AN OVERVIEW OF 2021 ACTIVITIES IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM

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A major objective of the Louisiana State University Agricultural Center (LSU AgCenter) sugarcane variety development program is to develop genetically improved varieties of sugarcane for the Louisiana sugar industry. The program is comprised of several distinct stages (Table 1) each of which is critical to the overall objective. The stages as listed in chronological order depict the process of creating, selecting, testing, and releasing of new, genetically improved varieties for commercial production. For the program to be effective, each of these stages must be accomplished every year. This report is a summary of the activities of the LSU AgCenter sugarcane variety development in the 2021 season.

Sugarcane variety development at the LSU AgCenter is a multidisciplinary and collaborative effort drawing from the expertise of scientists and allied professionals from a diversity of disciplines within (Table 2) as well as outside of the institution. The LSU AgCenter research team also works in collaboration with other institutions such as the United States Department of Agriculture (USDA) and the American Sugar Cane League (ASCL). The best varieties from the LSU AgCenter ('L' varieties) and USDA ('Ho' and 'HoCP') programs are brought together for evaluation at the off-station, infield, and outfield testing stages of the program (Table 1). Outfield testing is conducted by personnel from the LSU AgCenter, the USDA, and the American Sugar Cane League. Upon recommending a variety for commercial release, 'seedcane' increase is carried out by the American Sugar Cane League and generally commences when varieties are introduced to the outfield testing stage (Table 1). This long-standing cooperative effort between the three entities (the LSU AgCenter, the USDA, and the ASCL) which has served the Louisiana sugar industry well is outlined in the "Three-Way Agreement of 2007".

Success in any variety development program is heavily dependent on the availability of novel genetic variability made available for selection via targeted cross hybridization among desirable sugarcane genotypes/parents. Cultivated sugarcane does not flower naturally in Louisiana because of the cool fall temperatures hence, the breeding program must resort to artificial photoperiod treatment to induce and synchronize flowering of sugarcane for crossing. Photoperiod treatment to induce flowering began on June 1 and continued until September 27, 2021. The first crosses were made in the second week of September and crossing lasted till November 1, 2021.

Unlike the 2020 crossing campaign which faced a lot of issues including scheduling of personnel brought about by the COVID-19 closures, the 2021 campaign came with many improvements and successes. Details about the adjustments that were made in the 2021 crossing campaign and the successes that arose from them can be found in the section titled '**2021 PHOTOPERIOD AND CROSSING IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM**'. In summary, stalk number was decreased (deliberately) in 2021 to 1,077 stalks as compared to 1,362 stalks in 2020. On average, there were 3.3 stalks per

can with 272 cans producing tassels. There was an increase in the tassel production with 683 tassels produced in 2021 (Table 2) as compared to 87 tassels in 2020. A total of 683 tassels comprising 93 genotypes were used to produce 390 crosses achieving a higher number of crosses than the previous five years. A total of 122,862 viable seeds were produced in 2021 with 112,322 seeds coming from bi-parental crosses, 9,970 seeds from polycrosses, and 570 seeds from self-crosses. Germination rate was estimated based on the germination of 0.5 g of seed under greenhouse conditions in late December of 2021 into January 2022. Germination rates increased in 2021 with an average of 22 plants per gram of seed compared to 15 plants per gram of seed in 2020.

In the next stage of the selection program (the seedling stage) a total of 52,985 seedlings from 144 crosses of the 2020 crossing series were planted to the field in the spring of 2021. Many of these seedlings were progeny of crosses among commercial and superior experimental varieties. In the fall of 2021, individual selection was practiced on the 21,951 stubble single stools of the 2019 crossing series, planted in 2020, that survived the winter. The 662 clones selected and advanced from the single stools were planted in 10-foot, first-line trial plots.

The first line trial plots established last year were evaluated and superior clones selected and planted into a second line trial. Breeders walked through the plots and dropped clones based on visual appraisal for diseases, insect damage, poor stand including lodging. Clones that were not dropped the first time around were evaluated for pith, and Brix. A total of 449 clones were eventually selected and planted into single row, 16-foot second line trial. From the second line trial established the year before 154 clones were selected and planted into 2-row, unreplicated, 16-foot increase plots. These are tentative selections with the 'seedcane' being increased pending additional data from the first line and second line ratoon crops. By the time clones are assigned a permanent 'L' variety number using both the plant and first ratoon cane crop data there will be enough material to plant replicated trials at three on-station nurseries.

Preliminary visual ratings for cane yield and plant type were done in the fall on the 214 clones from the 2016 crossing series that remained active in the second line trial. Clones with acceptable ratings were further evaluated for lodging and/or broken tops, borer damage, disease symptoms, pith, estimated cane yield, sucrose content and sugar yield. A total of 29 experimental varieties judged to be superior to the checks were assigned permanent variety designations ("L") in the fall of 2021. These newly assigned experimental varieties were entered into replicated on-station nursery trials (2 replicates, 16-foot plots) at three locations (Sugar Research Station, Iberia Research Station, and USDA-ARS Ardoyne Farm. Additional details about selection in the seedling and early clonal stages can be found in the section titled '**SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LSU AGCENTER'S SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR 2021**'.

The section titled **'2021 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM NURSERY AND INFIELD VARIETY TRIALS'** describes experiments that were conducted outside of the experiment station in several locations scattered across the Louisiana sugarcane industry. The objective is to identify and select varieties that will perform well across the range of environments a commercial variety is likely to encounter in Louisiana. Some of these tests are planted in grower's farms by the breeding crew but are managed by the

growers. Nineteen experimental varieties from the 2020 assignment series (2015 Crossing series) that performed well in the plant cane crop on-station nursery trials were replanted into infield and off station nursery tests. The off-station nurseries were planted in single row, 20-foot plots with 4-foot alleys. The infield tests were planted in two-row, 25-foot plots with 5-foot alleys. The experimental design for the off-station nursery and infield tests was a randomized complete block with two replications per location. The infield test is the first-time experimental varieties are harvested and weighed using weigh wagons to estimate cane yield. Up until this point, cane yield was estimated using stalk counts multiplied by the weight of 10 random stalks in a plot. Varieties selected by the LSU AgCenter and USDA are jointly evaluated in the off-station and infield locations.

Three experimental varieties from the 2019 assignment series that performed well in the infield, off-station and on-station nursery tests were introduced to outfield locations and planted into increase plots. Those that continue to perform well in these tests will subsequently be planted into the outfield testing stage of the program in 2022. In 2021, none of the experimental varieties from the 2018 Assignment Series were eligible for planting into the outfield trial stage or introduced on primary increase stations. One experimental variety, L 15-306, was released to the Louisiana sugar industry. The outfield stage of the program is described in detail in the section titled '**2021 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM OUTFIELD VARIETY TRIALS'.**

The section titled **'SUCROSE LABORATORY AT THE SUGAR RESEARCH STATION'** describes activities in the sucrose ('juice lab') laboratory for 2021. The lab. Processed a total of 3,344 samples using the Spectracane FT-NIR instrument. A subset of samples was processed using the standard wet chemistry method and the data were used to validate data obtained from the Spectracane FT-NIR instrument.

Promising experimental varieties that made it to the advanced stages of the program were entered into several tests to screen for resistance to prominent diseases (Dr. Jeff Hoy, Plant Pathologist) and insect pests (Dr. Blake Wilson, Entomologist) of sugarcane in Louisiana. Results gathered from these screening tests will be instructive in determining which varieties to recommend for commercial release and how best to manage these varieties during commercial production. The data will also be useful in the crossing program in determining what parents to pair to avoid making susceptible by susceptible crosses. Also informative were data from the molecular breeding program (Dr. Niranjan Baisakh) in deciding, which crosses to make based on genetic diversity among parents at the molecular level and, which parents harbor the Bru 1 gene that confers rust resistance.

The decision regarding further testing and seed increase of candidate varieties in the advanced stages of the program was determined at the Variety Advancement Committee meeting attended by members of all three (LSU AgCenter, USDA and ASCL) organizations.

The 2021 Louisiana sugarcane industry had a cold start, with a February ice storm that covered a portion of the state in freezing rain and ice. Spring months were cooler and wetter than

average, with May and April bringing over double the average monthly rainfall to Baton Rouge. The 2021 Hurricane season brought Louisiana one tropical storm (Claudette), one hurricane (Nicholas), and one major hurricane (Ida). Starting off Hurricane season was Tropical Storm Claudette, making landfall in southeast Louisiana on June 19th. On August 29th category 4 Hurricane Ida made landfall in Port Fourchon, bringing with it gusts of up to 172 mph and up to 12 feet of storm surge in some coastal parishes. Ida hit the Louisiana industry hard and has been regarded as the 5th costliest Hurricane in U.S. history. The last hurricane to impact the industry in 2021 was Hurricane Nicholas in mid-September, which brought heavy rain to the lower half of the state. Baton Rouge received 79.85" of rain in 2021, which is 17.91" over the 30-year average. The harvest season was warmer than average, with the month of December being one of the warmest on record. All mills in the Louisiana industry completed grinding by January 21, 2022. L 01-299 was once again the most widely grown varieties in Louisiana in 2021 (57%) distantly followed by HoCP 96-540 (10%) and several other newly released varieties. L 01-299 was used as a check in all trials.

Progress in the LSU AgCenter Sugarcane Variety Development Program would not be possible without the collaboration of many growers on whose farm several of the trials are conducted. Financial support from the state of Louisiana disbursed through the LSU AgCenter and from the Louisiana sugar industry disbursed through the American Sugar Cane League is gratefully acknowledged. So too is the collaboration of personnel from the American Sugarcane League and the USDA-ARS Sugarcane Research Unit.

Table 1. Chronological activities within the LSU AgCenter sugarcane variety ('L' varieties) development program.

Year	Stage and activity
1	Crossing
2	Seedlings planted
3	Seedlings selected in 1R to plant first line trial
4	First line trial selected in PC to plant second line trial
5	Second line trial selected in PC to plant increase plots
6	Second line trial selected in 1R to assign permanent 'L' variety numbers On-station nurseries planted (at St. Gabriel, Houma, New Iberia) using 'seedcane' from increase plots
7	On-station nurseries PC harvested Off-station (3) and infield (2) nurseries planted
8	On-station nurseries 1R harvested Off-station and infield nurseries PC harvested Experimental clones introduced to 12 outfield test sites and planted as 'seedcane' increase plots Experimental clones introduced to 3 primary increase stations
9	On-station nurseries 2R harvested Off-station and infield 1R harvested Outfield tests planted at 12 locations Experimental clones increased on 3 primary increase stations
10	On-station nurseries 3R harvested Off-station and infield nurseries 2R harvested Outfield tests PC harvested Continue to increase experimental clones on primary increase stations
11	Off-station and infield nurseries 3R harvested Outfield tests 1R harvested Introduce experimental clones to 44 secondary increase stations
12	Outfield tests 2R harvested Increase experimental clones on 44 secondary increase stations
13	Variety release meeting New variety distributed by ASCL from secondary increase stations

1R, First ratoon cane crop; PC, Plant cane crop; 2R, Second ratoon cane crop; ASCL, American Sugarcane League.

Table 2. Members of the LSU AgCenter Sugarcane Variety Development Team.

Team Member	Budgetary Unit	Responsibility
Collins Kimbeng	Sugar Research Station	Program Leader
Michael Pontif	Sugar Research Station	Selection and Variety Testing
Blake Wilson	Sugar Research Station	Insect Resistance
Kenneth Gravois	Sugar Research Station	Extension
Jeffrey Hoy	Plant Pathology and Crop Physiology	Disease Resistance
Niranjan Baisakh	School of Plant, Environmental and Soil Sciences	Molecular Breeding
Albert Orgeron	St. James Parish, Lutcher	Herbicide Tolerance
Carlton Baucum	Sugar Research Station	Infield Variety Testing
Mavis Daigle	Sugar Research Station	Sucrose Laboratory
Brayden Blanchard	Sugar Research Station	Photoperiod & Crossing
Zachary Taylor	Sugar Research Station	Outfield Variety Testing
Alphonse Coco	Sugar Research Station	Farm Manager

2021 PHOTOPERIOD AND CROSSING IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM

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The longstanding and continued goal of the LSU AgCenter's Sugarcane Variety Development Program is the development of genetically improved sugarcane varieties which will positively impact the sugar industry. The variety development program begins with the photoperiod and crossing stages. Photoperiod treatments are managed to induce flowering of genotypes that would otherwise not naturally flower in Louisiana's climatic conditions. Crosses are made through hybridization techniques that use sugarcane yield components, borer resistance, and disease resistance characteristics as criteria to select parents and to decide what crosses to make. The breeding program strives to perform crosses that will yield superior progeny.

Eyepiece cuttings of breeding genotypes to be used for the 2021 crossing season were planted on October 20, 2020. The cuttings were planted in Styrofoam cell trays and maintained in the greenhouse. On February 3, 2021, the cuttings were transferred to can culture. The transplants were planted in large cans (38 liters) containing equal parts of field soil, washed sand, and peat moss and maintained in the greenhouse. During their time in these cans, the plants were trimmed once to harden the parent stalks and induce tillering. On the week of April 14-15, 2021, the cans were moved from the greenhouse to the photoperiod rail carts. Natural lighting and six light-tight chambers were used for photoperiod treatments. The cans were placed on photoperiod carts and assigned to a specific photoperiod regime based on previous knowledge of their flowering behavior. Genotypes that are difficult to flower were given a longer induction treatment of 41 consecutive days of 12 ½ hours of constant day length with a later start date of decline period which began on July 10, 2021. In comparison, genotypes considered to be easy to flower were given a shorter induction treatment of 37 consecutive days of 12 ½ hours of constant day length and a decline period which began on July 6, 2021. New genotypes for which flowering behavior was not known were placed throughout the photoperiod carts. The new genotypes will be moved to more favorable photoperiod conditions in the following crossing season if they do not flower in a specific photoperiod regime. Fertilization was adjusted to condition plants for floral induction as a high C:N ratio has been shown to promote flowering in sugarcane.

The first photoperiod treatment began on June 1, 2021. All photoperiod treatments were initiated with a minimum of 37 consecutive days of 12 ½ hours of constant day length (Table 1). After the initial constant photoperiod days, day length was artificially shortened by one minute per day. Tassel (flower) initiation begins when day length begins to decrease. Treatments differed by the number of days with constant day length (photoinductive days) and the date on which the decline in day length was initiated (Table 1). All photoperiod treatments were discontinued on September 27, 2021, when natural day length was less than 12 ½ hours and decreasing at a rate conducive to sugarcane flowering.

Flowering of the parents began in the first week of September in 2021. The normal time frame for first flowering can be as early as the last week of August or as late as the third week of September. There may be a slight deviation in the appearance of the first flower due to temperature during the photoperiod induction phase, varietal characteristics, and the photoperiod treatments. Stalk numbers were decreased in 2021 to 1,077 stalks (Table 2) as compared to 1,362 stalks in 2020. On average, there were 3.3 stalks per can with 272 cans producing tassels (Table 2). There was a significant increase in tassel production with 683 tassels produced in 2021 (Table 2) as compared to 87 tassels produced in 2020. This was the highest amount of tassels produced in the last six years. Typically, flowering percentages are highest in stalks located in cart position "A" (Table 1) relative to other cart positions. This appeared to be true for the 2021 season, however large increases in flowering percentages were observed in all cart positions compared to the 2020 season. The total flowering percentage for the six photoperiod bays increased from 6.4% in 2020 to 63.4% in 2020 achieving the highest flowering percentage since 2010.

Crossing began on September 3, 2021 and ended on November 1, 2021. A total of 683 tassels comprising 93 genotypes (Table 2) were used to produce 390 crosses (Table 3, Table 5) achieving a higher number of crosses than the previous five years. A total of 122,862 viable seeds were produced in 2021 (Table 3) with 112,322 seeds coming from bi-parental crosses, 9,970 seeds from polycrosses, and 570 seeds from self-crosses (Table 3). Germination rate was estimated based on the germination of 0.5 g of seed under greenhouse conditions in late December of 2021 into January 2022. Germination rates increased in 2021 with an average of 22 plants per gram of seeds compared to 15 plants per gram of seeds in 2020 (Table 3).

