

RESULTS OF AMERICAN CRYSTAL SUGAR COMPANY'S 2020 CODED OFFICIAL VARIETY TRIALS

William S. Niehaus, Official Trial Manager
Deborah L. Moomjian, Beet Seed Analyst
American Crystal Sugar Company Moorhead, Minnesota

American Crystal Sugar Company's (ACSC) coded Official Variety Trials (OVT) are designed to provide an unbiased evaluation of the genetic potential of sugarbeet variety entries under several different environments. The two-year 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 2020 American Crystal OVTs and describes the procedures and cultural practices involved in the trials.

Table	Information in the Table
1	ACSC approved varieties for 2021
2	Multi-year performance of approved varieties (all locations combined)
3	Performance of ACSC Aphanomyces specialty varieties
4	Disease ratings for ACSC tested varieties (multiple diseases)
5	Root Aphid Ratings
6	Official trial sites, cooperators, plant and harvest dates, soil types and disease notes
7	Seed treatments applied to seed used in the OVTs
8-15	2020 Roundup Ready variety trials and combined trials
16-19	Approval calculations for ACSC market
20	Aphanomyces disease nursery ratings
21	Cercospora disease nursery ratings
22	Rhizoctonia disease nursery ratings
23	Fusarium disease nursery ratings
24	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. All Official Trials utilize seed identified by code numbers which prevents ACSC personnel from knowing variety names when conducting trials.

The 2020 official coded variety performance trials and disease nurseries were planted at 18 sites by American Crystal Sugar Company (ACSC) including 13 yield trial sites and five disease nurseries. Seven additional disease nurseries were planted by third party cooperators. Thanks are extended to the dedicated Technical Services staff involved in the official trial plot care, harvest, and data analysis.

Results from the Official Variety Trials sites were good to excellent. Stands in the trials were generally very good this year. Seven sites were used for variety approval calculations. Two sites were abandoned due to erratic emergence (St.Thomas and Hillsboro) and one due to water damage (Stephen). Three sites were used for performance of Aphanomyces Specialty varieties under Aphanomyces conditions (Climax , Grandin and Perley).

Rhizoctonia presence was minimal in 2020. AZteroid (in-furrow), seed treatments and one application of Quadris (POST) were utilized for Rhizoctonia management. Based upon susceptible plot observations, root aphids were present in low levels at one site. Revenue calculations in 2020 are based on a hypothetical \$45.12 payment (5-year rolling average) at 17.5% sugar and 1.5% SLM not considering hauling or production costs.

Fusarium ratings are from two Moorhead sites. The Rhizoctonia ratings are from two RRV nurseries. The Aphanomyces ratings are from Shakopee, MN and two RRV nurseries. The Cercospora data is from Foxhome, MN; Randolph, MN; and Michigan USDA.

2020 harvest conditions were excellent. Soil moisture levels remained average to dry throughout the months of August and September, creating good harvest conditions in all five Factory Districts for all involved. With a slightly earlier OVT harvest start date and the benefit of our new harvester, the harvest completion date was earlier than previous years.

The 2020 data has been combined with the previous years' data, and results are enclosed. Bolter data is presented in plants per acre based upon 60,000 seeds per acre. Results for the yield trials from individual sites are available here and on the internet.

Conventional trials were not planted in the 2020 OVT trials. Conventional varieties that were approved for 2020 sales are permitted to continue with sales in 2021.

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 from 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 (water conditioning agent + surfactant) and full rates of fungicides were applied using a pickup sprayer driven down the alleys. Hand weeding was utilized where necessary. All yield trials were treated with Quadris in a band during the 6-10 leaf stage (14 oz/acre) for Rhizoctonia management. Treatments used for Cercospora management in 2020 included Inspire XT/Manzate, Agri Tin/Incognito, Proline/Manzate, and Priaxor/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 PowerMAX were made in the 4-6 (32 oz/acre) and 8 – 12 (22 oz/acre) 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 (Big Red) with increased cleaning capacity. All harvested beets of each plot were used for yield determination while one sample (approx. 25 lbs each) for sugar, and impurity analysis was obtained from each plot. Quality analysis was performed at the ACSC Technical Services Quality Lab in Moorhead, MN.

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. Magno Seed staff for Aphanomyces nursery, 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 2021 Sugarbeet Crop ++

Roundup Ready ®	Full Market	Aph Spec	Rhc Spec	High Rzm	2019 Conventional	Full Market	High Rzm
BTS 8337	Yes	Yes		Hi Rzm	Crystal R761	Yes	Hi Rzm
BTS 8500	Yes	Yes		Hi Rzm	Crystal 620	Yes	Hi Rzm
BTS 8524	Yes	Yes		Hi Rzm	Crystal 840	Yes	Hi Rzm
BTS 8606	Yes			Hi Rzm	Crystal 950	Yes	Hi Rzm
BTS 8629	Yes	Yes		Hi Rzm	Hilleshög HM3035Rz	Yes	Rzm
BTS 8767	Yes	Yes		Hi Rzm	SX 8869 Cnv	Yes	Hi Rzm
BTS 8815	Yes			Hi Rzm	SV 48777	Yes	Hi Rzm
BTS 8882	Yes			Hi Rzm			
BTS 8927	New	New		Hi Rzm			
BTS 8938	New	New	New	Hi Rzm			
BTS 8961	New	New		Hi Rzm			
BTS 8976	New	New		Hi Rzm			
Crystal 572	Yes			Hi Rzm			
Crystal 574	Yes	Yes		Hi Rzm			
Crystal 684	Yes	Yes		Hi Rzm			
Crystal 793	Yes	Yes		Hi Rzm			
Crystal 796	Yes	Yes		Hi Rzm			
Crystal 803	Yes	Yes		Hi Rzm			
Crystal 804	Yes	Yes	New	Hi Rzm			
Crystal 808	Yes	Yes		Hi Rzm			
Crystal 912	New	New	New	Hi Rzm			
Crystal 913	New	New		Hi Rzm			
Crystal 916	New	New		Hi Rzm			
Hilleshög HM4448RR +	Yes			Rzm			
Hilleshög HM9528RR	Yes	Yes		Hi Rzm			
Hilleshög HIL9708	Yes	New	Yes	Rzm			
Hilleshög HIL9920	Yes	New		Hi Rzm			
Hilleshög HIL2317	New	New		Hi Rzm			
Maribo MA504	Yes			Hi Rzm			
Maribo MA717	Yes	Yes		Hi Rzm			
Maribo MA902	New			Hi Rzm			
SX Marathon	Yes			Hi Rzm			
SX 1887	Yes	New		Hi Rzm			
SX 1888	Yes	Yes		Hi Rzm			
SX 1898	Yes	New		Hi Rzm			
SV 265	Yes			Hi Rzm			
SV 268	Yes	Yes		Hi Rzm			
SV 285	Yes	Yes		Hi Rzm			
SV 333	Yes	Yes		Hi Rzm			
SV 375	Yes			Hi Rzm			
					Aph Spec = variety meets Aphanomyces specialty requirements		
					Rhc Spec = variety meets Rhizoctonia specialty requirements		
					Hi Rzm = may perform better under severe Rhizomania		
					New = newly approved		

+ Previously approved varieties not meeting current approval standards. According to Approval Policy, may be sold in 2021

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

Roundup Ready ® is a registered trademark of Monsanto Company.

Created 10/30/2020

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

Description	Years Comm	2021 Growing Season ***																					
		Rev/Acre			Rec/Ton			Rec/Acre			Sugar		Yield		CR Rating +		Aph Root +		Fusarium +				
		2020	2019#	%Sus	2020	2019#	%Sus	2020	2019#	%Sus	2020	2019#	%Sus	20	2 Yr	20	2 Yr	20	2 Yr				
# of locations		3	0	3	3	0	3	3	0	3	3	0	3	0	3	6	3	4	2	4	2	5	
Previously Approved																							
BTS 8337	6	40.89	--	133	852	--	144	####	-	6280	--	####	--	20.4	--	4.46	4.43	3.5	3.5	3.6	3.6	4.4	4.0
BTS 8500	4	32.19	--	105	721	--	122	####	-	5986	--	####	--	21.4	--	4.38	4.19	4.2	4.2	2.4	2.3	4.6	4.5
BTS 8524	4	32.86	--	107	722	--	122	####	-	5914	--	####	--	20.9	--	4.38	4.45	4.2	4.4	3.0	3.1	4.1	4.1
BTS 8629	3	32.72	--	106	789	--	134	####	-	6493	--	####	--	23.1	--	4.55	4.60	3.9	4.6	3.8	3.7	4.3	4.1
BTS 8767	2	32.70	--	106	659	--	112	####	-	5410	--	####	--	19.1	--	4.38	4.32	4.5	4.4	2.5	2.5	4.7	4.4
Crystal 574	4	33.16	--	108	777	--	132	####	-	6328	--	####	--	22.3	--	4.64	4.46	4.1	4.1	2.3	2.1	4.2	4.3
Crystal 684	2	32.62	--	106	799	--	136	####	-	6622	--	####	--	23.6	--	4.44	4.28	4.0	4.1	2.3	2.2	4.2	4.1
Crystal 793	2	37.97	--	123	886	--	150	####	-	6732	--	####	--	22.4	--	4.31	4.18	3.9	3.8	2.6	2.7	4.8	4.5
Crystal 796	1	36.17	--	117	795	--	135	####	-	6223	--	####	--	21.2	--	4.95	4.85	3.9	3.9	2.2	2.3	4.5	4.2
Crystal 803	NC	39.43	--	128	908	--	154	####	-	6793	--	####	--	22.3	--	3.93	3.90	4.0	4.2	2.5	2.6	5.0	4.8
Crystal 804	NC	33.22	--	108	864	--	147	####	-	7144	--	####	--	25.4	--	4.77	4.61	3.6	4.0	2.3	2.3	3.9	3.8
Crystal 808	NC	35.29	--	115	833	--	141	####	-	6702	--	####	--	23.4	--	5.07	4.92	4.0	3.8	2.3	2.4	3.9	4.0
Maribo MA717	2	34.86	--	113	731	--	124	####	-	5834	--	####	--	20.2	--	5.11	5.11	3.8	4.1	4.6	4.7	4.6	4.4
SV 268	3	38.06	--	124	829	--	141	####	-	6339	--	####	--	21.3	--	4.78	4.80	4.5	4.8	4.0	4.5	5.2	4.7
SV 285	NC	38.37	--	125	822	--	139	####	-	6301	--	####	--	21.1	--	4.50	4.67	4.3	4.4	5.4	5.1	4.0	4.2
SV 333	5	37.62	--	122	813	--	138	####	-	6231	--	####	--	20.9	--	4.69	4.59	4.1	4.4	5.6	5.2	4.6	4.3
SX 1888	1	37.03	--	120	787	--	133	####	-	6038	--	####	--	20.3	--	4.67	4.78	4.0	4.3	5.5	5.5	4.2	4.2
Newly Approved																							
BTS 8927	NC	43.12	--	140	985	--	167	####	-	7070	--	####	--	22.4	--	4.42	4.39	3.9	4.0	2.6	2.7	4.4	4.2
BTS 8938	NC	37.24	--	121	848	--	144	####	-	6467	--	####	--	21.6	--	4.66	4.51	3.9	3.8	3.7	3.4	3.9	3.7
BTS 8961	NC	36.54	--	119	835	--	142	####	-	6478	--	####	--	22.0	--	4.69	4.48	4.0	4.0	2.2	2.4	4.1	3.9
BTS 8976	NC	38.45	--	125	822	--	139	####	-	6167	--	####	--	20.4	--	4.15	3.99	3.5	3.6	2.9	3.3	4.5	4.3
Crystal 912	NC	35.21	--	114	886	--	150	####	-	7041	--	####	--	24.4	--	4.75	4.69	3.7	3.8	3.6	3.5	3.5	3.6
Crystal 913	NC	39.55	--	128	951	--	161	####	-	7129	--	####	--	23.5	--	4.13	4.12	3.7	3.7	2.6	2.6	4.6	4.4
Crystal 916	NC	35.60	--	116	887	--	150	####	-	7014	--	####	--	24.2	--	4.49	4.38	3.9	4.0	2.4	2.5	4.6	4.4
Hilleshög HIL2317	NC	36.66	--	119	741	--	126	####	-	5836	--	####	--	20.0	--	5.05	4.97	3.9	3.9	6.0	5.6	4.9	4.6
Hilleshög HM9528RR	5	36.06	--	117	720	--	122	####	-	5703	--	####	--	19.6	--	4.84	4.88	3.7	4.1	4.7	4.4	4.6	4.3
Hilleshög HIL9708	3	34.56	--	112	644	--	109	####	-	5192	--	####	--	18.1	--	4.97	4.96	4.0	4.3	3.6	3.8	3.8	3.8
Hilleshög HIL9920	2	35.57	--	115	706	--	120	####	-	5606	--	####	--	19.3	--	4.82	4.88	3.6	4.3	6.3	5.8	5.1	4.9
SX 1887	1	37.29	--	121	790	--	134	####	-	6033	--	####	--	20.2	--	5.09	4.99	3.9	4.3	4.3	4.5	4.8	4.5
SX 1898	NC	37.53	--	122	855	--	145	####	-	6643	--	####	--	22.6	--	4.73	4.70	3.8	4.3	5.4	5.3	4.2	4.2
Aph Sus Checks		30.80	--		590	--		####	-	4984	--	####	--	18.0	--								
Mean of Aph Specialty Varieties		36.28	--		809	--		####	-	6325	--	####	--	21.6	--								
%Sus = % of susceptible varieties.																				Created 11/2/2020			
+ Aphanomyces ratings from Shakopee, Glyndon and Grandin (res.<4.4, susc>5.0). Cercospora from Randolph MN, Foxhome MN & Michigan (res.<4.5, susc>5.0). Fusarium from RRV (res.<3.0, susc>5.0). Rhizoctonia from Mnd (res.<3.8, susc>5).																							
++ 2020 Revenue estimates based on a \$45.12 beet payment at 17.5% sugar and 1.5% loss to molasses. 2019 Revenue estimates based on a \$44.38 beet payment. Revenue does not consider hauling or production costs.																							
+++ 2020 Data from Climax, Perley, and Grandin.																							
# Lack of Aphanomyces pressure at any of the OVT sites prevented collection of Aphanomyces Yield Data for 2019.																							

