/T	Rec/T	Rec/A	Rec/A	Loss	Rev/T	Rev/T	Rev/A	Rev/A	Sugar	Yield	Na	K	AmN	Bolter	Emerg.
Description @	Code	lbs.	%Mean	lbs.	%Mean	Mol %	$ ++	%Mean	$ ++	%Mean	%	T/A	ppm	ppm	ppm	/Ac	%
Previous Approved																	
Crystal 620	807	314.2	100	9613	104	1.24	42.76	100	1307	104	16.95	30.72	284	1674	418	0	0.0
Crystal 840	802	302.7	96	9469	103	1.27	39.57	93	1237	98	16.39	31.13	327	1648	423	0	0.0
Crystal R761	806	311.3	99	9962	108	1.43	41.95	98	1339	106	16.98	32.09	375	1853	480	0	0.0
Hilleshög HM3035Rz	803	322.5	103	8926	97	1.17	45.08	105	1246	99	17.31	27.76	273	1509	407	0	0.0
Seedex 8869 Cnv	801	313.1	100	9492	103	1.17	42.47	99	1290	102	16.84	30.56	433	1523	346	0	0.0
SV 48777	805	323.2	103	9070	98	1.10	45.29	106	1270	101	17.27	27.97	283	1475	349	0	0.0
Newly Approved																	
Crystal 950	804	309.7	99	9821	106	1.25	41.51	97	1315	104	16.74	31.46	317	1597	424	0	0.0
Benchmark Mean		319.6		9666		1.20	46.17		1367		17.52	29.63	257	1587	417		0.0
Trial Mean		314.1		9235		1.23	42.75		1260		16.93	29.32	325	1604	405		0.0
Coeff. of Var. (%)		3.7		3.7		8.0	7.6		6.7		3.1	3.3	32.2	4.0	14.5		0.0
Mean LSD (0.05)		18.6		560		0.15	5.17		138		0.84	1.52	161	103	85		0.0
Mean LSD (0.01)		25.1		758		0.20	6.98		187		1.14	2.04	216	138	114		0.0
Sig Lvl		**		**		*	**		**		**	**	**	**	*		0.0

* 2019 Data from Scandia MN

Created 11/18/2019

%Mean = percentage of trial mean.

Trial # = 198208

@ Some varieties not approved for sale. Refer to approval list for approval status.

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 20. 2019 Performance of Approved Varieties - Conventional Official Trials

Bathgate ND - All Characters

Unadjusted		Rec/T	Rec/T	Rec/A	Rec/A	Loss	Rev/T	Rev/T	Rev/A	Rev/A	Sugar	Yield	Na	K	AmN	Bolter	Emerg.
Description @	Code	lbs.	%Mean	lbs.	%Mean	Mol %	$ ++	%Mean	$ ++	%Mean	%	T/A	ppm	ppm	ppm	/Ac	%
Previous Approved																	
Crystal 620	807	327.2	101	10825	104	0.89	46.39	102	1539	105	17.25	32.98	131	1558	229	0	0.0
Crystal 840	802	314.1	97	9830	94	1.05	42.73	94	1331	91	16.76	31.46	201	1669	296	0	0.0
Crystal R761	806	317.6	98	11158	107	0.96	43.70	96	1541	105	16.83	35.00	155	1673	250	0	0.0
Hilleshög HM3035Rz	803	325.0	100	9513	91	0.85	45.76	100	1348	92	17.11	29.04	122	1544	209	0	0.0
Seedex 8869 Cnv	801	322.7	99	10925	105	0.80	45.15	99	1525	104	16.95	33.93	122	1535	167	0	0.0
SV 48777	805	340.6	105	11036	106	0.81	50.12	110	1623	111	17.84	32.47	123	1548	174	0	0.0
Newly Approved																	
Crystal 950	804	317.1	98	10989	106	0.89	43.58	95	1509	103	16.75	34.71	162	1585	210	0	0.0
Benchmark Mean		329.4		10734		0.91	46.48		1523		17.29	32.78	132	1578	241		0.0
Trial Mean		324.7		10408		0.91	45.70		1465		17.15	32.05	145	1595	232		0.0
Coeff. of Var. (%)		3.2		6.7		5.6	6.2		9.1		2.8	5.2	18.6	3.8	10.6		0.0
Mean LSD (0.05)		15.9		998		0.08	4.44		194		0.76	2.39	44	89	42		0.0
Mean LSD (0.01)		21.5		1341		0.11	5.97		261		1.02	3.20	60	120	57		0.0
Sig Lvl		*		**		**	*		**		*	**	**	**	**		0.0

* 2019 Data from Bathgate ND

Created 11/18/2019

%Mean = percentage of trial mean.

Trial # = 198213

@ Some varieties not approved for sale. Refer to approval list for approval status.

++ Revenue estimates are based on a $44.38 beet payment at 17.5% sugar & 1.5% loss to molasses and does not consider hauling costs.

Table 21.
Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2020

Description	Approval Status	Rec/Ton 2018	Rec/Ton 2019	Rec/Ton 2 Yr	Rec/Ton % Bench	Rev/Acre 2018	Rev/Acre 2019	Rev/Acre 2 Yr	Rev/Acre % Bench	R/T + $/A Bench	Cercospora Rating + 2017	Cercospora Rating + 2018	Cercospora Rating + 2019	Cercospora Rating + 2 Yr Mean	Cercospora Rating + 3 Yr Mean
Previously Approved (3 Yr)															**<=5.30**
BTS 8337	Approved	356.8	326.6	341.7	102.2	1619	1442	1531	102.8	205.0	4.36	4.64	4.40	4.52	4.47
BTS 8500	Approved	343.7	310.9	327.3	97.9	1719	1418	1569	105.3	203.2	4.29	4.40	4.00	4.20	4.23
BTS 8524	Approved	333.6	304.0	318.8	95.4	1658	1408	1533	102.9	198.3	4.38	4.50	4.52	4.51	4.47
BTS 8606	Approved	349.8	315.9	332.9	99.6	1684	1404	1544	103.7	203.2	4.73	4.80	4.69	4.74	4.74
BTS 8629	Approved	343.2	309.0	326.1	97.6	1752	1445	1599	107.3	204.9	4.29	4.52	4.66	4.59	4.49
BTS 8735	Approved	354.1	311.8	333.0	99.6	1689	1413	1551	104.1	203.7	4.22	4.21	4.15	4.18	4.19
BTS 8749	Approved	347.6	317.8	332.7	99.5	1596	1393	1495	100.3	199.9	4.05	4.10	3.95	4.02	4.03
BTS 8767	Approved	344.7	317.4	331.1	99.0	1664	1447	1556	104.4	203.5	4.16	4.32	4.26	4.29	4.24
BTS 8784	Approved	358.0	327.3	342.7	102.5	1667	1409	1538	103.3	205.8	3.65	3.73	3.84	3.78	3.74
Crystal 093RR	Approved	356.0	324.8	340.4	101.8	1666	1470	1568	105.3	207.1	4.49	4.88	5.09	4.98	4.82
Crystal 247RR	Approved	345.4	311.9	328.7	98.3	1669	1330	1500	100.7	199.0	4.55	4.54	4.50	4.52	4.53
Crystal 355RR	Approved	350.1	325.2	337.7	101.0	1524	1321	1423	95.5	196.5	4.36	4.52	4.68	4.60	4.52
Crystal 572RR	Approved	354.6	331.7	343.2	102.7	1718	1476	1597	107.2	209.9	4.27	4.45	4.68	4.56	4.47
Crystal 574RR	Approved	342.5	313.3	327.9	98.1	1733	1436	1585	106.4	204.5	4.35	4.42	4.28	4.35	4.35
Crystal 578RR	Approved	346.5	314.3	330.4	98.9	1645	1417	1531	102.8	201.6	4.91	4.74	4.64	4.69	4.76
Crystal 684RR	Approved	342.3	310.3	326.3	97.6	1756	1429	1593	106.9	204.5	4.34	4.41	4.12	4.27	4.29
Crystal 793RR	Approved	356.7	325.5	341.1	102.1	1804	1555	1680	112.8	214.9	3.93	4.26	4.04	4.15	4.08
Crystal 796RR	Approved	345.4	315.0	330.2	98.8	1743	1530	1637	109.9	208.7	4.85	4.74	4.74	4.74	4.78
Hilleshög HM4302RR	Approved	343.8	311.3	327.6	98.0	1572	1271	1422	95.4	193.4	3.93	4.26	3.93	4.09	4.04
Hilleshög HM4448RR	Not Approved	346.8	315.5	331.2	99.1	1720	1455	1588	106.6	205.7	5.28	5.26	5.48	5.37	5.34
Hilleshög HM9528RR	Approved	344.5	317.7	331.1	99.1	1632	1455	1544	103.6	202.7	4.99	4.79	4.93	4.86	4.90
Hilleshög HIL9708	Approved	346.9	316.3	331.6	99.2	1684	1433	1559	104.6	203.8	4.61	4.71	4.96	4.83	4.76
Hilleshög HIL9920	Approved	355.2	325.2	340.2	101.8	1695	1430	1563	104.9	206.7	4.89	4.79	4.95	4.87	4.88
Maribo MA109	Approved	354.3	326.2	340.3	101.8	1522	1321	1422	95.4	197.2	4.14	4.33	4.07	4.20	4.18
Maribo MA504	Approved	343.0	307.1	325.1	97.3	1748	1420	1584	106.3	203.6	5.50	4.98	5.34	5.16	5.27
Maribo MA717	Approved	354.4	319.8	337.1	100.9	1666	1476	1571	105.5	206.3	4.85	4.78	5.11	4.95	4.91
SX Bronco RR	Approved	349.0	321.8	335.4	100.3	1647	1415	1531	102.8	203.1	4.08	4.65	4.77	4.71	4.50
SX Canyon RR	Approved	346.0	319.0	332.5	99.5	1674	1434	1554	104.3	203.8	4.92	4.79	4.58	4.69	4.76
SX Marathon RR	Approved	347.2	318.2	332.7	99.5	1717	1380	1549	104.0	203.5	4.54	5.27	4.79	5.03	4.87
SV RR265	Approved	343.7	319.7	331.7	99.2	1663	1422	1543	103.6	202.8	5.19	4.48	4.28	4.38	4.65
SV RR268	Approved	350.3	319.8	335.1	100.2	1679	1408	1544	103.6	203.9	5.06	4.70	4.82	4.76	4.86
SV RR333	Approved	351.1	322.9	337.0	100.8	1642	1408	1525	102.4	203.2	4.84	4.78	4.49	4.64	4.70
SV RR351	Approved	347.4	320.6	334.0	99.9	1661	1401	1531	102.8	202.7	4.41	4.61	4.90	4.76	4.64
SV RR371	Approved	346.0	320.6	333.3	99.7	1622	1377	1500	100.7	200.4	4.59	4.71	4.34	4.53	4.55

Table 21.
Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2020

Description	Approval Status	Rec/Ton 2018	Rec/Ton 2019	Rec/Ton 2 Yr	Rec/Ton % Bench	Rev/Acre 2018	Rev/Acre 2019	Rev/Acre 2 Yr	Rev/Acre % Bench	R/T + $/A Bench	Cercospora Rating + 2017	Cercospora Rating + 2018	Cercospora Rating + 2019	Cercospora Rating + 2 Yr Mean	Cercospora Rating + 3 Yr Mean
Candidates for Approval (2 Yr)														**<=5.00**	
BTS 8815	Approved	351.1	325.5	338.3	101.2	1670	1458	1564	105.0	206.2	--	4.65	4.61	4.63	--
BTS 8882	Approved	345.3	316.0	330.7	98.9	1709	1445	1577	105.9	204.8	--	4.53	4.18	4.35	--
Crystal 803RR	Approved	352.2	329.5	340.8	102.0	1727	1493	1610	108.1	210.1	--	4.01	3.88	3.95	--
Crystal 804RR	Approved	343.5	319.2	331.3	99.1	1731	1472	1602	107.5	206.7	--	4.42	4.46	4.44	--
Crystal 808RR	Approved	347.8	315.4	331.6	99.2	1771	1456	1614	108.3	207.5	--	4.86	4.78	4.82	--
Hilleshög HIL2230	Not Approved	342.7	316.8	329.8	98.7	1578	1424	1501	100.8	199.5	--	4.71	4.91	4.81	--
Hilleshög HIL2233	Not Approved	351.4	324.6	338.0	101.1	1705	1508	1607	107.9	209.0	--	4.87	5.26	5.06	--
SX 1887	Approved	348.6	326.6	337.6	101.0	1659	1421	1540	103.4	204.4	--	4.89	4.89	4.89	--
SX 1888	Approved	349.3	323.2	336.2	100.6	1698	1475	1587	106.5	207.1	--	4.92	4.89	4.90	--
SV 285	Approved	346.3	324.2	335.3	100.3	1633	1422	1528	102.6	202.9	--	4.52	4.84	4.68	--
SV 289	Approved	351.3	324.2	337.8	101.1	1689	1376	1533	102.9	203.9	--	4.65	4.59	4.62	--
SV RR375	Approved	347.2	323.6	335.4	100.3	1648	1431	1540	103.4	203.7	5.08	4.96	4.11	4.54	4.72

