2023-2024
Spreckels Sugar
RESEARCH REPORT

WORKING TOGETHER

SPRECKELS

Research

TABLE OF CONTENTS

SPRECKELS
Research

2023-2024 Sugar Beet Emergence Utilizing Furrow and Sprinkler Irrigation – Research Trial

Mark Bloomquist[1], Joaquin Santiago[1], and John Lamb[2]
Spreckels Sugar Company Inc[1]., University of Minnesota[2]

Justification:

The Imperial Valley climate can be very harsh for the emergence of seedling sugar beet plants. The daily high temperatures in September are often in excess of 100 degrees F. In addition to these temperatures, many of the soils in the Imperial Valley have salt levels that can create emergence issues for small-seeded crops. Traditionally, sugar beet is furrow irrigated in the Imperial Valley. However, there has been increasing interest in utilizing solid set sprinkler pipe during the germination and emergence period and then converting the field to furrow irrigation once the sugar beet stand is established. This project was developed to quantify if there are sugar beet emergence differences between these two irrigation methods. If differences exist, do these differences equate to a root yield and quality difference at harvest?

Objective:

The objective of this project is to determine if an advantage exists to sprinkler irrigation versus furrow irrigation during the germination and emergence period. Comparisons will include emergence percent, root yield, and root quality. The project consists of a replicated research trial conducted at the Imperial Valley Research Center in Brawley, CA. The trial compared sprinkler irrigation to furrow irrigation during the emergence period. Two varieties were utilized to compare variety responses to the two irrigation types. The 2023-2024 growing season was the third year of the project.

Material and Methods:

In the fall of 2023, a research trial was initiated at the Imperial Valley Research Center, Brawley, CA. The trial was conducted as a randomized complete block in a split-plot arrangement with three replications. Irrigation type (sprinkler, furrow) was the whole plot, and variety was the subplot. The two varieties utilized in the trial were BTS 5678 and SV 983. The irrigation strips were set up as 12-row strips with 12 rows of unplanted area between the strips. The unplanted area separated the irrigation treatments to prevent water from the sprinkler treatments from reaching the adjacent strip. Figure 1 is a map of the trial.

Before listing beds, 100 pounds per acre of MAP fertilizer (11-52-0) was applied to the trial area. Once beds were listed, 120 pounds of nitrogen per acre was injected into the bed as urea ammonium nitrate (UAN32) liquid fertilizer (32-0-0). The beds were shaped, and the trial was planted on September 25, 2023, at a 3" seed spacing. Following planting, irrigation basins were constructed on the furrow irrigation strips, and sprinkler pipe was installed in the sprinkler irrigation strips. On November 8, 2023, an additional 52 pounds per acre of UAN32 nitrogen fertilizer was injected into the side of the bed as a layby treatment. Table 1 shows the dates irrigation treatments were applied. The sprinkler treatment utilized 5/64" nozzles and 40 psi. The furrow irrigation was applied with a 1.25" siphon tube in each row. The furrow treatment applied a total of 12.2" of irrigation water per acre, and 5.26" of water per acre was

applied by the sprinkler treatment. The sprinkler treatment applied less than half the amount of the water used in the furrow emergence treatment.
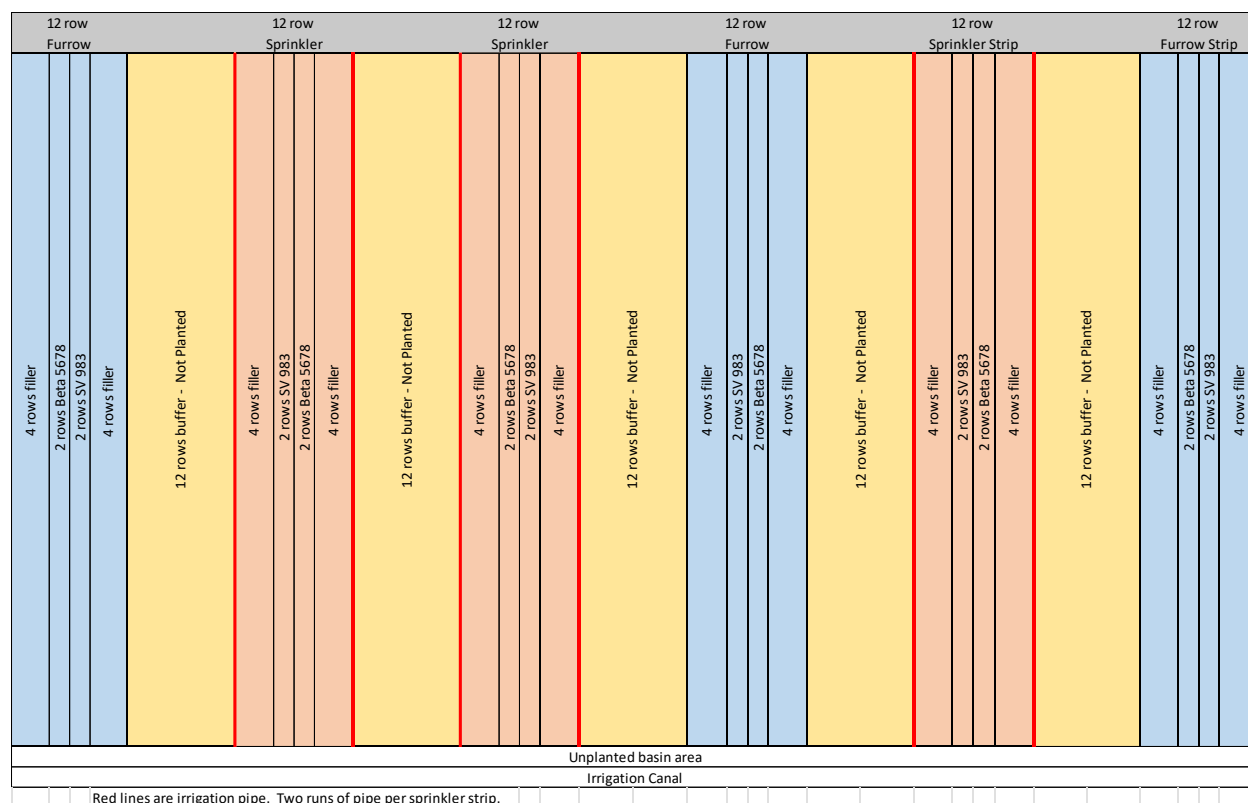

Figure 1. Trial map of 2023-2024 Early Season Irrigation Trial.

Table 1. Emergence irrigation treatments.

Irrigation Treatment	Date	Hours of Water Application
Sprinkler	September 26, 2023	24 hours
Sprinkler	September 28, 2023	12 hours
Sprinkler	October 2, 2023	8 hours
Furrow	September 26, 2023	6 hours
Furrow	October 2, 2023	3 hours

Emergence stand counts were taken on October 12, 2023, and a final stand count was taken on October 24, 2023. Stand counts were taken for both varieties on each subplot by counting all the emerged beets per range. This provided ten stand counts per variety per replicate. For the analysis, stand counts were converted to sugar beet plants per 100 feet of row. Crop protection products were applied to the trial as needed during the growing season. After the initial irrigation treatments, the entire trial was converted to furrow irrigation, and all treatments received the same irrigation practices and amounts of water for the remainder of the season.

The trial was harvested on April 18, 2024. Root yield was collected for each variety and each irrigation treatment with a two-row research harvester. Plot weights were recorded on the harvester, and a sub-sample of the beets was obtained for quality analysis at the Spreckels Sugar Tare Lab. The trial was analyzed as an RCBD in a split-plot arrangement with sampling. The analysis was conducted utilizing Proc Mixed in SAS 9.4. Treatment differences were considered significant at a 0.1 significance level.

Results and Discussion:

Table 2 contains the results of the statistical analysis. An interaction occurred with the emergence percent, sugar beet stand, root yield, and extractable sucrose per acre. The interactions for emergence percent and sugar beet stand appear to be caused by different variety responses to the irrigation treatments. Figure 2 and Figure 3 contain the emergence and sugar beet stand counts for all four treatments. The SV 983 showed a greater advantage to sprinkler irrigation than BTS 5678. Figure 4 contains the root yield for the four treatments, and Figure 5 contains the extractable sucrose per acre. For the root yield and extractable sucrose per acre, SV 983 with sprinkler irrigation showed a greater advantage to sprinkler irrigation than the BTS 5678.

Table 2. Statistical analysis of the 2023-2024 trial.