After the unfortunate 2020 crossing season resulting from COVID-19 related difficulties, the 2021 crossing season came with many adaptations and resulting success. After hypothesizing the detrimental effects of over-trimming the parental genotypes, the breeding team decided to reduce the amount of trimming. This would remove the added stress that typically will encourage tillering in sugarcane, therefore it was predicted that there would be less stalks in the cans combined with increased growth of the stalks present. The goal was to achieve the growth of two to four internodes of the parental stalks by the start of the photoinductive period of 12.5 hours of sunlight for at least 37 days. This was based on previous research reported in LaBorde (2007) describing the transition of the growth of grasses from the juvenile stage to the reproductive stage where tassel induction is possible (Burr et al. 1957; Clements and Awada 1967; Coleman 1969; Julien 1973). If the plants did not achieve the 2-4 internode length until after the start of the photoinductive period, then by the time they would, the daylength periods would be shorter than the necessary 12.5 hours of sunlight needed to induce flowering. This has to do with the reduced amount of summer daylength specific to the latitude at St. Gabriel, LA relative to the summer periods of a tropical region where sugarcane flowers naturally. At the start of the photoinductive period of 37 days, 72.2% (234/324) of the cans had achieved the 2-4 internodes growth desired. Of these, 96.7% (226/234) of the cans successfully resulted in production of tassels. Of the eight varieties that were not induced to flowering, five of them had not achieved the 2-4 internode growth at the start of the photoinductive period. Of the 272 cans that produced tassels, only 31.2% of them had not achieved the 2-4 internodes growth desired.

This is hypothesized to have greatly contributed to the higher flowering percentage in the 2021 season. This also testifies to the need to find an ideal strategy to apply enough stress to the parental genotypes to induce tillering while avoiding the inhibition of proper growth so that the plants will reach the reproductive stage of growth at the start of the photoinductive period. The cans were moved out of the greenhouse and onto the carts during the second week of April. The change of environment allowed for the reduced threat of diseases such as Sheath Rot, which have an affinity to the greenhouse conditions, to afflict the plants like it had in the 2020 season. Great diligence was given to the care of the parental genotypes in greenhouse culture in the 2021 season to promote maturity and general health of the plants. The benefits of these new practices were seen in the resulting high-quality crosses made and the potential abundance of genetic variation achieved from the 2021 Crossing Campaign.

Table 1. Summary of the 2021 photoperiod treatments for the LSU AgCenter's sugarcane variety development program

Bay	Cart	Treatment Start Date	Days of Constant Photoperiod	Date Photoperiod Decline Started	Days of Declining Photoperiod		Mean Flowering Date	Total Stalks	Percent Flowered
					Peak 1	Peak 2			
1	A	14-Jun	44	28-Jul	72	87	280±1	68	82
1	B	14-Jun	44	28-Jul	72	87	279±1	70	77
1	C	14-Jun	44	28-Jul	72	87	276±1	62	60
2	A	14-Jun	44	28-Jul	72	87	292±2	62	61
2	B	14-Jun	44	28-Jul	72	87	286±1	63	67
2	C	14-Jun	44	28-Jul	72	87	284±1	60	73
3	A	1-June	37	6-Jul	87	102	265±1	65	77
3	B	1-June	37	6-Jul	87	102	263±2	61	56
3	C	1-June	37	6-Jul	87	102	264±2	56	54
4	A	1-June	37	6-Jul	87	102	264±2	53	74
4	B	1-June	37	6-Jul	87	102	268±3	66	41
4	C	1-June	37	6-Jul	87	102	259±2	57	44
5	A	1-June	41	10-Jul	82	97	271±2	49	82
5	B	1-June	41	10-Jul	82	97	270±1	62	58
5	C	1-June	41	10-Jul	82	97	271±2	57	35
6	A	1-June	41	10-Jul	82	97	273±1	59	83
6	B	1-June	41	10-Jul	82	97	272±2	50	58
6	C	1-June	41	10-Jul	82	97	272±2	57	58

Table 2. Summary of can, variety, and flower information in bays 1-6 subjected to photoperiod treatments.

Varieties used in crossing	Cans with stalks	Cans with tassels	Total stalks	Total tassels	Mean stalks per can	Mean tassels per can†	Mean pollen rating‡	Mean days to flower§
---Number---								
93	324	272	1077	683	3.32±1.13	2.51 ± 1.11	5.50 ± 2.14	76.61 ± 11.27

† Based upon cans with tassels.
‡ Pollen rating of 1 through 4 indicates male tassel; pollen rating of 5 through 9 indicates female tassel.
§ Days from photoperiod decline start date to flowering.

Table 3. Summary of 2021 crossing and seed production.

Type of Cross	Crosses	Sum of Seed Production	Mean Seed Production Per Cross	Mean Seed Production Per Female Tassel	Mean Germination Per Gram Seed
---Number---					
Biparental	353	112322	318±475	318±475	22±31
Polycross	33	9970	302±314	302±314	39±40
Self	4	570	143±151	143±151	18±18
Total	390	122862	315±461	315±461	22±32

Table 4. Varietal flowering summary in 2021 in the photoperiod bays

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days to Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
CP01-1372	38±1		.		14		
CP83-644	35±0	281	94	6	7	1	14
HO06-563	35±0	258	74±1	3	8	7	88
HO07-613	40±2		.		8	.	.
HO08-717	38±1	272	82±2	7	14	4	29
HO08-730	39±0	253	80±5	3	12	9	75
HO09-827	42±1	272	79±2	7	10	5	50
HO09-832	44±0	284	75	6	3	2	67
HO09-840	39±1	253	69±1	8	22	15	68
HO09-9401	38±1	246	61±1	8	19	19	100
HO11-532	43±1	263	77±1	3	25	11	44
HO11-573	39±0	295	113±9	4	2	2	100
HO12-615	42±1	260	79±1	6	21	16	76
HO13-705	44±0	284	75	4	5	1	20
HO13-739	38±1	274	89±2	9	9	4	44
HO14-835	35±0	263	78±2	6	3	3	100
HO15-971	35±0	284	97±	8	6	1	17
HO16-600	35±0	258	83±12	6	3	2	67
HO16-608	38±1	.	.	.	6	.	.
HO17-776	40±2	256	70±1	9	7	7	100
HO95-988	39±0	270	80±1	3	2	2	100
HOCP00-950	42±1	270	79±3	8±1	20	10	50
HOCP01-517	35±	.	.	.	1	.	.
HOCP01-523	39±0	293	102	7	9	1	11
HOCP02-618	35±0	265	84±4	4	6	3	50
HOCP04-838	41±1	272	87±3	8	11	8	73
HOCP04-847	41±1	270	83±3	9	21	13	62
HOCP05-902	44±0	284	80±5	8	4	2	50
HOCP09-804	41±1	274	80±3	4	16	9	56
HOCP09-814	39±0	274	86±1	8	4	3	75
HOCP14-802	35±0	246	64±2	3	8	6	75
HOCP14-867	39±0	274	83	8	2	2	100
HOCP14-885	38±1	277	86±3	3	18	11	61
HOCP17-702	35±0	.	.	.	2	.	.
HOCP18-801	39±1	284	76±1	6	10	2	20
HOCP85-845	39±0	277	88±2	3	6	4	67
HOCP91-552	40±1	251	66±1	4	19	16	84
HOCP92-618	39±2	270	81±2	3	6	4	67
HOCP92-624	41±1	260	72±1	7	12	10	83
HOCP95-951	36±0	263	77±1	3	15	7	47
HOCP96-540	39±1	270	79±2	4	19	10	53
HOCP96-561	39±1	270	84±2	6	20	15	75
HOCP97-609	38±1	256	76±2	4	10	8	80
HOL14-841	44±0	274	68±2	6	4	3	75
HOL15-508	35±0	291	105±1	3	6	2	33
L01-283	40±1	272	86±1	7	7	7	100
L01-299	40±1	263	78±2	3	18	13	72
L01-315	35±0	253	70±2	8	5	5	100

Table 4.
Continued

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days to Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
L03-371	39±0	298	107	8	7	1	14
L05-448	41±1	256	72±1	3	19	18	95
L05-457	41±1	246	63±1	8	19	19	100
L06-001	39±1	263	86±6	4	18	8	44
L06-038	35±0	256	74±2	4	5	4	80
L06-040	44±0	277	72±4	7	5	3	60
L07-057	40±1	246	66±2	7	15	12	80
L08-088	39±0	270	84±4	7	8	3	38
L08-090	39±1	253	72±1	5	22	18	82
L09-099	39±1	256	77±2	3	26	14	54
L09-112	37±1	277	94±5	4	13	4	31
L09-123	40±1	250	70±3	8	16	14	88
L09-131	39±0	258	77±2	3	13	8	62
L10-146	39±0	274	87±2	6	11	3	27
L10-147	39±0	260	76±3	7	9	7	78
L11-183	40±1	258	78±2	9	20	17	85
L11-187	41±1	265	87±4	5	19	17	89
L12-201	41±1	281	75±2	8	12	5	42
L12-202	40±1	256	71±1	4	20	18	90
L12-218	35±0	267	89±3	8	6	6	100
L12-227	41±1	260	75±3	4	6	6	100
L13-243	44±0	.	.	.	2	.	.
L13-251	38±1	256	73±2	4	16	15	94
L14-264	44±0	277	68	8	2	2	100
L14-265	39±0	279	92±1	8	6	6	100
L14-266	44±0	281	77±4	4	4	3	75
L14-267	38±1	279	96±3	4	8	6	75
L14-269	44±0	281	76±3	6	4	4	100
L14-273	44±0	270	80±8	8	10	7	70
L14-275	44±0	284	75	3	4	3	75
L14-276	44±0	277	73±3	6±1	7	7	100
L14-282	42±1	270	80±1	9	8	4	50
L15-298	44±0	270	65±3	9	5	3	60
L15-300	35±0	286	101±2	3	4	3	75
L15-305	35±0	.	.	.	4	.	.
L15-306	40±2	277	81±3	9	9	7	78
L15-320	44±0	263	64±3	6	13	13	100
L15-337	38±0	270	87±4	2	24	8	33
L17-410	40±2	272	85±1	10	5	3	60
L17-428	44±0	281	72	.	2	1	50
L85-384	39±1	267	91±8	4	16	6	38
L86-454	39±0	260	69	4	4	1	25
L94-426	38±1	263	82±4	6	9	8	89
L94-433	39±0	279	93±5	6±2	3	2	67
L97-128	39±1	250	68±1	6	15	12	80
L98-207	39±0	265	75±1	4	7	2	29

Table 4.
Continued

Variety	Days of Constant Photoperiod	First Flower Date	Mean Days to Flower	Pollen Rating	Total Stalk Number	Total Flowers	Percent Flowering Stalks
L98-209	39±0		.	.	5	.	.
L99-226	39±1	256	80±2	4	36	21	58
L99-233	40±1	250	70±1	4	39	18	46
LCP81-010	41±1	263	72±1	4	19	19	100
LCP81-030	35±0	258	72±1	4	2	2	100
N27	35±0	298	111±	7	4	1	25
US01-040	39±0	270	79±0	4	7	6	86

Table 5. Crosses and seed made in 2021

Cross	Female	Male	Seed
XL21-001	L05-457	HOCP14-802	912
XL21-002	L07-057	HOCP14-802	392
XL21-003	HO09-9401	HOCP14-802	0
XL21-004	HO09-9401	HOCP14-802	512
XL21-005	L07-057	HOCP14-802	14
XL21-006	HO09-9401	HOCP14-802	528
XL21-007	L97-128	HOCP14-802	0
XL21-008	L09-123	L99-233	432
XL21-009	L97-128	L99-233	0
XL21-010	HO09-9401	L99-233	0
XL21-011	HO09-9401	HOCP14-802	240
XL21-012	HO09-9401	HOCP14-802	512
XL21-013	L07-057	HOCP14-802	14
XL21-014	HO09-9401	21P1	368
XL21-015	L07-057	21P2	0
XL21-016	L07-057	21P3	0
XL21-017	HO09-9401	L99-233	80
XL21-018	L01-315	HOCP14-802	160
XL21-019	HO09-840	HOCP14-802	128
XL21-020	L09-123	HO08-730	160
XL21-021	HO09-9401	HO08-730	192
XL21-022	L05-457	L99-233	64
XL21-023	L09-123	L99-233	128
XL21-024	L97-128	L99-233	0
XL21-025	L07-057	HO08-730	70
XL21-026	L07-057	HO08-730	42
XL21-027	L97-128	HO08-730	12
XL21-028	L09-123	L08-090	16
XL21-029	L97-128	L08-090	0
XL21-030	HO17-776	HO08-730	72
XL21-031	L01-315	HO08-730	0
XL21-032	L05-457	HO08-730	512
XL21-033	HO17-776	L99-226	18
XL21-034	L97-128	L99-226	0
XL21-035	L01-315	L99-226	80
XL21-036	L08-090	L13-251	0
XL21-037	L09-123	L13-251	0
XL21-038	HO09-9401	L13-251	16
XL21-039	L01-315	L13-251	0
XL21-040	HO09-840	L99-226	176
XL21-041	L05-457	L99-226	0
XL21-042	L97-128	HOCP97-609	12
XL21-043	L05-448	L05-448	42
XL21-044	L05-448	L05-448	0
XL21-045	HOCP91-552	L05-448	368
XL21-046	HOCP91-552	L05-448	344
XL21-047	L13-251	L13-251	200
XL21-048	L13-251	L13-251	328
XL21-049	L12-202	21P4	40
XL21-050	L06-038	21P5	0
XL21-051	L99-233	21P6	0
XL21-052	HOCP91-552	21P7	720
XL21-053	L99-233	21P8	176
XL21-054	L11-183	L08-090	0
XL21-055	L09-123	L09-099	0
XL21-056	HO09-840	L09-131	112
XL21-057	L07-057	L12-202	168
XL21-058	L13-251	21P9	480
XL21-059	L13-251	21P10	440
XL21-060	HOCP91-552	21P11	760
XL21-061	L05-448	21P12	156
XL21-062	HO09-9401	HOCP14-802	96
XL21-063	HO09-9401	HOCP14-802	640
XL21-064	HO09-840	L12-227	0
XL21-065	HO12-615	L12-227	0
XL21-066	L10-147	L12-227	476
XL21-067	HO16-600	L99-226	0
XL21-068	HO17-776	L13-251	72
XL21-069	L11-183	L13-251	270
XL21-070	HO12-615	HOCP14-802	0
XL21-071	L08-090	HOCP14-802	120
XL21-072	L08-090	HO06-563	72
XL21-073	L08-090	HO06-563	72
XL21-074	L08-090	L05-448	0
XL21-075	L10-147	LCP81-030	168
XL21-076	L11-183	LCP81-030	144
XL21-077	HOCP92-624	L12-202	882
XL21-078	L05-457	L09-099	0
XL21-079	L05-457	L09-099	128
XL21-080	HO17-776	L09-099	18
XL21-081	L05-457	L09-099	64
XL21-082	HO14-835	L01-299	120
XL21-083	HO09-840	L01-299	176
XL21-084	L94-426	L01-299	24
XL21-085	L08-090	L01-299	120
XL21-086	HO14-835	L99-226	240
XL21-087	L10-147	L99-226	994
XL21-088	HOCP92-624	L99-226	686
XL21-089	L08-090	L99-226	60
XL21-090	L11-183	HO11-532	36
XL21-091	L15-320	HO11-532	216
XL21-092	L15-320	L08-090	60
XL21-093	L10-147	L08-090	476
XL21-094	HO12-615	L08-090	12
XL21-095	L09-123	L12-202	0
XL21-096	HOCP95-951	L12-202	18
XL21-097	HO09-840	HO06-563	64
XL21-098	L06-038	HO06-563	80