Benchmark Varieties		2017	2018	2019		2017	2018	2019	
Hilleshög HM4302RR	Benchmark	334.0				1597			
BTS 80RR52	Benchmark	334.2	346.5			1699	1536		
Crystal 101RR (Check)	Benchmark	329.3	337.8	309.5		1718	1602	1355	
Crystal 355RR	Benchmark	340.0	350.1	325.2		1711	1524	1321	
BTS 8572 (Check)	Benchmark		350.7	327.5			1677	1459	
BTS 8337	Benchmark			326.6				1442	
Benchmark mean		334.4	346.3	322.2	334.2	1681	1585	1394	1490

+ All Cercospora ratings 2017-2019 were adjusted to 1982 basis. Created 11-21-2019

Variety approval criteria include: 1) 2 years of official trial data, 2) Cercospora rating must not exceed 5.00 (1982 adjusted data), 3a) R/T >= 100% of Bench or 3b) R/T >= 97% and R/T + $/A >= 202% of Bench. 3 yrs of data may be considered for initial approval.

Bench for 2019 added Beta 8337 and dropped Beta 80RR52 (Check).

To maintain approval, the 3-year Cercospora rating must not exceed 5.20 (1982 adjusted data).

Table 22.
Projected Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2020

Description	Approval ^ Likely	Rec/Ton 2019	Rec/Ton % Bench	Rev/Acre 2019	Rev/Acre % Bench	R/T + $/A Bench	CR Rating ^^ 2019
Candidates for Retesting (1 Yr)							
BTS 8927	On Track	337.8	104.8	1583	113.5	218.4	4.35
BTS 8938	On Track	329.2	102.2	1487	106.7	208.8	4.35
BTS 8945	On Track	318.1	98.7	1530	109.7	208.5	4.41
BTS 8958	On Track	317.0	98.4	1470	105.4	203.8	3.66
BTS 8961	On Track	315.7	98.0	1475	105.8	203.8	4.27
BTS 8976	On Track	332.4	103.2	1524	109.3	212.5	3.83
BTS 8985	Not On Track	318.1	98.7	1368	98.1	196.8	4.10
BTS 8989	On Track	326.8	101.4	1523	109.2	210.7	3.93
BTS 8994	Not On Track	317.7	98.6	1413	101.3	199.9	4.13
BTS 8995	On Track	322.3	100.0	1459	104.6	204.7	3.74
Crystal 912RR	On Track	316.1	98.1	1595	114.4	212.5	4.62
Crystal 913RR	On Track	332.5	103.2	1620	116.2	219.4	4.11
Crystal 914RR	Not On Track	311.6	96.7	1388	99.6	196.3	4.52
Crystal 915RR	On Track	320.7	99.5	1466	105.1	204.7	4.41
Crystal 916RR	On Track	318.2	98.8	1575	113.0	211.7	4.26
Crystal 918RR	On Track	322.1	100.0	1460	104.7	204.7	4.14
Hilleshög HIL2315	Not On Track	313.8	97.4	1343	96.3	193.7	4.86
Hilleshög HIL2316	Not On Track	318.6	98.9	1356	97.3	196.1	4.65
Hilleshög HIL2317	On Track	332.2	103.1	1502	107.7	210.8	4.90
Hilleshög HIL2318	Not On Track	317.7	98.6	1364	97.8	196.4	4.34
Hilleshög HIL2319	Not On Track	318.1	98.7	1513	108.5	207.2	5.45
Hilleshög HIL2320	On Track	331.1	102.8	1550	111.2	213.9	4.92
Maribo MA901	On Track	322.1	100.0	1343	96.3	196.3	4.57
Maribo MA902	Not On Track	319.2	99.1	1425	102.2	201.3	4.91
Maribo MA903	Not On Track	321.8	99.9	1520	109.0	208.9	5.25
SX 1894	Not On Track	320.5	99.5	1364	97.8	197.3	5.13
SX 1895	Not On Track	326.5	101.3	1344	96.4	197.7	4.56
SX 1896	Not On Track	314.6	97.6	1306	93.7	191.3	4.93
SX 1897	Not On Track	313.2	97.2	1366	98.0	195.2	4.81
SX 1898	On Track	325.3	101.0	1433	102.8	203.7	4.68
SV 391	Not On Track	313.7	97.4	1421	101.9	199.3	5.07
SV 392	Not On Track	325.1	100.9	1345	96.5	197.4	5.37
SV 393	On Track	325.0	100.9	1387	99.5	200.3	4.94
SV 394	Not On Track	319.9	99.3	1331	95.5	194.7	4.71
Benchmarks							
Crystal 101RR (Check)		309.5	96.1	1355	97.2		
Crystal 355RR		325.2	100.9	1321	94.7		
BTS 8572 (Check)		327.5	101.6	1459	104.6		
BTS 8337		326.6	101.4	1442	103.4		
Benchmark Mean		322.2		1394			

^ Not on Track = not on track for approval. On Track = data is tracking for potential approval. Created 11-21-2019

^^ All Cercospora ratings 2019 were adjusted to 1982 basis.

Full market approval criteria include: 1) 2 years of official trial data, 2) Cercospora rating must not exceed 5.00 (1982 adjusted data),

3a) R/T >= 100% of Bench or 3b) R/T >= 97% and R/T + $/A equal to 202 of Bench.

Bench for 2019 added Beta 8337 and dropped Beta 80RR52 (Check).

Table 23

Calculation for Approval of Sugarbeet Varieties for ACSC Aphanomyces Specialty Market for 2020

Trial		Approval	Root Aph. Rating					Cercospora Rating +				
Yrs	Description	Status	2017	2018	2019	2 Yr	3 Yr	2017	2018	2019	2 Yr	3 Yr
	Previously Approved (3 Yrs)						**<=4.70**					**<=5.30**
7	BTS 8337	Approved	3.78	3.74	3.45	3.60	3.66	4.36	4.64	4.40	4.52	4.47
5	BTS 8500	Approved	4.52	4.43	4.30	4.37	4.42	4.29	4.40	4.00	4.20	4.23
5	BTS 8524	Approved	4.49	4.08	4.51	4.30	4.36	4.38	4.50	4.52	4.51	4.47
4	BTS 8629	Approved	4.68	3.89	5.32	4.61	4.63	4.29	4.52	4.66	4.59	4.49
3	BTS 8735	Approved	4.74	4.00	4.53	4.27	4.42	4.22	4.21	4.15	4.18	4.19
3	BTS 8749	Approved	3.53	2.79	2.97	2.88	3.10	4.05	4.10	3.95	4.03	4.03
10	Crystal 093RR	Approved	4.43	4.38	5.22	4.80	4.68	4.49	4.88	5.09	4.99	4.82
7	Crystal 355RR	Not Approved	4.84	4.42	5.02	4.72	4.76	4.36	4.52	4.68	4.60	4.52
5	Crystal 574RR	Approved	4.72	4.32	3.99	4.16	4.34	4.35	4.42	4.28	4.35	4.35
5	Crystal 578RR	Approved	4.56	4.21	4.88	4.55	4.55	4.91	4.74	4.64	4.69	4.76
4	Crystal 684RR	Approved	4.31	3.83	4.33	4.08	4.16	4.34	4.41	4.12	4.27	4.29
3	Crystal 793RR	Approved	3.02	3.32	3.72	3.52	3.35	3.93	4.26	4.04	4.15	4.08
3	Crystal 796RR	Approved	3.11	3.61	3.97	3.79	3.56	4.85	4.74	4.74	4.74	4.78
6	Hilleshög HM9528RR	Not Approved	5.63	4.22	4.56	4.39	4.80	4.99	4.79	4.93	4.86	4.90
6	Maribo MA109	Not Approved	5.06	4.38	5.28	4.83	4.91	4.14	4.33	4.07	4.20	4.18
3	Maribo MA717	Approved	5.31	4.15	4.42	4.29	4.63	4.85	4.78	5.11	4.95	4.91
4	SX Bronco RR	Not Approved	4.88	4.05	5.38	4.72	4.77	4.08	4.65	4.77	4.71	4.50
6	SX Canyon RR	Approved	4.33	4.34	4.99	4.67	4.55	4.92	4.79	4.58	4.69	4.76
4	SV RR268	Approved	4.71	4.21	5.08	4.65	4.67	5.06	4.70	4.82	4.76	4.86
7	SV RR333	Approved	4.99	4.06	4.70	4.38	4.58	4.84	4.78	4.49	4.64	4.70
5	SV RR351	Not Approved	4.18	4.50	5.65	5.08	4.78	4.41	4.61	4.90	4.76	4.64
	Candidates for Approval					**<=4.40**						**<=5.00**
3	BTS 8767	Approved	4.80	4.28	4.32	4.30	4.47	4.16	4.32	4.26	4.29	4.25
3	BTS 8784	Approved	4.59	4.22	4.38	4.30	4.40	3.65	3.73	3.84	3.79	3.74
4	BTS 8606	Not Approved	4.91	4.43	5.11	4.77	4.82	4.73	4.80	4.69	4.75	4.74
2	BTS 8815	Not Approved		3.97	5.24	4.61			4.65	4.61	4.63	
2	BTS 8882	Not Approved		4.98	5.17	5.08			4.53	4.18	4.36	
8	Crystal 247RR	Not Approved	5.35	5.02	4.84	4.93	5.07	4.55	4.54	4.50	4.52	4.53
5	Crystal 572RR	Not Approved	4.69	4.47	4.98	4.73	4.71	4.27	4.45	4.68	4.57	4.47
2	Crystal 803RR	Approved		3.86	4.45	4.16			4.01	3.88	3.95	
2	Crystal 804RR	Approved		3.58	4.30	3.94			4.42	4.46	4.44	
2	Crystal 808RR	Approved		3.60	3.57	3.59			4.86	4.78	4.82	
2	Hilleshög HIL2230	Not Approved		3.96	4.95	4.46			4.71	4.91	4.81	
2	Hilleshög HIL2233	Not Approved		4.02	4.43	4.23			4.87	5.26	5.07	
9	Hilleshög HM4302RR	Not Approved	6.66	4.65	5.20	4.93	5.50	3.93	4.26	3.93	4.10	4.04
7	Hilleshög HM4448RR	Not Approved	6.29	4.53	4.86	4.70	5.23	5.28	5.26	5.48	5.37	5.34
5	Hilleshög HIL9708	Not Approved	5.94	4.25	4.61	4.43	4.93	4.61	4.71	4.96	4.84	4.76
3	Hilleshög HIL9920	Not Approved	4.94	4.09	5.05	4.57	4.69	4.89	4.79	4.95	4.87	4.88
5	Maribo MA504	Not Approved	6.20	5.30	6.17	5.74	5.89	5.50	4.98	5.34	5.16	5.27
5	SX Marathon RR	Not Approved	4.52	4.72	5.15	4.94	4.80	4.54	5.27	4.79	5.03	4.87
2	SX 1887	Not Approved		4.49	4.67	4.58			4.89	4.89	4.89	
2	SX 1888	Approved		4.03	4.65	4.34			4.92	4.89	4.91	
2	SV 285	Approved		3.98	4.47	4.23			4.52	4.84	4.68	
2	SV 289	Not Approved		4.42	5.30	4.86			4.65	4.59	4.62	
4	SV RR265	Not Approved	5.35	4.16	5.47	4.82	4.99	5.19	4.48	4.28	4.38	4.65
3	SV RR375	Not Approved	4.54	3.83	5.03	4.43	4.47	5.08	4.96	4.11	4.54	4.72
3	SV RR371	Not Approved	4.55	4.51	4.99	4.75	4.68	4.59	4.71	4.34	4.53	4.55
	Approval Criteria new varieties					4.40					5.00	
	Criteria to Maintain Approval						4.70					5.30

+ All Cercospora ratings 2017-2019 were adjusted to 1982 basis. Created 11/25/2019

Aphanomyces approval criteria include: 1) Cercospora rating must not exceed 5.00 (1982 adjusted data), 2) Aph root rating <= 4.40 after 2 years. 3 yrs of data may be considered for initial approval.