Term	Emergence	Beet Stand	Root Yield	Sucrose %	ESA
Irrigation Type	<0.0001	<0.0001	0.116	0.535	0.018
Variety	<0.0001	<0.0001	<0.0001	0.0014	<0.0001
I x V	0.0431	0.0451	0.004	0.1072	0.0005
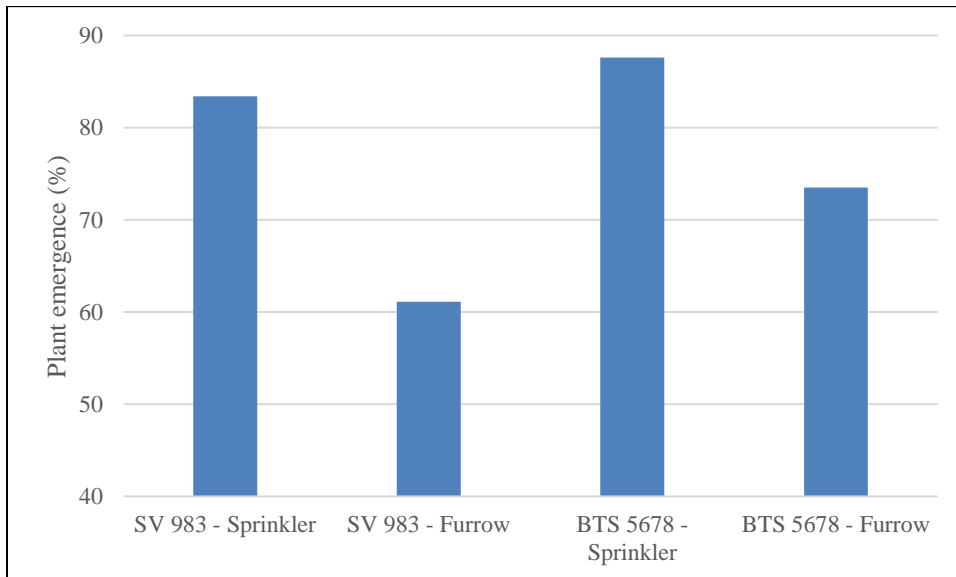
Figure 2. Emergence percent of SV983 and BTS 5678 for both the sprinkler and furrow treatments.
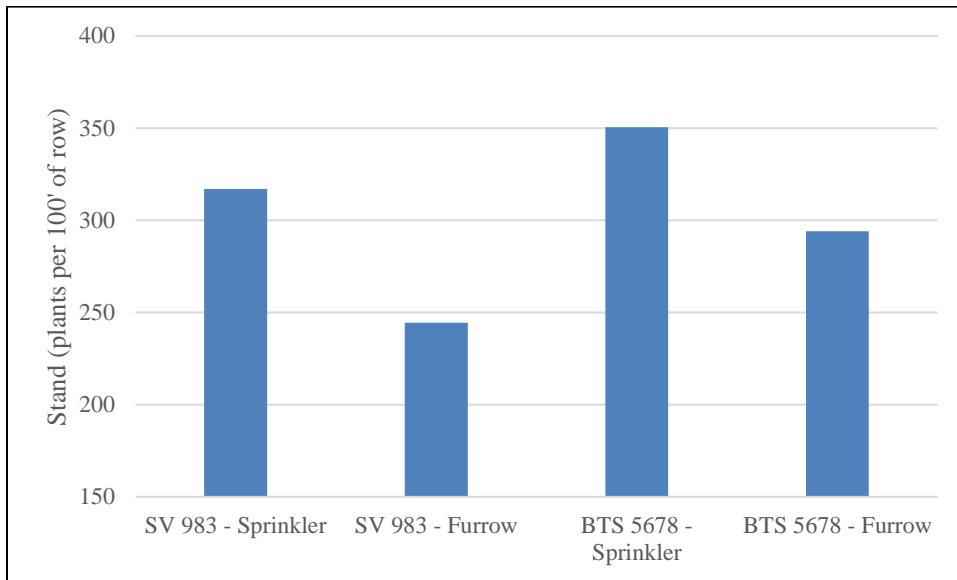
Figure 3. Sugar beet stand counts per 100' of row of SV 983 and BTS 5678 for both the sprinkler and furrow treatments.
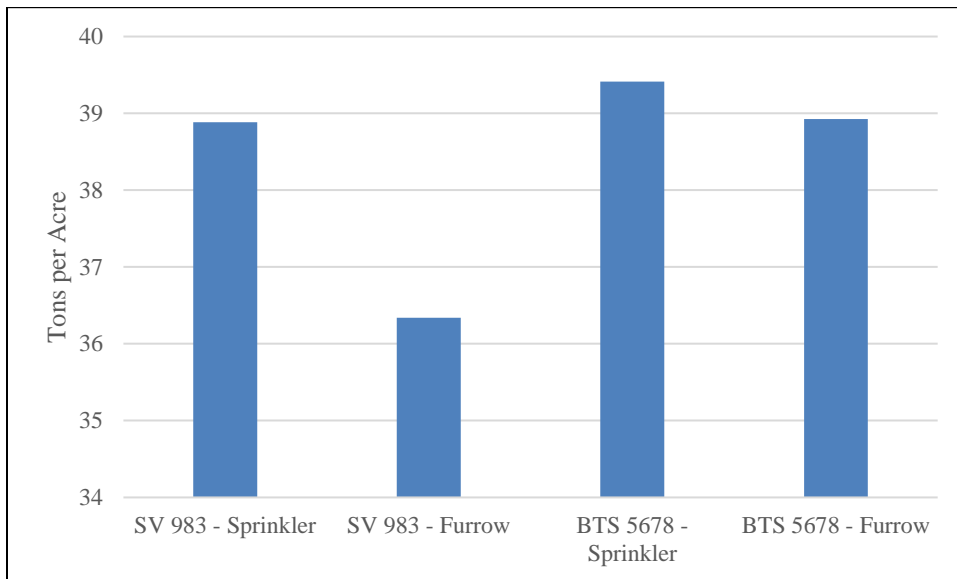
Figure 4. Sugar beet root yield for SV 983 and BTS 5678 for both the sprinkler and furrow treatments.
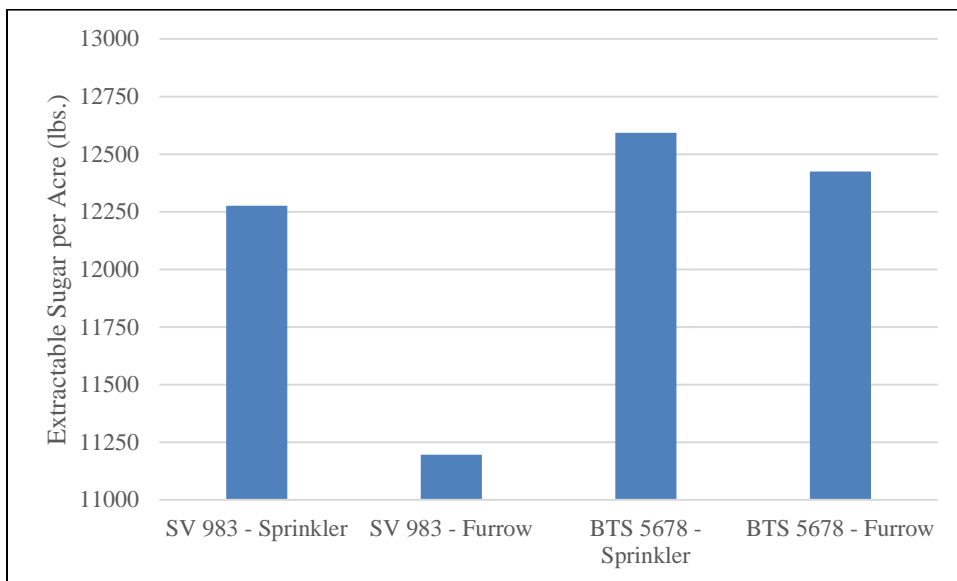
Figure 5. Extractable sucrose per acre for SV 983 and BTS 5678 for both sprinkler and furrow treatments.

The emergence and yield results from the 2023-2024 trial show similar results to the 2021-2022 trial with an increased benefit to sprinkler irrigation than seen in the 2022-2023 trial results. The 2021-2022 and 2022-2023 trial results can be found in the Spreckels Sugar Research Reports on the Spreckels Sugar website: https://www.spreckelssugar.com/Agronomy/Research.aspx. One possible reason for the difference between years is each season's temperature patterns in September and early October.

Conclusions:

In the first season (2021-2022) of this early season irrigation trial, sugar beet emergence, sugar beet stand, and extractable sucrose per acre were increased by sprinkler irrigation compared to furrow irrigation during the germination and emergence period. The results from the second season (2022-2023) of the trial did not show as large of an advantage to sprinkler irrigation for sugar beet emergence and stand. The emergence, final stands, root yields, and extractable sucrose per acre results from season three (2023-2024) of the trial did show an advantage to the sprinkler system. In two of the three seasons the trials were conducted, sprinkler irrigation showed an advantage over furrow irrigation for sugar beet emergence and extractable sucrose per acre.

Acknowledgements:

2023-2024 Late Season Irrigation Trial

Mark Bloomquist[1], Joaquin Santiago[1], and John Lamb[2]
Spreckels Sugar Company Inc[1]., University of Minnesota[2]

Justification:

Sugar beet harvest in the Imperial Valley of California typically begins around April 1 and continues until approximately August 1 each season. During the final 4-6 weeks of the harvest season, daily temperatures in the Imperial Valley often exceed 110 degrees Fahrenheit. This extreme heat, in combination with anaerobic soil conditions that can occur with furrow irrigation water applications, creates an environment favorable for "late rot" to develop in the sugar beet roots. Phytophthora and Pythium root rot are two root diseases that can develop under these conditions (UC IPM, 2009). Because multiple organisms can cause late rot, the disease will be referred to as late rot complex in this report. Rot developing in the sugar beet during the late harvest season decreases the crop's sucrose content, purity, and root yield potential. In severe infestations of late rot, fields must be rogued to remove rot-infested sugar beet roots or abandoned. Preliminary field observations by Imperial Valley growers suggest that sprinkler irrigation late in the growing season may reduce late rot development in fields compared to furrow irrigated fields. This research project is in its second season and was developed to investigate the effect of variety tolerance to late rot using sprinkler and furrow irrigation in a controlled experiment.

Objective:

Determine the effect of variety tolerance with sprinkler and furrow irrigation on late rot development, root yield, and root quality during the July to August harvest period.

Materials and Methods:

In the fall of 2023, a research trial was initiated at the Imperial Valley Research Center, Brawley, CA. The trial was conducted as a randomized complete block in a split-plot arrangement with three replications. Irrigation type (sprinkler, furrow) was the whole plot, and variety was the subplot. The trial utilized two varieties, a late rot tolerant variety (BTS 5460) and a late rot susceptible variety (SV 501). The irrigation strips were set up as 12-row strips with 12 rows of unplanted area between the irrigation treatments. The unplanted area separated the irrigation treatments to prevent water from the sprinkler treatments from reaching the adjacent strip. Figure 1 is a map of the trial site.