Table 5. Continued

Cross	Female	Male	Seed
XL21-099	L07-057	L99-233	28
XL21-100	L05-457	L99-233	48
XL21-101	L05-448	21P13	90
XL21-102	L86-454	21P14	48
XL21-103	LCP81-010	21P15	424
XL21-104	HOCP95-951	21P16	84
XL21-105	HOCP91-552	L06-038	0
XL21-106	HOCP97-609	HOCP91-552	0
XL21-107	LCP81-010	HOCP97-609	0
XL21-108	L11-187	L01-299	24
XL21-109	L15-320	L01-299	420
XL21-110	L05-457	L01-299	352
XL21-111	L11-183	L99-226	90
XL21-112	L15-320	L99-226	132
XL21-113	HO09-9401	L99-226	512
XL21-114	L15-320	L12-227	876
XL21-115	HO09-9401	L12-227	256
XL21-116	L09-123	L12-227	16
XL21-117	HOCP92-624	L12-227	1274
XL21-118	L15-320	L98-207	864
XL21-119	HO09-9401	LCP81-010	144
XL21-120	L01-315	L09-131	0
XL21-121	L94-426	L99-233	24
XL21-122	HOCP92-624	L99-233	1750
XL21-123	HOCP02-618	21P17	48
XL21-124	HOCP97-609	21P18	40
XL21-125	HOCP95-951	21P19	186
XL21-126	LCP81-010	21P20	280
XL21-127	L11-183	LCP85-384	216
XL21-128	HO09-9401	LCP85-384	720
XL21-129	L11-183	L09-099	252
XL21-130	L94-426	L09-099	0
XL21-131	L12-218	L08-090	16
XL21-132	L94-426	L08-090	0
XL21-133	L05-457	L08-090	32
XL21-134	L09-123	L98-207	80
XL21-135	HOCP92-624	L98-207	1624
XL21-136	HOCP92-624	LCP81-010	1414
XL21-137	L99-233	HOCP95-951	0
XL21-138	L99-233	HOCP95-951	24
XL21-139	HOCP00-950	L09-099	0
XL21-140	L11-187	L09-099	48
XL21-141	L14-273	L09-099	480
XL21-142	HO14-835	L09-099	36
XL21-143	L14-282	L15-337	306
XL21-144	L12-218	L15-337	144
XL21-145	L09-123	L15-337	0
XL21-146	L14-282	L06-001	648
XL21-147	HOCP96-561	L06-001	0
XL21-148	HO09-840	L06-001	96
XL21-149	HOCP04-847	L99-226	90
XL21-150	HOCP96-561	L99-226	348
XL21-151	L94-426	L99-226	12
XL21-152	HOCP96-561	L99-233	120
XL21-152	HOCP96-561	L99-233	0
XL21-153	HO09-840	L99-233	16
XL21-154	L15-298	L01-299	360
XL21-155	LCP85-384	L01-299	128
XL21-156	L09-131	L01-299	24
XL21-157	L94-426	HOCP96-540	0
XL21-158	L05-457	HOCP96-540	144
XL21-159	US01-040	HOCP96-540	0
XL21-160	HOCP92-624	L12-202	1120
XL21-161	L05-457	L12-202	224
XL21-162	L09-131	L12-202	18
XL21-163	L05-457	HOCP92-618	784
XL21-163	L05-457	HOCP92-618	304
XL21-164	HOCP91-552	HOCP92-618	208
XL21-164	HOCP91-552	HOCP92-618	8
XL21-165	L01-283	L99-226	140
XL21-166	L14-273	L99-226	288
XL21-167	HOCP04-838	L99-226	64
XL21-168	L11-187	HO11-532	84
XL21-169	HOCP04-838	HO11-532	240
XL21-170	HO09-827	HO11-532	42
XL21-171	L11-187	L99-233	228
XL21-172	L15-298	L99-233	396
XL21-173	HO08-717	L15-337	0
XL21-174	HOCP04-838	L15-337	352
XL21-175	L10-147	L15-337	1358
XL21-176	HOCP96-561	L15-337	204
XL21-177	HO09-9401	L15-337	464
XL21-178	HO09-840	L15-337	0
XL21-179	HO09-827	L12-202	70
XL21-180	HOCP04-847	L12-202	0
XL21-181	HO09-840	HO95-988	48
XL21-182	L94-426	HO95-988	0
XL21-183	L05-457	HO95-988	64
XL21-184	L97-128	L09-131	12
XL21-185	L05-457	L09-131	0
XL21-186	L08-088	HOCP96-540	14
XL21-187	US01-040	21P21	0
XL21-188	LCP81-010	21P22	16
XL21-189	L17-410	HOCP09-804	40
XL21-190	HOL14-841	HOCP09-804	24
XL21-191	L14-282	HOCP09-804	144
XL21-192	HO13-739	HO08-730	180
XL21-193	HOCP00-950	HO08-730	48

Table 5. Continued

Cross	Female	Male	Seed
XL21-194	HOCP14-867	HO08-730	160
XL21-195	L11-183	HO08-730	270
XL21-196	L01-283	HO08-730	112
XL21-197	L10-147	HO08-730	1554
XL21-198	L11-187	HO08-730	96
XL21-199	L17-410	L99-226	20
XL21-200	HO08-717	L99-226	1260
XL21-201	L10-146	L99-226	132
XL21-202	L11-187	L99-226	156
XL21-203	L12-218	L99-226	448
XL21-204	L15-320	L15-337	396
XL21-205	HOCP14-867	L15-337	192
XL21-206	HOCP09-814	L15-337	0
XL21-207	L11-183	L06-001	684
XL21-208	HOCP04-838	L06-001	0
XL21-209	HOCP96-561	L12-202	324
XL21-210	HOCP96-561	L08-090	72
XL21-211	HOCP04-838	L08-090	528
XL21-212	L99-233	L01-299	0
XL21-213	LCP81-010	L01-299	0
XL21-214	HOCP92-618	L01-299	0
XL21-215	HO17-776	HOCP14-885	0
XL21-216	L11-183	HOCP14-885	2250
XL21-217	L14-264	HOCP14-885	32
XL21-218	L01-283	HOCP14-885	1498
XL21-219	L11-187	HOCP14-885	168
XL21-220	L14-264	HOCP09-804	0
XL21-221	L11-183	HOCP09-804	1080
XL21-222	L15-320	HOCP09-804	420
XL21-223	L14-276	HOCP09-804	1264
XL21-224	HO09-827	HOCP09-804	0
XL21-225	HOCP09-814	HOCP09-804	256
XL21-226	HOL14-841	L13-251	108
XL21-227	L11-187	L13-251	240
XL21-228	L14-276	L13-251	1648
XL21-229	HOCP96-561	L13-251	564
XL21-230	L11-187	L12-202	60
XL21-230	L11-187	L12-202	36
XL21-231	HOCP00-950	L08-090	0
XL21-232	HOCP04-847	L08-090	0
XL21-233	HOCP92-624	L08-090	112
XL21-234	HO09-840	L09-099	832
XL21-234	HOCP96-561	L09-099	528
XL21-235	L06-040	L09-099	476
XL21-236	HOCP92-624	L09-099	2072
XL21-237	L06-040	L99-226	210
XL21-238	HOCP91-552	L99-226	24
XL21-239	LCP81-010	L99-233	176
XL21-239	LCP81-010	L99-233	0
XL21-240	HOCP92-624	HOCP85-845	1778
XL21-241	L05-457	HOCP85-845	80
XL21-242	L15-306	HOCP14-885	540
XL21-243	L15-320	HOCP14-885	1020
XL21-244	L12-218	HOCP14-885	320
XL21-245	HO17-776	L14-267	108
XL21-246	HO13-739	L14-267	1980
XL21-247	L15-320	L14-267	996
XL21-248	HO19-739	L09-112	1134
XL21-249	L15-320	L09-112	384
XL21-250	L01-283	L09-112	980
XL21-251	HOCP00-950	HOCP09-804	0
XL21-252	L01-283	HOCP09-804	574
XL21-253	L10-147	HOCP09-804	840
XL21-254	HOCP09-814	L99-226	848
XL21-255	L14-265	L99-226	1040
XL21-256	L14-276	L99-226	1520
XL21-257	HO09-840	L99-233	144
XL21-258	HOCP04-847	HOCP02-618	378
XL21-258	HOCP04-847	L15-337	396
XL21-259	L05-457	L08-090	224
XL21-260	L10-146	HOCP96-540	1116
XL21-261	L14-276		1504
XL21-262	L15-320		216
XL21-263	L97-128		72
XL21-264	L15-306	HOCP14-885	576
XL21-265	HO16-600	HOCP14-885	720
XL21-266	L12-201	HOCP14-885	336
XL21-267	L10-146	HOCP14-885	492
XL21-268	HOCP00-950	HOCP14-885	160
XL21-269	L15-306	L14-266	54
XL21-270	L12-201	L14-266	640
XL21-271	HO12-615	L14-266	24
XL21-272	L15-306	L09-099	0
XL21-273	L12-201	L09-099	1168
XL21-274	L12-218	L09-099	320
XL21-275	HOL14-841	L01-299	72
XL21-276	L14-276	L01-299	160
XL21-277	L14-269	L01-299	24
XL21-278		L99-226	42
XL21-279	L15-298	L99-226	756
XL21-280	L14-265	L99-226	1584
XL21-281	L14-269	L08-090	0
XL21-282	L14-276	L08-090	112
XL21-283	L97-128	L08-090	0
XL21-284	L97-128	HOCP96-540	96
XL21-285	L09-840	HOCP96-540	448
XL21-286	CP83-644	L05-448	84
XL21-287	HOCP96-561	L05-448	876

Table 5. Continued

Cross	Female	Male	Seed
XL21-288	L07-057	L05-448	0
XL21-289	L11-187	L05-448	336
XL21-290	HOCP18-801	L14-267	780
XL21-291	HO12-615	L14-267	24
XL21-292	L11-183	L14-267	2340
XL21-293	L12-218	L14-267	640
XL21-294	L15-306	HOCP09-804	0
XL21-295	HO17-776	HOCP09-804	0
XL21-296	HO09-832	HOCP09-804	720
XL21-297	HO15-971	HOCP14-885	64
XL21-298	HO12-615	HOCP14-885	72
XL21-299	HOCP05-902	HOCP14-885	112
XL21-300	HOCP04-847	L14-266	216
XL21-301	HO09-827	L14-266	434
XL21-302	HO09-832	HO11-532	828
XL21-303	L14-269	HO11-532	12
XL21-304	HOCP96-561	HO11-532	960
XL21-305	L07-057	HO11-532	322
XL21-306	L11-183	HO13-705	126
XL21-307	L14-265	HO13-705	2000
XL21-308	HOCP96-561	HO13-705	96
XL21-309	L14-265	L01-299	800
XL21-310	L07-057	L01-299	70
XL21-311	HOCP96-561	L14-275	132
XL21-312	L08-088	L14-275	350
XL21-313	HOCP85-845	21P31	588
XL21-314	HOCP96-540	21P32	128
XL21-315	L05-448	21P33	102
XL21-316	L12-202	21P34	176
XL21-317	L12-227	21P35	544
XL21-318	HOCP96-540	21P36	1240
XL21-319	L05-448	21P37	156
XL21-320	LCP85-384	21P38	784
XL21-321	L99-226	21P39	408
XL21-322	HOCP18-801	HO11-532	0
XL21-323	HO12-615	HO11-532	0
XL21-324	HO12-615	L12-202	24
XL21-325	L14-273	HOCP14-885	832
XL21-326	HO08-717	HOCP14-885	798
XL21-327	L14-273	HO08-730	16
XL21-328	L14-265	HO08-730	240
XL21-329	HOCP00-950	L15-300	96
XL21-330	L14-265	L15-300	112
XL21-331	LCP85-384	21P40	728
XL21-332	HOCP96-540	21P41	760
XL21-333	L15-306	L09-112	162
XL21-334	HO12-615	L09-112	36
XL21-335	L12-201	L09-112	656
XL21-336	L14-282	L14-267	1728
XL21-337	L12-201	L14-267	1552
XL21-338	L14-273	L14-267	0
XL21-339	HO12-615	HOCP09-804	0
XL21-340	L14-273	HOCP09-804	80
XL21-341	HOCP04-847	HOCP09-804	0
XL21-342	HO12-615	L09-099	0
XL21-343	HOCP04-847	L09-099	936
XL21-344	L09-123	HOCP14-885	0
XL21-345	HOCP04-847	HOCP14-885	756
XL21-346	HOCP00-950	HO11-532	0
XL21-347	HOCP04-847	HO11-532	144
XL21-348	L94-433	HO11-532	1358
XL21-349	HO08-717	HO11-532	14
XL21-350	HOCP04-847	HOCP92-618	0
XL21-351	L11-187	HOCP92-618	0
XL21-352	L15-306	HO11-532	198
XL21-353	L09-123	HO11-532	48
XL21-354	L17-410	L09-112	0
XL21-355	HOCP04-847	L09-112	72
XL21-356	L11-183	HOL15-508	1350
XL21-357	HO12-615	HOL15-508	0
XL21-358	HO12-615	L15-300	0
XL21-359	L14-269	L15-300	0
XL21-360	HO12-615	HOCP97-609	0
XL21-361	L01-283	HOL15-508	784
XL21-362	HOCP01-523	HOL15-508	28
XL21-363	HOCP05-902	HOL15-508	0
XL21-364	L09-123	L14-266	528
XL21-365	HO12-615	L12-227	0
XL21-366	HOCP00-950	L12-227	32
XL21-367	HOCP00-950	HO11-573	224
XL21-368	HOCP96-561	HO11-573	972
XL21-369	L11-183	HO11-573	2862
XL21-370	L09-123	L99-226	144
XL21-371	L03-371	L99-226	32
XL21-372	L01-283	L99-226	112
XL21-373	L15-320	HOCP97-609	312
XL21-374	L11-187	HOCP97-609	1032
XL21-375	L11-183	HOCP09-804	720
XL21-376	HOCP04-838	HOCP09-804	32
XL21-377	L94-426	LCP85-384	12
XL21-378	L14-276	L13-251	0
XL21-379	HOCP04-838	L14-267	0
XL21-380	HOCP04-847	L13-251	0
XL21-381	HOCP96-561	L13-251	12
XL21-382	HOCP00-950	L01-299	0
XL21-383	L11-187	L01-299	0

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SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LSU AGCENTER'S SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR 2021

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In the selection phase of the LSU AgCenter's Sugarcane Variety Development Program, superior clones are advanced through the seedling (single stool), first line, second line, and increase stages of the breeding program. In the first stubble crop of the second-line trials, those clones with acceptable breeding or commercial value are assigned a permanent variety number. A total of 52,985 seedlings from 144 crosses were planted in the field in the spring of 2021. The majority of these seedlings are progeny of bi-parental crosses among commercial and elite experimental varieties. In the fall of 2021, family selection was practiced on the 21,951 stubble seedlings, planted in 2020, surviving the winter. This selection resulted in the planting of 662 first-line trial plots. At the same time, superior clones were selected and advanced through subsequent stages (449 to second line trials, 154 to the increase stage). Assignments of permanent "L21" numbers were given to the 29 best clones of the 2016 crossing series.

Procedures

In the selection stage of the LSU AgCenter's Sugarcane Variety Development Program, single stools are established from seed generated in the crossing stage. After evaluating and selecting the families for cane yield potential in the cross-appraisal studies, clones with desirable phenotypes are selected and advanced through first line, second line, and increase stages. In the first stubble crop of the second-line trials, clones judged to have breeding or commercial value are assigned a permanent variety number and advanced to the nursery stage of testing.

Results and Discussion

A total of 52,985 seedlings from 144 crosses of the 2020 crossing series were planted to the field in the spring of 2021 (Table 1). Many of these seedlings were progeny of crosses among commercial and superior experimental varieties. In the fall of 2021, individual selection was practiced on the 21,951 stubble single stools of the 2019 crossing series, planted in 2020, that survived the winter. The 662 clones selected and advanced from the single stools were planted in 10-foot, first-line trial plots. Dates of planting and harvesting of all plots in the selection phase of the program can be found in Table 2.

The 1,373 first-line trial plots of the 2018 crossing series were visually appraised for cane yield potential in August of 2021 (Table 3). After screening for cane yield potential, acceptable clones were further evaluated for pest resistance (diseases and borer injury), stalk quality, and Brix (Table 3). This second stage of advancement concluded with the planting of 449 clones in single row, 16-foot, second line trials plots.

The 409 plant-cane, second line trial plots of the 2017 crossing series were visually appraised for yield potential August 2021. Based on the field evaluation, comments and sucrose lab data collected in 2020, 154 clones were planted in one single row, 25-foot plots representing the increase stage of the program (Table 4). These clones will be candidates for assignment in 2022. Of the 338 candidates from the first stubble crop of the second line trial plots, the best 29 clones from the 2016 crossing series were assigned permanent "L21" numbers (Table 5). These

newly assigned “L21” varieties were then planted in replicated nursery trials at three on station locations (Sugar Research Station, Iberia Research Station, and USDA-ARS Ardoyne Farm)

The advancement summary of clones from crosses made in 2016 through 2020 is shown in Table 6. Crosses are sorted by female parent in ascending order, with the percentile ranking given for each cross in each stage of the program.