To maintain Aphanomyces approval criteria include: 1) Cercospora 3 year mean must not exceed 5.30, 2) Aph root rating <= 4.70 after 3 years.

Table 24

Calculation for Approval of Sugarbeet Varieties for ACSC Rhizoctonia Specialty Market for 2020

Description	Approval Status	Disease Index + 2017	2018	2019	2 Yr Mn	3 Yr Mn	Cercospora Rating 2017	2018	2019	2 Yr Mn	3 Yr Mn
Previously Approved (3 Yr)											
Crystal 355RR	Approved	4.09	3.66	3.67	3.67	3.81	4.36	4.52	4.68	4.60	4.52
Hilleshög HM4302RR	Approved	3.60	3.71	3.97	3.84	3.76	3.93	4.26	3.93	4.10	4.04
Maribo MA109	Approved	3.63	3.69	3.73	3.71	3.68	4.14	4.33	4.07	4.20	4.18
Candidates for Approval (2 Yr)											
BTS 8337	Approved	4.30	4.07	3.62	3.85	4.00	4.36	4.64	4.40	4.52	4.47
BTS 8500	Not Approved	4.57	4.36	4.28	4.32	4.40	4.29	4.40	4.00	4.20	4.23
BTS 8524	Not Approved	4.41	4.23	4.00	4.12	4.21	4.38	4.50	4.52	4.51	4.47
BTS 8606	Not Approved	5.00	4.24	4.60	4.42	4.61	4.73	4.80	4.69	4.75	4.74
BTS 8629	Not Approved	4.21	4.02	3.89	3.96	4.04	4.29	4.52	4.66	4.59	4.49
BTS 8735	Not Approved	4.38	4.12	3.95	4.04	4.15	4.22	4.21	4.15	4.18	4.19
BTS 8749	Approved	3.95	3.88	3.58	3.73	3.80	4.05	4.10	3.95	4.03	4.03
BTS 8767	Not Approved	4.75	4.10	4.14	4.12	4.33	4.16	4.32	4.26	4.29	4.25
BTS 8784	Not Approved	4.64	4.60	4.29	4.45	4.51	3.65	3.73	3.84	3.79	3.74
BTS 8815	Not Approved	--	3.88	4.03	3.96	--	--	4.65	4.61	4.63	--
BTS 8882	Not Approved	--	4.37	4.27	4.32	--	--	4.53	4.18	4.36	--
Crystal 093RR	Not Approved	4.50	4.59	4.14	4.37	4.41	4.49	4.88	5.09	4.99	4.82
Crystal 247RR	Not Approved	4.49	4.56	4.32	4.44	4.46	4.55	4.54	4.50	4.52	4.53
Crystal 572RR	Not Approved	4.47	4.54	4.14	4.34	4.38	4.27	4.45	4.68	4.57	4.47
Crystal 574RR	Not Approved	4.16	4.36	4.45	4.41	4.32	4.35	4.42	4.28	4.35	4.35
Crystal 578RR	Not Approved	4.40	4.30	4.21	4.26	4.30	4.91	4.74	4.64	4.69	4.76
Crystal 684RR	Not Approved	4.57	4.39	4.01	4.20	4.32	4.34	4.41	4.12	4.27	4.29
Crystal 793RR	Not Approved	4.26	4.11	4.18	4.15	4.18	3.93	4.26	4.04	4.15	4.08
Crystal 796RR	Not Approved	4.23	3.97	3.85	3.91	4.02	4.85	4.74	4.74	4.74	4.78
Crystal 803RR	Not Approved	--	4.67	4.54	4.61	--	--	4.01	3.88	3.95	--
Crystal 804RR	Not Approved	--	4.02	3.72	3.87	--	--	4.42	4.46	4.44	--
Crystal 808RR	Not Approved	--	3.83	4.09	3.96	--	--	4.86	4.78	4.82	--
Hilleshög HIL2230	Not Approved	--	4.06	4.48	4.27	--	--	4.71	4.91	4.81	--
Hilleshög HIL2233	Not Approved	--	4.04	3.78	3.91	--	--	4.87	5.26	5.07	--
Hilleshög HIL9708	Approved	4.21	3.71	3.87	3.79	3.93	4.61	4.71	4.96	4.84	4.76
Hilleshög HIL9920	Not Approved	4.48	4.65	4.68	4.67	4.60	4.89	4.79	4.95	4.87	4.88
Hilleshög HM4448RR	Not Approved	4.63	4.38	4.04	4.21	4.35	5.28	5.26	5.48	5.37	5.34
Hilleshög HM9528RR	Not Approved	4.21	4.04	4.10	4.07	4.12	4.99	4.79	4.93	4.86	4.90
Maribo MA504	Not Approved	4.37	4.25	4.69	4.47	4.44	5.50	4.98	5.34	5.16	5.27
Maribo MA717	Not Approved	4.28	4.35	4.15	4.25	4.26	4.85	4.78	5.11	4.95	4.91
SV 285	Not Approved	--	4.35	4.38	4.37	--	--	4.52	4.84	4.68	--
SV 289	Not Approved	--	4.37	4.06	4.22	--	--	4.65	4.59	4.62	--
SV RR265	Not Approved	4.42	4.32	4.25	4.29	4.33	5.19	4.48	4.28	4.38	4.65
SV RR268	Not Approved	4.57	4.21	4.21	4.21	4.33	5.06	4.70	4.82	4.76	4.86
SV RR333	Not Approved	4.44	4.23	4.08	4.16	4.25	4.84	4.78	4.49	4.64	4.70
SV RR351	Not Approved	4.25	4.16	4.09	4.13	4.17	4.41	4.61	4.90	4.76	4.64
SV RR371	Not Approved	4.31	4.19	3.97	4.08	4.16	4.59	4.71	4.34	4.53	4.55
SV RR375	Not Approved	4.25	4.13	4.05	4.09	4.14	5.08	4.96	4.11	4.54	4.72
SX 1887	Not Approved	--	4.16	4.18	4.17	--	--	4.89	4.89	4.89	--
SX 1888	Not Approved	--	4.57	4.19	4.38	--	--	4.92	4.89	4.91	--
SX Bronco RR	Not Approved	4.23	4.73	4.71	4.72	4.56	4.08	4.65	4.77	4.71	4.50
SX Canyon RR	Not Approved	4.51	4.36	3.89	4.13	4.25	4.92	4.79	4.58	4.69	4.76
SX Marathon RR	Not Approved	4.40	4.19	4.36	4.28	4.32	4.54	5.27	4.79	5.03	4.87
Susceptible Checks											
RH CK#08 CRYS539RR		4.74	4.68	4.67							
RH CK#21 CRYS768RR		4.66	4.52	4.66							
RH CK#25 HILL4043RR		4.51	4.83	4.66							
RH CK#28 CRYS658RR		4.36	4.02	4.37							
RH CK#29 BETA87RR58		4.79									
RH CK#31 HILL4000RR		4.65									
RH CK#35 SES36812RR		4.71	4.29	4.29							
RH CK#36 BTS85RR02		4.10	4.46	4.56							
RH CK#37 SES36918RR		4.43	4.32	4.75							
RH CK#40 CRYS101RR		4.55	4.50	4.73							
RH CK#45 BTS82RR33		4.73	4.70	4.09							
RH CK#47 SES36272RR		4.62	4.36	4.26							
RH CK#49 CRYS247RR		4.65	4.62	4.16							
RH CK#53 BTS8500				4.30							
Susceptible Hybrid Mean		4.66	4.48	4.49	4.48	4.54				**5.00**	**5.30**
Approval Criteria ++		3.82	3.82	3.82	**3.82**	**3.82**					
Disapproval Criteria						**4.09**					

Rhc and CR ratings were adjusted based upon check performance. Created 11/26/2019

+ Disease Index is based on a scale of 0 (healthy) to 7 (dead).

++ Candidates must have better tolerance than susc. check mean * 80%. To maintain approval, tolerance must be better than susc. check mean * 90%.

Previously approved varieties not meeting current approval standards may be sold in 2019.

Table 25.
2019 Aphanomyces Ratings for Official Trial Entries
Betaseed Nursery - Shakopee, MN

			Unadjusted ^^		Adjusted ^^							
				Shak		Shak							Trial
Chk++	Code	Description		8/27		8/27	2019	2 Yr	3 Yr	2019^^	2018++	2017++	Yrs $$
	573	BTS 8337	---	3.56	---	3.45	3.45	3.59	3.65	3.45	3.74	3.78	7
	540	BTS 8500	---	4.44	---	4.30	4.30	4.37	4.42	4.30	4.43	4.52	5
	515	BTS 8524	---	4.66	---	4.51	4.51	4.29	4.36	4.51	4.08	4.49	5
	574	BTS 8606	---	5.28	---	5.11	5.11	4.77	4.81	5.11	4.43	4.91	4
	504	BTS 8629	---	5.50	---	5.32	5.32	4.61	4.63	5.32	3.89	4.68	4
	518	BTS 8735	---	4.68	---	4.53	4.53	4.27	4.42	4.53	4.00	4.74	3
	513	BTS 8749	---	3.07	---	2.97	2.97	2.88	3.10	2.97	2.79	3.53	3
	510	BTS 8767	---	4.46	---	4.32	4.32	4.30	4.46	4.32	4.28	4.80	3
	524	BTS 8784	---	4.53	---	4.38	4.38	4.30	4.40	4.38	4.22	4.59	3
	580	BTS 8815	---	5.41	---	5.24	5.24	4.60	--	5.24	3.97	--	2
	557	BTS 8882	---	5.34	---	5.17	5.17	5.07	--	5.17	4.98	--	2
	539	BTS 8927	---	4.19	---	4.06	4.06	--	--	4.06	--	--	1
	505	BTS 8938	---	3.87	---	3.75	3.75	--	--	3.75	--	--	1
	531	BTS 8945	---	4.38	---	4.24	4.24	--	--	4.24	--	--	1
	555	BTS 8958	---	5.06	---	4.90	4.90	--	--	4.90	--	--	1
	568	BTS 8961	---	4.02	---	3.89	3.89	--	--	3.89	--	--	1
	545	BTS 8976	---	3.67	---	3.55	3.55	--	--	3.55	--	--	1
	565	BTS 8985	---	4.70	---	4.55	4.55	--	--	4.55	--	--	1
	535	BTS 8989	---	4.93	---	4.77	4.77	--	--	4.77	--	--	1
	527	BTS 8994	---	4.14	---	4.01	4.01	--	--	4.01	--	--	1
	520	BTS 8995	---	4.84	---	4.68	4.68	--	--	4.68	--	--	1
	551	Crystal 093RR	---	5.39	---	5.22	5.22	4.80	4.68	5.22	4.38	4.43	10
	544	Crystal 247RR	---	5.00	---	4.84	4.84	4.93	5.07	4.84	5.02	5.35	8
	569	Crystal 355RR	---	5.19	---	5.02	5.02	4.72	4.76	5.02	4.42	4.84	7
	549	Crystal 572RR	---	5.14	---	4.98	4.98	4.72	4.71	4.98	4.47	4.69	5
	529	Crystal 574RR	---	4.12	---	3.99	3.99	4.16	4.34	3.99	4.32	4.72	5
	532	Crystal 578RR	---	5.04	---	4.88	4.88	4.54	4.55	4.88	4.21	4.56	5
	523	Crystal 684RR	---	4.47	---	4.33	4.33	4.08	4.16	4.33	3.83	4.31	4
	548	Crystal 793RR	---	3.84	---	3.72	3.72	3.52	3.35	3.72	3.32	3.02	3
	501	Crystal 796RR	---	4.10	---	3.97	3.97	3.79	3.56	3.97	3.61	3.11	3
	533	Crystal 803RR	---	4.60	---	4.45	4.45	4.16	--	4.45	3.86	--	2
	566	Crystal 804RR	---	4.44	---	4.30	4.30	3.94	--	4.30	3.58	--	2
	514	Crystal 808RR	---	3.69	---	3.57	3.57	3.58	--	3.57	3.60	--	2
	571	Crystal 912RR	---	4.04	---	3.91	3.91	--	--	3.91	--	--	1
	560	Crystal 913RR	---	3.70	---	3.58	3.58	--	--	3.58	--	--	1
	509	Crystal 914RR	---	5.35	---	5.18	5.18	---	--	5.18	--	--	1
	564	Crystal 915RR	---	4.44	---	4.30	4.30	--	--	4.30	--	--	1
	553	Crystal 916RR	---	4.31	---	4.17	4.17	--	--	4.17	--	--	1
	550	Crystal 918RR	---	4.83	---	4.67	4.67	--	--	4.67	--	--	1
	575	Hilleshög HIL2230	---	5.11	---	4.95	4.95	4.45	--	4.95	3.96	--	2
	561	Hilleshög HIL2233	---	4.58	---	4.43	4.43	4.22	--	4.43	4.02	--	2
	537	Hilleshög HIL2315	---	4.84	---	4.68	4.68	--	--	4.68	--	--	1
	528	Hilleshög HIL2316	---	3.67	---	3.55	3.55	--	--	3.55	--	--	1
	525	Hilleshög HIL2317	---	4.09	---	3.96	3.96	--	--	3.96	--	--	1
	511	Hilleshög HIL2318	---	5.02	---	4.86	4.86	--	--	4.86	--	--	1
	576	Hilleshög HIL2319	---	5.39	---	5.22	5.22	--	--	5.22	--	--	1
	512	Hilleshög HIL2320	---	4.73	---	4.58	4.58	--	--	4.58	--	--	1
	562	Hilleshög HM4302RR	---	5.37	---	5.20	5.20	4.93	5.50	5.20	4.65	6.66	9
	522	Hilleshög HM4448RR	---	5.02	---	4.86	4.86	4.70	5.23	4.86	4.53	6.29	7
	552	Hilleshög HM9528RR	---	4.71	---	4.56	4.56	4.39	4.80	4.56	4.22	5.63	6
	506	Hilleshög HIL9708	---	4.76	---	4.61	4.61	4.43	4.93	4.61	4.25	5.94	5
	536	Hilleshög HIL9920	---	5.22	---	5.05	5.05	4.57	4.70	5.05	4.09	4.94	3
	521	Maribo MA109	---	5.46	---	5.28	5.28	4.83	4.91	5.28	4.38	5.06	6
	517	Maribo MA504	---	6.37	---	6.17	6.17	5.73	5.89	6.17	5.30	6.20	5
	507	Maribo MA717	---	4.57	---	4.42	4.42	4.29	4.63	4.42	4.15	5.31	3
	579	Maribo MA901	---	5.06	---	4.90	4.90	--	--	4.90	--	--	1
	508	Maribo MA902	---	5.49	---	5.31	5.31	--	--	5.31	--	--	1
	542	Maribo MA903	---	4.71	---	4.56	4.56	--	--	4.56	--	--	1
	530	SX 1887	---	4.83	---	4.67	4.67	4.58	--	4.67	4.49	--	2
	547	SX 1888	---	4.80	---	4.65	4.65	4.34	--	4.65	4.03	--	2