Before listing beds, 100 pounds per acre of MAP fertilizer (11-52-0) was applied to the trial area. The soil test residual nitrogen was 135 pounds per acre to a four-foot depth. Once beds were listed, 140 pounds of N per acre was injected into the bed as urea ammonium nitrate liquid fertilizer, UAN32 (32-0-0). On November 10, 2022, an additional 52 pounds of N per acre was applied as UAN 32 as a layby application. The beds were shaped, and the trial was planted on October 6, 2023, at a 3" seed spacing. Following planting, sprinkler irrigation was applied to the entire trial for germination and emergence.

SPRECKELS
Research
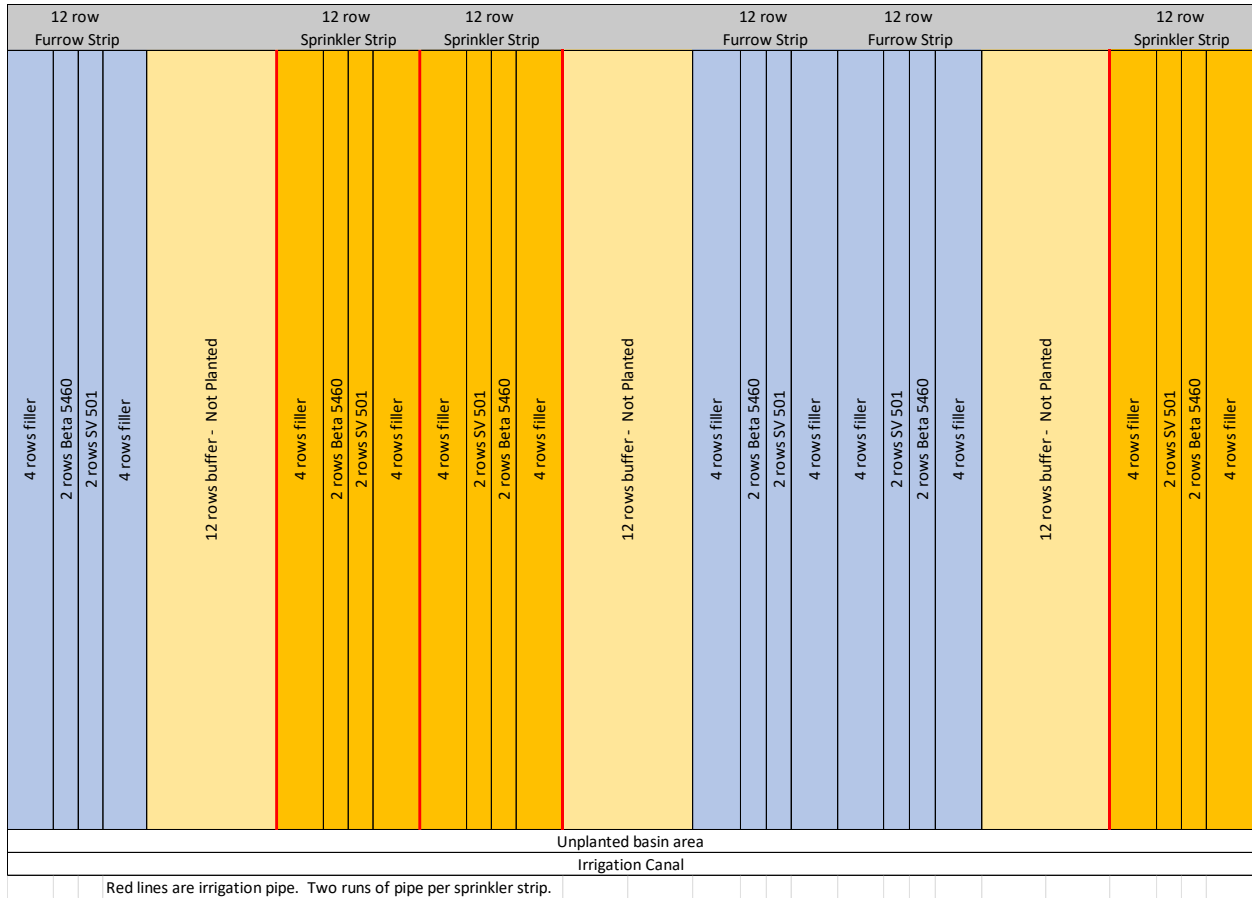
Figure 1. Map of 2023-2024 Late Season Irrigation Trial.

Following emergence, subplots were established in each variety and irrigation type. The subplots were 30 feet long, minus a four-foot alley. These subplots were used for final stand counts, rot counts, harvest yield, and quality. Final stand counts were taken on November 7, 2023, for both varieties on each subplot by counting all the beets per plot. This provided ten stand counts per variety per replicate. On November 1, 2023, the trial was converted to furrow irrigation, and the irrigation water was applied to every other furrow until the irrigation treatments were installed in mid-May. Crop protection products were applied to the trial as needed during the growing season for weed, insect, and foliar disease management.

The irrigation treatments were installed in mid-May, and the first sprinkler versus furrow irrigation treatments were applied on May 24, 2024. Furrow irrigation was conducted with a 1.25" siphon tube on every other row. Sprinkler irrigation was conducted with a 5/64" sprinkler nozzle and 45 psi. The hours of operation were tracked to calculate the amount of water applied with each irrigation treatment. Table 1 contains the dates and hours of irrigation for the two irrigation treatments.

Table 1. Irrigation dates and hours of operation for the sprinkler and furrow irrigation treatments.

Sprinkler Treatment			Furrow Treatment		
Date	**Hours**		**Date**	**Hours**	**Notes**
21-May	14		21-May	5	siphon tube every row
30-May	12		31-May	5	siphon tube every other row
6-Jun	14		10-Jun	6	siphon tube every other row
13-Jun	14		18-Jun	6	siphon tube every other row
20-Jun	16		28-Jun	5	siphon tube every other row
27-Jun	16		5-Jul	6	siphon tube every other row
4-Jul	12		12-Jul	5	siphon tube every other row
11-Jul	12		19-Jul	4	siphon tube every other row
18-Jul	14		25-Jul	4	siphon tube every other row
24-Jul	14				

Total water use was calculated based on hours of operation for each irrigation type and an application rate of 0.127" per hour for sprinkler irrigation and 0.685" per hour for furrow irrigation. The total water applied through the sprinklers was 17.6 inches, and for the furrow treatment, the total application was 34.9 inches.

Rot counts were taken across the trial on July 9, 16, 23, 30, and August 5, 2024. The rot counts included counting all the beets with visual above ground rot symptoms in each subplot. The number of rot beets was divided by the final stand of each subplot to determine the percentage of rot for each subplot.

The trial was defoliated on August 5, and all beets with visual rot symptoms were rouged out of the row before harvest. The rouging of the rotten beets out of the row follows the harvest practice that growers must do when late rot reaches a critical level in their field. Removing the rotten beets from the row provides a harvest root yield and quality based on good-quality sugar beets. Harvest was conducted on August 5 and 6, 2024. Root yield was collected in each variety and each irrigation treatment with a two-row research harvester. Plot weights were recorded on the harvester, and a sub-sample of the beets was obtained for quality analysis at the Spreckels Sugar Tare lab.

Extractable sucrose per acre and gross revenue per acre were calculated for each subplot. Gross revenue per acre was calculated using a Spreckels Sugar revenue calculator with a $37 per hundredweight net selling price of sugar. The trial was analyzed as an RCBD in a split-plot arrangement with sampling. The analysis was conducted utilizing Proc Mixed in SAS 9.4. Treatment differences were considered significant at a 0.1 significance level.

Results:

Rot counts were taken each week for five weeks before the trial harvest. These rot counts were converted to a percentage of rot and are shown in Figure 2. The percentage of rot increased in all four treatments. However, the tolerant variety with sprinkler irrigation remained the lowest of all the treatments at 1.8% rot on August 5. The susceptible variety with furrow irrigation had the highest percentage of rot at 16.8% on August 5. The combination of the tolerant variety with sprinkler irrigation provided the best suppression of late rot of the four treatments in the trial.
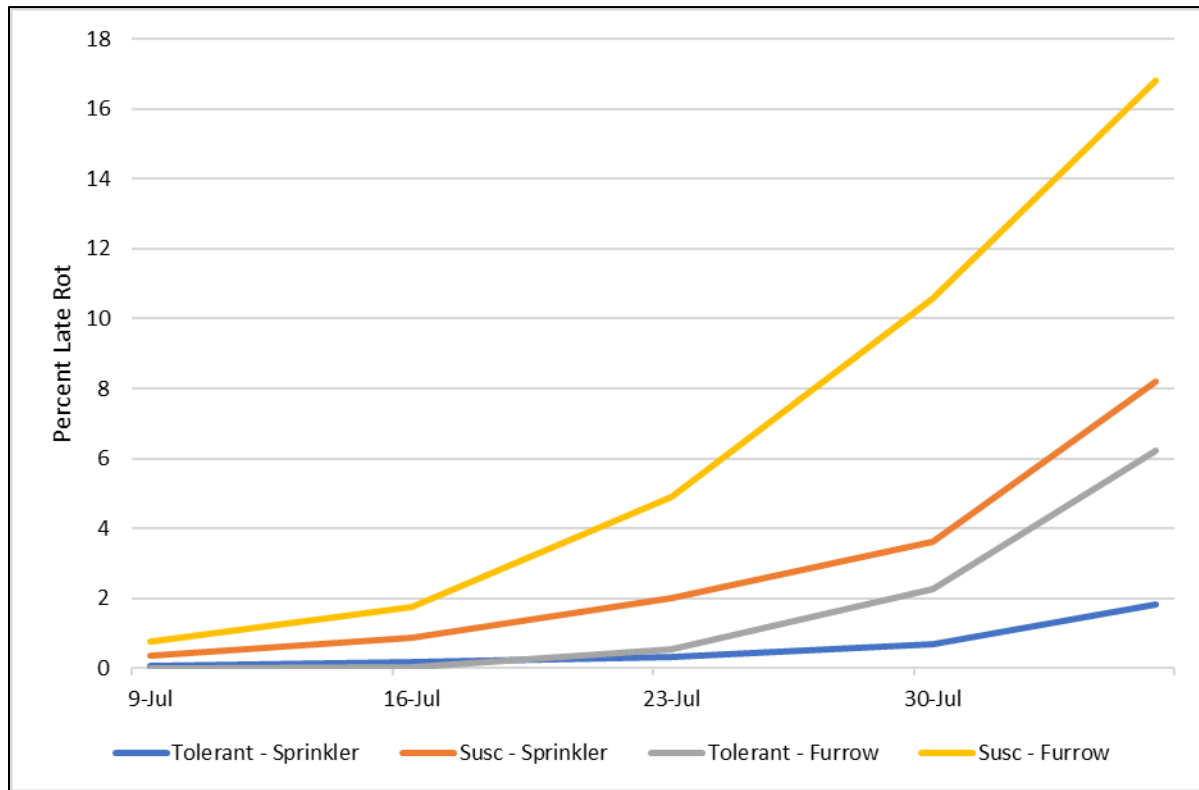
Figure 2. Percent rot of the treatments between July 9 and August 5, 2024.