Table 1. Summary of selections, advancements and assignments made during 2021 by the Louisiana, “L” Sugarcane Variety Development Program’s personnel

	Crosses				Advanced to			
Crossing series	Progeny test	Selection program	Plants transplanted	Over-wintered plants	1st line	2nd line	Increase	On-station Nurseries (L20 Assignments)
			---------- number of clones ----------					
X16	20	333	83,214	34,599	776	338	214	29
X17	20	230	71,116	67,041	1,076	409	154	
X18	--	70	72,661	44,689	1,373	449		
X19	50	96	46,969	21,951	662			
X20	50	144	52,985					

Table 2. Dates of seedling and line trials planted or harvested in 2021

Crossing Series	Test	Crop	Date Planted	Date Harvested
X20	Seedlings	Planted	04/22-04/29/21	
X19	Seedlings	First Stubble	04/14-04/16/20	10/11-10/15/21
X19	First Line Trails	Planted	10/19/21	
X18	First Line Trials	Plant-cane	10/08/20	10/07/21
X17	First Line Trials	First Stubble	10/04/19	11/11/21
X18	Second Line Trials	Planted	10/11/21	
X17	Second Line Trials	Plant-cane	19/16/20	10/25/21
X16	Second Line Trials	First Stubble	19/24/19	11/02/21
X14	Second Line Trials	Second Stubble	19/27/17	11/09/21
X17	Light Soil Increase	Planted	10/27/21	
X16	Light Soil Increase	Plant-cane	19/29/20	12/09/21
X15	Light Soil Increase	First Stubble	11/06/19	11/29/21
X17	Heavy Soil Increase	Planted	10/27/21	
X16	Heavy Soil Increase	Plant-cane	09/30/20	12/06/21

Table 3. Numbers of experimental clones dropped for identified faults in the 2018 crossing series first-line trials

	Fault	
Trait	Frequency	Percent
---------- 1373 clones enter first round of evaluation ----------		
Rating	385	28.04
---------- 988 clones enter second round of evaluation ----------		
Pith	183	13.33
Smut	1	0.07
Lodge / Broken	0	0
Tube	166	12.09
Rating	142	10.34
Other	0	0
----------507 clones entered third round of evaluation ----------		
Rating	59	4.30
---------- 59 clones dropped ----------		
Clones advanced	448	32.63

Table 4. Number of experimental clones dropped for identified faults in the 2017 crossing series of the plant-cane second line trial prior to advancement to the increase stage

	Fault	
Trait	Frequency	Percent
---------- 409 clones enter first round of evaluation ----------		
Lodged	9	2.20
Rating	49	11.98
Pith	55	13.45
Tube	38	9.29
Smut	0	0
Leaf Scald	0	0
Other	14	3.42
---------- 162 clones dropped ----------		
Clones advanced to Increase stage	247	60.39

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Table 5. First stubble second line trial data for 2021 “L” assignments. Assignments were made at the second line first stubble stage and included data accumulated from the proceeding stages. The population parameters (mean, minimum, maximum and standard deviation) reported are for the assigned data only.

Variety	FEMALE	MALE	Sugar per Acre	Stalk weight	Fiber
			lbs/Ton	lbs/stalk	%
Ho12-615	TUCCP77-042	HoCP96-540	276.7	1.2	13.8
L 12-201	L97-128	HoCP96-540	283.1	1.9	11.3
HoCP09-804	HOCP02-625	HOCP01-523	262.7	1.4	12.7
L01-299	L93-365	LCP85-384	250.2	1.6	12.7
HoCP96-540	LCP86-454	LCP85-384	259.6	2.2	11.0
L21-088	HOCP92-618	L06-001	258.6	2.5	9.4
L21-089	L14-265	L99-226	266.7	1.4	12.6
L21-090	L14-265	L99-226	277.6	1.7	11.6
L21-091	L98-209	L08-090	250.4	1.6	12.7
L21-092	L05-457	HOCP13-726	259.0	1.7	13.2
L21-093	HOCP01-523	CP83-644	242.8	1.2	13.4
L21-094	N27	L99-226	257.6	2.2	10.6
L21-095	L13-260	L99-233	270.0	1.5	10.9
L21-096	HO09-827	L08-090	253.2	1.6	12.6
L21-097	HOCP92-618	L13-251	276.5	1.5	12.6
L21-098	N27	L99-226	249.4	1.3	12.9
L21-099	L05-457	L99-226	252.3	2.1	12.2
L21-100	HOCP92-618	HO06-563	273.9	2.0	12.0
L21-101	L14-269	HOCP97-609	272.0	1.4	13.4
L21-102	L05-457	L06-001	267.2	1.7	12.2
L21-073	L14-295	L06-001	292.3	1.6	12.8
L21-074	L14-295	L06-001	269.1	1.6	12.9
L21-075	L14-295	L06-001	316.6	1.8	10.8
L21-076	L05-457	L01-299	265.0	1.7	12.1
L21-077	HOCP97-609	HOCP09-804	258.6	2.2	12.2
L21-078	L05-457	L99-226	288.8	1.3	13.1
L21-079	HO09-832	L06-001	253.1	1.8	11.0
L21-080	HO09-840	HO06-563	259.4	1.9	11.6
L21-081	L14-265	L08-090	258.2	2.1	13.4
L21-082	HOCP01-517	HOCP96-540	273.6	1.5	12.9

Table 5. Continued

Variety	FEMALE	MALE	Sugar per Acre	Stalk weight	Fiber
			lbs/Ton	lbs/stalk	%
L21-083	L94-428	HOCP91-552	255.1	1.5	12.3
L21-084	L05-457	L01-299	258.2	1.8	11.7
L21-085	L14-265	L08-090	269.4	1.3	11.0
L21-086	HO09-827	HO06-563	254.2	1.7	11.7
L21-087	HOCP92-618	HO06-563	293.7	1.8	11.1
Mean			266.4	1.7	12.1
Min			242.8	1.2	9.4
Max			316.6	2.5	13.8
Std Dev			15.3	0.32	0.98