Table 25.
2019 Aphanomyces Ratings for Official Trial Entries
Betaseed Nursery - Shakopee, MN

			Unadjusted ^^		Adjusted ^^							
				Shak		Shak							Trial
Chk++	Code	Description		8/27		8/27	2019	2 Yr	3 Yr	2019^^	2018++	2017++	Yrs $$
	503	SX 1894	---	4.95	---	4.79	4.79	--	--	4.79	--	--	1
	556	SX 1895	---	4.49	---	4.35	4.35	--	--	4.35	--	--	1
	534	SX 1896	---	5.63	---	5.45	5.45	--	--	5.45	--	--	1
	577	SX 1897	---	5.85	---	5.66	5.66	--	--	5.66	--	--	1
	559	SX 1898	---	4.90	---	4.74	4.74	--	--	4.74	--	--	1
	502	SX Bronco RR	---	5.56	---	5.38	5.38	4.71	4.77	5.38	4.05	4.88	4
	558	SX Canyon RR	---	5.16	---	4.99	4.99	4.67	4.55	4.99	4.34	4.33	6
	554	SX Marathon RR	---	5.32	---	5.15	5.15	4.94	4.80	5.15	4.72	4.52	5
	578	SV 285	---	4.62	---	4.47	4.47	4.23	--	4.47	3.98	--	2
	572	SV 289	---	5.48	---	5.30	5.30	4.86	--	5.30	4.42	--	2
	563	SV 391	---	5.09	---	4.93	4.93	--	--	4.93	--	--	1
	543	SV 392	---	5.43	---	5.26	5.26	--	--	5.26	--	--	1
	526	SV 393	---	5.20	---	5.03	5.03	--	--	5.03	--	--	1
	516	SV 394	---	5.52	---	5.34	5.34	--	--	5.34	--	--	1
	546	SV RR265	---	5.65	---	5.47	5.47	4.81	4.99	5.47	4.16	5.35	4
	567	SV RR268	---	5.25	---	5.08	5.08	4.65	4.67	5.08	4.21	4.71	4
	570	SV RR333	---	4.86	---	4.70	4.70	4.38	4.58	4.70	4.06	4.99	7
	541	SV RR351	---	5.84	---	5.65	5.65	5.07	4.77	5.65	4.50	4.18	5
	538	SV RR371	---	5.16	---	4.99	4.99	4.75	4.69	4.99	4.51	4.55	3
	519	SV RR375	---	5.20	---	5.03	5.03	4.43	4.47	5.03	3.83	4.54	3
1	1001	AP CK-32 CRYS981RR	---	2.97	---	2.87	2.87	3.33	3.28	2.87	3.79	3.19	11
1	1002	AP CK-33 CRYS768RR	---	5.01	---	4.85	4.85	4.71	4.72	4.85	4.56	4.74	13
1	1003	AP CK-35 BETA87RR58	---	5.57	---	5.39	5.39	5.53	5.31	5.39	5.68	4.86	13
1	1004	AP CK-41 CRYS765RR	---	6.16	---	5.96	5.96	5.98	5.99	5.96	5.99	6.01	9
1	1005	AP CK-43 BTS80RR32	---	4.65	---	4.50	4.50	4.55	4.58	4.50	4.60	4.64	10
1	1006	AP CK-44 SX VISION RR	---	5.23	---	5.06	5.06	5.04	5.09	5.06	5.03	5.17	11
1	1007	AP CK-45 CRYS986RR	---	4.75	---	4.60	4.60	4.30	4.27	4.60	4.01	4.22	11
1	1008	AP CK-47 CRYS101RR	---	3.02	---	2.92	2.92	3.35	3.51	2.92	3.79	3.83	9
1	1009	AP CK-49 BTS82RR33	---	5.43	---	5.26	5.26	5.29	5.62	5.26	5.32	6.29	8
1	1010	AP CK-51 CRYS246RR	---	5.10	---	4.94	4.94	5.08	4.94	4.94	5.22	4.65	8
1	1011	AP CK-52 HILL4094RR	---	5.93	---	5.74	5.74	5.16	4.96	5.74	4.57	4.58	12
1	1012	AP CK-55 CRYS247RR	---	5.06	---	4.90	4.90	5.11	4.74	4.90	5.33	4.00	8
1	1013	AP CK-56 BTS8363	---	5.42	---	5.25	5.25	5.20	5.00	5.25	5.15	4.60	7
1	1014	AP CK-57 CRYS578RR	---	4.73	---	4.58	4.58	4.54	4.55	4.58	4.50	4.56	5
1	1015	AP CK-58 CRYS572RR	---	5.30	---	5.13	5.13	4.80	4.76	5.13	4.47	4.69	5
	1016	AP CHK MOD RES RR	---	5.57	---	5.39	5.39	5.12	4.96	5.39	4.84	4.65	13
	1017	AP CHK RES RR	---	6.05	---	5.86	5.86	5.17	4.94	5.86	4.49	4.49	14
	1018	AP CHK SUS HYB#3	---	6.07	---	5.88	5.88	5.85	5.57	5.88	5.83	4.99	13
	1019	AP CHK SUS HYB#4	---	6.26	---	6.06	6.06	6.04	6.02	6.06	6.02	5.99	13
	1020	AP SUS RR#5	---	5.62	---	5.44	5.44	5.38	5.68	5.44	5.32	6.29	3
		Conventional											
	902	Crystal 620	---	4.86	---	4.70	4.70	4.25	4.19	4.70	3.79	4.09	4
	907	Crystal 840	---	4.17	---	4.03	4.03	3.92	--	4.03	3.80	--	2
	904	Crystal 950	---	5.00	---	4.84	4.84	--	--	4.84	--	--	1
	906	Crystal R761	---	4.58	---	4.43	4.43	4.26	4.18	4.43	4.09	4.01	13
	903	Hilleshög HM3035Rz	---	5.30	---	5.13	5.13	5.15	5.16	5.13	5.18	5.18	15
	905	Seedex 8869 Cnv	---	5.00	---	4.84	4.84	4.83	4.88	4.84	4.82	4.99	4
	901	SV 48777	---	5.05	---	4.89	4.89	5.01	4.74	4.89	5.13	4.20	3
	1012	AP CK-55 CRYS247RR	---	4.97	---	4.81	4.81	5.11	4.74	4.90	5.33	4.00	8
	1014	AP CK-57 CRYS578RR	---	4.89	---	4.73	4.73	4.54	4.55	4.58	4.50	4.56	5
	1015	AP CK-58 CRYS572RR	---	5.23	---	5.06	5.06	4.80	4.76	5.13	4.47	4.69	5
		Check Mean	---	4.96	---	4.80	4.80						
15		Trial Mean	---	4.92	---	4.76	4.76						
		Coeff. of Var. (%)	---	12.80	---	12.80							
		Mean LSD (0.05)	---	0.79	---	0.76							
		Mean LSD (0.01)	---	1.04	---	1.01							
		Sig Lvl	---	**	---	**							
		Adjustment Factor	---	0.97	---								

^^ 2019 Root Rating was taken in early fall (1=healthy, 9+=severe damage).
++ Ratings adjusted to 2003 basis. (2000-2002 Aph nurseries). Ratings adjusted on the basis of checks.

Table 26.
2019 Cercospora Ratings for Official Trial Entries
Betaseed (Randolph MN), BSDF (Frankenmuth MI) & NDSU (Foxhome MN)