The root yield, quality, and gross revenue results were tabulated for irrigation type, variety, and variety by irrigation type. Table 2 contains the root yield, quality, and gross revenue results by irrigation type. Sucrose content, purity, extractable sugar per acre, and revenue per acre were statistically greater with sprinkler irrigation versus furrow irrigation. Root yield was numerically greater for sprinkler irrigation but not statistically significant. This could be caused by the number of replications, which are only three for the trial. The study will be conducted over additional years to increase the precision of the evaluation of the irrigation systems.

Root yield, quality, and gross revenue results by variety are shown in Table 3. The late rot tolerant variety had statistically greater root yield, extractable sucrose per acre, and gross revenue per acre compared to the susceptible variety. In Figure 2, the rot percentage was considerably greater in the susceptible variety, leading to a decrease in root yield for the susceptible variety. The susceptible variety did, however, have statistically greater sucrose content than the tolerant variety. This difference in sucrose content is likely caused by the susceptible variety being genetically greater in sucrose content and the rot beets being rogued out of the row, preventing low-quality rot-infected beets from being harvested. The differences in root yield are greater by variety than by irrigation type; the difference in root yield was enough to be statistically significant by variety. Table 4 contains the root yield, quality, and gross revenue information for each variety by irrigation treatment.

Table 2. Yield results by irrigation type.

Irrigation Type	Root yield (tons/acre)	Sucrose%	Purity %	ESA (lbs./A)	Rev/Acre ($/A)
Sprinkler	59.9	16.6a	87.6a	15,980a	$3,583a
Furrow	56.8	15.2b	85.2b	13,217b	$2,947b
Pr>F	0.2866	<0.0001	0.012	0.023	0.022
Alpha	0.1	0.1	0.1	0.1	0.1
Reps	3	3	3	3	3

Table 3. Yield results by variety.

Variety	Root yield (tons/acre)	Sucrose %	Purity %	ESA (lbs./A)	Rev/Acre ($/A)
Tolerant Variety (BTS 5460)	63.8a	15.7a	86.6	15,831a	$3,542a
Susceptible Variety (SV 501)	52.9b	16.0b	86.2	13,365b	$2,987b
Pr>F	<0.0001	0.0074	0.2496	<0.0001	<0.0001
Alpha	0.1	0.1	0.1	0.1	0.1
Reps	3	3	3	3	3

Table 4. Yield results by irrigation type and variety.

Irrigation Type	Variety	Root yield (tons/acre)	Sucrose %	Purity %	ESA (lbs./A)	Rev/Acre ($/A)
Sprinkler	Tolerant	64.4	16.4	87.8	17,030	$3,820
Sprinkler	Susceptible	55.5	16.7	87.4	14,929	$3,345
Furrow	Tolerant	63.2	15.0	85.4	14,632	$3,264
Furrow	Susceptible	50.3	15.3	85.0	11,802	$2,629

Conclusions:

The late rot tolerance of certain varieties has been established through the Official Variety Trials and grower field information in the past, and this trial supports that data for variety tolerance. Tolerant varieties are very important for successful sugar beet production on fields harvested in July and August. In the 2023-2024 trial, sprinkler irrigation was better than furrow irrigation for reducing rot development and increasing yield and revenue. The treatment, including a tolerant variety and sprinkler irrigation, had the lowest amount of rot and the highest extractable sugar yield and revenue per acre. Spreckels Research is repeating this trial at the Imperial Valley Research Center for the 2024-2025 growing season.

Acknowledgments:

References:

University of California Integrated Pest Management. (2009) Sugar Beet Phytophthora and Pythium Root Rots. http://ipm.ucanr.edu/PMG/r735100711.html (accessed 14 October 2024).

2023-2024 Imperial Valley Official Variety Trial Procedures

Mark Bloomquist and Joaquin Santiago
Spreckels Sugar Company Inc.

Four Official Variety Trial locations were planted. Two of these trials were planted on early harvest fields, and two of the trials were planted on late harvest fields. Trials were planted with an ERMAS vacuum planter. Plots were two 30"-rows wide by twenty-five feet long. Each variety was replicated eight times across each trial. The experimental design of the trials was a randomized complete block. Emergence counts were taken approximately 21-28 days after planting. After the emergence counts were taken, plots were thinned to a uniform spacing, and all doubles were removed. Final stand counts were taken following thinning.

Weed control, insect control, and disease control applications were applied by the trial cooperator to match the practices of the field. Weed escapes were removed throughout the season to prevent competition with the sugar beets.

Before harvest, row lengths were taken on each harvest row to calculate yield at harvest. All plots were defoliated using a 4-row defoliator with scalpers. Each two-row plot was harvested using a 2-row research harvester. All beets harvested from the two rows were weighed on a scale on the harvester, and a sample of beets was taken for quality analysis at the Spreckels Sugar Tare Lab.

All varieties in their second year of testing and beyond were entered into various disease nurseries to evaluate the disease tolerance of the varieties. Rhizomania was evaluated at the Beet Sugar Development Foundation's Rhizomania Nursery by Dr. Carl Strausbaugh in Kimberly, Idaho. Spreckels Sugar Research evaluated Powdery Mildew at the IVRC in Brawley, California.

Data is summarized and merged with the previous two years to evaluate the varieties for approval. The Imperial Valley Policy sets out guidelines for minimum performance standards of the varieties. Varieties that meet all the approval criteria are approved for growers to plant their 2024-2025 sugar beet crop.

2023-2024 Imperial Valley Official Variety Trial Locations

Trial Name	Cooperator	Canal/Gate	Plant Date	Harvest Date
Early Harvest Loc. 1	IVRC	Malan 5A	10/3/23	4/15/24
Early Harvest Loc. 2	Cameron Ranches	Eucalyptus 140A	9/21/23	6/25/24
Late Harvest Loc. 1	Dan Walker	Trifolium 7-136A	10/16/23	6/11/24
Late Harvest Loc. 2	Steve Veysey	Newside 33A	10/20/23	7/2/24
Powdery Mildew Nursery	IVRC	Malan 5A	10/13/23	N/A

SPRECKELS
Research

Imperial Valley Early Harvest Official Variety Trials
1 Year Data (2024)

Variety	Approval Status for 2024-25 crop	Extractable Sugar/Acre	Extractable Sugar/Ton	Gross Sugar/Acre	Tons/Acre	Percent Sugar	Percent Purity	Final Stand**	Percent Bolt	Percent Emergence*	Powdery Mildew#	% of Fully Approved	Rhizomania Root Rating##
BTS 5483		12,885	312.6	15,298	41.0	18.6	90.0	232	0.0	51.7	--	--	--
BTS 511N	Specialty Approval	12,532	309.1	14,894	40.6	18.3	90.1	232	0.0	65.6	6.6	109.5	--
BTS 5448		12,901	304.1	15,238	42.4	18.0	90.5	232	0.0	55.7	--	--	--
SV 1915	Limited Approval	12,382	302.4	14,734	41.4	18.0	90.1	231	0.0	51.0	6.0	99.6	--
SV 1927	Full Approval	13,371	302.2	15,901	44.1	18.0	90.1	233	0.0	54.7	7.1	117.8	--
BTS 5419		12,417	302.1	14,789	40.9	18.0	90.0	231	0.0	55.1	--	--	--
BTS 5255	Full Approval	13,395	301.0	15,877	44.1	17.9	90.5	233	0.0	54.4	5.7	94.6	--
BTS 540N		11,903	300.8	14,198	39.7	18.0	90.0	233	0.0	54.8	--	--	--
SV 1941		11,914	299.4	14,223	39.7	17.9	89.8	232	0.0	56.8	--	--	--
BTS 5678	Full Approval	13,230	297.7	15,753	44.6	17.8	90.0	232	0.0	56.6	5.7	94.6	--
SV 1942N		11,523	297.5	13,819	38.5	17.9	89.4	232	0.0	37.9	--	--	--
BTS 5432		12,446	294.1	14,880	42.0	17.6	89.9	232	0.0	51.4	--	--	--
BTS 5460	Full Approval	12,030	291.8	14,418	41.1	17.5	89.8	232	0.0	57.6	5.6	92.9	--
SV 911	Limited Approval	13,629	290.8	16,215	47.3	17.3	90.3	231	0.0	36.7	6.0	99.6	--
SV 602	Last Year of Sales	13,263	284.2	15,869	46.9	17.0	89.9	228	0.0	39.8	6.5	107.9	--

		Extractable Sugar/Acre	Extractable Sugar/Ton	Gross Sugar/Acre	Tons/Acre	Percent Sugar	Percent Purity			Mean of Fully Approved Varieties		
Mean of Fully Approved (24-25)		13,006	298.2	15,487	43.5	17.8	90.1		2024 Mean	6.0	100.0	--
97% of Fully Approved (24-25)		12,616	289.2	15,022	42.2	17.2	87.4					

CV%		4.2	2.6	3.9	3.8	1.9	0.7	1.1	7.9	
LSD (0.05)		593.7	8.6	662.1	1.8	0.4	0.7	2.9	4.5	

Cooperator	**Planted**	**Harvested**		**Plot Size**		**Notes:**	
IVRC	10/3/23	4/15/24		2 rows, 30" rows		Experimental Design: RCBD	

Varieties ranked by Extractable Sugar per Ton.