Table 5. Root Aphid Ratings
2020 Growing Season

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Table 6. Planting & Harvest Dates, Previous Crop and Disease Levels for 2020 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 ND	Mhd/Hlb	Todd Weber Farms	5/4	9/30	Wheat	Medium/Light	L-M	L	N	N	N	N	A few Rhc spots. Heavier Aph in NE and SW corners.
Glyndon MN	Mhd/Hlb	Menholt Farms	5/3	9/9	Wheat	Medium/Light	L	L-M	N	N	N	N	Moderate Rhc in NE corner.
Perley MN	Mhd/Hlb	Hoff Farms	6/7	9/2	Soybeans	Medium	L-M	N	N	N	N	N	Some standing water in spots.
Ada MN	Mhd/Hlb	Corey Jacobson	5/15	9/10	Wheat	Medium	L	N	L	N	N	N	Uniform site.
Hillsboro ND	Mhd/Hlb	SK Farms	5/31	Abandon	Wheat	Medium	L-M	L	N	N	N	N	Non-uniform stunting in Official Trials.
Grandin ND	Mhd/Hlb	Paulsrud Farms	5/23	9/4	Wheat	Medium	L-V	L	N	N	N	N	Aph heavier on south side and nursery. Nursery rated.
Grand Forks ND	EGF/Crk	Drees Farming Association	5/22	9/22	Wheat	Medium/Light	N	L	N	N	N	N	Light Rzm on a few beets. Scattered damage from standing water.
Scandia MN	EGF/Crk	Deboer Farms	5/18	9/8	Wheat	Medium	N	N	L-M	N	N	N	Scattered Rzm symptoms. Some stunted areas.
Climax MN	EGF/Crk	Knutson Farms	5/23	9/28	Wheat	Medium/Light	L-M	N	N	N	N	N	Moderate Aph scattered throughout.
East Grand Forks MN	EGF/Crk	Mark Holz	5/15	9/15	Wheat	Medium	L	N	N	N	N	N	Weaker stands in W end of commercial trial.
St. Thomas ND	Dtn	Kennelly Farms	5/12	9/16 Exp	Wheat	Medium/Light	N	N	N	N	N	N	Commercial trial abandoned due to erratic stands.
Stephen MN	Dtn	Jensen Farms	5/3	Abandon	Wheat	Medium/Heavy	NA	NA	NA	NA	NA	NA	Heavy water damage.
Bathgate ND	Dtn	Shady Bend Farms	5/21	9/18	Wheat	Medium	N	N	N	N	N	L	A few root aphids.
Location	District / Trial Type	Cooperator	Planting Date	Rating Date	Preceding Crop	Soil Type	Diseases Present @						Comments
							Aph	Rhc	Rzm	Fus	Maggot	Rt Aphid	
Moorhead Fus-N MN	Fus Nurs	Nelson Farms	5/17	Multiple	Wheat	Medium/Heavy	NA	NA	NA	V	NA	NA	
Moorhead Fus-S MN	Fus Nurs	Oberg Farms	5/17	Multiple	Soybeans	Medium	NA	L	NA	V	NA	NA	
Mhd Rhc-E MN	Rhc Nurs	Jon Hickel	5/24	8/25	Soybeans	Heavy	NA	V	NA	L	NA	NA	
Mhd Rhc-W MN	Rhc Nurs	Jon Hickel	5/24	8/5	Soybeans	Heavy	NA	V	NA	L-M	NA	NA	
NWROC MN	Rhc Nurs	Albert Sims	5/16	Abandon	Soybeans	Medium	NA	NA	NA	NA	NA	NA	Standing water damaged the site
BSDF MI	Rhc Nurs	Mitch McGrath	5/26	8/11	NA	NA	NA	V	NA	NA	NA	NA	Abandoned
Shakopee MN	Aphanomyces	Patrick O'Boyle	5/8	8/27	NA	NA	V	NA	NA	NA	NA	NA	
Glyndon MN	Aphanomyces	Dennis Simmons	5/30	8/25	Corn	Medium	V	NA	NA	NA	NA	NA	
Perley MN	Aphanomyces	Hoff Farms	6/7	Abandon	Soybeans	Medium	L-M	N	N	N	N	N	Water and deer damage
Grandin ND	Aphanomyces	Paulsrud Farms	5/23	8/24	Wheat	Medium	M-V	L	N	N	N	N	Symptoms more severe on S side.
Longmont CO	Root Aphids	Kara Guffey	5/8	10/9	NA	NA	NA	NA	NA	NA	NA	V	
Foxhome MN	Cercospora	NDSU/Kevin Etzler	5/8	Multiple	Wheat	Medium	NA	NA	NA	NA	NA	NA	
BSDF MI	Cercospora	Mitch McGrath	5/23	Multiple	NA	NA	NA	NA	NA	NA	NA	NA	Nursery was reinoculated due to rain following first inoculation.
Randolph MN	Cercospora	Patrick O'Boyle	5/3	Multiple	NA	NA	NA	NA	NA	NA	NA	NA	

* Fertilizer applied in accordance with cooperative recommendations.

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

Created 10-30-2020

Table 7. Seed Treatments Used on Varieties in Official Variety Trials in 2020

Description	Years in Trial	Years Comm.	Fungicide (Rhizoctonia)	Insecticide Spring Tails & Maggots	Tachigaren Rate (Aphanomyces)	Priming (Emergence)	Fungicide (Damping Off)
ACSC Commercial							
BTS 8337	8	6	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8500	6	4	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8524	6	4	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8606	5	3	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8629	5	3	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8767	4	2	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8815	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8882	3	1	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
Crystal 572	6	4	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 574	6	4	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 684	5	2	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 793	4	2	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 796	4	1	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Hilleshog HIL9708	6	3	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
Hilleshog HIL9920	4	2	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
Hilleshog HM4448RR	8	7	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
Hilleshog HM9528RR	7	5	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
Maribo MA504	6	4	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
Maribo MA717	4	2	Vibrance	Cruiser Maxx	20	XBEET	Apron XL Maxim
SV 265	5	3	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 268	5	3	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 333	8	5	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 375	4	1	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SX 1887	3	1	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX 1888	3	1	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX Marathon	6	4	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
Crystal 355RR(Check)	8	5	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 578RR (Check)	6	3	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
BTS 8572 (Check)	6	4	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
AP SUS RR#5	4	7	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
AP CHK MOD RES RR#4	9	7	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Root Aphid Susc Chk#3	7	5	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
ACSC Experimental							
BTS 8007	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8009	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8013	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8018	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8034	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8042	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8055	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8073	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8090	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8092	1	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8927	2	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8938	2	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8961	2	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8976	2	NC	Kabina	Poncho Beta	35	Ultipro	Allegiance Thiram
Crystal 021	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 022	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 024	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 025	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 026	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 027	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 029	1	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 803	3	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 804	3	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 808	3	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 912	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 913	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Crystal 916	2	NC	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
Hilleshog HIL2233	3	NC	Vibrance	Cruiser Maxx	45	HIL-Activate	Apron XL Maxim
Hilleshog HIL2317	2	NC	Vibrance	Cruiser Maxx	45	HIL-Activate	Apron XL Maxim
Hilleshog HIL2320	2	NC	Vibrance	Cruiser Maxx	45	HIL-Activate	Apron XL Maxim
Hilleshog HIL2366	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshog HIL2367	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshog HIL2368	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshog HIL2369	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Hilleshog HIL2370	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA902	2	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA903	2	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA922	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
Maribo MA923	1	NC	Vibrance	Cruiser Maxx	45	XBEET	Apron XL Maxim
SV 201	1	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 202	1	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 203	1	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 204	1	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 285	3	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SV 393	2	NC	Metlock/Rizolex/Vibrance	Nipslt	45	XBEET	Sebring Thiram
SX 1801	1	NC	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX 1802	1	NC	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX 1803	1	NC	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX 1804	1	NC	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
SX 1898	2	NC	Metlock/Rizolex/Kabina	Nipslt	20	XBEET	Sebring Thiram
Crystal 355RR(Check)	8	5	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram
BTS 8572 (Check)	6	4	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
BTS 8337 (Check)	8	6	Systiva	Poncho Beta	35	Ultipro	Allegiance Thiram
Crystal 578RR (Check)	6	3	Kabina	Poncho Beta	45	XBEET	Allegiance Thiram

Table 16.

Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2021

Table 17
Projected Calculation for Approval of Sugarbeet Varieties for ACSC Market for 2021

Description	Approval ^ Likely	Rec/Ton		Rev/Acre		R/T +	CR Rating ^^
		2020	Bench	2020	Bench	\$/A	2020
						Bench	
Candidates for Retesting (1 Yr)							
BTS 8007	Not On Track	322.3	96.6	1433	112.7	209.3	4.27
BTS 8009	On Track	336.0	100.8	1354	106.4	207.2	4.27
BTS 8013	On Track	343.5	103.0	1391	109.4	212.4	3.88
BTS 8018	On Track	332.8	99.8	1501	118.0	217.8	2.41
BTS 8034	On Track	327.3	98.1	1534	120.6	218.7	2.70
BTS 8042	On Track	333.1	99.9	1399	110.0	209.9	4.50
BTS 8055	On Track	332.1	99.6	1386	109.0	208.5	4.16
BTS 8073	On Track	337.0	101.1	1537	120.8	221.9	4.68
BTS 8090	On Track	334.7	100.4	1380	108.5	208.9	4.35
BTS 8092	On Track	329.9	98.9	1474	115.9	214.8	4.26
Crystal 021	On Track	326.6	97.9	1489	117.1	215.0	2.20
Crystal 022	On Track	348.5	104.5	1536	120.8	225.3	4.71
Crystal 024	Not On Track	322.5	96.7	1443	113.4	210.2	4.70
Crystal 025	On Track	332.8	99.8	1444	113.5	213.3	4.56
Crystal 026	On Track	329.1	98.7	1491	117.2	215.9	4.76
Crystal 027	On Track	348.7	104.6	1425	112.0	216.6	4.38
Crystal 029	On Track	333.7	100.1	1477	116.1	216.2	4.67
Hilleshög HIL2366	On Track	328.2	98.4	1383	108.7	207.1	4.94
Hilleshög HIL2367	Not On Track	334.8	100.4	1440	113.2	213.6	5.08
Hilleshög HIL2368	On Track	345.2	103.5	1301	102.3	205.8	4.69
Hilleshög HIL2369	Not On Track	324.4	97.3	1366	107.4	204.7	5.55
Hilleshög HIL2370	Not On Track	317.9	95.3	1392	109.4	204.8	4.79
Maribo MA922	Not On Track	314.2	94.2	1388	109.1	203.3	4.77
Maribo MA923	Not On Track	316.3	94.8	1259	99.0	193.8	4.81
SX 1801	On Track	330.8	99.2	1327	104.3	203.5	4.63
SX 1802	Not On Track	319.3	95.7	1467	115.3	211.1	5.54
SX 1803	Not On Track	321.8	96.5	1325	104.2	200.7	4.87
SX 1804	On Track	329.9	98.9	1393	109.5	208.4	4.76
SV 201	On Track	333.0	99.9	1361	107.0	206.9	4.83
SV 202	Not On Track	324.1	97.2	1230	96.7	193.9	4.12
SV 203	Not On Track	333.5	100.0	1466	115.3	215.3	5.03
SV 204	On Track	332.1	99.6	1347	105.9	205.5	4.88
Benchmarks							
Crystal 355RR(Check)		333.5	100.0	1203	94.6		
BTS 8572 (Check)		336.3	100.8	1303	102.5		
BTS 8337 (Check)		342.6	102.7	1262	99.2		
Crystal 578RR (Check)		321.5	96.4	1319	103.7		
Benchmark Mean		333.5		1272			

[^] Not on Track = not on track for approval. On Track = data is tracking for potential approval. Created 10-29-2020

^{^^} All Cercospora ratings 2020 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)
 3a) R/T >= 100% of Bench or 3b) R/T >= 97% and R/T + \$/A equal to 202% of Bench.

Bench for 2020 added Crystal 578 and dropped Crystal 101 (Check).

Table 18.

Table 18. Calculation for Approval of Sugarbeet Varieties for ACSC Aphanomyces Specialty Market for 2021												
Trial Yrs	Description	Approval Status	Root Aph. Rating					Cercospora Rating +				
			2018	2019	2020	2 Yr	3 Yr	2018	2019	2020	2 Yr	3 Yr
	Previously Approved (3 Yrs)						<=4.70					<=5.30
8	BTS 8337	Approved	3.74	3.45	3.48	3.47	3.56	4.64	4.40	4.46	4.43	4.50
6	BTS 8500	Approved	4.43	4.30	4.16	4.23	4.30	4.40	4.00	4.38	4.19	4.26
6	BTS 8524	Approved	4.08	4.51	4.21	4.36	4.27	4.50	4.52	4.38	4.45	4.47
5	BTS 8629	Approved	3.89	5.32	3.92	4.62	4.38	4.52	4.66	4.55	4.61	4.58
4	BTS 8767	Approved	4.28	4.32	4.46	4.39	4.35	4.32	4.26	4.38	4.32	4.32
6	Crystal 574	Approved	4.32	3.99	4.11	4.05	4.14	4.42	4.28	4.64	4.46	4.45
5	Crystal 684	Approved	3.83	4.33	3.97	4.15	4.04	4.41	4.12	4.44	4.28	4.32
4	Crystal 793	Approved	3.32	3.72	3.87	3.80	3.64	4.26	4.04	4.31	4.18	4.20
4	Crystal 796	Approved	3.61	3.97	3.85	3.91	3.81	4.74	4.74	4.95	4.85	4.81
3	Crystal 803	Approved	3.86	4.45	3.96	4.21	4.09	4.01	3.88	3.93	3.91	3.94
3	Crystal 804	Approved	3.58	4.30	3.61	3.96	3.83	4.42	4.46	4.77	4.62	4.55
3	Crystal 808	Approved	3.60	3.57	4.02	3.80	3.73	4.86	4.78	5.07	4.93	4.90
4	Maribo MA717	Approved	4.15	4.42	3.77	4.10	4.11	4.78	5.11	5.11	5.11	5.00
5	SV 268	Approved	4.21	5.08	4.49	4.79	4.59	4.70	4.82	4.78	4.80	4.77
3	SV 285	Approved	3.98	4.47	4.28	4.38	4.24	4.52	4.84	4.50	4.67	4.62
8	SV 333	Approved	4.06	4.70	4.09	4.40	4.28	4.78	4.49	4.69	4.59	4.65
3	SX 1888	Approved	4.03	4.65	3.99	4.32	4.22	4.92	4.89	4.67	4.78	4.76
	Candidates for Approval					<=4.40					<=5.00	
5	BTS 8606	NO	4.43	5.11	4.56	4.84	4.70	4.80	4.69	4.79	4.74	4.76
3	BTS 8815	NO	3.97	5.24	4.17	4.71	4.46	4.65	4.61	4.86	4.74	4.71
3	BTS 8882	NO	4.98	5.17	4.33	4.75	4.83	4.53	4.18	4.71	4.45	4.47
2	BTS 8927	Approved	--	4.06	3.87	3.97	--	--	4.35	4.42	4.39	--
2	BTS 8938	Approved	--	3.75	3.86	3.81	--	--	4.35	4.66	4.51	--
2	BTS 8961	Approved	--	3.89	4.04	3.97	--	--	4.27	4.69	4.48	--
2	BTS 8976	Approved	--	3.55	3.55	3.55	--	--	3.83	4.15	3.99	--
6	Crystal 572	NO	4.47	4.98	4.28	4.63	4.58	4.45	4.68	4.46	4.57	4.53
2	Crystal 912	Approved	--	3.91	3.67	3.79	--	--	4.62	4.75	4.69	--
2	Crystal 913	Approved	--	3.58	3.75	3.67	--	--	4.11	4.13	4.12	--
2	Crystal 916	Approved	--	4.17	3.85	4.01	--	--	4.26	4.49	4.38	--
3	Hilleshög HIL2233	NO	4.02	4.43	3.77	4.10	4.07	4.87	5.26	5.23	5.25	5.12
2	Hilleshög HIL2317	Approved	--	3.96	3.86	3.91	--	--	4.90	5.05	4.98	--
2	Hilleshög HIL2320	NO	--	4.58	3.55	4.07	--	--	4.92	5.11	5.02	--
6	Hilleshög HIL9708	Approved	4.25	4.61	3.96	4.29	4.27	4.71	4.96	4.97	4.97	4.88
4	Hilleshög HIL9920	Approved	4.09	5.05	3.65	4.35	4.26	4.79	4.95	4.82	4.89	4.85
8	Hilleshög HM4448RR	NO	4.53	4.86	4.09	4.48	4.49	5.26	5.48	5.61	5.55	5.45
7	Hilleshög HM9528RR	Approved	4.22	4.56	3.72	4.14	4.17	4.79	4.93	4.84	4.89	4.85
6	Maribo MA504	NO	5.30	6.17	5.06	5.62	5.51	4.98	5.34	5.35	5.35	5.22
2	Maribo MA902	NO	--	5.31	4.01	4.66	--	--	4.91	4.96	4.94	--
2	Maribo MA903	NO	--	4.56	3.42	3.99	--	--	5.25	5.15	5.20	--
5	SV 265	NO	4.16	5.47	3.98	4.73	4.54	4.48	4.28	4.55	4.42	4.44
4	SV 375	NO	3.83	5.03	4.04	4.54	4.30	4.96	4.11	4.78	4.45	4.62
2	SV 393	NO	--	5.03	4.02	4.53	--	--	4.94	4.87	4.91	--
3	SX 1887	Approved	4.49	4.67	3.92	4.30	4.36	4.89	4.89	5.09	4.99	4.96
2	SX 1898	Approved	--	4.74	3.76	4.25	--	--	4.68	4.73	4.71	--
6	SX Marathon	NO	4.72	5.15	4.12	4.64	4.66	5.27	4.79	4.85	4.82	4.97
	Approval Criteria new varieties						4.40				5.00	
	Criteria to Maintain Approval							4.70				5.30

All Corseconera ratings 2018-2020 were adjusted to 1082 basis points.