			Unadjusted			Adjusted to 1982 Basis ++								
			Randolph	BSDF	Foxhome	Randolph	BSDF	Foxhome						Trial
Chk	Code	Description	Avg	Avg	Avg	Avg	Avg	Avg	2019	2 Yr	3 Yr	2018	2017	Yrs $$
			6 Dates+	5 Dates+	9 Dates+	6 Dates+	5 Dates+	9 Dates+	3 loc					
	573	BTS 8337	3.77	3.37	3.23	4.18	4.10	4.92	4.40	4.52	4.47	4.64	4.36	7
	540	BTS 8500	3.94	2.82	2.76	4.37	3.43	4.21	4.00	4.20	4.23	4.40	4.29	5
	515	BTS 8524	4.24	3.39	3.11	4.71	4.13	4.74	4.52	4.51	4.47	4.50	4.38	5
	574	BTS 8606	4.35	3.60	3.18	4.83	4.38	4.85	4.69	4.74	4.74	4.80	4.73	4
	504	BTS 8629	4.25	3.64	3.17	4.72	4.43	4.83	4.66	4.59	4.49	4.52	4.29	4
	518	BTS 8735	3.69	3.43	2.74	4.10	4.17	4.18	4.15	4.18	4.19	4.21	4.22	3
	513	BTS 8749	3.43	3.09	2.80	3.81	3.76	4.27	3.95	4.02	4.03	4.10	4.05	3
	510	BTS 8767	3.93	3.21	2.95	4.36	3.91	4.50	4.26	4.29	4.24	4.32	4.16	3
	524	BTS 8784	3.37	3.09	2.63	3.74	3.76	4.01	3.84	3.78	3.74	3.73	3.65	3
	580	BTS 8815	4.28	3.48	3.18	4.75	4.24	4.85	4.61	4.63	--	4.65	--	2
	557	BTS 8882	4.09	3.19	2.70	4.54	3.88	4.12	4.18	4.35	--	4.53	--	2
	539	BTS 8927	4.26	3.26	2.86	4.73	3.97	4.36	4.35	--	--	--	--	1
	505	BTS 8938	3.83	3.67	2.85	4.25	4.47	4.34	4.35	--	--	--	--	1
	531	BTS 8945	3.92	3.42	3.09	4.35	4.16	4.71	4.41	--	--	--	--	1
	555	BTS 8958	3.02	2.86	2.73	3.35	3.48	4.16	3.66	--	--	--	--	1
	568	BTS 8961	3.83	3.25	3.01	4.25	3.96	4.59	4.27	--	--	--	--	1
	545	BTS 8976	3.71	2.91	2.51	4.12	3.54	3.83	3.83	--	--	--	--	1
	565	BTS 8985	3.66	3.21	2.84	4.06	3.91	4.33	4.10	--	--	--	--	1
	535	BTS 8989	3.54	2.83	2.89	3.93	3.44	4.41	3.93	--	--	--	--	1
	527	BTS 8994	4.12	3.09	2.67	4.57	3.76	4.07	4.13	--	--	--	--	1
	520	BTS 8995	3.50	2.78	2.60	3.88	3.38	3.96	3.74	--	--	--	--	1
	551	Crystal 093RR	4.57	4.01	3.48	5.07	4.88	5.31	5.09	4.98	4.82	4.88	4.49	10
	544	Crystal 247RR	4.16	3.61	2.94	4.62	4.39	4.48	4.50	4.52	4.53	4.54	4.55	8
	569	Crystal 355RR	3.96	3.57	3.47	4.40	4.34	5.29	4.68	4.60	4.52	4.52	4.36	7
	549	Crystal 572RR	3.95	3.82	3.29	4.38	4.65	5.02	4.68	4.56	4.47	4.45	4.27	5
	529	Crystal 574RR	4.00	3.17	2.97	4.44	3.86	4.53	4.28	4.35	4.35	4.42	4.35	5
	532	Crystal 578RR	4.13	3.95	2.97	4.58	4.81	4.53	4.64	4.69	4.76	4.74	4.91	5
	523	Crystal 684RR	4.02	2.89	2.88	4.46	3.52	4.39	4.12	4.27	4.29	4.41	4.34	4
	548	Crystal 793RR	3.59	3.12	2.84	3.98	3.80	4.33	4.04	4.15	4.08	4.26	3.93	3
	501	Crystal 796RR	4.23	3.87	3.16	4.70	4.71	4.82	4.74	4.74	4.78	4.74	4.85	3
	533	Crystal 803RR	3.41	3.08	2.70	3.78	3.75	4.12	3.88	3.95	--	4.01	--	2
	566	Crystal 804RR	4.27	3.42	2.93	4.74	4.16	4.47	4.46	4.44	--	4.42	--	2
	514	Crystal 808RR	4.50	3.50	3.33	4.99	4.26	5.08	4.78	4.82	--	4.86	--	2
	571	Crystal 912RR	4.34	3.47	3.17	4.82	4.22	4.83	4.62	--	--	--	--	1
	560	Crystal 913RR	3.95	3.06	2.77	4.38	3.72	4.22	4.11	--	--	--	--	1
	509	Crystal 914RR	4.63	3.35	2.85	5.14	4.08	4.34	4.52	--	--	--	--	1
	564	Crystal 915RR	3.86	3.47	3.09	4.28	4.22	4.71	4.41	--	--	--	--	1
	553	Crystal 916RR	3.71	3.51	2.88	4.12	4.27	4.39	4.26	--	--	--	--	1
	550	Crystal 918RR	3.94	3.03	2.85	4.37	3.69	4.34	4.14	--	--	--	--	1
	575	Hilleshög HIL2230	4.62	4.12	3.00	5.13	5.01	4.57	4.91	4.81	--	4.71	--	2
	561	Hilleshög HIL2233	4.91	4.26	3.37	5.45	5.18	5.14	5.26	5.06	--	4.87	--	2
	537	Hilleshög HIL2315	4.42	4.22	2.98	4.91	5.14	4.54	4.86	--	--	--	--	1
	528	Hilleshög HIL2316	4.22	3.97	2.90	4.68	4.83	4.42	4.65	--	--	--	--	1
	525	Hilleshög HIL2317	4.66	3.67	3.31	5.17	4.47	5.05	4.90	--	--	--	--	1
	511	Hilleshög HIL2318	4.29	3.53	2.59	4.76	4.30	3.95	4.34	--	--	--	--	1
	576	Hilleshög HIL2319	4.95	4.69	3.37	5.49	5.71	5.14	5.45	--	--	--	--	1
	512	Hilleshög HIL2320	4.52	3.82	3.35	5.02	4.65	5.11	4.92	--	--	--	--	1
	506	Hilleshög HIL9708	4.68	4.18	3.01	5.19	5.09	4.59	4.96	4.83	4.76	4.71	4.61	5
	536	Hilleshög HIL9920	4.06	4.23	3.41	4.51	5.15	5.20	4.95	4.87	4.88	4.79	4.89	3
	562	Hilleshög HM4302RR	3.65	3.16	2.55	4.05	3.85	3.89	3.93	4.09	4.04	4.26	3.93	9
	522	Hilleshög HM4448RR	5.03	4.72	3.35	5.58	5.74	5.11	5.48	5.37	5.34	5.26	5.28	7
	552	Hilleshög HM9528RR	4.68	3.99	3.11	5.19	4.86	4.74	4.93	4.86	4.90	4.79	4.99	6
	521	Maribo MA109	3.56	3.43	2.68	3.95	4.17	4.09	4.07	4.20	4.18	4.33	4.14	6
	517	Maribo MA504	5.07	4.42	3.28	5.63	5.38	5.00	5.34	5.16	5.27	4.98	5.50	5
	507	Maribo MA717	4.62	4.36	3.22	5.13	5.31	4.91	5.11	4.95	4.91	4.78	4.85	3
	579	Maribo MA901	4.39	3.71	2.83	4.87	4.52	4.31	4.57	--	--	--	--	1
	508	Maribo MA902	4.64	4.03	3.07	5.15	4.90	4.68	4.91	--	--	--	--	1
	542	Maribo MA903	4.99	4.10	3.42	5.54	4.99	5.21	5.25	--	--	--	--	1
	578	SV 285	4.32	3.64	3.47	4.79	4.43	5.29	4.84	4.68	--	4.52	--	2
	572	SV 289	3.89	4.09	2.93	4.32	4.98	4.47	4.59	4.62	--	4.65	--	2
	563	SV 391	4.63	4.04	3.39	5.14	4.92	5.17	5.07	--	--	--	--	1
	543	SV 392	5.26	4.31	3.30	5.84	5.25	5.03	5.37	--	--	--	--	1

Table 26.
2019 Cercospora Ratings for Official Trial Entries
Betaseed (Randolph MN), BSDF (Frankenmuth MI) & NDSU (Foxhome MN)

			Unadjusted			Adjusted to 1982 Basis ++								
			Randolph	BSDF	Foxhome	Randolph	BSDF	Foxhome						Trial
Chk	Code	Description	Avg	Avg	Avg	Avg	Avg	Avg	2019	2 Yr	3 Yr	2018	2017	Yrs $$
	526	SV 393	4.45	4.13	3.19	4.94	5.03	4.86	4.94	--	--	--	--	1
	516	SV 394	4.37	3.94	2.94	4.85	4.80	4.48	4.71	--	--	--	--	1
	546	SV RR265	3.78	3.60	2.80	4.20	4.38	4.27	4.28	4.38	4.65	4.48	5.19	4
	567	SV RR268	4.27	4.12	3.09	4.74	5.01	4.71	4.82	4.76	4.86	4.70	5.06	4
	570	SV RR333	3.77	3.59	3.22	4.18	4.37	4.91	4.49	4.64	4.70	4.78	4.84	7
	541	SV RR351	4.31	4.08	3.25	4.78	4.97	4.95	4.90	4.76	4.64	4.61	4.41	5
	538	SV RR371	3.90	3.45	2.94	4.33	4.20	4.48	4.34	4.52	4.55	4.71	4.59	3
	519	SV RR375	3.50	3.59	2.67	3.88	4.37	4.07	4.11	4.54	4.72	4.96	5.08	3
	530	SX 1887	4.31	3.88	3.38	4.78	4.72	5.15	4.89	4.89	--	4.89	--	2
	547	SX 1888	4.44	3.82	3.34	4.93	4.65	5.09	4.89	4.90	--	4.92	--	2
	503	SX 1894	4.96	4.03	3.26	5.51	4.90	4.97	5.13	--	--	--	--	1
	556	SX 1895	3.95	3.73	3.11	4.38	4.54	4.74	4.56	--	--	--	--	1
	534	SX 1896	4.68	3.96	3.13	5.19	4.82	4.77	4.93	--	--	--	--	1
	577	SX 1897	4.70	3.66	3.12	5.22	4.45	4.76	4.81	--	--	--	--	1
	559	SX 1898	4.31	3.89	2.96	4.78	4.73	4.51	4.68	--	--	--	--	1
	502	SX Bronco RR	4.17	4.15	3.04	4.63	5.05	4.63	4.77	4.71	4.50	4.65	4.08	4
	558	SX Canyon RR	3.97	3.97	2.96	4.41	4.83	4.51	4.58	4.69	4.76	4.79	4.92	6
	554	SX Marathon RR	4.33	3.74	3.29	4.81	4.55	5.02	4.79	5.03	4.87	5.27	4.54	5
1	1101	CR CK#19 CRYS539RR	5.05	3.98	3.47	5.61	4.84	5.29	5.25	5.32	5.38	5.39	5.49	15
1	1102	CR CK#24 HILL4012RR	4.65	4.60	3.43	5.16	5.60	5.23	5.33	5.45	5.34	5.56	5.13	14
1	1103	CR CK#28 HILL4010RR	4.80	4.02	3.21	5.33	4.89	4.89	5.04	5.15	5.25	5.27	5.44	14
1	1104	CR CK#41 CRYS981RR	4.66	4.03	3.39	5.17	4.90	5.17	5.08	5.04	4.99	5.00	4.90	11
1	1105	CR CK#43 CRYS246RR	4.40	3.67	3.09	4.88	4.47	4.71	4.69	4.73	4.75	4.78	4.77	8
1	1106	CR CK#44 BETA80RR32	4.44	3.99	3.40	4.93	4.86	5.18	4.99	5.03	5.00	5.06	4.94	10
1	1107	CR CK#45 HILL4448RR	5.05	5.06	3.35	5.61	6.16	5.11	5.62	5.38	5.33	5.14	5.24	8
1	1108	CR CK#47 HILL4094RR	3.66	3.62	2.87	4.06	4.41	4.38	4.28	4.37	4.35	4.46	4.31	12
1	1109	CR CK#48 MARI504	4.95	4.39	3.48	5.49	5.34	5.31	5.38	5.19	5.29	4.99	5.50	5
1	1110	CR CK#49 CRYS578RR	4.10	3.91	3.21	4.55	4.76	4.89	4.73	4.77	4.82	4.80	4.91	5
1	1111	CR CK#50 CRYS101RR	3.90	4.01	3.03	4.33	4.88	4.62	4.61	4.57	4.57	4.53	4.57	9
1	1112	CR CK#51 CRYS355RR	3.96	3.62	3.11	4.40	4.41	4.74	4.51	4.52	4.47	4.53	4.36	7
	1113	CR CK MOD SUS HYB#3	5.09	4.12	3.42	5.65	5.01	5.21	5.29	5.37	5.38	5.44	5.41	15
	1114	CR CK MOD RES HYB#4	3.58	3.32	3.12	3.97	4.04	4.76	4.26	4.31	4.28	4.35	4.22	12
	1115	CR CK MOD RES HYB#4	3.60	3.63	3.06	4.00	4.42	4.66	4.36	4.36	4.31	4.35	4.22	12
	1116	CR CK MOD SUS HYB#5	4.93	4.21	3.61	5.47	5.12	5.50	5.37	5.33	5.26	5.29	5.11	13
		Conventional												
	902	Crystal 620	3.66	3.37	2.43	4.06	4.10	3.70	3.95	4.13	4.13	4.30	4.14	4
	907	Crystal 840	4.03	3.55	2.46	4.47	4.32	3.76	4.18	4.25	--	4.33	--	2
	904	Crystal 950	4.37	3.89	3.01	4.85	4.73	4.59	4.72	--	--	--	--	1
	906	Crystal R761	4.37	4.40	3.11	4.85	5.36	4.75	4.98	4.85	4.88	4.72	4.93	13
	903	Hilleshög HM3035Rz	3.90	3.98	2.68	4.33	4.84	4.09	4.42	4.32	4.36	4.23	4.42	15
	905	Seedex 8869 Cnv	4.05	4.03	2.73	4.50	4.90	4.16	4.52	4.59	4.80	4.66	5.21	4
	901	SV 48777	3.48	3.55	2.69	3.87	4.32	4.11	4.10	4.33	4.47	4.56	4.76	3
	1107	CR CK#45 HILL4448RR	5.00	4.97	3.33	5.55	6.05	5.08	5.56	5.35	5.31	5.14	5.24	8
	1109	CR CK#48 MARI504	4.73	4.50	3.33	5.25	5.48	5.08	5.27	5.13	5.25	4.99	5.50	5
	1110	CR CK#49 CRYS578RR	4.37	3.89	3.37	4.85	4.73	5.14	4.91	4.85	4.87	4.80	4.91	5
12		Check Mean	4.47	4.08	3.25	4.96	4.96	4.96	4.96					
		Trial Mean	4.20	3.71	3.07	4.66	4.52	4.68	4.62					
		Coeff. of Var. (%)	5.64	6.84	7.25	5.64	6.84	7.25						
		Mean LSD (0.05)	0.30	0.44	0.28	0.33	0.54	0.43						
		Mean LSD (0.01)	0.40	0.58	0.36	0.44	0.71	0.55						
		Sig Mrk	**	**	**	**	**	**						
		Adj Factor				1.10995	1.21708	1.52447						

* Lower numbers indicate better Cercospora resistance (1-Ex,9=Poor).