* Emergence counts taken prior to thinning and converted to a percent.

** Final Stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.

Mildew rating using 1-9 scale (1=no disease and 9=completely covered with disease. Ratings from 2023-2024 IVRC powdery mildew nursery.

Root rating using 0-9 scale (0=healthy and 9=dead; ≥ 3 would be considered susceptible.

Variety	Approval Status for 2024-25 crop	Extractable Sugar/Acre	Extractable Sugar/Ton	Gross Sugar/Acre	Tons/Acre	PercentSugar	Percent Purity	Final Stand**	Percent Bolt	Percent Emergence*		Powdery Mildew[#]	% of Fully Approved	Rhizomania Root Rating[##]
BTS 511N	Specialty Approval													
2024 Trial		12,532	309.1	14,894	40.6	18.3	90.1	232	0.0	65.6		6.6	109.5	--
2023 Trial		14,639	301.8	17,423	48.4	18.0	90.0	160	0.0	35.7		2.6	68.9	2.0
Average		13,585	305.5	16,158	44.5	18.2	90.1	196	0.0	50.7				
SV 1927	Full Approval													
2024 Trial		13,371	302.2	15,901	44.1	18.0	90.1	233	0.0	54.7		7.1	117.8	--
2023 Trial		15,551	287.3	18,568	55.1	17.1	90.0	172	0.0	51.3		4.3	113.9	2.3
Average		14,461	294.8	17,234	49.6	17.6	90.1	203	0.0	53.0				
SV 1915	Limited Approval													
2024 Trial		12,382	302.4	14,734	41.4	18.0	90.1	231	0.0	51.0		6.0	99.6	--
2023 Trial		15,313	285.2	18,495	54.1	17.1	89.5	172	0.0	51.1		3.7	98.0	2.5
Average		13,848	293.8	16,614	47.8	17.6	89.8	201	0.0	51.1				
BTS 5255	Full Approval													
2024 Trial		13,395	301.0	15,877	44.1	17.9	90.5	233	0.0	54.4		5.7	94.6	--
2023 Trial		15,813	282.8	18,796	56.2	16.8	90.5	175	0.0	44.7		3.1	82.1	2.2
Average		14,604	291.9	17,336	50.2	17.4	90.5	204	0.0	49.6				
BTS 5678	Full Approval													
2024 Trial		13,230	297.7	15,753	44.6	17.8	90.0	232	0.0	56.6		5.7	94.6	--
2023 Trial		15,769	278.7	18,888	57.1	16.7	90.1	173	0.0	47.6		3.6	95.4	1.8
Average		14,500	288.2	17,320	50.9	17.3	90.1	202	0.0	52.1				
BTS 5460	Full Approval													
2024 Trial		12,030	291.8	14,418	41.1	17.5	89.8	232	0.0	57.6		5.6	92.9	--
2023 Trial		15,548	277.7	18,520	56.1	16.6	90.1	171	0.0	53.5		4.1	108.6	2.2
Average		13,789	284.8	16,469	48.6	17.1	90.0	202	0.0	55.6				
SV 911	Limited Approval													
2024 Trial		13,629	290.8	16,215	47.3	17.3	90.3	231	0.0	36.7		6.0	99.6	--
2023 Trial		15,259	266.3	18,376	57.7	16.1	89.7	160	0.0	33.2		4.2	111.3	2.3
Average		14,444	278.6	17,296	52.5	16.7	90.0	195	0.0	35.0				
SV 602	Last Year of Sales													
2024 Trial		13,263	284.2	15,869	46.9	17.0	89.9	228	0.0	39.8		6.5	107.9	--
2023 Trial		16,142	267.1	19,519	61.2	16.2	89.3	154	0.0	31.0		3.9	103.3	2.4
Average		14,703	275.7	17,694	54.1	16.6	89.6	191	0.0	35.4				

											Mean of Fully Approved Varieties		
Mean of Fully Approved (24-25)	14,338	289.9	17,090	49.8	17.3	90.1	202.7		2024 Mean	6.0	100.0	--
97% of Fully Approved (24-25)	13,908	281.2	16,577	48.3	16.8	87.4	196.6		2023 Mean	3.8	100.0	2.1

CV%

2024 Trial		4.2	2.6	3.9	3.8	1.9	0.7	1.1	--	7.9		5.9	
2023 Trial		2.4	1.6	2.6	3.6	1.3	0.5	3.1	--	12.7		15.7	--

LSD (0.05)

2024 Trial		593.7	8.6	662.1	1.8	0.4	0.7	2.9	--	4.5		0.3	
2023 Trial		752.2	9.7	990.4	4.1	0.5	0.9	10.8	--	11.6		0.7	0.2

Cooperator	**Planted**	**Harvested**	**Plot Size**		**Notes:**
IVRC	10/3/23	4/15/24	2 rows. 30" rows.		Experimental Design: RCBD
Ruegger Farms	9/20/22	4/17/23	2 rows. 30" rows.		Experimental Design: RCBD
Jason Taylor	9/29/22	5/15/23	2 rows. 30" rows.		Experimental Design: RCBD

Varieties ranked by Extractable Sugar per Ton.

* Emergence counts taken prior to thinning and converted to a percent.

** Final Stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.

[#] 2023 Powdery mildew ratings were taken from 2023 EH Location 2 on 5/9/23 on a 1-9 rating scale. 2024 data is from IVRC Powdery Mildew Nursery.

[##] Root rating using 0-9 scale (0=healthy and 9=dead; ≥ 3 would be considered susceptible.

Variety	Approval Status for 2024-25 crop	Extractable Sugar/Acre	Extractable Sugar/Ton	Gross Sugar/Acre	Tons/Acre	Percent Sugar	Percent Purity	Final Stand**	Percent Bolt	Percent Emergence*		Powdery Mildew#	% of Fully Approved	Rhizomania Root Rating##
BTS 511N	Specialty Approval													
2024 Trial		12,532	309.1	14,894	40.6	18.3	90.1	232	0.0	65.6		6.6	109.5	--
2023 Trial		14,639	301.8	17,423	48.4	18.0	90.0	160	0.0	35.7		2.6	68.9	2.0
2022 Trial		9,945	264.0	12,562	37.8	16.7	86.5	212	0.0	53.0		--	--	1.8
Average		12,372	291.6	14,960	42.3	17.7	88.9	201	0.0	51.4				
BTS 5255	Full Approval													
2024 Trial		13,395	301.0	15,877	44.1	17.9	90.5	233	0.0	54.4		5.7	94.6	--
2023 Trial		15,813	282.8	18,796	56.2	16.8	90.5	175	0.0	44.7		3.1	82.1	2.2
2022 Trial		10,819	272.7	13,471	39.4	17.0	87.2	214	0.0	53.4		--	--	--
Average		13,342	285.5	16,048	46.6	17.2	89.4	207	0.0	50.8				
SV 1927	Full Approval													
2024 Trial		13,371	302.2	15,901	44.1	18.0	90.1	233	0.0	54.7		7.1	117.8	--
2023 Trial		15,551	287.3	18,568	55.1	17.1	90.0	172	0.0	51.3		4.3	113.9	2.3
2022 Trial		10,161	263.0	12,703	38.7	16.5	87.2	212	0.0	58.5		--	--	--
Average		13,028	284.2	15,724	46.0	17.2	89.1	206	0.0	54.8				
SV 1915	Limited Approval													
2024 Trial		12,382	302.4	14,734	41.4	18.0	90.1	231	0.0	51.0		6.0	99.6	--
2023 Trial		15,313	285.2	18,495	54.1	17.1	89.5	172	0.0	51.1		3.7	98.0	2.5
2022 Trial		9,846	261.7	12,443	37.9	16.5	86.8	211	0.0	49.6		--	--	2.7
Average		12,514	283.1	15,224	44.5	17.2	88.8	205	0.0	50.6				
BTS 5678	Full Approval													
2024 Trial		13,230	297.7	15,753	44.6	17.8	90.0	232	0.0	56.6		5.7	94.6	--
2023 Trial		15,769	278.7	18,888	57.1	16.7	90.1	173	0.0	47.6		3.6	95.4	1.8
2022 Trial		10,573	267.1	13,245	39.4	16.8	87.0	213	0.0	54.5		--	--	2.0
Average		13,191	281.2	15,962	47.0	17.1	89.0	206	0.0	52.9				
BTS 5460	Full Approval													
2024 Trial		12,030	291.8	14,418	41.1	17.5	89.8	232	0.0	57.6		5.6	92.9	--
2023 Trial		15,548	277.7	18,520	56.1	16.6	90.1	171	0.0	53.5		4.1	108.6	2.2
2022 Trial		9,910	261.2	12,490	38.0	16.5	86.7	213	0.0	52.0		--	--	1.9
Average		12,496	276.9	15,143	45.1	16.9	88.9	205	0.0	54.4				
SV 911	Limited Approval													
2024 Trial		13,629	290.8	16,215	47.3	17.3	90.3	231	0.0	36.7		6.0	99.6	--
2023 Trial		15,259	266.3	18,376	57.7	16.1	89.7	160	0.0	33.2		4.2	111.3	2.3
2022 Trial		10,361	252.9	13,073	41.0	16.0	86.8	212	0.0	50.2		--	--	2.7
Average		13,083	270.0	15,888	48.7	16.5	88.9	201	0.0	40.0				
SV 602	Last Year of Sales													
2024 Trial		13,263	284.2	15,869	46.9	17.0	89.9	228	0.0	39.8		6.5	107.9	--
2023 Trial		16,142	267.1	19,519	61.2	16.2	89.3	154	0.0	31.0		3.9	103.3	2.4
2022 Trial		10,602	255.8	13,293	41.4	16.1	87.1	211	0.0	49.4		--	--	2.8
Average		13,336	269.0	16,227	49.8	16.4	88.8	198	0.0	40.1				