Created 10/20/2020

+ All Cercospora ratings 2018-2020 were adjusted to 1982 basis. Created 10/30/2020
Aphanomyces approval criteria include: 1) Cercospora rating 2 year mean must not exceed 5.00 (1982 adjusted data), 2) Aph root rating 2 year mean <= 1.40.

Three years of data may be considered for initial approval.

Three years of data may be considered for initial approval. To maintain Aphrodisias approval, criteria include: 1) Corrosion 3-year mean must not exceed 5.30; 2) ARI root rating 3-year mean

Table 19.

Table 20.
2020 Aphanomyces Ratings for Official Trial Entries
Grandin, ND - Shakopee, MN - Glyndon, MN

Chk++	Code	Description	Unadjusted ^			Adjusted ^						Trial Yrs \$\$		
			Gran	Shak	Glyn	Gran	Shak	Glyn	2020	2 Yr	3 Yr	2019^	2018 ^	
	518	BTS 8007	3.21	3.94	3.90	4.31	4.24	3.61	4.06	—	—	—	—	1
	513	BTS 8009	2.78	3.61	4.19	3.74	3.89	3.88	3.83	—	—	—	—	1
	549	BTS 8013	3.01	4.22	4.62	4.04	4.55	4.28	4.29	—	—	—	—	1
	521	BTS 8018	2.61	3.60	4.57	3.51	3.88	4.23	3.87	—	—	—	—	1
	546	BTS 8034	3.05	3.76	5.33	4.10	4.05	4.93	4.36	—	—	—	—	1
	550	BTS 8042	2.88	3.71	3.67	3.87	4.00	3.40	3.75	—	—	—	—	1
	570	BTS 8055	2.64	3.04	4.34	3.55	3.28	4.02	3.61	—	—	—	—	1
	571	BTS 8073	2.53	3.21	3.76	3.40	3.46	3.48	3.45	—	—	—	—	1
	520	BTS 8090	3.01	3.73	4.48	4.04	4.02	4.15	4.07	—	—	—	—	1
	505	BTS 8092	2.99	3.62	3.91	4.02	3.90	3.62	3.85	—	—	—	—	1
	510	BTS 8337	2.71	3.21	3.62	3.64	3.46	3.35	3.48	3.46	3.56	3.45	3.74	8
	573	BTS 8500	3.58	3.67	4.00	4.81	3.95	3.70	4.16	4.23	4.30	4.30	4.43	6
	552	BTS 8524	2.94	4.17	4.52	3.95	4.49	4.18	4.21	4.36	4.27	4.51	4.08	6
	564	BTS 8606	3.21	4.56	4.81	4.31	4.91	4.45	4.56	4.84	4.70	5.11	4.43	5
	524	BTS 8629	2.76	4.03	4.00	3.71	4.34	3.70	3.92	4.62	4.38	5.32	3.89	5
	536	BTS 8767	3.20	4.29	4.81	4.30	4.62	4.45	4.46	4.39	4.35	4.32	4.28	4
	575	BTS 8815	2.85	4.22	4.48	3.83	4.55	4.15	4.17	4.71	4.46	5.24	3.97	3
	543	BTS 8882	3.28	4.21	4.38	4.41	4.54	4.06	4.33	4.75	4.83	5.17	4.98	3
	532	BTS 8927	2.82	3.55	4.33	3.79	3.82	4.01	3.87	3.96	—	4.06	—	2
	563	BTS 8938	2.91	3.67	4.00	3.91	3.95	3.70	3.86	3.80	—	3.75	—	2
	531	BTS 8961	2.90	4.12	4.10	3.90	4.44	3.80	4.04	3.97	—	3.89	—	2
	555	BTS 8976	2.78	3.26	3.67	3.74	3.51	3.40	3.55	3.55	—	3.55	—	2
	554	Crystal 021	2.83	3.11	3.48	3.80	3.35	3.22	3.46	—	—	—	—	1
	556	Crystal 022	2.69	3.64	4.19	3.61	3.92	3.88	3.81	—	—	—	—	1
	567	Crystal 024	2.65	3.38	4.05	3.56	3.64	3.75	3.65	—	—	—	—	1
	515	Crystal 025	2.68	3.07	3.57	3.60	3.31	3.31	3.40	—	—	—	—	1
	506	Crystal 026	2.79	3.33	4.24	3.75	3.59	3.93	3.75	—	—	—	—	1
	527	Crystal 027	2.78	3.62	3.81	3.74	3.90	3.53	3.72	—	—	—	—	1
	542	Crystal 029	2.73	2.98	4.24	3.67	3.21	3.93	3.60	—	—	—	—	1
	547	Crystal 572	3.32	4.55	3.76	4.46	4.90	3.48	4.28	4.63	4.57	4.98	4.47	6
	514	Crystal 574	3.24	3.61	4.43	4.35	3.89	4.10	4.11	4.05	4.14	3.99	4.32	6
	509	Crystal 684	2.86	3.76	4.33	3.84	4.05	4.01	3.97	4.15	4.04	4.33	3.83	5
	565	Crystal 793	2.91	3.66	4.05	3.91	3.94	3.75	3.87	3.79	3.64	3.72	3.32	4
	516	Crystal 796	2.83	3.89	3.85	3.80	4.19	3.56	3.85	3.91	3.81	3.97	3.61	4
	533	Crystal 803	3.06	3.76	4.00	4.11	4.05	3.70	3.96	4.20	4.09	4.45	3.86	3
	503	Crystal 804	2.57	3.68	3.67	3.45	3.96	3.40	3.61	3.95	3.83	4.30	3.58	3
	560	Crystal 808	2.78	4.03	4.29	3.74	4.34	3.97	4.02	3.79	3.73	3.57	3.60	3
	569	Crystal 912	2.58	3.52	4.05	3.47	3.79	3.75	3.67	3.79	—	3.91	—	2
	511	Crystal 913	2.59	3.56	4.24	3.48	3.84	3.93	3.75	3.66	—	3.58	—	2
	558	Crystal 916	2.75	3.45	4.48	3.69	3.72	4.15	3.85	4.01	—	4.17	—	2
	519	Hilleshög HIL2233	2.84	3.92	3.52	3.82	4.22	3.26	3.77	4.10	4.07	4.43	4.02	3
	557	Hilleshög HIL2317	3.21	3.76	3.48	4.31	4.05	3.22	3.86	3.91	—	3.96	—	2
	528	Hilleshög HIL2320	2.69	3.51	3.52	3.61	3.78	3.26	3.55	4.06	—	4.58	—	2
	544	Hilleshög HIL2366	2.93	3.80	3.67	3.94	4.09	3.40	3.81	—	—	—	—	1
	517	Hilleshög HIL2367	2.83	3.87	2.76	3.80	4.17	2.56	3.51	—	—	—	—	1
	502	Hilleshög HIL2368	2.75	3.88	3.47	3.69	4.18	3.21	3.70	—	—	—	—	1
	534	Hilleshög HIL2369	2.80	3.86	3.14	3.76	4.16	2.91	3.61	—	—	—	—	1
	553	Hilleshög HIL2370	3.04	4.47	3.86	4.08	4.82	3.57	4.16	—	—	—	—	1
	574	Hilleshög HIL9708	2.76	4.18	3.95	3.71	4.50	3.66	3.96	4.28	4.27	4.61	4.25	6
	559	Hilleshög HIL9920	2.57	3.84	3.62	3.45	4.14	3.35	3.65	4.35	4.26	5.05	4.09	4
	508	Hilleshög HM4448RR	2.94	4.35	3.91	1.92	4.69	3.62	4.09	4.47	4.49	4.86	4.53	8
	526	Hilleshög HM9528RR	2.61	3.88	3.76	3.51	4.18	3.48	3.72	4.14	4.17	4.56	4.22	7
	535	Maribo MA504	3.03	5.96	5.05	4.07	6.42	4.68	5.06	5.61	5.51	6.17	5.30	6
	561	Maribo MA717	2.61	4.38	3.33	3.51	4.72	3.08	3.77	4.10	4.12	4.42	4.15	4