Table 6. Advancement summary of the crosses in 2016 through 2019 series

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
2019 Crossing Series										
HoCP13-752	Ho12-630	170	8	92	.	.	.	.	.	.
HoCP13-738	Ho11-573	211	1	30	.	.	.	.	.	.
HoCP14-885	Ho11-573	196	5	78	.	.	.	.	.	.
L03-371	HoCP14-890	133	7	94	.	.	.	.	.	.
HoCp04-852	Ho11-573	385	1	23	.	.	.	.	.	.
Ho07-613	HoCP14-885	227	0	11	.	.	.	.	.	.
HoCP09-804	Ho12-630	188	0	11	.	.	.	.	.	.
Ho15-964	HoCP 14-885	872	2	22	.	.	.	.	.	.
L09-112	L12-201	178	6	87	.	.	.	.	.	.
Ho15-960	Ho13-708	282	4	60	.	.	.	.	.	.
Ho15-963	Ho13-708	700	6	44	.	.	.	.	.	.
Ho13-708	HoCP 14-885	225	0	11	.	.	.	.	.	.
Ho13-708	HoCp14-885	396	0	11	.	.	.	.	.	.
Ho13-739	HoCp14-885	164	1	37	.	.	.	.	.	.
HoCP09-804	HoCP14-885	98	0	11	.	.	.	.	.	.
HOCP92-618	CP83-644	354	3	43	.	.	.	.	.	.
L05-457	HO06-563	185	12	97	.	.	.	.	.	.
L09-123	L99-233	115	1	45	.	.	.	.	.	.
L05-457	HO06-563	171	1	36	.	.	.	.	.	.
L07-057	HO06-563	182	1	34	.	.	.	.	.	.
HOCP00-950	L06-001	121	0	11	.	.	.	.	.	.
HO08-717	L06-001	203	6	82	.	.	.	.	.	.
HO09-827	L99-233	560	11	73	.	.	.	.	.	.
L05-457	L99-233	407	6	61	.	.	.	.	.	.
L07-057	HOCP91-552	127	1	42	.	.	.	.	.	.
L09-123	L06-001	159	0	11	.	.	.	.	.	.
L05-457	L06-001	198	0	11	.	.	.	.	.	.
HOCP04-838	L06-001	359	1	25	.	.	.	.	.	.
L16-360	HOCP97-609	877	23	79	.	.	.	.	.	.
L07-057	HOCP97-609	197	6	83	.	.	.	.	.	.
HO09-827	L99-233	199	0	11	.	.	.	.	.	.
L05-457	HOCP91-552	394	10	77	.	.	.	.	.	.
L05-457	L99-226	230	2	45	.	.	.	.	.	.
HOCP95-951	L16-386	441	7	68	.	.	.	.	.	.
L10-147	L12-227	318	1	27	.	.	.	.	.	.
L05-457	HOCP96-552	183	2	55	.	.	.	.	.	.
L10-147	HOCP96-552	742	2	24	.	.	.	.	.	.
L05-457	L99-233	338	0	11	.	.	.	.	.	.
HOCP91-552	19P3	211	2	52	.	.	.	.	.	.
L09-099	19P3	452	3	40	.	.	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
L11-168	L99-233	408	23	95	.	.	.	.	.	.
L11-187	L99-233	452	27	96	.	.	.	.	.	.
HOCP96-561	L99-233	897	18	74	.	.	.	.	.	.
HOCP96-561	L99-226	176	2	57	.	.	.	.	.	.
HO09-840	L99-226	142	5	88	.	.	.	.	.	.
L05-457	HOCP04-838	87	0	11	.	.	.	.	.	.
HO09-840	HOCP14-802	917	14	63	.	.	.	.	.	.
L05-457	HOCP14-802	211	2	52	.	.	.	.	.	.
L05-457	HOCP91-552	82	0	11	.	.	.	.	.	.
L09-123	L99-233	939	3	28	.	.	.	.	.	.
HO06-563	19P4	172	0	11	.	.	.	.	.	.
L11-183	19P4	191	19	98	.	.	.	.	.	.
L16-391	19P4	389	6	64	.	.	.	.	.	.
LCP81-010	L99-226	1732	31	72	.	.	.	.	.	.
L10-147	L06-001	1383	15	54	.	.	.	.	.	.
L09-123	L99-233	182	3	70	.	.	.	.	.	.
12-202	HO06-563	543	5	48	.	.	.	.	.	.
L06-040	L16-386	201	1	31	.	.	.	.	.	.
L16-360	L01-299	983	27	81	.	.	.	.	.	.
LCP81-010	L06-001	781	33	90	.	.	.	.	.	.
L05-457	L99-233	455	3	39	.	.	.	.	.	.
LCP81-010	L99-233	422	7	71	.	.	.	.	.	.
HO11-9406	L16-386	870	14	69	.	.	.	.	.	.
L14-265	L16-386	314	2	38	.	.	.	.	.	.
L11-187	L99-226	229	11	93	.	.	.	.	.	.
L14-265	L99-226	774	4	32	.	.	.	.	.	.
US01-040	HO11-532	59	0	11	.	.	.	.	.	.
LCP81-010	L12-202	176	0	11	.	.	.	.	.	.
HO06-563	HOCP04-838	453	6	59	.	.	.	.	.	.
L08-090	L99-226	147	1	41	.	.	.	.	.	.
L09-123	L99-226	458	0	11	.	.	.	.	.	.
L08-090	HO11-532	636	7	56	.	.	.	.	.	.
L09-099	19P5	1386	8	35	.	.	.	.	.	.
L12-202	19P5	338	1	26	.	.	.	.	.	.
L12-227	19P5	320	4	58	.	.	.	.	.	.
L99-233	19P5	572	5	47	.	.	.	.	.	.
HO11-9406	L99-226	330	5	62	.	.	.	.	.	.
HOCP09-814	HO11-532	1126	11	53	.	.	.	.	.	.
L11-168	HO11-532	191	3	67	.	.	.	.	.	.
L12-202	HO11-532	498	11	76	.	.	.	.	.	.
HO06-530	HO13-705	157	0	11	.	.	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
L13-243	L09-099	413	13	85	.	.	.	.	.	.
L14-265	L09-099	859	35	89	.	.	.	.	.	.
L10-147	L99-233	411	0	11	.	.	.	.	.	.
L13-243	HOCP97-609	236	0	11	.	.	.	.	.	.
L14-265	HOCP97-609	883	27	84	.	.	.	.	.	.
HO06-530	L99-226	1288	6	29	.	.	.	.	.	.
L14-282	L14-266	194	3	65	.	.	.	.	.	.
L13-243	19P6	180	0	11	.	.	.	.	.	.
L11-183	HO11-532	149	4	80	.	.	.	.	.	.
L01-283	HO11-532	423	19	91	.	.	.	.	.	.
L15-298	L99-233	219	0	11	.	.	.	.	.	.
L10-147	HO13-705	530	5	50	.	.	.	.	.	.
LCP81-010	L06-001	1392	45	86	.	.	.	.	.	.
LCP81-010	L99-226	490	10	75	.	.	.	.	.	.
HO08-730	L01-299	212	2	50	.	.	.	.	.	.
2018 Crossing Series										
HO15-964	HOCP14-885	118	0	7	0	15	.	.	.	.
HO13-739	HOL15-501	131	3	65	2	91	.	.	.	.
HOCP14-885	HO11-573	136	2	47	0	15	.	.	.	.
HOL15-508	HO11-573	142	0	7	0	15	.	.	.	.
HO11-573	HOCP14-826	115	3	73	1	75	.	.	.	.
L12-201	HO12-630	227	6	74	3	85	.	.	.	.
L09-112	L12-201	329	2	22	1	44	.	.	.	.
HO09-840	L12-201	107	4	84	1	78	.	.	.	.
L14-282	L12-201	138	0	7	0	15	.	.	.	.
L14-282	HO12-630	499	0	7	0	15	.	.	.	.
HO11-532	HO12-630	117	0	7	0	15	.	.	.	.
L01-299	HO11-532	112	2	51	2	94	.	.	.	.
L14-282	HOL15-508	464	0	7	0	15	.	.	.	.
HO13-739	HOL15-993	132	2	48	0	15	.	.	.	.
HO13-739	HO15-930	80	0	7	0	15	.	.	.	.
HOCP14-885	HOL15-501	137	5	83	2	88	.	.	.	.
HO13-708	HO12-630	446	0	7	0	15	.	.	.	.
HO13-739	HOCP14-826	135	0	7	0	15	.	.	.	.
L99-233	18P1	299	7	69	0	15	.	.	.	.
L99-233	18P1	1798	3	14	0	15	.	.	.	.
L09-123	18P1	396	4	35	1	40	.	.	.	.
L07-057	18P1	236	15	98	9	99	.	.	.	.
L99-233	18P2	934	0	7	0	15	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
L09-123	18P2	314	2	23	0	15	.	.	.	.
L05-457	18P2	248	7	77	3	84	.	.	.	.
HO09-9401	18P2	240	5	61	0	15	.	.	.	.
L99-233	18P3	365	0	7	0	15	.	.	.	.
L07-057	18P3	576	2	19	1	34	.	.	.	.
HO09-840	HOCP04-838	252	9	81	3	83	.	.	.	.
L09-123	HOCP04-838	1714	11	24	0	15	.	.	.	.
HO09-840	L99-233	736	5	26	2	43	.	.	.	.
L09-123	18P4	332	13	86	0	15	.	.	.	.
L11-168	HOCP04-838	160	8	94	1	61	.	.	.	.
L12-227	18P6	2540	8	18	1	30	.	.	.	.
L12-202	18P6	215	13	96	5	97	.	.	.	.
L12-202	18P6	344	8	68	2	59	.	.	.	.
HOCP92-624	HOCP15-510	410	4	34	2	55	.	.	.	.
HOCP92-624	HO06-563	239	15	97	4	93	.	.	.	.
L11-187	HOCP97-609	393	19	93	6	91	.	.	.	.
L05-457	L99-233	2402	33	43	17	66	.	.	.	.
L11-183	HOCP91-552	374	9	70	2	58	.	.	.	.
HO09-827	HOCP04-838	1518	21	44	5	47	.	.	.	.
L05-457	HOCP04-838	3728	31	30	12	46	.	.	.	.
US01-040	HO14-835	463	18	85	7	90	.	.	.	.
L07-057	HO14-835	119	0	7	0	15	.	.	.	.
L11-187	HO14-835	200	5	71	1	57	.	.	.	.
L05-457	HOCP14-802	659	24	82	15	96	.	.	.	.
HOCP92-624	L99-233	1626	27	50	12	68	.	.	.	.
US01-040	18P7	390	23	95	4	79	.	.	.	.
HO11-9406	18P8	884	4	21	1	31	.	.	.	.
L05-457	HOCP04-838	413	16	85	3	67	.	.	.	.
HOCP95-951	HOCP96-540	246	5	58	0	15	.	.	.	.
L05-457	L99-233	239	3	37	0	15	.	.	.	.
LCP81-010	L06-038	2386	23	33	4	33	.	.	.	.
HO09-827	L06-001	2844	58	59	18	62	.	.	.	.
HOL15-993	18P9	1310	10	29	3	37	.	.	.	.
L14-275	18P9	243	0	7	0	15	.	.	.	.
L15-337	18P9	234	5	64	2	73	.	.	.	.
L14-275	18P9	295	4	42	0	15	.	.	.	.
L12-218	L09-099	353	15	90	3	71	.	.	.	.
L05-457	L12-227	192	4	61	0	15	.	.	.	.
LCP81-010	18P10	1296	4	17	0	15	.	.	.	.
HOCP04-838	18P10	351	3	31	0	15	.	.	.	.
L12-218	HO13-705	479	14	80	4	69	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HOCP96-561	L99-233	2160	28	39	9	50	.	.	.	.
L13-251	18P11	2510	19	28	5	36	.	.	.	.
L11-168	L09-099	154	2	40	0	15	.	.	.	.
HOCP14-867	HO13-705	2558	18	27	6	38	.	.	.	.
L14-282	L01-299	596	12	57	5	70	.	.	.	.
L14-275	L12-202	69	1	46	0	15	.	.	.	.
LCP81-010	HOCP91-552	2578	35	42	12	53	.	.	.	.
HO08-730	HO11-532	1261	29	66	6	54	.	.	.	.
HO09-827	HO11-532	1464	64	91	22	89	.	.	.	.
L09-123	L09-099	322	6	53	1	45	.	.	.	.
L11-168	L09-099	638	26	89	9	87	.	.	.	.
L15-337	L09-099	453	13	79	4	76	.	.	.	.
LCP81-010	HO11-9406	1510	28	52	14	77	.	.	.	.
HOCP92-624	HO11-9406	617	10	49	4	64	.	.	.	.
HOCP92-624	L99-226	684	19	75	8	81	.	.	.	.
HOCP14-867	HO11-532	2250	28	36	12	57	.	.	.	.
L13-243	18P12	1099	24	64	12	80	.	.	.	.
HOCP91-552	18P12	369	5	41	1	42	.	.	.	.
L14-273	L99-226	436	11	72	3	65	.	.	.	.
HOCP00-950	HO11-532	191	0	7	0	15	.	.	.	.
L13-243	HO11-532	499	23	92	8	92	.	.	.	.
L14-273	HO11-532	235	11	92	3	85	.	.	.	.
LCP81-010	HO11-532	1996	7	20	3	32	.	.	.	.
HOCP92-618	18P13	1610	17	35	4	39	.	.	.	.
L99-233	18P13	767	7	32	5	64	.	.	.	.
HOCP95-951	L01-299	475	10	63	4	71	.	.	.	.
HO09-827	L01-299	702	12	50	3	50	.	.	.	.
L11-187	L01-299	211	0	7	0	15	.	.	.	.
L CP81-010	L06-001	352	14	88	3	72	.	.	.	.
HO09-827	L09-099	331	13	87	6	95	.	.	.	.
HO09-827	HO11-532	1171	33	76	11	78	.	.	.	.
HOCP96-561	HO11-532	1102	22	57	2	35	.	.	.	.
HOCP96-561	HO13-705	1544	6	21	0	15	.	.	.	.
L98-209	L99-226	371	1	16	1	42	.	.	.	.
HOL15-993	L99-226	523	10	55	1	35	.	.	.	.
L14-282	L99-226	809	0	7	0	15	.	.	.	.
HOCP04-838	18P14	935	13	45	4	51	.	.	.	.
HO11-9406	18P14	421	12	78	5	82	.	.	.	.
L10-147	18P14	1238	24	56	8	63	.	.	.	.
HOCP97-609	18P14	448	1	15	0	15	.	.	.	.
L14-273	L01-299	492	40	99	16	98	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HOCP92-624	L99-226	1047	20	54	9	74	.	.	.	.
LCP81-010	L99-226	3092	22	28	8	41	.	.	.	.
L11-183	HOCP04-838	293	6	60	1	48	.	.	.	.
L94-433	18P15	1017	29	78	6	60	.	.	.	.
L11-183	L06-001	1740	22	38	6	49	.	.	.	.
HO09-827	L99-226	1954	13	25	9	52	.	.	.	.
L14-276	L99-226	367	9	71	5	86	.	.	.	.
HO08-730	18P16	604	14	67	3	56	.	.	.	.
2017 Crossing Series										
HO11-512	HO11-532	211	2	33	1	51	.	.	.	.
HO11-512	HO11-532	415	4	36	1	35	.	.	.	.
HOCP14-897	L01-299	382	14	88	12	96	5	91	.	.
HOCP14-897	HO12-630	203	0	6	0	14	.	.	.	.
HOCP09-857	HO09-832	135	5	90	2	86	.	.	.	.
HOCP09-804	HOCP14-885	328	14	93	6	89	2	75	.	.
HO12-630	L01-299	595	23	91	5	72	.	.	.	.
HOCP96-540	HO11-532	428	17	91	5	83	1	34	.	.
L14-282	HO12-630	232	1	15	0	14	.	.	.	.
HOCP16-685	HO12-630	440	0	6	0	14	.	.	.	.
HO11-532	HO12-630	224	9	92	0	14	.	.	.	.
HO11-512	HOCP14-867	190	23	99	10	98	4	95	.	.
HOCP15-506	HOCP14-867	226	4	63	4	88	1	61	.	.
HO15-959	HOCP14-867	421	0	6	0	14	.	.	.	.
HO11-512	HO11-532	211	2	33	1	51	.	.	.	.
HO11-512	HO11-532	415	4	36	1	35	.	.	.	.
L09-112	HO11-532	240	4	62	0	14	.	.	.	.
HO11-515	HO11-532	206	3	57	2	77	.	.	.	.
HO15-959	L12-201	196	0	6	0	14	.	.	.	.
HOCP16-685	L12-201	389	3	23	2	55	.	.	.	.
HOCP16-685	HOL15-993	353	0	6	0	14	.	.	.	.
HO15-964	HOCP14-885	412	11	82	9	93	4	85	.	.
L14-285	HO15-930	373	0	6	0	14	.	.	.	.
HO09-832	HOCP14-885	171	0	6	0	14	.	.	.	.
HOCP13-737	HOCP14-885	200	3	60	3	87	1	67	.	.
HOCP14-901	HOCP14-885	858	26	84	9	81	4	65	.	.
HOCP04-838	09P1	204	7	87	2	78	.	.	.	.
HOCP00-930	11P24	185	0	6	0	14	.	.	.	.
L09-131	12P12	208	1	16	0	14	.	.	.	.
HO09-840	L99-226	94	0	6	0	14	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HO09-827	HO06-563	177	3	63	0	14	.	.	.	.
HO11-9406	L99-233	189	4	72	4	92	1	70	.	.
HO11-9406	L99-233	613	9	58	5	71	1	22	.	.
HO11-9406	L99-233	894	18	70	9	79	1	12	.	.
L99-233	HO11-9406	264	8	84	3	82	1	56	.	.
L05-457	L99-226	233	5	76	0	14	.	.	.	.
L05-457	L99-226	867	9	39	6	64	.	.	.	.
L05-457	L01-299	229	3	51	3	84	3	92	.	.
HO09-832	L06-001	425	12	83	4	76	1	35	.	.
HOCP85-845	L06-001	224	2	27	1	49	.	.	.	.
HOCP92-618	CP83-644	236	1	14	0	14	.	.	.	.
L14-275	HOCP96-540	168	2	48	0	14	.	.	.	.
HOCP92-624	HOCP09-804	194	1	17	0	14	.	.	.	.
L94-433	HOCP09-804	403	5	50	1	37	.	.	.	.
L07-057	HOCP04-838	358	0	6	0	14	.	.	.	.
L09-123	HOCP04-838	380	1	12	0	14	.	.	.	.
HO09-840	L99-233	465	10	77	0	14	.	.	.	.
HOCP92-624	L99-233	1240	26	71	7	59	3	40	.	.
L05-457	L99-233	766	7	29	1	29	1	17	.	.
L05-457	L99-233	964	11	44	3	44	1	9	.	.
L05-457	L99-233	1035	22	74	3	42	1	6	.	.
L09-123	HO06-563	391	3	22	1	37	.	.	.	.
L05-457	HOCP04-838	333	6	65	3	75	.	.	.	.
L05-457	L12-202	139	2	55	2	86	.	.	.	.
HO09-827	L99-233	1370	26	67	12	74	4	48	.	.
L15-324	17P5	942	13	53	3	45	.	.	.	.
L05-448	17P5	179	4	77	1	56	.	.	.	.
L07-057	HOCP97-609	901	9	37	7	68	3	49	.	.
HO09-827	L01-299	313	4	50	0	14	.	.	.	.
HO09-827	L01-299	381	9	80	3	69	.	.	.	.
L05-457	HOCP91-552	462	4	25	0	14	.	.	.	.
L09-123	HOCP91-552	412	2	17	0	14	.	.	.	.
L98-207	L08-090	355	1	12	0	14	.	.	.	.
L09-123	L09-099	209	3	55	0	14	.	.	.	.
L05-457	L99-233	766	7	29	1	29	2	43	.	.
L05-457	L99-233	964	11	44	3	44	2	29	.	.
L05-457	L99-233	1035	22	74	3	42	2	27	.	.
HO11-9406	L99-233	189	4	72	4	92	4	96	.	.
HO11-9406	L99-233	613	9	58	5	71	4	77	.	.
HO11-9406	L99-233	894	18	70	9	79	4	62	.	.
L05-457	L99-233	766	7	29	1	29	1	17	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
L05-457	L99-233	964	11	44	3	44	1	9	.	.
L05-457	L99-233	1035	22	74	3	42	1	6	.	.
HO11-9406	L99-233	189	4	72	4	92	1	70	.	.
HO11-9406	L99-233	613	9	58	5	71	1	22	.	.
HO11-9406	L99-233	894	18	70	9	79	1	12	.	.
L01-315	HOCP96-540	549	6	41	1	33	.	.	.	.
L14-289	L06-001	107	0	6	0	14	.	.	.	.
L14-275	HO09-804	764	9	47	1	31	.	.	.	.
US01-040	HO09-804	143	16	98	5	97	2	93	.	.
HO08-730	L12-202	346	5	56	2	62	1	46	.	.
L98-207	L12-202	175	0	6	0	14	.	.	.	.
L11-183	HOCP91-552	155	4	82	4	94	1	76	.	.
HOCP92-624	L01-299	202	19	97	4	90	2	87	.	.
HOCP92-624	L01-299	988	0	6	0	14	2	28	.	.
L01-315	L99-233	232	0	6	0	14	.	.	.	.
L14-276	HOCP04-838	179	2	41	0	14	.	.	.	.
L10-146	HOCP04-838	130	7	95	4	96	.	.	.	.
L05-448	HO11-532	209	5	81	0	14	.	.	.	.
HO09-827	L01-299	313	4	50	0	14	.	.	.	.
HO09-827	L01-299	381	9	80	3	69	.	.	.	.
US01-040	L01-299	381	14	89	2	55	2	69	.	.
HOCP92-624	L01-299	202	19	97	4	90	.	.	.	.
HOCP92-624	L01-299	988	0	6	0	14	.	.	.	.
HO06-530	L11-187	106	1	32	0	14	.	.	.	.
L14-275	HOCP09-804	488	2	13	1	34	.	.	.	.
L13-251	HOCP09-804	1458	33	78	20	85	8	74	.	.
L13-723	L09-099	559	5	28	3	56	2	54	.	.
US01-040	L99-233	1198	5	13	0	14	.	.	.	.
HOCP92-624	HOCP96-540	1786	17	34	11	62	6	50	.	.
HOCP01-523	L13-251	508	12	80	9	89	5	86	.	.
HOCP92-624	HO06-563	1245	15	48	6	54	1	2	.	.
HOCP96-561	L99-226	360	3	24	1	40	.	.	.	.
L14-275	L06-001	849	17	68	6	67	2	37	.	.
L14-296	L01-299	211	3	54	1	51	.	.	.	.
L14-282	HOCP04-838	694	8	46	4	61	3	60	.	.
L14-282	HOCP04-838	1262	11	26	6	53	3	39	.	.
HOCP13-723	HOCP04-838	789	6	22	1	28	1	16	.	.
L01-315	L09-099	472	7	60	3	63	1	30	.	.
L15-304	L09-099	452	7	61	1	34	.	.	.	.
L14-282	L09-099	902	17	66	8	74	1	11	.	.
HOCP13-723	L09-099	278	2	21	1	46	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HO09-840	L09-099	169	3	64	0	14	.	.	.	.
L14-265	L12-227	146	7	94	4	95	1	79	.	.
HO09-840	L12-227	596	6	37	1	32	.	.	.	.
HO09-827	L12-227	104	0	6	0	14	.	.	.	.
CP83-644	LCP85-384	1237	13	40	2	32	1	3	.	.
LCP81-010	LCP85-384	1445	15	39	2	31	.	.	.	.
HO09-840	HOCP97-609	51	1	68	0	14	.	.	.	.
LCP81-010	L99-226	1490	64	93	17	82	4	44	.	.
HOCP92-624	L99-226	536	5	31	3	58	2	55	.	.
HOCP92-624	L99-226	709	8	43	5	65	2	45	.	.
HOCP92-624	L99-226	1464	10	20	4	39	2	19	.	.
LCP81-010	HOCP04-838	703	6	25	0	14	.	.	.	.
HOCP92-624	L99-226	536	5	31	3	58	1	24	.	.
HOCP92-624	L99-226	709	8	43	5	65	1	20	.	.
HOCP92-624	L99-226	1464	10	20	4	39	1	1	.	.
L05-457	L99-226	233	5	76	0	14	3	90	.	.
L05-457	L99-226	867	9	39	6	64	3	53	.	.
L14-282	HOCP04-838	694	8	46	4	61	.	.	.	.
L14-282	HOCP04-838	1262	11	26	6	53	.	.	.	.
L14-275	L11-187	205	18	96	12	99	5	97	.	.
L14-276	L06-001	696	4	18	2	41	.	.	.	.
L11-183	L99-226	239	16	96	1	48	.	.	.	.
L14-265	HOCP97-609	1151	11	35	5	48	3	41	.	.
L14-265	L12-202	1289	30	79	16	84	7	72	.	.
HOCP92-624	L99-226	536	5	31	3	58	5	83	.	.
HOCP92-624	L99-226	709	8	43	5	65	5	80	.	.
HOCP92-624	L99-226	1464	10	20	4	39	5	51	.	.
L01-283	HOCP13-723	361	7	67	4	81	.	.	.	.
L14-276	HO13-705	124	6	94	5	98	5	98	.	.
HOCP92-624	HO13-705	422	14	86	4	77	1	38	.	.
L14-269	L06-001	245	0	6	0	14	.	.	.	.
HO09-827	L09-099	120	4	87	2	87	1	82	.	.
L14-296	L09-099	522	16	85	2	47	1	25	.	.
HOCP95-951	L99-226	236	2	24	2	73	1	59	.	.
CP83-644	HO11-532	1217	15	49	4	46	1	4	.	.
HO09-827	L06-001	1548	21	52	11	67	6	58	.	.
L14-273	L99-226	414	6	56	0	14	.	.	.	.
HOCP13-726	L01-299	652	24	89	15	94	7	88	.	.
L11-183	L01-299	215	0	6	0	14	.	.	.	.
L98-209	L06-001	881	16	65	5	60	4	64	.	.
HOCP13-726	HOCP96-540	820	5	18	2	36	1	14	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
L14-295	HOCP96-540	445	2	15	2	50	1	32	.	.
LCP81-010	HO13-705	868	14	62	4	50	2	33	.	.
L05-457	L09-099	214	3	53	2	75	1	66	.	.
HOCP00-950	L09-099	130	4	86	1	68	1	81	.	.
2016 Crossing Series										
HO06-530	L99-233	225	0	7	0	18	0	23	0	41
N27	L06-001	248	0	7	0	18	0	23	0	41
L07-057	L99-233	369	1	22	0	18	0	23	0	41
HO09-840	HOCP04-838	314	1	23	0	18	0	23	0	41
HO09-840	L99-233	824	6	51	4	72	3	72	0	41
L05-457	L99-233	637	11	84	9	94	6	94	0	41
L13-242	HOCP91-552	558	4	50	4	82	4	88	0	41
L05-457	L99-233	937	6	45	4	62	2	56	0	41
L09-123	L01-299	220	3	76	2	86	1	79	0	41
HO09-840	L01-299	167	2	70	0	18	0	23	0	41
L05-457	HOCP91-552	197	1	37	0	18	0	23	0	41
HO09-840	L01-299	395	18	98	2	74	1	61	0	41
L05-457	L01-299	380	5	72	4	89	3	92	1	93
HOCP92-624	L01-299	612	6	64	1	41	0	23	0	41
L05-457	L01-299	240	3	71	1	61	1	76	0	41
L98-209	L05-448	182	1	42	0	18	0	23	0	41
L09-123	HOCP91-552	921	3	24	1	37	0	23	0	41
HOCP91-552	16P1	831	4	31	1	38	1	49	0	41
L06-038	16P1	212	0	7	0	18	0	23	0	41
HO06-563	16P1	232	6	91	2	84	0	23	0	41
HO06-563	16P1	438	5	68	3	80	3	87	0	41
HOCP13-726	HOCP12-647	601	3	36	0	18	0	23	0	41
HOCP91-552	HOCP12-647	284	6	86	0	18	0	23	0	41
L13-243	HOCP12-647	410	0	7	0	18	0	23	0	41
L12-227	L01-299	209	3	79	0	18	0	23	0	41
L05-457	L01-299	417	9	87	5	91	2	82	1	92
N27	L99-226	2426	59	89	29	90	15	87	2	84
N27	LCP85-384	2110	58	92	20	88	9	77	0	41
L07-057	LCP85-384	420	1	20	1	46	1	59	0	41
L05-457	L08-090	406	12	95	6	95	3	91	0	41
HO09-827	L08-090	280	1	27	1	57	1	71	1	97
L98-209	HOCP11-532	452	0	7	0	18	0	23	0	41
HOCP04-838	16P2	405	9	87	7	97	5	95	0	41