												Mean of Fully Approved Varieties		
Mean of Fully Approved (24-25)		13,014	281.9	15,719	46.2	17.1	89.1					2024 Mean	6.0	100.0	--
97% of Fully Approved (24-25)		12,624	273.5	15,247	44.8	16.6	86.4					2023 Mean	3.8	100.0	2.1
												2022 Mean	--	--	2.0

CV%

2024 Trial		4.2	2.6	3.9	3.8	1.9	0.7	1.1	--	7.9		5.9		
2023 Trial		2.4	1.6	2.6	3.6	1.3	0.5	3.1	--	12.7		15.7		--
2022 Trial		2.9	2.3	2.5	2.5	1.9	0.6	7.6	--	2.3		--		--

LSD (0.05)

2024 Trial		593.7	8.6	662.1	1.8	0.4	0.7	2.9	--	4.5		0.3		
2023 Trial		752.2	9.7	990.4	4.1	0.5	0.9	10.8	--	11.6		0.7		0.2
2022 Trial		587.0	NS	640.8	2.0	NS	NS	8.1	--	NS		--		0.3

Cooperator	Planted	Harvested	Plot Size		Notes:
IVRC	10/3/23	4/15/24	2 rows. 30" rows.		Experimental Design: RCBD
Ruegger Farms	9/20/22	4/17/23	2 rows. 30" rows.		Experimental Design: RCBD
Jason Taylor	9/29/22	5/15/23	2 rows. 30" rows.		Experimental Design: RCBD
Horizon Farms	9/15/21	3/30/22	2 rows. 30" rows.		Experimental Design: RCBD
Lance Reeves	9/25/21	4/6/22	2 rows. 30" rows.		Experimental Design: RCBD

Varieties ranked by Extractable Sugar per Ton.

* Emergence counts taken prior to thinning and converted to a percent.

** Final Stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.

2023 Powdery mildew ratings were taken from 2023 EH Location 2 on 5/9/23 on a 1-9 rating scale. 2024 data is from IVRC Powdery Mildew Nursery.

Rhizomania Root rating using 0-9 scale (0=healthy and 9=dead; ≥ 3 would be considered susceptible.

2023-2024 Imperial Valley Early Harvest Official Variety Trial Results - Location 1

Entry	Entry Name	Extractable Sugar per Ton	Extractable Sugar per Acre	Gross Sugar per Acre	Tons per Acre	Percent Sugar	Extractable Sugar Percent	Percent Purity	Brei N (ppm)	Percent Tare	Percent* Emergence	Final Stand** Beets/100'	Percent Bolters
1	SV 602	284.2	13,263	15,869	46.9	17.0	14.2	89.9	68.2	0.7	39.8	228.0	0.0
2	SV 911	290.8	13,629	16,215	47.3	17.3	14.5	90.3	56.0	0.7	36.7	230.7	0.0
3	SV 1915	302.4	12,382	14,734	41.4	18.0	15.1	90.1	80.2	1.2	51.0	230.9	0.0
4	SV 1927	302.2	13,371	15,901	44.1	18.0	15.1	90.1	47.1	1.1	54.7	233.4	0.0
5	SV 1941	299.4	11,914	14,223	39.7	17.9	15.0	89.8	54.0	1.0	56.8	232.0	0.0
6	SV 1942N	297.5	11,523	13,819	38.5	17.9	14.9	89.4	64.0	1.8	37.9	231.5	0.0
7	BTS 5460	291.8	12,030	14,418	41.1	17.5	14.6	89.8	69.3	1.2	57.6	232.4	0.0
8	BTS 5678	297.7	13,230	15,753	44.6	17.8	14.9	90.0	73.7	1.3	56.6	231.6	0.0
9	BTS 511N	309.1	12,531	14,894	40.6	18.3	15.4	90.1	65.5	2.0	65.6	231.6	0.0
10	BTS 5255	301.0	13,395	15,877	44.1	17.9	15.1	90.5	60.8	1.3	54.4	232.8	0.0
11	BTS 5419	302.1	12,417	14,789	40.9	18.0	15.1	90.0	52.9	1.4	55.1	231.4	0.0
12	BTS 5432	294.1	12,446	14,880	42.0	17.6	14.7	89.9	65.9	1.4	51.4	231.9	0.0
13	BTS 5448	304.1	12,901	15,238	42.4	18.0	15.2	90.5	51.4	1.4	55.7	232.2	0.0
14	BTS 5483	312.6	12,885	15,298	41.0	18.6	15.6	90.0	62.6	1.4	51.7	231.9	0.0
15	BTS 540N	300.8	11,903	14,198	39.7	18.0	15.1	90.0	71.3	1.6	54.8	232.5	0.0
	Trial mean	299.3	12,655	15,074	42.3	17.9	15.0	90.0	62.9	1.3	52.0	231.7	
	Residual	77.2	367,004	456,473	3.4	0.2	0.2	0.5	513.3	0.2	21.4	8.5	
	CV (%)	2.6	4.2	3.9	3.8	1.9	2.6	0.7	29.5	31.3	7.9	1.1	
	LSD (0.05)	8.6	593.7	662.1	1.8	0.4	0.4	0.7	22.2	0.5	4.5	2.9	
	Reps	8	8	8	8	8	8	8	8	8	8	8	

*Emergence counts taken prior to thinning and converted to a percent.

**Final stand counts taken after thinning and converted to beets per 100' of row.

Trial Location: Imperial Valley Research Center

Plant Date: October 3, 2023

Harvest Date: April 15, 2024

Plot size: 2 row, 30" rows.

Experimental Design: RCBD. Analyzed with spatial analysis.

2023-2024 Imperial Valley Early Harvest Official Variety Trial Results - Location 2

Entry	Entry Name	Extractable Sugar per Ton	Extractable Sugar per Acre	Gross Sugar per Acre	Tons per Acre	Percent Sugar	Extractable Sugar Percent	Percent Purity	Brei N (ppm)	Percent Tare	Percent* Emergence	Final Stand** Beets/100'	Percent[#] Bolters	Percent[##] Rot
1	SV 602	257.4	21,352	25,806	83.4	15.6	12.9	89.4	37.7	0.6	33.7	223.8	6.0	0.4
2	SV 911	261.2	20,547	24,753	77.5	15.7	13.1	90.0	37.5	0.6	34.4	210.3	5.5	0.4
3	SV 1915	258.4	19,958	24,845	77.2	16.1	12.9	87.7	29.5	1.5	40.8	222.2	0.7	0.0
4	SV 1927	275.9	21,454	25,865	78.0	16.7	13.8	89.4	34.1	1.0	41.3	224.5	7.8	0.0
5	SV 1941	271.9	20,545	24,822	75.3	16.4	13.6	89.6	26.9	1.1	51.5	230.9	1.4	0.1
6	SV 1942N	267.9	20,278	24,781	76.0	16.4	13.4	88.4	27.4	1.3	31.4	214.8	9.0	0.5
7	BTS 5460	277.3	20,470	24,551	73.8	16.7	13.9	89.3	24.7	1.8	52.7	226.7	2.3	0.0
8	BTS 5678	283.7	20,806	24,743	73.1	16.9	14.2	90.2	28.1	1.3	53.6	230.7	0.1	0.0
9	BTS 511N	284.3	20,164	24,265	70.7	17.1	14.2	89.6	28.9	3.1	61.2	230.5	0.1	0.0
10	BTS 5255	284.7	20,441	24,162	71.6	16.9	14.2	90.6	25.2	1.5	47.2	232.5	0.1	0.0
11	BTS 5419	286.8	21,257	25,474	73.7	17.2	14.3	89.8	27.6	1.3	41.0	224.8	0.0	0.0
12	BTS 5432	279.4	19,867	24,033	71.2	16.9	14.0	89.1	28.9	1.4	43.8	227.2	0.0	0.0
13	BTS 5448	277.0	20,664	24,813	74.7	16.7	13.8	89.4	25.6	1.5	53.5	228.8	0.0	0.0
14	BTS 5483	302.3	20,525	24,455	67.9	18.1	15.1	89.8	36.7	2.4	52.9	231.0	11.7	0.1
15	BTS 540N	284.7	20,904	24,831	73.9	16.9	14.3	90.2	30.5	1.8	44.7	227.5	0.2	0.0
	Trial mean	276.9	20,615	24,813	74.5	16.7	13.8	89.5	30.0	1.5	45.6	225.8	3.0	0.1
	Residual	87.4	1,057,492	993,018	7.8	0.1	0.2	1.5	38.4	0.2	34.6	64.8	2.0	0.1
	CV (%)	3.0	4.4	3.6	3.3	1.7	3.0	1.2	17.6	28.2	11.5	3.2	45.9	286.6
	LSD(0.05)	9.2	1,007.8	976.6	2.7	0.3	0.5	1.2	6.1	0.5	5.8	7.9	1.4	0.3
	Reps	8	8	8	8	8	8	8	8	8	8	8	8	8

*Emergence counts taken prior to thinning and converted to a percent.

**Final stand counts taken after thinning and converted to beets per 100' of row.

[#]Bolter percent is calculated by counting bolters present versus total beets in each plot.

[##]Percent rot is calculated by counting rot beets present versus total beets in each plot.

Trial Cooperator: Cameron Ranches
Plant Date: September 21, 2023
Harvest Date: June 25, 2024
Plot size: 2 row, 30" rows.
Experimental Design: RCBD. Analyzed with spatial analysis.