	538	Maribo MA902	2.81	4.13	4.10	3.78	4.45	3.80	4.01	4.66	--	5.31	--	2
	537	Maribo MA903	2.55	3.45	3.38	3.43	3.72	3.13	3.42	3.99	--	4.56	--	2
	529	Maribo MA922	2.84	3.70	3.52	3.82	3.99	3.26	3.69	--	--	--	--	1
	541	Maribo MA923	3.08	4.81	4.81	4.14	5.18	4.45	4.59	--	--	--	--	1
	562	SV 201	3.04	3.82	3.86	4.08	4.12	3.57	3.92	--	--	--	--	1
	523	SV 202	3.21	3.85	5.81	4.31	4.15	5.38	4.61	--	--	--	--	1
	572	SV 203	3.23	4.33	4.33	4.34	4.67	4.01	4.34	--	--	--	--	1
	568	SV 204	3.01	3.98	4.62	4.04	4.29	4.28	4.20	--	--	--	--	1
	539	SV 285	3.04	4.16	4.62	4.08	4.48	4.28	4.28	4.38	4.25	4.47	3.98	3
	501	SV 393	2.92	4.11	4.00	3.92	4.43	3.70	4.02	4.53	--	5.03	--	2
	548	SV 265	3.07	3.71	4.14	4.12	4.00	3.83	3.98	4.73	4.54	5.47	4.16	5
	551	SV 268	3.24	4.20	4.95	4.35	4.53	4.58	4.49	4.78	4.59	5.08	4.21	5
	504	SV 333	3.08	4.25	3.85	4.14	4.58	3.56	4.09	4.40	4.29	4.70	4.06	8
	576	SV 375	3.15	3.88	4.00	4.23	4.18	3.70	4.04	4.54	4.30	5.03	3.83	4
	540	SX 1801	3.04	4.10	5.19	4.08	4.42	4.80	4.44	--	--	--	--	1
	545	SX 1802	3.24	4.35	5.14	4.35	4.69	4.76	4.60	--	--	--	--	1
	507	SX 1803	3.37	4.28	4.76	4.53	4.61	4.41	4.52	--	--	--	--	1
	530	SX 1804	2.75	3.95	4.43	3.69	4.26	4.10	4.02	--	--	--	--	1
	566	SX 1887	3.16	3.87	3.62	4.25	4.17	3.35	3.92	4.30	4.36	4.67	4.49	3
	512	SX 1888	2.98	4.17	3.76	4.00	4.49	3.48	3.99	4.32	4.22	4.65	4.03	3
	522	SX 1898	2.70	3.95	3.67	3.63	4.26	3.40	3.76	4.25	--	4.74	--	2
	525	SX Marathon	3.01	4.21	4.09	4.04	4.54	3.79	4.12	4.64	4.66	5.15	4.72	6
1	1001	AP CK-32 CRY981	3.02	3.29	4.71	4.06	3.54	4.36	3.99	3.43	3.55	2.87	3.79	12
1	1002	AP CK-33 CRYST768	3.72	4.38	5.29	5.00	4.72	4.90	4.87	4.86	4.76	4.85	4.56	14
1	1003	AP CK-35 BETA87RR58	3.63	4.12	5.09	4.88	4.44	4.71	4.68	5.03	5.25	5.39	5.68	14
1	1004	AP CK-41 CRYST765	4.08	5.19	6.76	5.48	5.59	6.26	5.78	5.87	5.91	5.96	5.99	10
1	1005	AP CK-43 BTS80RR32	3.55	4.85	5.14	4.77	5.23	4.76	4.92	4.71	4.67	4.50	4.60	11
1	1006	AP CK-44 SX VISION RR	3.47	5.11	5.72	4.66	5.51	5.30	5.15	5.11	5.08	5.06	5.03	12
1	1007	AP CK-45 CRY986	3.67	4.44	4.76	4.93	4.78	4.41	4.71	4.65	4.44	4.60	4.01	12
1	1008	AP CK-47 CRY9101	3.10	3.27	4.19	4.17	3.52	3.88	3.86	3.39	3.52	2.92	3.79	10
1	1009	AP CK-49 BTS82RR33	4.23	4.97	5.95	5.68	5.35	5.51	5.52	5.39	5.36	5.26	5.32	9
1	1010	AP CK-51 CRY9246	3.54	4.68	5.05	4.76	5.04	4.68	4.82	4.88	4.99	4.94	5.22	9
1	1011	AP CK-52 HILL4094RR	3.13	4.24	4.24	4.21	4.57	3.93	4.23	4.99	4.85	5.74	4.57	13
1	1012	AP CK-55 CRY9247	3.96	4.81	5.57	5.32	5.18	5.16	5.22	5.06	5.15	4.90	5.33	9
1	1013	AP CK-56 BTS8363	3.65	4.72	5.38	4.90	5.09	4.98	4.99	5.12	5.13	5.25	5.15	8
1	1014	AP CK-57 CRY9578	3.43	4.40	5.00	4.61	4.74	4.63	4.66	4.62	4.58	4.58	4.50	6
1	1015	AP CK-58 CRY9572	3.37	4.31	4.86	4.53	4.64	4.50	4.56	4.84	4.72	5.13	4.47	6
	1016	AP CHK MOD RES RR	3.16	4.18	5.48	4.25	4.50	5.07	4.61	5.00	4.95	5.39	4.84	14
	1017	AP CHK RES RR#6	2.77	3.50	4.05	3.72	3.77	3.75	3.75	3.73	3.59	3.72	3.32	4
	1018	AP CHK SUS HYB#3	4.37	5.19	6.86	5.87	5.59	6.35	5.94	5.91	5.88	5.88	5.83	14
	1019	AP CHK SUS HYB#4	3.81	5.07	6.33	5.12	5.46	5.86	5.48	5.77	5.85	6.06	6.02	14
	1020	AP SUS RR#5	4.49	4.89	5.00	6.03	5.27	4.63	5.31	5.37	5.36	5.44	5.32	4
		Check Mean	3.57	4.45	5.18	4.80	4.80	4.80	4.80					
15		Trial Mean	3.06	4.01	4.35	4.11	4.32	4.03	4.32					
		Coeff. of Var. (%)	10.9	9.1	14.1	10.9	9.1	14.1						
		Mean LSD (0.05)	0.49	0.48	0.99	0.66	0.52	0.92						
		Mean LSD (0.01)	0.64	0.64	1.30	0.86	0.69	1.20						
		Sig Lvl	**	**	**	**	**	**						
		Adjustment Factor	1.344	1.077	0.926									
		^* 2020 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.												
		Green highlighted ratings indicate specialty resistance.												
		Red highlighted ratings indicate a level of concern.												

Table 21. 2020 Cercospora Ratings for Official Trial Entries Betaseed (Randolph MN), BSDF (Frankenmuth MI) & NDSU (Foxhome MN)														
Chk	Code	Description	Unadjusted			Adjusted to 1982 Basis ++						Trial		
			Randolph	BSDF	Foxhome	Randolph	BSDF	Foxhome	2020	2 Yr	3 Yr	2019	2018	Yrs \$\$
			6 Dates+	6 Dates+	4 Dates+	6 Dates+	6 Dates+	4 Dates+	3 loc					
	518	BTS 8007	3.97	3.22	3.71	4.24	4.32	4.25	4.27	--	--	--	--	1
	513	BTS 8009	3.59	3.36	3.91	3.83	4.50	4.48	4.27	--	--	--	--	1
	549	BTS 8013	3.65	2.76	3.54	3.90	3.70	4.05	3.88	--	--	--	--	1
	521	BTS 8018	2.35	1.78	2.05	2.51	2.39	2.35	2.41	--	--	--	--	1
	546	BTS 8034	2.95	1.96	2.02	3.15	2.63	2.31	2.70	--	--	--	--	1
	550	BTS 8042	4.47	3.37	3.67	4.77	4.52	4.20	4.50	--	--	--	--	1
	570	BTS 8055	3.85	3.00	3.81	4.11	4.02	4.36	4.16	--	--	--	--	1
	571	BTS 8073	4.08	3.57	4.27	4.35	4.78	4.89	4.68	--	--	--	--	1
	520	BTS 8090	3.89	3.24	3.98	4.15	4.34	4.56	4.35	--	--	--	--	1
	505	BTS 8092	4.23	3.06	3.63	4.51	4.10	4.16	4.26	--	--	--	--	1
	510	BTS 8337	4.20	3.21	4.00	4.48	4.30	4.58	4.46	4.43	4.50	4.40	4.64	8
	573	BTS 8500	4.50	2.95	3.84	4.80	3.95	4.40	4.38	4.19	4.26	4.00	4.40	6
	552	BTS 8524	4.41	3.00	3.86	4.71	4.02	4.42	4.38	4.45	4.47	4.52	4.50	6
	564	BTS 8606	4.80	3.22	4.31	5.12	4.32	4.94	4.79	4.74	4.76	4.69	4.80	5
	524	BTS 8629	4.28	3.28	4.08	4.57	4.40	4.67	4.55	4.60	4.57	4.66	4.52	5
	536	BTS 8767	4.51	2.90	3.88	4.81	3.89	4.44	4.38	4.32	4.32	4.26	4.32	4
	575	BTS 8815	4.61	3.60	4.21	4.92	4.82	4.82	4.86	4.73	4.71	4.61	4.65	3
	543	BTS 8882	4.70	3.35	4.03	5.02	4.49	4.62	4.71	4.44	4.47	4.18	4.53	3
	532	BTS 8927	3.89	3.30	4.09	4.15	4.42	4.68	4.42	4.39	--	4.35	--	2
	563	BTS 8938	4.49	3.56	3.85	4.79	4.77	4.41	4.66	4.51	--	4.35	--	2
	531	BTS 8961	4.39	3.39	4.23	4.68	4.54	4.85	4.69	4.48	--	4.27	--	2
	555	BTS 8976	4.03	3.13	3.44	4.30	4.19	3.94	4.15	3.99	--	3.83	--	2
	554	Crystal 021	2.32	1.64	1.67	2.48	2.20	1.91	2.20	--	--	--	--	1
	556	Crystal 022	4.24	3.56	4.22	4.52	4.77	4.83	4.71	--	--	--	--	1
	567	Crystal 024	4.64	3.29	4.14	4.95	4.41	4.74	4.70	--	--	--	--	1
	515	Crystal 025	4.17	3.21	4.29	4.45	4.30	4.91	4.56	--	--	--	--	1
	506	Crystal 026	4.53	3.49	4.17	4.83	4.68	4.78	4.76	--	--	--	--	1
	527	Crystal 027	3.84	3.58	3.70	4.10	4.80	4.24	4.38	--	--	--	--	1
	542	Crystal 029	4.07	3.61	4.21	4.34	4.84	4.82	4.67	--	--	--	--	1
	547	Crystal 572	4.20	3.28	3.94	4.48	4.40	4.51	4.46	4.57	4.53	4.68	4.45	6
	514	Crystal 574	4.61	3.23	4.07	4.92	4.33	4.66	4.64	4.46	4.44	4.28	4.42	6
	509	Crystal 684	4.33	3.12	3.94	4.62	4.18	4.51	4.44	4.28	4.33	4.12	4.41	5
	565	Crystal 793	3.88	2.97	4.21	4.14	3.98	4.82	4.31	4.18	4.20	4.04	4.26	4
	516	Crystal 796	4.74	3.62	4.32	5.06	4.85	4.95	4.95	4.85	4.81	4.74	4.74	4
	533	Crystal 803	3.17	3.11	3.69	3.38	4.17	4.23	3.93	3.90	3.94	3.88	4.01	3
	503	Crystal 804	4.55	3.25	4.44	4.86	4.36	5.09	4.77	4.61	4.55	4.46	4.42	3
	560	Crystal 808	4.72	3.67	4.59	5.04	4.92	5.26	5.07	4.92	4.90	4.78	4.86	3
	569	Crystal 912	4.36	3.23	4.59	4.65	4.33	5.26	4.75	4.69	--	4.62	--	2
	511	Crystal 913	3.75	3.12	3.68	4.00	4.18	4.22	4.13	4.12	--	4.11	--	2
	558	Crystal 916	4.47	3.07	4.01	4.77	4.11	4.59	4.49	4.38	--	4.26	--	2
	519	Hilleshög HIL2233	4.94	3.63	4.85	5.27	4.86	5.56	5.23	5.24	5.12	5.26	4.87	3
	557	Hilleshög HIL2317	4.51	3.68	4.71	4.81	4.93	5.39	5.05	4.97	--	4.90	--	2
	528	Hilleshög HIL2320	4.90	3.52	4.69	5.23	4.72	5.37	5.11	5.02	--	4.92	--	2
	544	Hilleshög HIL2366	4.85	3.21	4.67	5.18	4.30	5.35	4.94	--	--	--	--	1
	517	Hilleshög HIL2367	4.87	3.58	4.58	5.20	4.80	5.25	5.08	--	--	--	--	1
	502	Hilleshög HIL2368	4.53	3.10	4.44	4.83	4.15	5.09	4.69	--	--	--	--	1
	534	Hilleshög HIL2369	5.06	4.30	4.78	5.40	5.76	5.48	5.55	--	--	--	--	1
	553	Hilleshög HIL2370	4.57	3.43	4.27	4.88	4.60	4.89	4.79	--	--	--	--	1
	574	Hilleshög HIL9708	4.82	3.54	4.39	5.14	4.74	5.03	4.97	4.96	4.88	4.96	4.71	6
	559	Hilleshög HIL9920	4.51	3.33	4.52	4.81	4.46	5.18	4.82	4.88	4.85	4.95	4.79	4
	508	Hilleshög HM4448RR	4.99	4.26	5.05	5.33	5.71	5.78	5.61	5.54	5.45	5.48	5.26	8
	526	Hilleshög HM9528RR	4.79	3.32	4.32	5.11	4.45	4.95	4.84	4.88	4.85	4.93	4.79	7
	535	Maribo MA504	4.94	3.94	4.81	5.27	5.28	5.51	5.35	5.34	5.22	5.34	4.98	6
	561	Maribo MA717	4.86	3.74	4.49	5.19	5.01	5.14	5.11	5.11	5.00	5.11	4.78	4
	538	Maribo MA902	4.67	3.51	4.53	4.98	4.70	5.19	4.96	4.94	--	4.91	--	2
	537	Maribo MA903	4.81	3.75	4.63	5.13	5.03	5.30	5.15	5.20	--	5.25	--	2
	529	Maribo MA922	4.36	3.80	3.99	4.65	5.09	4.57	4.77	--	--	--	--	1
	541	Maribo MA923	4.31	3.84	4.10	4.60	5.15	4.70	4.81	--	--	--	--	1
	562	SV 201	4.63	3.45	4.30	4.94	4.62	4.93	4.83	--	--	--	--	1
	523	SV 202	3.86	3.04	3.63	4.12	4.07	4.16	4.12	--	--	--	--	1
	572	SV 203	4.56	4.11	4.12	4.87	5.51	4.72	5.03	--	--	--	--	1
	568	SV 204	4.60	3.54	4.35	4.91	4.74	4.98	4.88	--	--	--	--	1
	539	SV 285	4.38	3.32	3.82	4.67	4.45	4.38	4.50	4.67	4.62	4.84	4.52	3
	501	SV 393	4.56	3.75	4.11	4.87	5.03	4.71	4.87	4.90	--	4.94	--	2
	548	SV 265	4.43	3.43	3.77	4.73	4.60	4.32	4.55	4.41	4.44	4.28	4.48	5
	551	SV 268	4.64	3.40	4.22	4.95	4.56	4.83	4.78	4.80	4.77	4.82	4.70	5
	504	SV 333	4.44	3.64	3.90	4.74	4.88	4.47	4.69	4.59	4.66	4.49	4.78	8
	576	SV 375	4.83	3.42	4.01	5.15	4.58	4.59	4.78	4.44	4.62	4.11	4.96	4