++ Ratings adjusted to 1982 basis (5.5 equivalent in 1978-81 CR nurseries). Ratings adjusted on the basis of checks.

Chk = varieties used to adjust CR readings to 1982 basis. Ratings * (Adj. factor) = Adj Rating.

$$ Trial years indicates how many years the entry has been in the official trials.

Created 11-19-2019

Table 27

2019 Rhizoctonia Ratings for OVT Entries

Rhizoctonia Nursery - BSDF, NWROC & One ACSC Site

Sus				Unadjusted				Adjusted @									
Chk	Chk			BSDF	TSC-E	TSC-W	NWROC	BSDF	TSC-E	TSC-W	NWROC						
^	@	Code	Description	8/21	7/31		7/23	8/21	7/16		7/23	2019	2 Yr	3 Yr	2018	2017	Years
		573	BTS 8337	4.10	3.64	---	2.94	3.78	3.55	---	3.51	3.62	3.84	3.99	4.07	4.30	7
		540	BTS 8500	4.45	4.29	---	3.81	4.11	4.19	---	4.55	4.28	4.32	4.40	4.36	4.57	5
		515	BTS 8524	4.60	4.28	---	3.00	4.25	4.18	---	3.58	4.00	4.12	4.21	4.23	4.41	5
		574	BTS 8606	4.82	4.95	---	3.78	4.45	4.83	---	4.51	4.60	4.42	4.61	4.24	5.00	4
		504	BTS 8629	4.32	3.96	---	3.21	3.99	3.87	---	3.83	3.89	3.96	4.04	4.02	4.21	4
		518	BTS 8735	4.16	3.94	---	3.50	3.84	3.85	---	4.18	3.95	4.04	4.15	4.12	4.38	3
		513	BTS 8749	4.29	3.28	---	3.01	3.96	3.20	---	3.59	3.58	3.73	3.81	3.88	3.95	3
		510	BTS 8767	4.63	4.40	---	3.22	4.27	4.30	---	3.84	4.14	4.12	4.33	4.10	4.75	3
		524	BTS 8784	4.68	4.11	---	3.80	4.32	4.01	---	4.54	4.29	4.44	4.51	4.60	4.64	3
		580	BTS 8815	4.61	4.10	---	3.21	4.25	4.00	---	3.83	4.03	3.95	--	3.88	--	2
		557	BTS 8882	4.45	4.48	---	3.62	4.11	4.37	---	4.32	4.27	4.32	--	4.37	--	2
		539	BTS 8927	4.49	4.15	---	3.00	4.14	4.05	---	3.58	3.93	--	--	--	--	1
		505	BTS 8938	3.72	3.43	---	3.05	3.43	3.35	---	3.64	3.47	--	--	--	--	1
		531	BTS 8945	3.83	3.59	---	3.57	3.53	3.50	---	4.26	3.77	--	--	--	--	1
		555	BTS 8958	4.60	3.88	---	2.90	4.25	3.79	---	3.46	3.83	--	--	--	--	1
		568	BTS 8961	4.31	3.78	---	3.09	3.98	3.69	---	3.69	3.79	--	--	--	--	1
		545	BTS 8976	4.02	4.22	---	3.55	3.71	4.12	---	4.24	4.02	--	--	--	--	1
		565	BTS 8985	4.23	4.43	---	3.16	3.90	4.32	---	3.77	4.00	--	--	--	--	1
		535	BTS 8989	5.25	5.10	---	3.84	4.85	4.98	---	4.58	4.80	--	--	--	--	1
		527	BTS 8994	4.27	3.61	---	3.32	3.94	3.52	---	3.96	3.81	--	--	--	--	1
		520	BTS 8995	3.92	4.39	---	2.89	3.62	4.29	---	3.45	3.78	--	--	--	--	1
		551	Crystal 093RR	4.66	4.04	---	3.50	4.30	3.94	---	4.18	4.14	4.37	4.41	4.59	4.50	10
		544	Crystal 247RR	5.02	4.13	---	3.59	4.63	4.03	---	4.28	4.32	4.44	4.45	4.56	4.49	8
		569	Crystal 355RR	4.06	3.85	---	2.94	3.75	3.76	---	3.51	3.67	3.66	3.81	3.66	4.09	7
		549	Crystal 572RR	4.63	4.10	---	3.46	4.27	4.00	---	4.13	4.14	4.34	4.38	4.54	4.47	5
		529	Crystal 574RR	4.97	4.48	---	3.68	4.59	4.37	---	4.39	4.45	4.41	4.32	4.36	4.16	5
		532	Crystal 578RR	4.73	4.17	---	3.52	4.37	4.07	---	4.20	4.21	4.25	4.30	4.30	4.40	5
		523	Crystal 684RR	4.48	4.19	---	3.18	4.13	4.09	---	3.80	4.01	4.20	4.32	4.39	4.57	4
		548	Crystal 793RR	4.50	4.19	---	3.60	4.15	4.09	---	4.30	4.18	4.15	4.18	4.11	4.26	3
		501	Crystal 796RR	4.43	3.97	---	3.01	4.09	3.88	---	3.59	3.85	3.91	4.02	3.97	4.23	3
		533	Crystal 803RR	4.52	4.61	---	4.14	4.17	4.50	---	4.94	4.54	4.60	--	4.67	--	2
		566	Crystal 804RR	4.34	3.60	---	3.06	4.01	3.51	---	3.65	3.72	3.87	--	4.02	--	2
		514	Crystal 808RR	4.71	4.18	---	3.22	4.35	4.08	---	3.84	4.09	3.96	--	3.83	--	2
		571	Crystal 912RR	3.71	3.69	---	3.10	3.42	3.60	---	3.70	3.58	--	--	--	--	1
		560	Crystal 913RR	4.77	4.17	---	3.73	4.40	4.07	---	4.45	4.31	--	--	--	--	1
		509	Crystal 914RR	4.63	4.62	---	3.26	4.27	4.51	---	3.89	4.22	--	--	--	--	1
		564	Crystal 915RR	4.40	4.48	---	3.26	4.06	4.37	---	3.89	4.11	--	--	--	--	1
		553	Crystal 916RR	4.97	4.10	---	3.50	4.59	4.00	---	4.18	4.26	--	--	--	--	1
		550	Crystal 918RR	4.82	3.68	---	3.22	4.45	3.59	---	3.84	3.96	--	--	--	--	1
		575	Hilleshög HIL2230	5.15	4.28	---	3.77	4.75	4.18	---	4.50	4.48	4.27	--	4.06	--	2
		561	Hilleshög HIL2233	4.03	3.88	---	3.22	3.72	3.79	---	3.84	3.78	3.91	--	4.04	--	2
		537	Hilleshög HIL2315	4.11	4.28	---	3.74	3.79	4.18	---	4.46	4.15	--	--	--	--	1
		528	Hilleshög HIL2316	4.49	4.44	---	3.73	4.14	4.33	---	4.45	4.31	--	--	--	--	1
		525	Hilleshög HIL2317	3.96	4.17	---	4.07	3.65	4.07	---	4.86	4.19	--	--	--	--	1
		511	Hilleshög HIL2318	4.37	4.49	---	3.18	4.03	4.38	---	3.80	4.07	--	--	--	--	1
		576	Hilleshög HIL2319	4.64	4.03	---	3.12	4.28	3.93	---	3.72	3.98	--	--	--	--	1
		512	Hilleshög HIL2320	4.75	3.91	---	3.29	4.38	3.82	---	3.93	4.04	--	--	--	--	1
		562	Hilleshög HM4302RR	4.53	4.80	---	2.54	4.18	4.69	---	3.03	3.97	3.84	3.76	3.71	3.60	9
		522	Hilleshög HM4448RR	4.95	4.03	---	3.03	4.57	3.93	---	3.62	4.04	4.21	4.35	4.38	4.63	7
		552	Hilleshög HM9528RR	4.27	4.33	---	3.45	3.94	4.23	---	4.12	4.10	4.07	4.12	4.04	4.21	6
		506	Hilleshög HIL9708	4.43	3.93	---	3.08	4.09	3.84	---	3.68	3.87	3.79	3.93	3.71	4.21	5
		536	Hilleshög HIL9920	4.99	4.47	---	4.26	4.61	4.36	---	5.08	4.68	4.67	4.60	4.65	4.48	3
		521	Maribo MA109	3.82	3.88	---	3.26	3.53	3.79	---	3.89	3.73	3.71	3.69	3.69	3.63	6
		517	Maribo MA504	5.23	5.15	---	3.52	4.83	5.03	---	4.20	4.69	4.47	4.43	4.25	4.37	5
		507	Maribo MA717	4.58	4.32	---	3.36	4.23	4.22	---	4.01	4.15	4.25	4.26	4.35	4.28	3
		579	Maribo MA901	4.66	4.15	---	3.36	4.30	4.05	---	4.01	4.12	--	--	--	--	1
		508	Maribo MA902	4.55	4.26	---	2.98	4.20	4.16	---	3.56	3.97	--	--	--	--	1
		542	Maribo MA903	4.11	3.96	---	3.36	3.79	3.87	---	4.01	3.89	--	--	--	--	1
		530	SX 1887	4.58	4.21	---	3.51	4.23	4.11	---	4.19	4.18	4.17	--	4.16	--	2
		547	SX 1888	4.93	4.52	---	3.02	4.55	4.41	---	3.60	4.19	4.38	--	4.57	--	2
		503	SX 1894	4.42	4.45	---	3.68	4.08	4.34	---	4.39	4.27	--	--	--	--	1
		556	SX 1895	4.52	4.79	---	3.52	4.17	4.68	---	4.20	4.35	--	--	--	--	1
		534	SX 1896	4.56	4.58	---	4.00	4.21	4.47	---	4.77	4.48	--	--	--	--	1
		577	SX 1897	4.71	4.11	---	3.23	4.35	4.01	---	3.85	4.07	--	--	--	--	1
		559	SX 1898	4.47	4.70	---	3.29	4.13	4.59	---	3.93	4.21	--	--	--	--	1
		502	SX Bronco RR	4.59	5.02	---	4.18	4.24	4.90	---	4.99	4.71	4.72	4.56	4.73	4.23	4
		558	SX Canyon RR	4.78	3.70	---	3.05	4.41	3.61	---	3.64	3.89	4.12	4.25	4.36	4.51	6
		554	SX Marathon RR	4.91	4.59	---	3.42	4.53	4.48	---	4.08	4.36	4.28	4.32	4.19	4.40	5
		578	SV 285	5.12	4.45	---	3.42	4.73	4.34	---	4.08	4.38	4.37	--	4.35	--	2
		572	SV 289	4.68	4.05	---	3.28	4.32	3.95	---	3.91	4.06	4.22	--	4.37	--	2
		563	SV 391	4.30	4.48	---	3.32	3.97	4.37	---	3.96	4.10	--	--	--	--	1
		543	SV 392	4.20	4.40	---	3.34	3.88	4.30	---	3.99	4.05	--	--	--	--	1
		526	SV 393	4.67	4.61	---	3.50	4.31	4.50	---	4.18	4.33	--	--	--	--	1
		516	SV 394	4.54	5.12	---	3.52	4.19	5.00	---	4.20	4.46	--	--	--	--	1
		546	SV RR265	4.93	4.74	---	3.00	4.55	4.63	---	3.58	4.25	4.29	4.33	4.32	4.42	4
		567	SV RR268	4.92	4.30	---	3.25	4.54	4.20	---	3.88	4.21	4.21	4.33	4.21	4.57	4
		570	SV RR333	4.39	4.13	---	3.48	4.05	4.03	---	4.15	4.08	4.16	4.25	4.23	4.44	7
		541	SV RR351	4.37	4.07	---	3.56	4.03	3.97	---	4.25	4.09	4.12	4.16	4.16	4.25	5
		538	SV RR371	4.42	4.05	---	3.26	4.08	3.95	---	3.89	3.97	4.08	4.16	4.19	4.31	3
		519	SV RR375	4.53	4.10	---	3.32	4.18	4.00	---	3.96	4.05	4.09	4.14	4.13	4.25	3