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HOCP91-552	16P2	1495	9	44	5	55	3	55	0	41
HOCP91-552	16P2	596	8	74	4	79	2	69	0	41
HOCP97-609	16P2	227	2	56	1	64	0	23	0	41
HOCP97-609	16P2	619	0	7	0	18	0	23	0	41
L07-057	HOCP91-552	382	2	39	0	18	0	23	0	41
HO06-563	HOCP91-552	188	3	82	0	18	0	23	0	41
HOCP97-609	HOCP91-552	764	14	85	7	87	3	73	0	41
L94-428	HOCP91-552	594	5	54	3	74	2	69	1	89
HOCP95-951	L08-090	1169	8	48	5	63	3	62	0	41
L98-209	L08-090	785	12	81	2	48	2	61	1	87
L07-057	L08-090	179	2	67	0	18	0	23	0	41
L98-207	L12-202	376	0	7	0	18	0	23	0	41
L13-260	LCP85-384	289	1	25	1	56	1	70	0	41
HOCP91-552	LCP85-384	376	2	40	1	51	0	23	0	41
HO09-827	LCP81-010	203	0	7	0	18	0	23	0	41
HOCP91-552	LCP81-010	441	1	18	0	18	0	23	0	41
HOCP92-618	HOCP13-726	569	1	16	0	18	0	23	0	41
L05-457	HOCP13-726	340	2	43	1	53	1	67	1	94
L13-260	L08-090	179	2	67	0	18	0	23	0	41
L98-207	L08-090	301	4	73	1	54	0	23	0	41
HOCP92-624	L09-099	591	8	74	0	18	0	23	0	41
L13-260	L99-233	207	2	62	1	71	1	83	1	99
HO09-840	L99-233	550	6	66	1	42	1	53	0	41
HOCP91-552	16P3	179	0	7	0	18	0	23	0	41
HOCP91-552	16P3	229	0	7	0	18	0	23	0	41
L94-428	16P3	219	14	99	8	99	5	99	0	41
HOCP95-951	16P3	411	3	52	1	48	0	23	0	41
HO09-840	L99-226	476	4	53	3	77	1	56	0	41
L14-273	L99-226	251	1	28	0	18	0	23	0	41
L11-183	L99-226	137	2	80	1	82	1	89	0	41
L98-209	L99-226	637	1	15	0	18	0	23	0	41
L05-457	L99-226	1326	12	58	6	66	2	51	0	41
L11-183	L12-202	218	0	7	0	18	0	23	0	41
HOCP92-618	L12-202	461	4	56	1	43	1	57	0	41
LCP81-010	L12-202	2683	15	43	10	58	7	64	0	41
HO09-840	HO06-563	1047	7	47	3	52	1	47	1	85
HOCP92-618	HO06-563	1198	19	82	8	78	7	86	2	89
HO09-827	HO06-563	1248	17	76	5	60	5	74	1	83
HOCP92-618	HOCP96-540	1122	8	49	5	65	3	66	0	41
HOCP09-840	LCP85-384	387	1	21	0	18	0	23	0	41

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
HOCP00-950	HOCP91-552	333	1	23	0	18	0	23	0	41
HO11-532	HOCP12-647	501	2	29	0	18	0	23	0	41
L06-001	HOCP12-647	213	2	61	1	68	0	23	0	41
L01-299	HOCP12-647	223	0	7	0	18	0	23	0	41
HO11-9406	L99-233	547	1	17	1	43	1	54	0	41
L05-457	L99-233	617	10	83	3	73	2	68	0	41
HOCP02-618	L99-233	369	5	75	0	18	0	23	0	41
HOCP92-618	HOCP04-838	136	0	7	0	18	0	23	0	41
L05-457	L99-226	1128	13	69	7	76	3	65	1	84
LCP85-384	L99-226	418	3	51	0	18	0	23	0	41
L99-233	HO11-9406	386	2	38	1	50	1	64	0	41
HOCP92-624	L99-226	232	2	55	2	84	2	93	0	41
L05-457	L99-226	228	3	72	1	64	1	78	0	41
L05-457	L06-001	453	13	94	11	98	7	97	1	91
L14-295	L06-001	1111	25	88	10	85	8	89	3	94
L05-457	HOCP96-540	364	3	53	1	51	1	66	0	41
L14-275	HOCP96-540	782	7	58	3	58	0	23	0	41
L05-457	L12-202	614	3	35	1	40	1	51	0	41
L05-457	L99-226	387	4	65	4	89	2	84	1	92
US01-040	L99-226	207	1	33	1	71	0	23	0	41
HOCP92-618	HOCP96-540	216	1	30	1	66	0	23	0	41
HOCP92-624	LCP85-384	607	2	25	0	18	0	23	0	41
L01-283	HO06-563	419	6	79	2	69	2	82	0	41
L14-265	L99-226	586	6	64	3	75	3	84	0	41
L12-218	L99-226	213	2	61	1	68	1	80	0	41
HOCP85-845	L01-299	365	2	41	0	18	0	23	0	41
L05-457	HOCP09-804	222	0	7	0	18	0	23	0	41
LCP85-384	16P6	404	1	20	0	18	0	23	0	41
L05-457	L01-299	723	5	48	3	61	3	76	0	41
L97-128	L01-299	214	8	97	3	94	1	79	0	41
L14-265	L99-226	657	17	92	8	92	5	92	2	95
L98-209	L99-226	413	4	63	1	47	0	23	0	41
L14-265	L08-090	587	14	89	8	92	8	97	2	96
HO09-832	L06-001	570	18	97	9	96	9	98	1	90
HOCP92-618	L06-001	1478	17	69	10	79	6	75	1	82
L01-283	HOCP01-517	218	2	60	0	18	0	23	0	41
HOCP96-561	HOCP01-517	207	1	33	0	18	0	23	0	41
HOCP97-609	HOCP09-804	213	1	30	1	68	1	80	1	98
L05-457	HO11-532	438	6	77	3	80	1	58	0	41
HOCP00-950	HO13-705	388	0	7	0	18	0	23	0	41

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
N27	HOCP96-540	458	3	46	1	44	1	58	0	41
HO09-840	L12-227	983	9	59	3	53	1	48	0	41
HOCP92-618	L12-227	892	0	7	0	18	0	23	0	41
HOCP00-950	L13-251	589	0	7	0	18	0	23	0	41
HOCP92-618	L13-251	755	5	46	4	76	4	85	1	88
HOCP92-624	L99-226	565	5	57	2	56	1	53	0	41
L94-433	L99-226	180	0	7	0	18	0	23	0	41
HOCP92-624	HOCP91-552	530	1	17	0	18	0	23	0	41
L01-283	L09-099	414	2	33	1	46	1	60	0	41
L11-183	L99-226	136	4	94	1	83	1	90	0	41
HOCP85-845	L06-001	184	1	41	0	18	0	23	0	41
HOCP01-523	CP83-644	239	6	90	4	97	3	96	1	97
HOCP04-847	HOCP97-609	218	0	7	0	18	0	23	0	41
L14-269	HOCP97-609	850	3	26	1	38	1	48	1	86
HOCP85-845	L09-099	212	0	7	0	18	0	23	0	41
N27	L09-099	866	26	96	12	93	9	94	0	41
HOCP92-618	CP83-644	611	3	35	1	41	1	52	0	41
L14-282	CP83-644	214	3	78	2	87	0	23	0	41
HO09-9402	L15-301	254	7	93	1	59	1	74	0	41
HOCP01-517	HOCP96-540	830	14	84	4	70	3	71	1	87
L14-275	HOCP96-540	388	2	38	1	49	1	63	0	41
L05-457	LCP85-384	178	0	7	0	18	0	23	0	41
HOCP92-624	HOCP09-804	824	4	34	1	39	1	50	0	41
L94-433	HOCP09-804	263	1	28	0	18	0	23	0	41
HOCP92-624	CP83-644	435	1	19	1	45	0	23	0	41

2021 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM NURSERY AND INFIELD VARIETY TRIALS

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Five years after the initial hybridization of parents, clones that have met or exceeded criteria for desired characteristics at previous selection stages are assigned permanent numbers by each of the Louisiana Sugarcane Variety Development Programs. The LSU program assigns variety designations of "L," and the USDA program assigns variety designations of "Ho" and "HoCP." These varieties are planted in replicated nursery and infield tests at locations across the southern Louisiana sugarcane-growing areas.

One objective of the nursery and infield stages is to identify and select varieties that will perform well across the range of environments a commercial variety will encounter in Louisiana. Nursery tests are initially planted at three on-station locations (USDA-ARS - Ardoyne Farm, Iberia Research Station, and Sugar Research Station) during the year of assignment, and four to five additional and different off-station locations are planted the year after assignment. The off-station nurseries are Newton Cane, Inc. (Bunkie), Michael Melancon (Cecilia), and Landry Farms (Paincourtville), along with the two infield trial locations at Blackberry Farms (Vacherie), and Circle A Farms (Maurice). Both the LSU and USDA varieties were planted at each location. The locations, soil types, dates of planting and dates of harvest are listed in Table 1.

The on-station nursery trials were planted in single row (6-foot centers), 16-foot-long plots with 4-foot alleys. The off-station nurseries were planted in single row, 20-foot plots with 4-foot alleys. The infield tests were planted in two-row, 25-foot-long plots with 5-foot alleys. The experimental design for both nursery and infield tests was a randomized complete block with two replications per location. Commercial check varieties, HoCP96-540, L01-299, HoCP04-838, HoCP09-804, L11-183, L12-201, Ho 12-615, and Ho 13-739 were planted in all nursery and infield tests for comparison.

Millable stalk counts for both nursery and infield tests were made in late July and August. A combine harvester and weigh wagon system was used to cut and weigh plots, respectively, for the infield tests. At harvest, 10-stalk samples were harvested by hand and stripped of leaves. A bundle weight was recorded to obtain a stalk weight (lb) estimate. Samples were then analyzed for sucrose content and fiber content. At the USDA-ARS laboratory, the pre-breaker press method was used to estimate fiber content. A juice sample was sent to the laboratory to obtain Brix and pol readings, which were used to estimate theoretical recoverable sugar per ton as estimated by the Winter-Carp formula as reported by Gravois and Milligan (1992). Samples sent to the Sugar Research Station sucrose laboratory were analyzed with a NIR Spectra Cane system to estimate sucrose and fiber content. Cane yield for the nursery tests was estimated as the product of stalk weight and stalk number. Cane yield for the infield tests was determined from the plot weights and reduced 14 percent to account for extraneous trash. Sugar per acre was calculated as the product of sugar per ton and cane yield.

The 2021 Louisiana sugarcane industry had a cold start, with a February ice storm that covered a portion of the state in freezing rain and ice. Spring months were cooler and wetter than average, with May and April bringing over double the average monthly rainfall to Baton Rouge. The 2021 Hurricane season brought Louisiana one tropical storm (Claudette), one hurricane (Nicholas), and one major hurricane (Ida). Starting off Hurricane season was Tropical Storm Claudette, making landfall in southeast Louisiana on June 19th. On August 29th category 4 Hurricane Ida made landfall in Port Fourchon, bringing with it gusts of up to 172 mph and up to 12 feet of storm surge in some coastal parishes. Ida hit the Louisiana industry hard and has been regarded as the 5th costliest Hurricane in U.S. history. The last hurricane to impact the industry in 2021 was Hurricane Nicholas in mid-September, which brought heavy rain to the lower half of the state. Baton Rouge received 79.85" of rain in 2021, which is 17.91" over the 30-year average. Harvest season was warmer than average, with the month of December being one of the warmest on record. All mills in the Louisiana industry completed grinding by January 21, 2022. Recommended cultural practices were followed at all test locations. The most widely grown varieties in Louisiana in 2021 were L 01-299 and HoCP 96-540, occupying 57% and 10% of the state's acreage, respectively. L 01-299 was used as a standard comparison and is highlighted in the tables. Mean separation used least square means probability differences where P=0.05. Varieties that are significantly higher or lower than L 01-299 are denoted by a plus (+) or a minus (-), respectively, next to the value for each trait.

References:

Gravois, K.A. and S.B. Milligan. 1992. Genetic relationships between fiber and sugarcane yield components. Crop Sci. 32: 62-66.

Table 1. 2021 Location, soil texture, and planting and harvest dates for the nursery and infield tests

					Harvest Date	Varieties	
Series	Location†	Stage	Soil Texture	Planting Date	2020	No. Planted	No. Harvested
2016	Blackberry Farms	Infield	Commerce silt loam	09/06/17	Not Harvested	47	0
2016	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/24/17	Not Harvested	47	0
2016	Newton Cane, Inc.	Nursery	Norwood silt loam	08/16/17	Not Harvested	64	0
2016	Michael Melancon	Nursery	Loreauville silt loam	08/18/17	Not Harvested	64	0
2016	Landry Farms	Nursery	Sharkey silty clay loam	09/08/17	Not Harvested	64	0
2017	Sugar Research Station	Nursery	Commerce silt loam	11/18/17	Not Harvested	42	0
2017	Ardoyne Farm – U.S.D.A	Nursery	Commerce silt loam	11/13/17	Not Harvested	42	0
2017	Iberia Research Station	Nursery	Baldwin silty clay	11/7/17	Not Harvested	42	0
2017	Blackberry Farms	Infield	Commerce silt loam	09/17/18	Not Harvested	39	0
2017	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/15/18	Not Harvested	39	0
2017	Newton Cane, Inc	Nursery	Norwood silt loam	08/16/18	11/16/21	60	2
2017	Michael Melancon	Nursery	Loreauville silt loam	09/18/18	11/05/21	60	2
2017	Landry Farms	Nursery	Sharkey silty clay loam	09/19/18	10/13/21	60	2
2018	Sugar Research Station	Nursery	Commerce silt loam	11/16/18	Not Harvested	28	0
2018	Iberia Research Station	Nursery	Baldwin silty clay	11/19/18	Not Harvested	28	0
2018	Blackberry Farms	Infield	Commerce silt loam	09/12/19	11/03/21	31	3
2018	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/14/19	11/23/21	31	3
2018	Newton Cane, Inc	Nursery	Norwood silt loam	08/13/19	11/16/21	54	5
2018	Michael Melancon	Nursery	Loreauville silt loam	09/05/19	11/05/21	54	5
2018	Landry Farms	Nursery	Sharkey silty clay loam	09/14/19	10/13/21	54	5
2019	Sugar Research Station	Nursery	Commerce silt loam	11/11/19	11/29/21	42	3
2019	Ardoyne Farm—U.S.D.A	Nursery	Commerce silt loam	11/20/19	11/15/21	42	3
2019	Iberia Research Station	Nursery	Baldwin silty clay	11/07/19	11/12/21	42	3
2019	Blackberry Farms	Infield	Commerce silt loam	09/09/20	11/03/21	36	9
2019	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/13/20	11/23/21	36	9
2019	Newton Cane, Inc	Nursery	Norwood silt loam	08/19/20	12/15/21	54	18
2019	Michael Melancon	Nursery	Loreauville silt loam	08/18/20	12/02/21	54	18
2019	Landry Farms	Nursery	Sharkey silty clay loam	08/11/20	12/06/21	54	18
2020	Sugar Research Station	Nursery	Commerce silt loam	11/02/20	11/29/21	27	12
2020	Ardoyne Farm—U.S.D.A	Nursery	Commerce silt loam	11/04/20	11/15/21	33	15
2020	Iberia Research Station	Nursery	Baldwin silty clay	11/05/20	11/12/21	38	19
2020	Blackberry Farms	Infield	Commerce silt loam	09/27/21		34	
2020	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/19/21		34	
2020	Newton Cane, Inc	Nursery	Norwood silt loam	08/17/21		52	
2020	Michael Melancon	Nursery	Loreauville silt loam	09/28/21		52	
2020	Landry Farms	Nursery	Sharkey silty clay loam	08/24/21		52	
2021	Sugar Research Station	Nursery	Commerce silt loam	11/09/21		29	
2021	Ardoyne Farm—U.S.D.A	Nursery	Commerce silt loam	11/15/21		29	
2021	Iberia Research Station	Nursery	Baldwin silty clay	11/11/21		29	

† Ardoyne-U.S.D.A. Ardoyne Farm (Chacahoula), Blackberry Farms (Vacherie), Iberia Research Station (Jeanerette), Newton Cane, Inc. (Bunkie), Sugar Research Station (St. Gabriel), Michael Melancon (Cecilia), Landry Farms (Paincourtville), and Circle A Farm (Maurice).