Imperial Valley Late Harvest Official Variety Trials
1 Year Data Summary (2024)

Variety	2024-2025 Marketing Approval	Extractable Sugar/ Acre	Extractable Sugar/Ton	Gross Sugar/ Acre	Tons / Acre	Percent Sugar	Percent Purity	Final Stand**	Percent Bolt	Percent Rot***	Percent Emergence*	Powdery Mildew[#]	% of Full Approved.	Rhizomania Root Rating[##]
BTS 5483		18,520	312.4	22,004	59.3	18.6	90.1	229	--	4.2	54.8	--	--	--
BTS 5419		19,030	306.3	22,430	61.7	18.1	90.7	226	--	0.9	53.6	--	--	--
BTS 511N	Full Approval	18,890	299.2	22,511	63.5	17.8	90.0	233	--	3.2	63.0	6.6	110.5	--
BTS 5432		18,540	298.1	22,123	62.2	17.8	89.9	225	--	0.9	48.8	--	--	--
BTS 5448		19,134	297.4	22,774	64.3	17.7	90.1	232	--	1.1	58.9	--	--	--
SV 1941		18,817	297.2	22,508	63.7	17.8	89.8	222	--	5.5	53.4	--	--	--
BTS 5678	Full Approval	19,139	297.1	22,763	64.6	17.7	90.2	225	--	0.2	63.1	5.7	95.4	--
BTS 5460	Full Approval	19,116	296.6	22,831	64.5	17.7	89.9	225	--	1.0	60.3	5.6	93.7	--
SV 1927	Limited Approval	19,723	295.6	23,564	66.4	17.7	89.9	208	--	1.7	42.1	7.1	118.8	--
BTS 5255	Limited Approval	19,056	295.6	22,787	63.9	17.7	89.8	228	--	2.3	58.5	5.7	95.4	--
SV 1915	Full Approval	18,925	294.7	22,661	64.2	17.6	89.7	209	--	3.9	43.1	6.0	100.4	--
BTS 540N		18,403	292.5	21,869	63.0	17.4	90.3	230	--	4.5	53.6	--	--	--
SV 1942N		18,464	285.9	22,339	64.9	17.3	89.1	195	--	5.0	36.0	--	--	--

	Extractable Sugar/ Acre	Extractable Sugar/Ton	Gross Sugar/ Acre	Tons / Acre	Percent Sugar	Percent Purity		Mean of Fully Approved Varieties		
Mean of Fully Approved (24-25)	19,017	296.9	22,691	64.2	17.7	90.0		2024 Mean	6.0	100.0	--
97% of Fully Approved (24-25)	18,447	288.0	22,011	62.3	17.2	87.3				
LSD (0.05)	N/S	N/S	N/S	N/S	N/S	N/S		LSD (0.05)	0.3	--
C.V.	4.9	3.2	4.7	4.7	2.5	0.9		C.V.	5.9	--

Varieties ranked by Extractable Sugar per Ton.

*Emergence counts taken prior to thinning and converted to a percent.

**Final stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.

*** Percent rot is from the Late Harvest Location 2 site only and is calculated by counting rot beets per plot and converting to a percent based on the final stand count.

[#]2024 mildew data is from the IVRC powdery mildew nursery. Rating scale 1-9, with lower ratings meaning less disease and higher ratings meaning more disease.

[##] Root rating using a scale of 0-9 (0=healthy and 9=dead; ≥3 would be considered susceptible.

Cooperator	Planted	Harvested	Plot Size
Dan Walker	10/16/2023	6/11/2024	2 rows -- 30 inch rows
Veysey Farms	10/20/2023	7/2/2024	2 rows -- 30 inch rows

Imperial Valley Late Harvest Official Variety Trials
2 Year Data (2023-2024)

Variety	2024-2025 Marketing Approval	Year	Extractable Sugar/ Acre	Extractable Sugar/ Ton+	Gross Sugar/ Acre	Tons/ Acre	Percent Sugar	Percent Purity	Final Stand**	Percent Bolt	Percent Rot***	Percent Emergence*	Powdery Mildew Rating#	% of Full Approved.	Rhizomania Root Rating##
SV 1915	Full Approval	2024	18,925	294.7	22,661	64.2	17.6	89.7	209	--	3.9	43.1	6.0	100.4	--
		2023	20,478	302.8	24,060	67.5	17.8	90.9	238	0.4	0.0	48.8	5.1	78.5	2.5
		Average	19,701	298.8	23,360	65.9	17.7	90.3	223						
SV 1927	Limited Approval	2024	19,723	295.6	23,564	66.4	17.7	89.9	208	--	1.7	42.1	7.1	118.8	--
		2023	19,760	296.0	23,432	66.3	17.6	90.2	233	1.6	0.1	45.8	5.9	90.8	2.3
		Average	19,741	295.8	23,498	66.4	17.7	90.1	221						
BTS 5678	Full Approval	2024	19,139	297.1	22,763	64.6	17.7	90.2	225	--	0.2	63.1	5.7	95.4	--
		2023	20,981	294.3	24,688	71.6	17.3	91.0	239	0.0	0.1	55.7	7.9	121.5	1.8
		Average	20,060	295.7	23,725	68.1	17.5	90.6	232						
BTS 511N	Full Approval	2024	18,891	299.2	22,511	63.5	17.8	90.0	233	--	3.2	63.0	6.6	110.5	--
		2023	20,193	291.5	24,279	67.2	17.6	89.4	239	0.0	0.6	47.6	5.2	80.0	2.0
		Average	19,542	295.4	23,395	65.4	17.7	89.7	236						
BTS 5460	Full Approval	2024	19,116	296.6	22,831	64.5	17.7	89.9	225	--	1.0	60.3	5.6	93.7	--
		2023	20,678	292.3	24,463	70.4	17.3	90.5	238	0.1	0.2	60.0	7.8	120.0	2.2
		Average	19,897	294.5	23,647	67.5	17.5	90.2	232						
BTS 5255	Limited Approval	2024	19,056	295.6	22,787	63.9	17.7	89.8	228	--	2.3	58.5	5.7	95.4	--
		2023	20,240	288.3	24,117	69.9	17.2	90.0	239	0.0	0.2	48.2	7.0	107.7	2.2
		Average	19,648	292.0	23,452	66.9	17.5	89.9	234						

		Extractable Sugar/ Acre	Extractable Sugar/ Ton	Gross Sugar/ Acre	Tons/ Acre	Percent Sugar	Percent Purity	Final Stand	Percent Bolt	Percent Rot	Percent Emergence	Powdery Mildew	% of Full Approved	Rhizomania Root
Mean of Fully Approved (24-25)		19,800	296.1	23,532	66.7	17.6	90.2							
97% of Fully Approved (24-25)		19,206	287.2	22,826	64.7	17.1	87.5							
LSD (0.05)	2024	N/S	N/S	N/S	N/S	N/S	N/S	N/S	--	--	N/S	0.3		--
	2023	1,176.1	7.7	1,354.7	3.7	0.4	0.7	7.5	0.3	0.5	5.9	0.4		--
C.V.	2024	4.9	3.2	4.7	4.7	2.5	0.9	7.5	--	--	11.7	5.9		
	2023	5.1	2.4	5.0	4.7	1.8	0.7	3.0	143.0	199.4	10.0	5.6		--

Mean of Fully Approved Varieties

	Powdery Mildew Rating	% of Full Approved	Rhizomania Root Rating
2024 Mean	6.0	100.0	--
2023 Mean	6.5	100.0	2.1

+Varieties are ranked by Extractable Sugar per Ton
* Emergence counts taken prior to thinnng and converted to a percent.
**Final stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.
*** 2023 percent rot is from Location 1 site only. 2024 percent rot is from the Late Harvest Location 2 site only. It is calculated by counting rot beets per plot and converting to a percent based on the final stand count.
#2023 mildew data is from 2022-23 LH Loc. 1. 2024 mildew data is from IVRC mildew nursery. Rating scale 1-9 with lower ratings meaning less disease and higher ratings meaning more disease.
Root rating using a scale of 0-9 (0=healthy and 9=dead; ≥3 would be considered susceptible.

Cooperator	Planted	Harvested	Plot Size
Dan Walker	10/16/2023	6/11/2024	2 rows -- 30 inch rows
Veysey Farms	10/20/2023	7/2/2024	2 rows -- 30 inch rows
Dan Walker	10/13/2022	7/18/2023	2 rows -- 30 inch rows

Imperial Valley Late Harvest Official Variety Trials
3 Year Data (2022-2024)