Table 27

2019 Rhizoctonia Ratings for OVT Entries

Rhizoctonia Nursery - BSDF, NWROC & One ACSC Site

Sus				Unadjusted				Adjusted @									
Chk	Chk			BSDF	TSC-E	TSC-W	NWROC	BSDF	TSC-E	TSC-W	NWROC						
^	@	Code	Description	8/21	7/31		7/23	8/21	7/16		7/23	2019	2 Yr	3 Yr	2018	2017	Years
1	1	1301	RH CK#08 CRYS539RR	4.81	4.73	---	4.15	4.44	4.62	---	4.95	4.67	4.67	4.70	4.68	4.74	11
1	1	1302	RH CK#21 CRYS768RR	5.49	4.29	---	3.97	5.07	4.19	---	4.74	4.66	4.59	4.61	4.52	4.66	11
1	1	1303	RH CK#25 HILL4043RR	4.76	4.73	---	4.17	4.39	4.62	---	4.98	4.66	4.75	4.67	4.83	4.51	11
	1	1304	RH CK#28 CRYS658RR	4.56	4.88	---	3.47	4.21	4.76	---	4.14	4.37	4.19	4.25	4.02	4.36	14
	1	1305	RH CK#35 SES36812RR	5.11	4.33	---	3.29	4.72	4.23	---	3.93	4.29	4.29	4.43	4.29	4.71	12
	1	1306	RH CK#36 BTS85RR02	4.53	4.85	---	3.99	4.18	4.74	---	4.76	4.56	4.51	4.37	4.46	4.10	15
	1	1307	RH CK#37 SES36918RR	5.28	4.38	---	4.27	4.87	4.28	---	5.10	4.75	4.54	4.50	4.32	4.43	11
1	1	1308	RH CK#40 CRYS101RR	4.90	5.38	---	3.71	4.52	5.25	---	4.43	4.73	4.61	4.59	4.50	4.55	9
1	1	1309	RH CK#45 BTS82RR33	4.82	4.04	---	3.24	4.45	3.94	---	3.87	4.09	4.39	4.51	4.70	4.73	8
	1	1310	RH CK#47 SES36272RR	5.21	4.23	---	3.22	4.81	4.13	---	3.84	4.26	4.31	4.41	4.36	4.62	8
	1	1311	RH CK#48 HILL4094RR	4.32	4.16	---	3.26	3.99	4.06	---	3.89	3.98	3.85	3.83	3.72	3.80	12
1	1	1312	RH CK#49 CRYS247RR	4.36	3.95	---	3.85	4.02	3.86	---	4.59	4.16	4.39	4.47	4.62	4.65	8
1	1	1313	RH CK#51 SXWinchester	4.41	4.56	---	3.68	4.07	4.45	---	4.39	4.30	4.40	4.43	4.50	4.47	7
1	1	1314	RH CK#52 CRYS573RR	4.37	4.40	---	3.57	4.03	4.30	---	4.26	4.20	4.34	4.41	4.48	4.57	5
1	1	1315	RH CK#53 BTS8500	4.93	5.02	---	3.73	4.55	4.90	---	4.45	4.63	4.48	4.51	4.32	4.57	5
		1316	MOD RHC #6	4.81	4.63	---	4.74	4.44	4.52	---	5.66	4.87	4.49	4.55	4.11	4.68	13
		1317	RES RHC #1	4.24	4.30	---	3.41	3.91	4.20	---	4.07	4.06	3.77	3.72	3.49	3.62	14
		1318	RES RHC #3	4.52	4.11	---	2.94	4.17	4.01	---	3.51	3.90	3.63	3.63	3.36	3.63	6
		1319	SUS RHC #10	4.80	4.31	---	3.56	4.43	4.21	---	4.25	4.30	4.40	4.36	4.51	4.28	11
		1320	SUS RHC #3	4.86	4.64	---	3.97	4.49	4.53	---	4.74	4.58	4.65	4.64	4.71	4.64	15
			Conventional														
		902	Crystal 620	5.00	6.26	---	3.93	4.61	6.11	---	4.69	5.14	4.64	4.55	4.15	4.37	4
		907	Crystal 840	4.17	6.09	---	3.72	3.85	5.95	---	4.44	4.75	4.39	--	4.04	--	2
		904	Crystal 950	5.01	5.81	---	3.52	4.62	5.67	---	4.20	4.83	--	--	--	--	1
		906	Crystal R761	4.12	6.37	---	3.91	3.81	6.22	---	4.67	4.90	4.63	4.60	4.36	4.54	13
		903	Hilleshög HM3035Rz	3.94	5.72	---	3.25	3.64	5.59	---	3.88	4.37	4.19	4.15	4.01	4.07	15
		905	Seedex 8869 Cnv	5.57	5.83	---	3.87	5.14	5.69	---	4.61	5.15	4.86	4.70	4.56	4.40	4
		901	SV 48777	5.17	5.94	---	3.63	4.77	5.80	---	4.33	4.97	4.73	4.68	4.49	4.59	3
		1308	RH CK#40 CRYS101RR	4.72	5.07	---	3.67	4.36	4.95	---	4.38	4.56	4.53	4.54	4.50	4.55	9
		1314	RH CK#52 CRYS573RR	4.60	5.07	---	3.51	4.25	4.95	---	4.18	4.46	4.47	4.50	4.48	4.57	5
		1315	RH CK#53 BTS8500	4.88	4.66	---	3.83	4.50	4.55	---	4.57	4.54	4.43	4.48	4.32	4.57	5
	15		Mean of Check Varieties	4.791	4.529	---	3.705	4.421	4.421	---	4.421	4.421	4.421	4.447	4.421	4.498	
9			Mean of Susc Checks	4.761	4.567	---	3.786	4.394	4.458	---	4.518	4.457	4.514	4.545	4.571	4.606	
			Trial Mean	4.56	4.28	---	3.44	4.21	4.18	---	4.105						
			Coeff. of Var. (%)	14.17	14.99	---	13.04	14.17	14.99	---	13.0						
			Mean LSD (0.05)	0.86	0.79	---	0.58	0.79	0.77	---	0.69						
			Mean LSD (0.01)	1.13	1.04	---	0.76	1.04	1.02	---	0.91						
			Sig Lvl	**	**	---	**	**	**	---	**						
			Adjustment Factor	0.9229	0.9763	---	1.1934										
			Approval Limit (80% of susc	3.81	3.65	---	3.03	3.52	3.57	---	3.61	3.57	3.61	3.64	3.66	3.68	

++ Adjustment is based upon check varieties.

@ Ratings adjusted to 2009 basis (2007-2009) RH nurseries. Ratings adjusted on the basis of checks

Lower numbers indicate better tolerance (0=Ex, 7=Poor).

^ Approval criteria is based upon the mean of susc varieties (approval option 1) or 3.82 (approval option 2).

Table 28.
2019 Fusarium Ratings for Official Trial Entries
ACSC Nurseries - (Two Moorhead, MN Sites)

			Unadjusted		Adjusted							
Chk			N Mhd	S Mhd	N Mhd	S Mhd						
@	Code	Description	4 Dates+	4 Dates+	4 Dates+	4 Dates+	2019	2 Yr	3 Yr	2018	2017	Years
	573	BTS 8337	3.53	3.29	3.14	3.99	3.57	3.87	3.86	4.18	3.83	7
	540	BTS 8500	1.79	2.43	1.59	2.95	2.27	2.37	2.29	2.46	2.14	5
	515	BTS 8524	2.76	3.15	2.46	3.82	3.14	3.54	3.44	3.93	3.24	5
	574	BTS 8606	2.46	2.62	2.19	3.18	2.68	3.17	3.05	3.66	2.81	4
	504	BTS 8629	3.63	3.45	3.23	4.18	3.71	4.05	4.10	4.40	4.20	4
	518	BTS 8735	3.72	2.66	3.31	3.23	3.27	3.65	3.75	4.04	3.93	3
	513	BTS 8749	2.76	2.98	2.46	3.61	3.04	3.41	3.37	3.79	3.28	3
	510	BTS 8767	1.93	2.62	1.72	3.18	2.45	2.93	2.86	3.41	2.71	3
	524	BTS 8784	2.34	2.90	2.08	3.52	2.80	3.28	3.07	3.76	2.63	3
	580	BTS 8815	2.35	2.71	2.09	3.29	2.69	3.16	--	3.64	--	2
	557	BTS 8882	2.51	2.96	2.24	3.59	2.91	3.15	--	3.39	--	2
	539	BTS 8927	2.31	2.87	2.06	3.48	2.77	--	--	--	--	1
	505	BTS 8938	3.05	2.81	2.72	3.41	3.06	--	--	--	--	1
	531	BTS 8945	2.69	2.97	2.40	3.60	3.00	--	--	--	--	1
	555	BTS 8958	1.64	2.56	1.46	3.11	2.28	--	--	--	--	1
	568	BTS 8961	2.12	2.65	1.89	3.21	2.55	--	--	--	--	1
	545	BTS 8976	3.59	3.43	3.20	4.16	3.68	--	--	--	--	1
	565	BTS 8985	2.68	2.74	2.39	3.32	2.86	--	--	--	--	1
	535	BTS 8989	3.13	3.44	2.79	4.17	3.48	--	--	--	--	1
	527	BTS 8994	2.07	3.25	1.84	3.94	2.89	--	--	--	--	1
	520	BTS 8995	2.18	3.07	1.94	3.72	2.83	--	--	--	--	1
	551	Crystal 093RR	2.91	2.95	2.59	3.58	3.09	3.68	3.61	4.28	3.48	10
	544	Crystal 247RR	2.29	2.40	2.04	2.91	2.48	2.91	2.94	3.34	3.00	8
	569	Crystal 355RR	1.98	2.64	1.76	3.20	2.48	3.11	2.99	3.73	2.76	7
	549	Crystal 572RR	2.02	2.45	1.80	2.97	2.39	3.04	2.91	3.70	2.64	5
	529	Crystal 574RR	1.58	2.19	1.41	2.66	2.03	2.45	2.38	2.87	2.23	5
	532	Crystal 578RR	1.97	2.64	1.76	3.20	2.48	2.92	2.75	3.36	2.41	5
	523	Crystal 684RR	1.48	2.38	1.32	2.89	2.10	2.53	2.36	2.96	2.01	4
	548	Crystal 793RR	2.35	2.75	2.09	3.34	2.71	3.15	3.09	3.59	2.95	3
	501	Crystal 796RR	1.93	2.63	1.72	3.19	2.45	2.91	2.72	3.36	2.34	3
	533	Crystal 803RR	2.27	2.78	2.02	3.37	2.70	3.40	--	4.11	--	2
	566	Crystal 804RR	1.82	2.42	1.62	2.94	2.28	2.66	--	3.05	--	2
	514	Crystal 808RR	1.79	2.62	1.59	3.18	2.39	2.75	--	3.12	--	2
	571	Crystal 912RR	3.18	3.22	2.83	3.91	3.37	--	--	--	--	1
	560	Crystal 913RR	2.06	2.70	1.84	3.28	2.56	--	--	--	--	1
	509	Crystal 914RR	1.83	2.88	1.63	3.49	2.56	--	--	--	--	1
	564	Crystal 915RR	1.48	2.28	1.32	2.77	2.04	--	--	--	--	1
	553	Crystal 916RR	1.92	2.69	1.71	3.26	2.49	--	--	--	--	1
	550	Crystal 918RR	2.29	2.62	2.04	3.18	2.61	--	--	--	--	1
	575	Hilleshög HIL2230	4.75	3.66	4.23	4.44	4.34	4.60	--	4.86	--	2
	561	Hilleshög HIL2233	5.58	3.08	4.97	3.74	4.35	4.82	--	5.28	--	2
	537	Hilleshög HIL2315	4.25	3.65	3.79	4.43	4.11	--	--	--	--	1
	528	Hilleshög HIL2316	3.15	2.79	2.81	3.38	3.10	--	--	--	--	1
	525	Hilleshög HIL2317	6.18	4.20	5.51	5.09	5.30	--	--	--	--	1
	511	Hilleshög HIL2318	5.41	3.78	4.82	4.59	4.70	--	--	--	--	1
	576	Hilleshög HIL2319	4.87	3.67	4.34	4.45	4.40	--	--	--	--	1
	512	Hilleshög HIL2320	5.09	3.47	4.53	4.21	4.37	--	--	--	--	1
	562	Hilleshög HM4302RR	3.75	4.26	3.34	5.17	4.25	4.64	4.79	5.02	5.09	9
	522	Hilleshög HM4448RR	5.85	3.62	5.21	4.39	4.80	5.02	5.13	5.23	5.35	7
	552	Hilleshög HM9528RR	4.59	3.49	4.09	4.23	4.16	4.56	4.45	4.95	4.25	6
	506	Hilleshög HIL9708	4.03	3.45	3.59	4.18	3.89	4.25	4.37	4.61	4.61	5
	536	Hilleshög HIL9920	6.59	4.10	5.87	4.97	5.42	5.47	5.62	5.51	5.92	3
	521	Maribo MA109	3.92	3.78	3.49	4.59	4.04	4.49	4.41	4.95	4.23	6
	517	Maribo MA504	5.02	3.92	4.47	4.75	4.61	4.70	4.64	4.80	4.52	5
	507	Maribo MA717	5.54	3.87	4.94	4.69	4.81	4.84	4.88	4.86	4.95	3
	579	Maribo MA901	4.36	3.24	3.88	3.93	3.91	--	--	--	--	1
	508	Maribo MA902	3.76	3.36	3.35	4.08	3.71	--	--	--	--	1
	542	Maribo MA903	5.68	3.41	5.06	4.14	4.60	--	--	--	--	1
	530	SX 1887	5.36	3.78	4.78	4.59	4.68	5.01	--	5.35	--	2
	547	SX 1888	6.28	4.47	5.59	5.42	5.51	5.49	--	5.47	--	2