	540 SX 1801	4.44	3.32	4.11	4.74	4.45	4.71	4.63	--	--	--	--	1
	545 SX 1802	5.08	4.44	4.58	5.42	5.95	5.25	5.54	--	--	--	--	1
	507 SX 1803	4.78	3.61	4.07	5.10	4.84	4.66	4.87	--	--	--	--	1
	530 SX 1804	4.64	3.51	4.04	4.95	4.70	4.63	4.76	--	--	--	--	1
	566 SX 1887	4.94	3.70	4.39	5.27	4.96	5.03	5.09	4.99	4.95	4.89	4.89	3
	512 SX 1888	4.60	3.43	3.94	4.91	4.60	4.51	4.67	4.78	4.83	4.89	4.92	3
	522 SX 1898	4.75	3.20	4.21	5.07	4.29	4.82	4.73	4.70	--	4.68	--	2
	525 SX Marathon	4.68	3.55	4.20	4.99	4.76	4.81	4.85	4.82	4.97	4.79	5.27	6
1	1101 CR CK#19 CRYSS539RR	4.90	3.84	4.48	5.23	5.15	5.13	5.17	5.21	5.27	5.25	5.39	16
1	1102 CR CK#24 HILL4012RR	4.56	4.31	4.58	4.87	5.78	5.25	5.30	5.31	5.40	5.33	5.56	15
1	1103 CR CK#28 HILL4010RR	4.60	4.09	4.21	4.91	5.48	4.82	5.07	5.05	5.13	5.04	5.27	15
1	1104 CR CK#41 CRYSS981RR	4.73	3.62	4.56	5.05	4.85	5.22	5.04	5.06	5.04	5.08	5.00	12
1	1105 CR CK#43 CRYSS246RR	4.48	3.55	4.08	4.78	4.76	4.67	4.74	4.71	4.73	4.69	4.78	9
1	1106 CR CK#44 BETA80RR32	4.77	3.53	3.99	5.09	4.73	4.57	4.80	4.89	4.95	4.99	5.06	11
1	1107 CR CK#45 HILL4448RR	5.01	4.31	4.92	5.35	5.78	5.64	5.59	5.60	5.45	5.62	5.14	9
1	1108 CR CK#47 HILL4094RR	3.93	3.15	3.70	4.19	4.22	4.24	4.22	4.25	4.32	4.28	4.46	13
1	1109 CR CK#48 MARI504	5.02	3.90	4.99	5.36	5.23	5.72	5.43	5.41	5.27	5.38	4.99	6
1	1110 CR CK#49 CRYSS578RR	4.77	3.34	4.18	5.09	4.48	4.79	4.78	4.76	4.77	4.73	4.80	6
1	1111 CR CK#50 CRYSS101RR	4.64	3.27	4.10	4.95	4.38	4.70	4.68	4.64	4.61	4.61	4.53	10
1	1112 CR CK#51 CRYSS555RR	4.36	3.50	4.17	4.65	4.69	4.78	4.71	4.61	4.58	4.51	4.53	8
	1113 CR CK MOD SUS HYB#3	4.93	4.02	4.48	5.26	5.39	5.13	5.26	5.28	5.33	5.29	5.44	16
	1114 CR CK MOD RES HYB#4	4.40	3.49	4.09	4.70	4.68	4.68	4.69	4.47	4.43	4.26	4.35	13
	1115 CR CK MOD RES HYB#4	4.27	3.14	3.98	4.56	4.21	4.56	4.44	4.38	4.37	4.31	4.35	13
	1116 CR CK MOD SUS HYB#5	4.89	3.97	5.04	5.22	5.32	5.77	5.44	5.40	5.37	5.37	5.29	14
12	Check Mean	4.65	3.70	4.33	4.96	4.96	4.96	4.96					
	Trial Mean	4.42	3.42	4.12	4.72	4.58	4.72	4.67					
	Coeff. of Var. (%)	4.1	8.8	5.8	4.1	8.8	5.8						
	Mean LSD (0.05)	0.22	0.45	0.30	0.23	0.60	0.34						
	Mean LSD (0.01)	0.29	0.60	0.40	0.31	0.80	0.46						
	Sig Mrk	**	**	**	**	**	**						
	Adj Factor				1.06715	1.34013	1.14540						
* 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.													
+ Average rating based upon multiple rating dates.													
Green highlighted ratings indicate good resistance.													
Red highlighted ratings indicate a level of concern.													
Created 10/26/2020													

Table 22 2020 Rhizoctonia Ratings for OVT Entries																		
Sus		Unadjusted					Adjusted @											
Chk	Chk		BSDF	TSC-E	TSC-W	NWROC		BSDF	TSC-E	TSC-W	NWROC		2020	2 Yr	3 Yr	2019	2018	Years
^	@	Code	Description	+ 8/25	8/5	+		+ 8/25	8/5	+	2020		2020	2 Yr	3 Yr	2019	2018	Years
		518	BTS 8007	2.53	3.91			4.31	4.60		4.45		--	--	--	--	--	1
		513	BTS 8009	2.73	3.46			4.65	4.07		4.36		--	--	--	--	--	1
		549	BTS 8013	2.69	3.66			4.58	4.30		4.44		--	--	--	--	--	1
		521	BTS 8018	2.33	3.70			3.97	4.35		4.16		--	--	--	--	--	1
		546	BTS 8034	2.94	3.51			5.00	4.13		4.56		--	--	--	--	--	1
		550	BTS 8042	2.29	3.49			3.90	4.10		4.00		--	--	--	--	--	1
		570	BTS 8055	2.29	3.85			3.90	4.53		4.21		--	--	--	--	--	1
		571	BTS 8073	2.25	3.73			3.83	4.38		4.11		--	--	--	--	--	1
		520	BTS 8090	2.28	3.48			3.88	4.09		3.99		--	--	--	--	--	1
		505	BTS 8092	2.14	3.39			3.64	3.99		3.81		--	--	--	--	--	1
		510	BTS 8337	2.84	3.42			4.83	4.02		4.43		4.02	4.04	3.62	4.07	8	
		573	BTS 8500	2.68	4.01			4.56	4.71		4.64		4.46	4.43	4.28	4.36	6	
		552	BTS 8524	2.61	3.27			4.44	3.84		4.14		4.07	4.12	4.00	4.23	6	
		564	BTS 8606	2.87	3.93			4.88	4.62		4.75		4.67	4.53	4.60	4.24	5	
		524	BTS 8629	2.64	3.49			4.49	4.10		4.30		4.10	4.07	3.89	4.02	5	
		536	BTS 8767	3.17	3.37			5.39	3.96		4.68		4.41	4.30	4.14	4.10	4	
		575	BTS 8815	2.34	3.29			3.98	3.87		3.92		3.98	3.94	4.03	3.88	3	
		543	BTS 8882	2.46	3.68			4.19	4.33		4.26		4.26	4.30	4.27	4.37	3	
		532	BTS 8927	2.71	3.52			4.61	4.14		4.37		4.15	--	3.93	--	2	
		563	BTS 8938	2.27	3.35			3.86	3.94		3.90		3.69	--	3.47	--	2	
		531	BTS 8961	2.50	3.38			4.25	3.97		4.11		3.95	--	3.79	--	2	
		555	BTS 8976	2.50	4.07			4.25	4.78		4.52		4.27	--	4.02	--	2	
		554	Crystal 021	2.18	3.44			3.71	4.04		3.88		--	--	--	--	1	
		556	Crystal 022	2.10	2.90			3.57	3.41		3.49		--	--	--	--	1	
		567	Crystal 024	2.08	3.26			3.54	3.83		3.69		--	--	--	--	1	
		515	Crystal 025	2.22	3.12			3.78	3.67		3.72		--	--	--	--	1	
		506	Crystal 026	2.14	2.97			3.64	3.49		3.57		--	--	--	--	1	
		527	Crystal 027	2.25	3.80			3.83	4.47		4.15		--	--	--	--	1	
		542	Crystal 029	2.66	3.49			4.53	4.10		4.31		--	--	--	--	1	
		547	Crystal 572	2.58	3.43			4.39	4.03		4.21		4.17	4.30	4.14	4.54	6	
		514	Crystal 574	2.38	3.67			4.05	4.31		4.18		4.32	4.33	4.45	4.36	6	
		509	Crystal 684	2.54	3.39			4.32	3.99		4.15		4.08	4.18	4.01	4.39	5	
		565	Crystal 793	3.05	3.82			5.19	4.49		4.84		4.51	4.38	4.18	4.11	4	
		516	Crystal 796	2.71	3.65			4.61	4.29		4.45		4.15	4.09	3.85	3.97	4	
		533	Crystal 803	2.97	4.20			5.05	4.94		5.00		4.77	4.73	4.54	4.67	3	
		503	Crystal 804	2.24	3.39			3.81	3.99		3.90		3.81	3.88	3.72	4.02	3	
		560	Crystal 808	2.30	3.27			3.91	3.84		3.88		3.98	3.93	4.09	3.83	3	
		569	Crystal 912	2.15	2.91			3.66	3.42		3.54		3.56	--	3.58	--	2	
		511	Crystal 913	2.62	4.00			4.46	4.70		4.58		4.44	--	4.31	--	2	
		558	Crystal 916	2.71	3.83			4.61	4.50		4.56		4.41	--	4.26	--	2	
		519	Hilleshög HIL2233	2.78	3.51			4.73	4.13		4.43		4.11	4.08	3.78	4.04	3	
		557	Hilleshög HIL2317	3.06	3.99			5.21	4.69		4.95		4.57	--	4.19	--	2	
		528	Hilleshög HIL2320	3.07	3.45			5.22	4.06		4.64		4.34	--	4.04	--	2	
		544	Hilleshög HIL2366	2.52	3.57			4.29	4.20		4.24		--	--	--	--	1	
		517	Hilleshög HIL2367	2.61	3.47			4.44	4.08		4.26		--	--	--	--	1	
		502	Hilleshög HIL2368	2.05	3.02			3.49	3.55		3.52		--	--	--	--	1	
		534	Hilleshög HIL2369	2.80	3.82			4.77	4.49		4.63		--	--	--	--	1	
		553	Hilleshög HIL2370	2.82	3.57			4.80	4.20		4.50		--	--	--	--	1	
		574	Hilleshög HIL9708	2.26	3.24			3.85	3.81		3.83		3.85	3.80	3.87	3.71	6	
		559	Hilleshög HIL9920	3.38	3.81			5.75	4.48		5.12		4.90	4.82	4.68	4.65	4	
		508	Hilleshög HM4448RR	2.77	4.08			4.71	4.80		4.76		4.40	4.39	4.04	4.38	8	
		526	Hilleshög HM9528RR	2.70	3.87			4.59	4.55		4.57		4.33	4.24	4.10	4.04	7	
		535	Maribo MA504	2.96	3.94			5.04	4.63		4.83		4.76	4.59	4.69	4.25	6	
		561	Maribo MA717	2.84	3.73			4.83	4.38		4.61		4.38	4.37	4.15	4.35	4	
		538	Maribo MA902	2.22	3.47			3.78	4.08		3.93		3.95	--	3.97	--	2	
		537	Maribo MA903	2.35	3.35			4.00	3.94		3.97		3.93	--	3.89	--	2	
		529	Maribo MA922	2.72	4.28	196	4.63	5.03		4.83		--	--	--	--	--	1	
		541	Maribo MA923	2.93	4.32			4.99	5.08		5.03		--	--	--	--	1	
		562	SV 201	2.74	4.01			4.66	4.71		4.69		--	--	--	--	1	
		523	SV 202	3.60	4.82			6.13	5.67		5.90		--	--	--	--	1	
		572	SV 203	2.42	3.80			4.12	4.47		4.29		--	--	--	--	1	
		568	SV 204	2.81	3.75			4.78	4.41		4.60		--	--	--	--	1	