Table 2. Off-station nursery second-stubble means of the 2017 "HoCP" and "Ho" assignment series on a Commerce silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)	
HoCP 96-540	8838	33.8	260	2.06	33396	10.5	-
L 01-299	12650	46.8	270	1.72	54813	12.8	
HoCP 04-838	9286	32.9	282	1.61	40838	13.5	
HoCP 09-804	9466	35.9	262	1.47	48824	12.3	
L 11-183	13008	45.6	286	2.21	41927	12.2	
HoCP 17-701	9686	32.1	302	+ 1.87	34485	11.2	-
Ho 17-738	15691	58.0	275	2.01	56447	10.8	-
Ho 17-776	11182	37.8	296	+ 1.94	38841	10.3	-

Table 3. Off-station nursery second-stubble means of the "HoCP" and "Ho" assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)	
HoCP 96-540	6476	26.3	246	2.09	24866 -	12.2	-
L 01-299	6892	26.5	260	1.43	37208	13.8	
HoCP 04-838	4193	15.6	268	1.58	19784 -	13.9	
HoCP 09-804	9645	34.1	284	+ 1.29	52817 +	13.7	
L 11-183	6095	22.8	268	1.58	28859 -	13.0	
HoCP 17-701	8417	27.2	311	+ 1.71	31581 -	11.8	-
Ho 17-738	6651	23.5	283	+ 1.35	34848	13.4	

Table 4. Off-station nursery second-stubble means of the "HoCP" and "Ho" assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)	
HoCP 96-540	7907	35.9	220	1.56	46646	10.4	-
L 01-299	9358	44.2	212	1.49	58988	12.7	
HoCP 04-838	7487	33.0	227	1.54	42834	12.3	
HoCP 09-804	6354	25.7	247	+ 1.12 -	45920	12.8	
L 11-183	6628	33.3	199	2.08 +	31944	10.0	-
HoCP 17-701	8099	28.5	283	+ 1.37	41927	10.6	-
Ho 17-738	9859	40.9	241	1.51	54450	11.3	

Table 5. Off-station nursery second-stubble means of the 2017 “HoCP” and “Ho” assignment series across 3 locations (Melancon, Newton and Landry) in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)	
HoCP 96-540	7741	32.0	242	1.90 +	34969 -	11.0	-
L 01-299	9634	39.2	247	1.55	50336	13.1	
HoCP 04-838	6989	27.2	259	1.58	34485 -	13.2	
HoCP 09-804	8488	31.9	264	1.29	49187	12.9	
L 11-183	8577	33.9	251	1.96 +	34243 -	11.7	-
HoCP 17-701	8734	29.2	299	+ 1.65 +	35998 -	11.2	-
Ho 17-738	10734	40.8	266	+ 1.62	48582	11.9	-

Table 6. Off-station nursery first-stubble means of the 2018 "HoCP" assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2021

Variety	Sugar per Acre		Cane Yield		Sugar Per Ton		Stalk Weight		Stalk Number		Fiber	
	(lbs./A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)		(%)	
HoCP 96-540	10299		41.6		248	-	2.37		34304		11.3	-
L 01-299	13776		50.0		274		2.15		46646		13.8	
HoCP 09-804	12253		42.7		286		1.56	-	54995		12.3	
L 12-201	12558		43.5		289		2.35		37026		10.7	-
Ho 12-615	10017		36.8		273		1.49	-	49550		12.6	-
HoCP 18-803	13721		49.1		279		2.39		41382		13.0	
HoCP 18-815	13033		44.5		293	+	2.07		43016		10.4	-
HoCP 18-829	11856		43.1		275		1.91		45194		12.4	-
HoCP 18-846	11799		40.9		288		2.33		35211		14.0	
HoCP 18-876	12803		41.3		310	+	1.85		44649		12.1	-

Table 7. Off-station nursery first-stubble means of the 2018 "HoCP" assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2021

Variety	Sugar per Acre		Cane Yield		Sugar Per Ton		Stalk Weight		Stalk Number		Fiber	
	(lbs./A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)		(%)	
HoCP 96-540	5363	-	20.0	-	269		1.41		28314	-	11.7	-
L 01-299	10410		36.7		286		1.60		46101		13.8	
HoCP 09-804	9173		31.8		289		1.33		47735		13.7	
L 12-201	8907		32.3		276		2.09	+	31037	-	11.0	-
Ho 12-615	8581		30.4		282		1.30	-	46464		13.2	
HoCP 18-803	10879		35.2		309		1.66		42471		13.0	
HoCP 18-815	8571		29.0		293		1.33		43379		10.6	-
HoCP 18-829	8491		30.3		280		1.49		40656		12.1	-
HoCP 18-846	8466		31.0		274		1.64		37571		13.7	
HoCP 18-876	11130		37.9		294		1.63		47735		12.6	-

Table 8. Off-station nursery first-stubble means of the 2018 “HoCP” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2021

Variety	Sugar per Acre		Cane Yield	Sugar Per Ton		Stalk Weight	Stalk Number		Fiber	
	(lbs./A)		(tons/A)	(lbs/ton)		(lbs)	(stalks/A)		(%)	
HoCP 96-540	9290		41.8	223		1.82	45920	-	10.9	-
L 01-299	9405		39.8	237		1.35	58988		13.2	
HoCP 09-804	10240		38.8	266		1.29	59169		12.6	
L 12-201	9063		35.0	259		1.77	39567	-	10.1	-
Ho 12-615	10217		41.3	245		1.39	58806		12.9	
HoCP 18-803	11456		50.0	230		1.79	55539		12.8	
HoCP 18-815	9852		37.5	257		1.41	51728		10.0	-
HoCP 18-829	8955		40.2	227		1.35	58625		11.4	-
HoCP 18-846	10667		48.4	219		1.76	54450		12.8	
HoCP 18-876	12749		49.7	257		1.68	58443		11.5	-

Table 9. Off-station nursery first-stubble means of the 2018 “HoCP” assignment series across three locations (Newton, Melancon and Westfield) in 2021

Variety	Sugar per Acre		Cane Yield	Sugar Per Ton		Stalk Weight		Stalk Number		Fiber	
	(lbs./A)		(tons/A)	(lbs/ton)		(lbs)		(stalks/A)		(%)	
HoCP 96-540	8317	-	34.5	247		1.87		36179	-	11.3	-
L 01-299	11197		42.1	266		1.70		50578		13.6	
HoCP 09-804	10556		37.8	280		1.39	-	53966		12.9	-
L 12-201	10176		36.9	275		2.07	+	35877	-	10.6	-
Ho 12-615	9605		36.2	267		1.39	-	51607		12.9	-
HoCP 18-803	12019		44.8	273		1.95		46464		12.9	-
HoCP 18-815	10486		37.0	281		1.60		46041		10.4	-
HoCP 18-829	9767		37.9	261		1.58		48158		11.9	-
HoCP 18-846	10310		40.1	260		1.91		42411	-	13.5	
HoCP 18-876	12228		43.0	287	+	1.72		50276		12.1	-

Table 10. Off-station nursery plantcane means of the 2019 “L”and “HoCP”, assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight		Stalk Number		Fiber	
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)		(stalks/A)		(%)	
L 01 -299	13406	44.7	299	2.33		38478		12.9	
HoCP 09 -804	12205	40.9	299	1.57	-	51728	+	13.0	
L 12-201	16071	52.4	308	3.01	+	34667		10.6	-
Ho 12-615	14491	48.7	297	1.90		51183	+	13.0	
Ho13-739	12150	41.5	293	2.36		35211		11.8	-
L 19-006	10953	37.4	292	2.11		35756		12.0	
L 19-021	14562	48.3	305	2.41		39749		12.5	
L 19-486	12426	45.7	273	- 2.01		45194		13.3	
HoCP 19-900	12434	41.6	299	2.40		34667		11.5	-
HoCP 19-903	14095	46.3	302	2.15		42471		11.9	
HoCP 19-907	11644	41.1	285	2.12		38660		11.6	-
HoCP 19-915	12016	40.9	294	2.21		37026		13.1	
HoCP 19-929	15545	52.0	298	2.32		44649		12.5	
HoCP 19-932	10385	34.1	306	1.81	-	37208		10.9	-
HoCP 19-938	13563	44.4	306	2.26		39204		12.5	
HoCP 19-947	11426	38.3	298	2.37		32307		11.6	
HoCP 19-949	14500	48.3	300	2.23		43379		11.8	
HoCP 19-955	10823	36.2	298	1.95		36663		12.6	
HoCP 19-956	13043	44.9	292	2.58		35030		11.8	-
HoCP 19-957	13457	49.3	274	- 2.56		38841		12.5	
HoCP 19-960	14137	48.7	290	2.87	+	33941		13.4	
HoCP 19-963	10589	39.5	269	- 1.60	-	48279		11.9	
HoCP 19-964	13701	44.0	313	1.89		45557		9.8	-

Table 11. Off-station nursery plantcane means of the 2019 “L” and “HoCP”, assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield		Sugar Per Ton	Stalk Weight		Stalk Number		Fiber
	(lbs./A)	(tons/A)		(lbs/ton)	(lbs)		(stalks/A)		(%)
L 01 -299	10061	33.0		305	1.89		34848		11.4
HoCP 09 -804	12630	41.7		303	2.18		38297		11.9
L 12-201	17372	57.2	+	303	2.94	+	38841		10.8
Ho 12-615	13720	51.7		265	2.39		43197		11.1
Ho13-739	11320	39.2		288	2.30		34122		11.9
L 19-006	14531	50.2		291	2.62	+	38297		11.2
L 19-021	13390	42.1		318	2.54	+	33033		11.8
L 19-486	11743	38.9		302	2.31		33396		10.9
HoCP 19-900	9078	31.3		290	2.19		28496		11.0
HoCP 19-903	10757	35.2		305	2.54	+	26681		10.5
HoCP 19-907	14300	52.3	+	273	2.21		47190	+	10.5
HoCP 19-915	11271	38.6		293	2.30		33759		11.2
HoCP 19-929	15504	50.9	+	304	2.68	+	38115		11.2
HoCP 19-932	13673	48.5		282	2.27		42834		11.7
HoCP 19-938	19229	61.4	+	314	2.68	+	45557	+	12.1
HoCP 19-947	17858	56.1	+	319	2.91	+	38478		10.5
HoCP 19-949	11531	39.4		291	2.08		37934		11.1
HoCP 19-955	14404	49.3		293	1.94		51183	+	11.2
HoCP 19-956	13408	49.4		272	2.71	+	36482		11.3
HoCP 19-957	13047	44.0		296	2.48	+	35574		10.0
HoCP 19-960	15091	51.6	+	292	2.37		43923	+	11.3
HoCP 19-963	18178	62.8	+	289	2.10		59895	+	11.1
HoCP 19-964	12318	43.6		273	1.85		46827	+	8.7

Table 12. Off-station nursery plantcane means of the 2019 “L”and “HoCP”, assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2021

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)		Stalk Number (stalks/A)	Fiber (%)	
L 01 -299	10938	36.1	303	1.58		45557	11.6	
HoCP 09 -804	10013	33.6	298	1.38		49187	11.9	
L 12-201	12970	44.5	290	2.52	+	35393	9.2	-
Ho 12-615	12822	50.4	255	2.03		49731	11.7	
Ho13-739	12029	40.0	301	1.92		41382	11.1	
L 19-006	12492	44.6	280	1.98		45557	11.4	
L 19-021	10819	37.2	289	2.23		33941	10.6	
L 19-486	24842	89.2	277	2.36	+	76775	11.1	
HoCP 19-900	17350	65.2	266	3.13	+	41745	10.4	
HoCP 19-903	9288	38.3	238	1.86		41019	10.0	-
HoCP 19-907	12717	49.9	255	2.20		46283	10.1	-
HoCP 19-915	12071	44.4	270	1.96		45194	10.6	
HoCP 19-929	12208	47.9	255	2.32	+	42108	9.7	-
HoCP 19-932	13820	49.2	283	1.93		50820	11.0	
HoCP 19-938	11883	41.8	285	1.85		45012	10.6	
HoCP 19-947	12920	43.9	293	2.23		41201	10.3	-
HoCP 19-949	8145	29.8	275	1.68		35574	11.1	
HoCP 19-955	13104	49.5	262	1.94		51728	10.5	
HoCP 19-956	12691	43.9	290	2.29	+	38478	10.5	
HoCP 19-957	13838	48.5	286	2.34	+	41382	9.3	-
HoCP 19-960	13673	49.2	280	2.40	+	39749	12.2	
HoCP 19-963	13544	51.9	264	1.93		53906	10.8	
HoCP 19-964	9592	40.1	233	1.91		41745	8.5	-

Table 13. Off-station nursery plantcane means of the 2019 “L”and “HoCP”, assignment series across 3 locations (Newton, Melancon and Landry) in 2021

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)		Stalk Number (stalks/A)	Fiber (%)	
L 01 -299	11468	37.9	303	1.93		39628	12.0	
HoCP 09 -804	11616	38.7	300	1.71		46404	12.3	
L 12-201	15471	51.4	301	2.82	+	36300	10.2	-
Ho 12-615	13677	50.1	274	2.09		48543	12.1	
Ho13-739	11833	40.3	294	2.19		36905	11.6	
L 19-006	12659	44.1	288	2.23		39870	11.6	
L 19-021	12924	42.5	304	2.39	+	35574	11.6	
L 19-486	16337	57.9	284	2.23		51788	+ 11.8	
HoCP 19-900	12954	46.1	285	2.57	+	34969	11.0	-
HoCP 19-903	11380	39.9	282	2.19		36724	10.8	-
HoCP 19-907	12887	47.8	271	2.17		44044	10.7	-
HoCP 19-915	11786	41.3	286	2.16		38660	11.6	
HoCP 19-929	14419	50.3	286	2.44	+	41624	11.1	-
HoCP 19-932	12626	43.9	291	2.00		43621	11.2	
HoCP 19-938	14891	49.2	302	2.26		43258	11.7	
HoCP 19-947	14068	46.1	303	2.50	+	37329	10.8	-
HoCP 19-949	11392	39.2	289	2.00		38962	11.3	
HoCP 19-955	12777	45.0	284	1.95		46525	11.4	
HoCP 19-956	13047	46.1	285	2.53	+	36663	11.2	
HoCP 19-957	13448	47.3	286	2.46	+	38599	10.6	-
HoCP 19-960	14300	49.8	287	2.55	+	39204	12.3	
HoCP 19-963	14104	51.4	274	1.88		54027	+ 11.2	
HoCP 19-964	11870	42.6	273	1.88		44710	9.0	-