Table 28.
2019 Fusarium Ratings for Official Trial Entries
ACSC Nurseries - (Two Moorhead, MN Sites)

			Unadjusted		Adjusted							
Chk			N Mhd	S Mhd	N Mhd	S Mhd						
@	Code	Description	4 Dates+	4 Dates+	4 Dates+	4 Dates+	2019	2 Yr	3 Yr	2018	2017	Years
	503	SX 1894	4.40	3.41	3.92	4.14	4.03	--	--	--	--	1
	556	SX 1895	5.86	4.11	5.22	4.99	5.10	--	--	--	--	1
	534	SX 1896	4.42	3.60	3.94	4.37	4.15	--	--	--	--	1
	577	SX 1897	4.75	3.47	4.23	4.21	4.22	--	--	--	--	1
	559	SX 1898	6.34	3.82	5.65	4.63	5.14	--	--	--	--	1
	502	SX Bronco RR	6.61	4.11	5.89	4.99	5.44	5.48	5.67	5.52	6.04	4
	558	SX Canyon RR	5.15	3.98	4.59	4.83	4.71	4.82	4.92	4.93	5.12	6
	554	SX Marathon RR	6.51	4.62	5.80	5.60	5.70	5.61	5.35	5.51	4.84	5
	578	SV 285	5.21	4.02	4.64	4.88	4.76	5.09	--	5.42	--	2
	572	SV 289	6.96	4.42	6.20	5.36	5.78	5.61	--	5.45	--	2
	563	SV 391	4.87	3.62	4.34	4.39	4.36	--	--	--	--	1
	543	SV 392	6.67	4.73	5.94	5.74	5.84	--	--	--	--	1
	526	SV 393	6.42	3.92	5.72	4.75	5.24	--	--	--	--	1
	516	SV 394	4.08	3.74	3.63	4.54	4.09	--	--	--	--	1
	546	SV RR265	6.64	4.42	5.92	5.36	5.64	5.54	5.47	5.44	5.32	4
	567	SV RR268	5.60	4.00	4.99	4.85	4.92	5.02	5.02	5.12	5.01	4
	570	SV RR333	5.39	3.86	4.80	4.68	4.74	4.94	5.08	5.14	5.35	7
	541	SV RR351	6.13	3.90	5.46	4.73	5.10	5.20	5.12	5.30	4.96	5
	538	SV RR371	5.64	4.36	5.02	5.29	5.16	5.26	5.14	5.36	4.91	3
	519	SV RR375	5.75	3.97	5.12	4.82	4.97	5.24	5.31	5.51	5.44	3
1	1201	FS CK #07 CRYS658RR	4.00	3.67	3.56	4.45	4.01	3.77	3.46	3.53	2.85	14
1	1202	FS CK #08 HILL4000RR	6.95	4.73	6.19	5.74	5.96	5.89	6.12	5.81	6.59	12
1	1203	FS CK #09 HILL4010RR	7.96	5.11	7.09	6.20	6.64	6.28	6.32	5.91	6.41	14
1	1204	FS CK #12 HILL4012RR	6.70	4.36	5.97	5.29	5.63	5.65	5.73	5.68	5.89	14
1	1205	FS CK #13 HILL4043RR	6.69	4.77	5.96	5.79	5.87	5.80	5.97	5.73	6.31	13
1	1206	FS CK #18 CRYS768RR	4.71	3.87	4.20	4.69	4.45	4.65	4.56	4.85	4.37	11
1	1207	FS CK #28 SES36918RR	5.36	3.83	4.78	4.65	4.71	5.05	5.05	5.39	5.04	11
1	1208	FS CK #29 CRYS875RR	5.81	3.99	5.18	4.84	5.01	5.04	4.95	5.07	4.77	12
1	1209	FS CK #30 BTS8337	3.27	3.46	2.91	4.20	3.56	3.97	3.93	4.39	3.83	7
1	1210	FS CK #31 SXMarathon	6.13	4.50	5.46	5.46	5.46	5.17	5.06	4.88	4.84	5
	1211	FS CHK MOD RR RES #2	4.09	3.71	3.64	4.50	4.07	4.30	4.32	4.53	4.35	13
	1212	FS CHK MOD RR SUS #2	5.92	3.97	5.27	4.82	5.04	5.09	5.18	5.14	5.35	7
	1213	FS CHK RES RR #2	1.82	2.72	1.62	3.30	2.46	2.83	2.68	3.20	2.40	8
	1214	FS CHK SUS RR #10	5.97	4.10	5.32	4.97	5.15	5.16	5.17	5.17	5.20	6
	1215	FS CHK SUS RR #11	6.59	4.15	5.87	5.03	5.45	5.41	5.47	5.36	5.61	7
	1216	FS CHK SUS RR #2	7.41	4.27	6.60	5.18	5.89	5.84	6.02	5.80	6.37	9
		Conventional										
	902	Crystal 620	2.08	2.54	1.85	3.08	2.47	2.97	2.91	3.47	2.79	4
	907	Crystal 840	2.49	2.60	2.22	3.16	2.69	3.13	--	3.56	--	2
	904	Crystal 950	2.92	2.60	2.60	3.16	2.88	--	--	--	--	1
	906	Crystal R761	2.96	2.82	2.64	3.42	3.03	3.57	3.46	4.11	3.23	13
	903	Hilleshög HM3035Rz	4.70	3.29	4.19	3.99	4.09	4.27	4.08	4.45	3.70	15
	905	Seedex 8869 Cnv	3.65	3.16	3.25	3.83	3.54	3.65	3.61	3.77	3.53	4
	901	SV 48777	4.65	3.73	4.14	4.52	4.33	4.39	4.25	4.45	3.96	3
	1208	FS CK #29 CRYS875RR	5.52	4.17	4.92	5.06	4.99	5.03	4.94	5.07	4.77	12
	1209	FS CK #30 BTS8337	4.13	3.12	3.68	3.79	3.73	4.06	3.98	4.39	3.83	7
	1210	FS CK #31 SXMarathon	5.57	4.66	4.96	5.65	5.30	5.09	5.01	4.88	4.84	5
10		Check Mean	5.76	4.23	5.13	5.13	5.13					
		Trial Mean	4.16	3.45	3.71	4.18	3.95					
		Coeff. of Var. (%)	13.99	12.39	13.99	12.39						
		Mean LSD (0.05)	0.73	0.52	0.65	0.63						
		Mean LSD (0.01)	0.96	0.69	0.86	0.84						
		Sig Mrk	**	**	**	**						
		Adj Factor			0.89090	1.21300						

@ Ratings adjusted to 2007 basis. (2005-2006 FS Nurseries). Ratings adjusted on the basis of checks.
+ Average rating based upon multiple rating dates. Lower numbers indicate better tolerance (1=Ex, 9=Poor).

Table 29. Herbicides and Fungicides Applied to ACSC Official Trials

	Herbicide			Fungicide		
Location	Herbicide & Rate	Spray Dates	Method	Fungicide Used	Spray Dates	Method
Casselton*	RU1	6/14	Ground	AZteroid/Quadris	6/14,7/2	Ground
	RU2	7/2	Ground	CR.2/CR.3,CR.4	7/30,8/27,9/19	Ground
Glyndon	RU1	6/13	Ground	Quadris	6/6,6/29	Ground
	RU2	7/2	Ground	CR.1/CR.2/CR.3/CR.4	7/25,8/5,8/17,8/30	Ground
Climax	RU2	6/5	Ground	Quadris	6/12,6/28	Ground
	RU1	6/24	Ground	CR.1/CR.2/CR.3/CR.4	7/16,7/30,8/23,9/6	Ground
Grand Forks* +	Conventional	6/11,6/19	Ground	AZteroid/Quadris	5/10,7/2	Ground
				CR.1/CR.2/CR.3/CR.4	7/20,7/30,8/23,9/6	Ground
Scandia	RU2	6/5	Ground	Quadris	6/11,7/1	Ground
	RU1	6/24	Ground	CR.1/CR.2/CR.3/CR.4	7/16,7/30,8/23,9/6	Ground
	Conventional	6/6,6/17	Ground			
Argyle	RU2	6/5	Ground	Quadris	6/12,7/1	Ground
	RU1	6/24	Ground	CR.2/CR.3,CR.4	8/2,8/14,8/30	Ground
Kennedy	RU1	6/20	Ground	Quadris	6/14,7/8	Ground
	RU2	7/8	Ground	CR.2/CR.3,CR.4	8/2,8/14,8/30	Ground
Bathgate#	RU1	6/12	Ground	Quadris	6/5,6/24	Ground
	RU2	7/1	Ground	CR.2/CR.3,CR.4	8/2,8/14,8/30	Ground
	Conventional	6/12,6/19	Ground			

Ground applications made by beet seed personnel from Crystal Technical Services Center.

RU1 = Roundup Powermax (32 oz./A), Event (1 gal./100 gal water).

RU2 = Roundup Powermax (22 oz./A), Event (1 gal./100 gal water).

+ Counter 20G applied at 9.0 lbs./A at Grand Forks.

Lorsban applied for SBRM near peak fly.

Quadris=first application on 2 leaf beets, second on 4-8 leaf beets.

*AZteroid infurrow was used instead of first Quadris application.

CR.1=Insire XT + Manzate

CR.2=Agritin + Incognito

CR.3=Proline+Manzate

CR.4=Priaxor + Agritin