	539	SV 285	2.49	3.26		4.24	3.83		4.03	4.21	4.26	4.38	4.35	3
	501	SV 393	2.95	4.17		5.02	4.90		4.96	4.65	—	4.33	—	2
	548	SV 265	2.59	3.41		4.41	4.01		4.21	4.23	4.26	4.25	4.32	5
	551	SV 268	3.09	4.45		5.26	5.23		5.24	4.73	4.55	4.21	4.21	5
	504	SV 333	2.51	4.21		4.27	4.95		4.61	4.34	4.31	4.08	4.23	8
	576	SV 375	2.72	3.79		4.63	4.46		4.54	4.30	4.24	4.05	4.13	4
	540	SX 1801	3.37	3.99		5.74	4.69		5.21	—	—	—	—	1
	545	SX 1802	2.88	3.42		4.90	4.02		4.46	—	—	—	—	1
	507	SX 1803	2.62	3.56		4.46	4.19		4.32	—	—	—	—	1
	530	SX 1804	2.52	3.80		4.29	4.47		4.38	—	—	—	—	1
	566	SX 1887	3.00	3.83		5.11	4.50		4.80	4.49	4.38	4.18	4.16	3
	512	SX 1888	2.46	3.53		4.19	4.15		4.17	4.18	4.31	4.19	4.57	3
	522	SX 1898	2.58	3.34		4.39	3.93		4.16	4.19	—	4.21	—	2
	525	SX Marathon	2.67	3.39		4.54	3.99		4.26	4.31	4.27	4.36	4.19	6
1	1	1301 RH CK#08 CRY539	3.57	4.68		6.08	5.50		5.79	5.23	5.05	4.67	4.68	12
1	1	1302 RH CK#21 CRY5768	2.75	3.67		4.68	4.31		4.50	4.58	4.56	4.66	4.52	12
1	1	1303 RH CK#25 HILL4043RR	2.86	4.18		4.87	4.91		4.89	4.78	4.80	4.66	4.83	12
1	1	1304 RH CK#35 SES36812RR	2.67	3.73		4.54	4.38		4.46	4.38	4.35	4.29	4.29	13
1	1	1305 RH CK#36 BTS85RR02	2.90	4.48		4.94	5.27		5.10	4.83	4.71	4.56	4.46	16
1	1306	RH CK#37 SES36918RR	2.71	3.46		4.61	4.07		4.34	4.54	4.47	4.75	4.32	12
1	1	1307 RH CK#40 CRY5101	2.60	3.93		4.42	4.62		4.52	4.63	4.58	4.73	4.50	10
1	1308	RH CK#45 BTS82RR33	2.15	3.29		3.66	3.87		3.76	3.92	4.18	4.09	4.70	9
1	1309	RH CK#47 SES36272RR	2.47	3.84		4.20	4.51		4.36	4.31	4.33	4.26	4.36	9
1	1310	RH CK#48 HILL4094RR	2.01	3.23		3.42	3.80		3.61	3.79	3.77	3.98	3.72	13
1	1	1311 RH CK#49 CRY5247	2.56	3.79		4.36	4.46		4.41	4.28	4.39	4.16	4.62	9
1	1	1312 RH CK#51 SXWinchester	2.45	3.69		4.17	4.34		4.25	4.28	4.35	4.30	4.50	8
1	1	1313 RH CK#52 CRY573	3.23	4.35		5.50	5.11		5.31	4.75	4.66	4.20	4.48	6
1	1	1314 RH CK#53 BTS8500	2.49	3.86		4.24	4.54		4.39	4.51	4.45	4.63	4.32	6
1	1315	RH CK#54 CRY574	2.31	3.33		3.93	3.91		3.92	4.19	4.24	4.45	4.36	6
	1316	MOD RHC #9	2.72	3.90		4.63	4.58		4.61	4.53	4.47	4.45	4.36	6
	1317	RES RHC #1	1.89	2.75		3.22	3.23		3.22	3.64	3.59	4.06	3.49	15
	1318	RES RHC #3	1.94	3.26		3.30	3.83		3.57	3.73	3.61	3.90	3.36	7
	1319	SUS RHC #10	3.15	4.11		5.36	4.83		5.10	4.70	4.63	4.30	4.51	12
	1320	SUS RHC #3	3.91	4.12		6.65	4.84		5.75	5.17	5.01	4.58	4.71	16
15	Mean of Check Varieties		2.65	3.83		4.51	4.51		4.51	4.47	4.46	4.43	4.44	
9	Mean of Susc Checks		2.82	4.07		4.66	4.63		4.65	4.55	4.56	4.46	4.57	
	Trial Mean		2.63	3.67		4.48	4.31							
	Coeff. of Var. (%)		15.7	10.3		15.7	10.3							
	Mean LSD (0.05)		0.56	0.54		0.95	0.63							
	Mean LSD (0.01)		0.74	0.71		1.26	0.83							
	Sig Lvl		**	**		**	**							
	Adjustment Factor		1.7018	1.1756										
	Approval Limit (80% of susc chec		2.26	3.26		3.73	3.70		3.72	3.64	3.65	3.57	3.66	
	++ Adjustment is based upon check varieties.													
	+ Data not adequate in 2020.													
	@ 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 x 0.80 (approval option 1) or 3.82 (approval option 2).													
	Green highlighted ratings indicate good resistance.													
	Red highlighted ratings indicate a level of concern.													