Variety	2024-2025 Marketing Approval	Year	Extractable Sugar/ Acre	Extractable Sugar/Ton	Gross Sugar/ Acre	Tons/ Acre	Percent Sugar	Percent Purity	Final Stand**	Percent Bolt	Percent Rot^w	Percent Emergence*	Powdery Mildew Rating^#	% of Full Approved.	Rhizomania Root Rating^##
BTS 511N	Full Approval	2024	18,891	299.2	22,511	63.5	17.8	90.0	233	--	3.2	63.0	6.6	110.5	--
		2023	20,193	291.5	24,279	67.2	17.6	89.4	239	0.0	0.6	47.6	5.2	80.0	2.0
		2022	20,623	294.1	24,614	71.6	17.5	90.4	232	0.0	1.5	43.1	--	--	1.8
		Average	19,902	294.9	23,801	67.4	17.6	89.9	235						
SV 1915	Full Approval	2024	18,925	294.7	22,661	64.2	17.6	89.7	209	--	3.9	43.1	6.0	100.4	--
		2023	20,478	302.8	24,060	67.5	17.8	90.9	238	0.4	0.0	48.8	5.1	78.5	2.5
		2022	18,954	282.9	23,014	69.1	17.0	89.3	231	0.0	12.4	42.4	--	--	2.7
		Average	19,452	293.5	23,245	66.9	17.5	90.0	226						
BTS 5678	Full Approval	2024	19,139	297.1	22,763	64.6	17.7	90.2	225	--	0.2	63.1	5.7	95.4	--
		2023	20,981	294.3	24,688	71.6	17.3	91.0	239	0.0	0.1	55.7	7.9	121.5	1.8
		2022	18,995	288.0	22,703	66.6	17.1	90.0	232	0.0	9.0	45.1	--	--	2.0
		Average	19,705	293.1	23,384	67.6	17.4	90.4	232						
SV 1927	Limited Approval	2024	19,723	295.6	23,564	66.4	17.7	89.9	208	--	1.7	42.1	7.1	118.8	--
		2023	19,760	296.0	23,432	66.3	17.6	90.2	233	1.6	0.1	45.8	5.9	90.8	2.3
		2022	18,971	282.7	22,934	67.8	17.0	89.6	233	0.3	17.4	43.5	--	--	--
		Average	19,485	291.4	23,310	66.8	17.4	89.9	225						
BTS 5460	Full Approval	2024	19,116	296.6	22,831	64.5	17.7	89.9	225	--	1.0	60.3	5.6	93.7	--
		2023	20,678	292.3	24,463	70.4	17.3	90.5	238	0.1	0.2	60.0	7.8	120.0	2.2
		2022	20,059	283.4	24,299	71.9	17.0	89.5	231	0.2	2.7	47.5	--	--	1.9
		Average	19,951	290.8	23,864	68.9	17.3	90.0	231						
BTS 5255	Limited Approval	2024	19,056	295.6	22,787	63.9	17.7	89.8	228	--	2.3	58.5	5.7	95.4	--
		2023	20,240	288.3	24,117	69.9	17.2	90.0	239	0.0	0.2	48.2	7.0	107.7	2.2
		2022	20,856	286.4	24,944	73.8	17.0	90.2	233	0.0	0.4	44.4	--	--	--
		Average	20,051	290.1	23,949	69.2	17.3	90.0	233						

													Mean of Fully Approved Varieties		
Mean of Fully Approved (24-25)			19,753	293.1	23,574	67.7	17.5	90.1					2024 Mean	6.0	100.0	--
97% of Fully Approved (24-25)			19,160	284.3	22,867	65.7	16.9	87.4					2023 Mean	6.5	100.0	2.1
													2022 Mean	--	--	2.1

LSD (0.05)	2024	N/S	N/S	N/S	N/S	N/S	N/S	N/S	--	--	N/S	0.3	--		
	2023	1176.1	7.7	1354.7	3.7	0.4	0.7	7.5	0.3	0.5	5.9	0.4	0.2		
	2022	1081.4	6.6	1282.9	4.0	0.3	0.7	4.2	0.3	5.1	4.8	--	0.3		
C.V.	2024	4.9	3.2	4.7	4.7	2.5	0.9	7.5	--	--	11.7	5.9	--		
	2023	5.1	2.4	5.0	4.7	1.8	0.7	3.0	143.0	199.4	10.0	5.6	--		
	2022	8.6	3.4	8.5	9.0	2.6	1.1	2.6	315.4	30.1	15.9	--	--		

Varieties ranked by Extractable Sugar per Ton

* Emergence counts taken prior to thinning and converted to a percent.

** Final stand counts converted to beets per 100 foot of row. Final stand counts taken after thinning.

^# 2023 mildew data is from 2022-23 LH Loc. 1. 2024 mildew data is from IVRC mildew nursery. Rating scale 1-9 with lower ratings meaning less disease and higher ratings meaning more disease.

^w 2022 Rot data is from Location #1 only. 2023 Rot data s from Location #1 only. 2024 Rot data is from Location #2 only.

^## Root rating using a scale of 0-9 (0=healthy and 9=dead; ≥3 would be considered susceptible.

Cooperator	Planted	Harvested	Plot Size
Dan Walker	10/16/2023	6/11/2024	2 rows -- 30 inch rows
Veysey Farms	10/20/2023	7/2/2024	2 rows -- 30 inch rows
Dan Walker	10/13/2022	7/18/2023	2 rows -- 30 inch rows
Ruegger Farms	10/6/2021	6/1/2022	2 rows -- 30 inch rows
Gary and Brett Mamer	10/13/2021	7/7/2022	2 rows -- 30 inch rows

2023-2024 Imperial Valley Late Harvest Official Variety Trials - Combined Results

Entry	Entry Name	Extractable Sugar per Ton	Extractable Sugar per Acre	Gross Sugar per Acre	Tons per Acre	Percent Sugar	Extractable Sugar Percent	Percent Purity	Brei N (ppm)	Percent Tare	Percent* Emergence	Final Stand** Beets/100'
1	SV 1915	294.7	18,925	22,661	64.2	17.6	14.7	89.7	27.3	1.1	43.1	208.8
2	SV 1927	295.6	19,723	23,564	66.4	17.7	14.8	89.9	31.1	1.2	42.1	208.3
3	SV 1941	297.2	18,817	22,508	63.7	17.8	14.9	89.8	26.9	1.6	53.4	221.8
4	SV 1942N	285.9	18,464	22,339	64.9	17.3	14.3	89.1	39.4	1.8	36.0	195.4
5	BTS 5460	296.6	19,116	22,831	64.5	17.7	14.8	89.9	29.7	2.0	60.3	225.1
6	BTS 5678	297.1	19,139	22,763	64.6	17.7	14.8	90.2	33.9	1.9	63.1	225.4
7	BTS 511N	299.2	18,890	22,511	63.5	17.8	15.0	90.0	33.2	2.4	63.0	232.8
8	BTS 5255	295.6	19,056	22,787	63.9	17.7	14.8	89.8	29.5	1.5	58.5	228.3
9	BTS 5419	306.3	19,030	22,430	61.7	18.1	15.3	90.7	22.3	1.6	53.6	225.8
10	BTS 5432	298.1	18,540	22,123	62.2	17.8	14.9	89.9	37.8	1.7	48.8	225.3
11	BTS 5448	297.4	19,134	22,774	64.3	17.7	14.9	90.1	28.8	1.5	58.9	232.3
12	BTS 5483	312.4	18,520	22,004	59.3	18.6	15.6	90.1	35.1	2.0	54.8	229.1
13	BTS 540N	292.5	18,403	21,869	63.0	17.4	14.6	90.3	32.9	2.0	53.6	229.8
Mean		297.6	18,904	22,551	63.5	17.8	14.9	90.0	31.4	1.7	53.0	222.2
Residual MS		92.9	843,217	1,110,749	8.9	0.2	0.2	0.6	195.3	0.6	38.7	276.5
Analysis CV (%)		3.2	4.9	4.7	4.7	2.5	3.2	0.9	44.5	45.4	11.7	7.5

*Emergence counts taken prior to thinning and converted to a percent.
**Final stand counts taken after thinning and converted to beets per 100' of row.

2023-2024 Imperial Valley OVT Powdery Mildew Nursery

Imperial Valley Research Center - Brawley, CA

Entry Name	Entry	Average Rating
BTS 5460	1	5.6
BTS 5678	2	5.7
BTS 511N	3	6.6
BTS 5255	4	5.7
SV 602	5	6.5
SV 911	6	6.0
SV 1915	7	6.0
SV 1927	8	7.1
Tolerant Check	9	2.2
Susc. Check	10	5.7
Tolerant Check	11	2.2
Susc. Check	12	5.5
Mean		5.4
CV		5.9
lsd (0.05)		0.32
Pr>F		<0.0001
Reps		8

*Ratings are on a 1-9 scale. 1 = no disease, 9 = fully covered by disease.

**Ratings taken by Joaquin Santiago, Research Agronomist, Spreckels Sugar.

Ratings are an average of six rating dates.

2024 BSDF Rhizomania Nursery Results - Imperial Valley OVT

Cooperator: Dr. Carl Strausbaugh

USDA/ARS - Kimberly, Idaho

Entry[z]	Variety Name	Foliar rating (% susceptible)[y]	Root rating[x]	Sucrose content (%)	Nitrate (ppm)	Conductivity (mmhos)	Root yield (tons/A)	ERS (lb/A)[w]
3	BTS 511N	0 d	1.6 e	16.84 b	78	0.72 a-c	47.86 a	13,768 a
1	BTS 5460	0 cd	2.0 bc	17.28 a	66	0.68 b-d	44.52 c	13,225 a
2	BTS 5678	1 bc	1.6 de	16.46 b	63	0.71 a-c	46.92 ab	13,198 a
8	SV 1927	0 d	1.8 c-e	16.64 b	71	0.68 b-d	46.14 a-c	13,181 a
4	BTS 5255	1 b	2.2 b	16.85 b	56	0.66 cd	41.94 de	12,184 b
7	SV 1915	1 bc	2.2 b	16.58 b	45	0.64 d	41.63 e	11,920 b
5	SV 602	1 bc	1.9 cd	15.62 c	90	0.72 ab	44.75 bc	11,900 b
6	SV 911	0 d	1.9 cd	15.82 c	82	0.73 ab	44.15 cd	11,883 b
Check		100 a	4.1 a	15.44 c	56	0.74 a	19.03 f	4,997 c
Mean		11	2.2	16.39	67	0.7	41.88	11,806
$P > F$[v]		<0.0001	<0.0001	<0.0001	0.0644	0.0232	<0.0001	<0.0001
LSD		1	0.3	0.4	NS	0.06	2.26	697

[z] BTS 4D20 was included as the BNYVV susceptible check cultivar.

[y] Foliar rating = percentage of foliage with rhizomania symptoms (narrow yellow upright leaves).

[x] Root rating using a scale of 0-9 (0 = healthy and 9 = dead; Plant Disease 93:632-638); $\geq$ 3 would be considered susceptible).

[w] Estimated recoverable sucrose (ERS) = extraction x 0.01 x gross sucrose where extraction

= 250 + [1255.2 x (conductivity -15000) x (percent sucrose - 6185)]/(percent sucrose x [98.66 - (7.845 x conductivity)]).

[v] $P > F$ was the probability associated with the F value. Within each variable, means followed by the same letter did not differ significantly based on Fisher's protected least significant difference (LSD; α = 0.05). NS = not significant.