		Table 23.											
		2020 Fusarium Ratings for Official Trial Entries											
		ACSC Nurseries - (Two Moorhead, MN Sites)											
		Unadjusted				Adjusted							
Chk	@	Code	Description	N Mhd	S Mhd	N Mhd	S Mhd	2020		2 Yr	3 Yr	2019	
				4 Dates+	4 Dates+	4 Dates+	4 Dates+	2020	2 Yr	3 Yr	2019	2018	
												Years	
	518	BTS 8007		2.01	2.70	2.30	2.66	2.48	--	--	--	--	1
	513	BTS 8009		2.71	3.70	3.10	3.64	3.37	--	--	--	--	1
	549	BTS 8013		1.94	2.42	2.22	2.38	2.30	--	--	--	--	1
	521	BTS 8018		2.16	2.51	2.47	2.47	2.47	--	--	--	--	1
	546	BTS 8034		1.75	2.56	2.00	2.52	2.26	--	--	--	--	1
	550	BTS 8042		2.02	2.64	2.31	2.60	2.46	--	--	--	--	1
	570	BTS 8055		1.79	2.53	2.05	2.49	2.27	--	--	--	--	1
	571	BTS 8073		1.97	2.96	2.26	2.91	2.58	--	--	--	--	1
	520	BTS 8090		2.10	2.69	2.40	2.65	2.53	--	--	--	--	1
	505	BTS 8092		3.09	3.92	3.54	3.86	3.70	--	--	--	--	1
	510	BTS 8337		3.10	3.77	3.55	3.71	3.63	3.60	3.79	3.57	4.18	8
	573	BTS 8500		2.01	2.49	2.30	2.45	2.38	2.32	2.37	2.27	2.46	6
	552	BTS 8524		2.69	2.99	3.08	2.94	3.01	3.08	3.36	3.14	3.93	6
	564	BTS 8606		2.24	3.23	2.57	3.18	2.87	2.78	3.07	2.68	3.66	5
	524	BTS 8629		3.22	3.94	3.69	3.88	3.78	3.75	3.96	3.71	4.40	5
	536	BTS 8767		1.93	2.74	2.21	2.70	2.45	2.45	2.77	2.45	3.41	4
	575	BTS 8815		2.19	2.69	2.51	2.65	2.58	2.63	2.97	2.69	3.64	3
	543	BTS 8882		1.84	2.15	2.11	2.11	2.11	2.51	2.80	2.91	3.39	3
	532	BTS 8927		2.00	2.93	2.29	2.88	2.59	2.68	--	2.77	--	2
	563	BTS 8938		3.07	3.87	3.52	3.81	3.66	3.36	--	3.06	--	2
	531	BTS 8961		1.85	2.30	2.12	2.26	2.19	2.37	--	2.55	--	2
	555	BTS 8976		2.35	3.20	2.69	3.15	2.92	3.30	--	3.68	--	2
	554	Crystal 021		2.26	3.17	2.59	3.12	2.85	--	--	--	--	1
	556	Crystal 022		1.92	3.06	2.20	3.01	2.60	--	--	--	--	1
	567	Crystal 024		1.98	2.64	2.27	2.60	2.43	--	--	--	--	1
	515	Crystal 025		2.06	2.71	2.36	2.67	2.51	--	--	--	--	1
	506	Crystal 026		2.08	2.27	2.38	2.23	2.31	--	--	--	--	1
	527	Crystal 027		2.00	2.64	2.29	2.60	2.44	--	--	--	--	1
	542	Crystal 029		2.00	2.60	2.29	2.56	2.42	--	--	--	--	1
	547	Crystal 572		1.92	2.57	2.20	2.53	2.36	2.37	2.81	2.39	3.70	6
	514	Crystal 574		1.75	2.56	2.00	2.52	2.26	2.15	2.39	2.03	2.87	6
	509	Crystal 684		1.86	2.55	2.13	2.51	2.32	2.21	2.46	2.10	2.96	5
	565	Crystal 793		2.10	2.87	2.40	2.82	2.61	2.66	2.97	2.71	3.59	4
	516	Crystal 796		1.90	2.26	2.18	2.22	2.20	2.33	2.67	2.45	3.36	4
	533	Crystal 803		2.07	2.72	2.37	2.68	2.52	2.61	3.11	2.70	4.11	3
	503	Crystal 804		1.99	2.33	2.28	2.29	2.29	2.28	2.54	2.28	3.05	3
	560	Crystal 808		1.95	2.50	2.23	2.46	2.35	2.37	2.62	2.39	3.12	3
	569	Crystal 912		3.13	3.69	3.58	3.63	3.61	3.49	--	3.37	--	2
	511	Crystal 913		2.01	2.93	2.30	2.88	2.59	2.57	--	2.56	--	2
	558	Crystal 916		1.96	2.67	2.24	2.63	2.44	2.46	--	2.49	--	2
	519	Hilleshög HIL2233		4.22	4.12	4.83	4.05	4.44	4.40	4.69	4.35	5.28	3
	557	Hilleshög HIL2317		5.33	5.93	6.10	5.83	5.97	5.63	--	5.30	--	2
	528	Hilleshög HIL2320		3.94	4.69	4.51	4.61	4.56	4.47	--	4.37	--	2
	544	Hilleshög HIL2366		3.94	4.67	4.51	4.59	4.55	--	--	--	--	1
	517	Hilleshög HIL2367		3.97	4.40	4.55	4.33	4.44	--	--	--	--	1
	502	Hilleshög HIL2368		3.31	3.99	3.79	3.92	3.86	--	--	--	--	1
	534	Hilleshög HIL2369		4.01	5.06	4.59	4.98	4.78	--	--	--	--	1
	553	Hilleshög HIL2370		1.88	2.38	2.15	2.34	2.25	--	--	--	--	1
	574	Hilleshög HIL9708		3.12	3.77	3.57	3.71	3.64	3.76	4.05	3.89	4.61	6
	559	Hilleshög HIL9920		5.62	6.22	6.44	6.12	6.28	5.85	5.74	5.42	5.51	4
	508	Hilleshög HM4448RR		4.08	4.57	4.67	4.50	4.58	4.69	4.87	4.80	5.23	8
	526	Hilleshög HM9528RR		4.35	4.46	4.98	4.39	4.68	4.42	4.60	4.16	4.95	7
	535	Maribo MA504		3.48	4.59	3.98	4.52	4.25	4.43	4.55	4.61	4.80	6
	561	Maribo MA717		4.21	4.50	4.82	4.43	4.62	4.72	4.77	4.81	4.86	4
	538	Maribo MA902		3.20	4.43	3.66	4.36	4.01	3.86	--	3.71	--	2

	537	Maribo MA903	4.51	4.65	5.16	4.57	4.87	4.73	--	4.60	--	2
	529	Maribo MA922	3.84	4.24	4.40	4.17	4.28	--	--	--	--	1
	541	Maribo MA923	5.12	5.43	5.86	5.34	5.60	--	--	--	--	1
	562	SV 201	4.18	5.12	4.79	5.04	4.91	--	--	--	--	1
	523	SV 202	2.42	2.86	2.77	2.81	2.79	--	--	--	--	1
	572	SV 203	4.68	5.24	5.36	5.15	5.26	--	--	--	--	1
	568	SV 204	3.72	4.30	4.26	4.23	4.24	--	--	--	--	1
	539	SV 285	4.93	5.24	5.65	5.15	5.40	5.08	5.19	4.76	5.42	3
	501	SV 393	3.60	4.30	4.12	4.23	4.18	4.71	--	5.24	--	2
	548	SV 265	5.18	5.56	5.93	5.47	5.70	5.67	5.59	5.64	5.44	5
	551	SV 268	3.37	4.29	3.86	4.22	4.04	4.48	4.69	4.92	5.12	5
	504	SV 333	4.98	5.66	5.70	5.57	5.64	5.19	5.17	4.74	5.14	8
	576	SV 375	4.88	4.99	5.59	4.91	5.25	5.11	5.24	4.97	5.51	4
	540	SX 1801	2.92	4.12	3.34	4.05	3.70	--	--	--	--	1
	545	SX 1802	2.29	2.84	2.62	2.79	2.71	--	--	--	--	1
	507	SX 1803	4.35	4.71	4.98	4.63	4.81	--	--	--	--	1
	530	SX 1804	5.11	5.35	5.85	5.26	5.56	--	--	--	--	1
	566	SX 1887	3.50	4.66	4.01	4.58	4.30	4.49	4.77	4.68	5.35	3
	512	SX 1888	5.01	5.43	5.74	5.34	5.54	5.52	5.51	5.51	5.47	3
	522	SX 1898	5.02	5.16	5.75	5.08	5.41	5.28	--	5.14	--	2
	525	SX Marathon	4.96	5.14	5.68	5.06	5.37	5.53	5.53	5.70	5.51	6
1	1201	FS CK #08 HILL4000	5.66	6.58	6.48	6.47	6.48	6.22	6.08	5.96	5.81	13
1	1202	FS CK #09 HILL4010	6.55	6.93	7.50	6.82	7.16	6.90	6.57	6.64	5.91	15
1	1203	FS CK #12 HILL4012	5.77	6.39	6.61	6.29	6.45	6.04	5.92	5.63	5.68	15
1	1204	FS CK #13 HILL4043	4.58	5.16	5.24	5.08	5.16	5.52	5.59	5.87	5.73	14
1	1205	FS CK #18 CRYST768	3.53	4.45	4.04	4.38	4.21	4.33	4.50	4.45	4.85	12
1	1206	FS CK #28 SES3691	4.35	5.37	4.98	5.28	5.13	4.92	5.08	4.71	5.39	12
1	1207	FS CK #29 CRYST875	4.41	4.71	5.05	4.63	4.84	4.92	4.97	5.01	5.07	13
1	1208	FS CK #30 BTS8337	2.98	3.85	3.41	3.79	3.60	3.58	3.85	3.56	4.39	8
1	1209	FS CK #31 SXMarath	4.64	5.37	5.31	5.28	5.30	5.38	5.21	5.46	4.88	6
1	1210	FS CK #32 CRYST574	1.90	2.84	2.18	2.79	2.48	2.26	2.46	2.03	2.87	6
	1211	FS CHK MOD RR RE	3.65	4.10	4.18	4.03	4.11	4.09	4.24	4.07	4.53	14
	1212	FS CHK MOD RR SU	3.85	5.21	4.41	5.13	4.77	4.91	4.98	5.04	5.14	8
	1213	FS CHK RES RR #2	2.26	2.88	2.59	2.83	2.71	2.59	2.79	2.46	3.20	9
	1214	FS CHK SUS RR #10	4.29	5.01	4.91	4.93	4.92	5.03	5.08	5.15	5.17	7
	1215	FS CHK SUS RR #11	4.70	5.60	5.38	5.51	5.45	5.45	5.42	5.45	5.36	8
	1216	FS CHK SUS RR #2	6.03	6.63	6.90	6.52	6.71	6.30	6.13	5.89	5.80	10
10		Check Mean	4.44	5.17	5.08	5.08	5.08					
		Trial Mean	3.30	3.93	3.78	3.87	3.82					
		Coeff. of Var. (%)	11.1	11.9	11.1	11.9						
		Mean LSD (0.05)	0.45	0.57	0.52	0.56						
		Mean LSD (0.01)	0.59	0.75	0.68	0.74						
		Sig Mrk	**	**	**	**						
		Adj Factor			1.14510	0.98370						
		@ 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).										
		Green highlighted ratings indicate good resistance.										
		Red highlighted ratings indicate a level of concern.										

Table 24. Herbicides and Fungicides Applied to ACSC Official Trials

Location	Herbicide			Fungicide		
	Herbicide & Rate	Spray Dates	Method	Fungicide Used	Spray Dates	Method
Casselton	RU1, RU2	6/1, 6/23	Ground	CR1/CR2/CR3/CR4	7/7,7/17,7/31,8/22	Ground
Glyndon	RU1, RU2	6/2, 6/23	Ground	CR1/CR2/CR3/CR4	7/7,7/17,7/31,8/22	Ground
Perley	RU1, RU2	6/24, 7/14	Ground	CR2/CR4	7/30,8/22	Ground
Ada	RU1, RU2	6/2, 6/23	Ground	Air/CR2/CR3/CR4	7/6,7/17,7/31,8/22	Air/Ground
Grandin	RU1, RU2	6/24, 7/14	Ground	CR2/CR4	7/30,8/22	Ground
Grand Forks	RU1, RU2, RU2	6/4, 6/25, 8/3	Ground	CR2/CR3/CR4	7/15,7/30,8/22	Ground
Scandia	RU1, RU2	6/12, 7/6	Ground	CR2/CR3/CR4	7/10,7/29,8/22	Ground
Climax	RU1, RU2	6/12, 7/6	Ground	CR2/CR3/CR4	7/10,7/28,8/22	Ground
East Grand Forks	RU1, RU2	6/12, 7/14	Ground	CR2/CR3/CR4	7/15,7/28,8/22	Ground
St. Thomas	RU1, Outlook	6/19, 6/20	Ground	CR2/CR4	7/28,8/22	Ground
Bathgate	RU1, RU2	6/19, 7/6	Ground	CR2/CR4	7/28,8/22	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). CR1=Insire XT + Manzate

RU2 = Roundup Powermax (22 oz./A), Event (1 gal./100 gal water). CR2=Agritin + Incognito

Counter 20G applied at 8.9 lbs./A at all locations. CR3=Proline+Manzate

AZteroid infurrow was used at all locations. CR4=Priaxor + Agritin

Quadris was applied to 4-8 leaf beets at all locations