Table 14. On-station nursery first-stubble means of the 2019 "L" assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP96-540	1330	5.7	256	3.17	1762	11.14
L 01-283	3224	11.1	289 +	1.42 -	15428 +	12.59
L 01-299	6162 +	21.3 +	291 +	2.18 -	18551 +	11.04
HoCP 04-838	2472	9.8 +	264	2.54 -	6300	12.65
HoCP 09-804	12517 +	43.8 +	286 +	1.95 -	45148 +	11.56
L 17-410	11894 +	37.7	317 +	2.14 -	35166 +	10.96
L 17-428	5143 +	18.4	277	1.78 -	20419 +	12.99

Table 15. On-station nursery first-stubble means of the 2019 "L" assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	4514	16.7	266	2.11	16180	13.50
L 01-299	8020	30.2	267	1.92	31763	13.73
HoCP 09-804	6844	24.2	283	1.37	36073	14.59
L 11-183	5613	21.1	268	1.91	21326	12.96
L 19-006	4162	15.7	262	2.23	15726	13.33
L 19-021	11539	39.1	289	1.98	39476	12.29
L 19-486	4261	16.5	241	1.21	25183	13.34

Table 16. On-station nursery first-stubble means of the 2019 "L" assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8238	30.0	275	2.02 +	29721 -	12.04
L 01-299	6907	23.7	297	1.11	42199	12.98
HoCP 09-804	6898	23.7	292	1.04	45829	13.55
L 12-201	7614	25.3	300	1.80 +	29040 -	11.68 -
H0 12-615	9327 +	32.0	291	1.25	51274 +	13.18
L 19-006	11122 +	38.2 +	291	1.88 +	40838 +	14.22 +
L 19-021	8294	26.7	310	1.64 +	32670	11.67 -
L 19-486	8875	34.0 +	261	1.29	53089 +	12.90

Table 17. On-station nursery first-stubble means of the 2019 “L” assignment series across three locations (St. Gabriel. Iberia, and U.S.D.A. - Ardoyne Farms) in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	4891	18.0	265	2.40 +	16475	12.18
L 01-299	7239	26.1	284	1.64	33756	13.01
HoCP 09-804	5655	19.7	288	1.28	32443	13.58
L 11-183	5960	22.0	280	1.88	23879	12.36
L 12-201	6814	23.1	290	1.99	22864	11.64 -
H0 12-615	5991	21.1	275	1.83	28823	13.18
L 19-006	9477	33.1	280	2.02	34549	13.04
L 19-021	10576	34.5	305 +	1.92	35771	11.64 -
L 19-486	6093	23.0	259 -	1.42	32897	13.08

Table 18. On-station nursery plantcane means of the 2020 “L” assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8262	33.2	249	2.26	29267	11.1 -
L 01-299	8978	34.8	258	2.18	31763	12.1
HoCP 09-804	5786	21.6	267	1.63	25410	12.6
L 12-201	11284	39.4	286 +	2.44	32216	10.4 -
Ho 12-615	14335 +	50.6 +	283 +	2.45	41518 +	12.5
L 20-27	5847	23.8	246	2.76	17243 -	11.3
L 20-28	8582	35.3	241	2.49	28133	11.3
L 20-29	6454	26.2	244	1.65	31082	13.7 +
L 20-30	8779	29.6	295 +	2.68	21780	12.4
L20-32	11079	36.9	300 +	1.69	44014 +	12.9
L 20-37	12112	41.8	290 +	3.07 +	27225	11.5
L 20-46	11030	39.0	283 +	2.24	34939	10.8 -
L 20-55	11685	46.8	249	1.96	47644 +	13.0
L 20-57	10025	36.4	276 +	1.97	36981	13.0
L 20-59	10555	36.4	290 +	2.33	31763	12.9
L 20-61	6923	24.1	289 +	2.21	22007 -	11.3
L 20-62	6826	22.7	301 +	2.13	21326 -	9.7 -
L 20-63	10852	42.6	255	2.53	34031	13.3 +
L 20-65	10649	36.8	290 +	2.82	26091	11.2
L 20-68	9485	31.7	298 +	2.00	31309	12.7

Table 19. On-station nursery plantcane means of the 2020 “L” assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	8064	33.4	241	2.70	24503	13.6
L 01-299	9463	38.8	244	2.33	33351	13.7
HoCP 09-804	6701	25.7	259	1.82	27906	13.8
L 12-201	7151	27.6	264	2.22	24503	12.8
Ho 12-615	6951	29.6	234	1.95	30401	13.5
L 20-27	6126	22.6	271	2.46	18377 -	14.4
L 20-28	8702	35.5	245	3.10 +	22914	13.6
L 20-29	10971	42.8	260	2.82	29948	15.1 +
L 20-30	6805	25.6	270	2.12	25183	13.1
L20-32	8434	30.9	273	1.76	35166	14.3
L20-34	5110	19.8	258	2.34	17016 -	12.7
L 20-37	8262	28.5	290 +	2.65	21553 -	12.8
L20-40	5627	21.7	260	2.42	17923 -	13.6
L20-46	7870	28.8	272	2.10	27906	12.5
L 20-49	4151	16.9	246	1.54 -	22234	12.2 -
L20-52	5111	18.8	270	1.85	19738 -	12.7
L 20-55	4339	18.3	239	1.58 -	22914	14.5
L 20-57	8033	30.1	266	2.00	30174	14.0
L 20-59	7916	31.1	254	2.77	21780 -	13.9
L 20-61	8245	30.8	266	2.26	27225	13.5
L 20-62	6894	21.2	281 +	2.29	18377 -	11.6 -
L 20-63	6365	26.0	244	1.78	30628	13.8
L 20-65	8597	29.5	296 +	2.41	23822	12.5
L 20-68	8372	32.3	258	2.09	30855	15.5 +

Table 20. On-station nursery plantcane means of the 2020 “L” assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	12352	45.7	271	2.18	42199	11.8 -
L 01-299	11850	41.6	285	1.68	49686	12.8
HoCP 09-804	8096	27.7	292	1.17	47190	13.5
L 12-201	11463	38.7	296	1.94	39930	11.3 -
Ho 12-615	13034	44.6	291	1.62	54904	12.9
L 20-27	10130	33.2	306	1.88	35166 -	12.9
L 20-29	7918	30.8	258 -	1.94	31763 -	14.6 +
L20-32	9965	33.8	296	1.22	55811	13.7 +
L 20-37	12009	44.1	274	2.34	37661	12.1
L 20-46	10067	35.1	287	1.42	49005	11.5 -
L 20-55	10670	40.7	263	1.48	56038	12.6
L 20-57	7486	28.9	258 -	1.67	36754	12.3
L 20-59	8155	29.7	276	1.51	39249	13.4 +
L 20-61	11954	40.6	299	1.97	40611	12.6
L 20-62	9096	30.2	302	1.53	39476	11.4 -
L 20-63	10293	37.7	272	1.55	48551	12.6
L 20-65	11364	37.5	305	2.04	36754	12.4

Table 21. On-station nursery plantcane means of the 2020 “L” assignment series across three locations (St. Gabriel. Iberia, and U.S.D.A. - Ardoyne Farms) in 2021

Variety	Sugar per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs./A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	(%)
HoCP 96-540	9559	37.4	253	2.38	31989	12.2
L 01-299	10097	38.4	262	2.06	38266	12.8
HoCP 09-804	6861	25.0	273	1.54 -	33502	13.3
L 12-201	9966	35.3	282	2.20	32216	11.5 -
Ho 12-615	11440	41.6	270	2.00	42274	13.0
L 20-27	7367	26.5	274	2.37	23595 -	12.9
L 20-28	9248	37.0	250	2.71 +	30337	12.5
L 20-29	8448	33.3	254	2.14	30931	14.5 +
L 20-30	8178	28.7	286	2.17	29339	12.6
L20-32	9826	33.9	290 +	1.56 -	44997	13.6 +
L20-34	6423	23.2	269	2.18	24094 -	11.8
L 20-37	10770	37.6	287 +	2.69 +	28885 -	12.1
L20-40	6941	25.1	271	2.26	25002 -	12.7
L20-46	9656	34.3	281	1.92	37283 -	11.6 -
L 20-49	5464	20.3	258	1.38 -	29312 -	11.4 -
L20-52	6425	22.1	281	1.69	26817 -	11.8 -
L 20-55	8898	35.3	250	1.67	42199	13.4
L 20-57	8515	31.8	267	1.88	34636	13.1
L 20-59	8876	32.4	274	2.20	30931	13.4
L 20-61	9041	31.8	285 +	2.14	29948 -	12.5
L 20-62	7527	24.7	295 +	1.98	26393 -	10.9 -
L 20-63	9170	35.5	257	1.95	37737	13.2
L 20-65	10186	34.5	298 +	2.43	29107 -	11.9 -
L 20-68	9405	33.7	280	1.90	36473	14.2 +

2021 LOUISIANA "Ho" NURSERY VARIETY TRIALS

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In the USDA Sugarcane Research Unit's sugarcane variety program, promising experimental varieties are assigned permanent numbers three years after selection in the seedling stage. These varieties are planted in replicated yield trials (randomized complete block design with two replications) in the same year permanent variety numbers are assigned. Because assignments take place later in the year when most farmers have finished their plantings, these nursery trials are planted on research stations. In 2021, trials were planted at USDA's Ardoyne Farm in Schriever and at the LSU AgCenter's Iberia Research Station in Jeanerette and Sugar Research Station in St. Gabriel. Because of travel restrictions due to COVID 19, in 2020 two nursery trials were planted at Ardoyne Farm (one on heavy soil and one on light soil) and one trial was planted at St. Gabriel Research Station. Plots in these trials are 16 feet long by six feet (one row) wide with a four-foot alley between plots. A minimum of three commercial varieties are planted in each test for comparison purposes. The following year, experimental varieties advanced for further testing are combined with varieties from the LSU AgCenter program ("L" series) and planted in replicated nursery yield trials on commercial farms that represent the different regions of the sugarcane belt.

In the spring and summer, team members rate nursery test plots for yield traits such as population, stalk height, stalk diameter, erectness, etc. During the rating process, notes are taken on the presence of any diseases in varieties as well as any damage present from insects or other pests. Mature, millable stalks are counted in each plot in late July or early August. A 10-stalk sample is hand-cut from plots of active varieties during the harvest season. Samples from USDA nurseries are analyzed at the Juice and Milling Quality Laboratory at the USDA Ardoyne Farm, where they are weighed to determine stalk weight and processed for sucrose analysis. Estimates of theoretical recoverable sugar (TRS) per ton of cane are calculated based on Brix (% w/w) and pol reading (Z°) values, while estimated yields of cane per acre, sugar per acre, and number of stalks per acre are calculated based on results from juice analyses, mature millable stalk counts, and mean stalk weight. Varieties with yields equal to or higher than the control varieties and not susceptible to diseases are advanced for further testing.

Table 1 lists the planting and harvest dates of USDA nursery evaluations. Results of trials harvested in 2021 are in tables 2 to 15. Varieties where both the cross and selection were done in Houma were assigned a prefix of "Ho". Varieties where a cross was made at the USDA facility in Canal Point, FL and selection was done in Houma have a "HoCP" prefix. Varieties having a "HoL" prefix are derived from a cross made at the LSU Sugar Research Station in St. Gabriel and selected from the USDA farm. Statistical analyses were run for each test and for each crop combined across locations using PROC MIXED procedures in SAS (version 9.4). Because L 01-299 occupies more acreage than any other variety in the industry, it is highlighted in each table and all other varieties are compared to it. Yield values that are significantly higher or lower (P=0.05) than values for L 01-299 are noted with a '+' or '-', respectively.

Table 1. Planting and harvest dates of "Ho" nursery tests in 2021

Series	Location[1]	Soil Series [2]	Planting	Harvest Dates 2018	2019	2020	2021
2017	IRS	Bsc	11/02/17	12/11	10/17		11/19
2017	STG	Csl	10/27/17	12/17	11/25	11/19	11/10
2018	AFL	CbA	11/21/18		12/16	12/17	10/27
2018	IRS	Bsc	10/19/18		11/04		11/19
2019	AFL	CbA	11/07/19			12/21	12/03
2019	IRS	Bsc	11/19/19				11/19
2019	STG	Csl	11/21/19			12/15	12/15
2020	AFH	ShA	11/17/20				12/02
2020	AFL	CbA	11/04/20				12/20
2020	STG	Csl	11/19/20				12/16
2021	AFH	ShA	10/27/21				
2021	IRS	Bsc	11/08/21				
2021	STG	Csl	11/10/21				

[1] AFH = Ardoyne Farm heavy soil in Schriever, AFL = Ardoyne Farm light soil in Schriever, IRS = Iberia Research Station in Jeanerette, STG = Sugar Research Station in St. Gabriel
[2] Bsc = Baldwin silty clay loam, CbA = Cancienne silt loam, Csl = Commerce silt loam, Sc = Sharkey clay, ShA = Schriever clay

Table 2. Nursery third-stubble means of the 2017 "Ho" and "HoCP" assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2021

Variety	Sugar/ acre (lbs.)	Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)
L 01-299	10330	35.9	288	1.44	49913
HoCP 96-540	3545 -	12.4 -	285	1.52	15881 -
L 01-283	7627	26.4	289	1.38	38342
HoCP 04-838	6114	21.1	289	1.34	32216 -
HoCP 09-804	7523	25.7	293	0.97 -	53769
HoCP 17-701	6093	19.5 -	313 +	1.58	24049 -
Ho 17-738	8985	30.5	294	1.43	42426
Means	7174	24.5	293	1.38	36657

Table 3. Nursery third-stubble means of the 2017 “Ho” and “HoCP” assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	7211	25.1	288	1.24	39703
HoCP 96-540	4958	18.3	272 -	1.34	27225
L 01-283	6383	20.8	307 +	1.03	41064
HoCP 04-838	4725	16.2	291	0.99	33351
HoCP 09-804	6351	21.1	301 +	1.01	41972
HoCP 17-701	6818	21.6	316 +	1.11	39476
Ho 17-738	6340	21.6	292	1.02	41972
Means	6112	20.7	295	1.10	37823

Table 4. Nursery third-stubble means of the 2017 “Ho” and “HoCP” assignment series across locations (Iberia Research Station & Sugar Research Station) in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	8771	30.5	288	1.34	44808
HoCP 96-540	4251 -	15.3 -	278	1.43	21553
L 01-283	7005	23.6	298	1.20	39703
HoCP 04-838	5420 -	18.7 -	290	1.16	32783
HoCP 09-804	6937	23.4	297	0.99 -	47871
HoCP 17-701	6456	20.5 -	314 +	1.34	31763
Ho 17-738	7662	26.1	293	1.22	42199
Means	6643	22.6	294	1.24	37240

Table 5. Nursery second-stubble means of the 2018 “Ho” and “HoCP” assignment series on a Cancienne silt loam soil at the Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	9646	39.4	243	1.41	56265
HoCP 96-540	7281	32.1	228	1.98 +	32443 -
HoCP 04-838	10138	37.2	273 +	1.67	44921
HoCP 09-804	10479	39.2	268	1.54	51274
L 11-183	8869	34.7	256	1.72	40384 -
HoCP 18-803	9733	35.6	270	1.56	44921
HoCP 18-815	9924	36.8	269	1.59	46283
HoCP 18-829	9163	34.3	267	1.56	44921
HoCP 18-846	10623	42.3	251	2.07 +	41064 -
Ho 18-878	12279	42.7	288 +	1.71	49913
Means	9813	37.4	261	1.68	45239

Table 6. Nursery second-stubble means of the 2018 “Ho” and “HoCP” assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	10323	35.0	294	1.48	47190
HoCP 96-540	6418 -	23.5	272	1.49	31309 -
HoCP 04-838	6586 -	23.5	278	1.23	39703
HoCP 09-804	6058 -	19.9 -	305	1.04	38342
L 11-183	7461	27.2	275	1.78	30401 -
HoCP 18-803	8723	29.8	294	1.53	38796
HoCP 18-815	9801	32.7	300	1.64	39930
HoCP 18-829	7593	26.9	283	1.38	38796
HoCP 18-846	7053	25.0	282	1.33	37661
Ho 18-878	9917	31.9	311	1.33	48098
Means	7993	27.6	289	1.42	39023

Table 7. Nursery second-stubble means of the 2018 “Ho” and “HoCP” assignment series across locations (Ardoyne Farm & Iberia Research Station) in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	9984	37.2	269	1.44	51728
HoCP 96-540	6850	27.8	250	1.74	31876 -
HoCP 04-838	8362	30.4	276	1.45	42312 -
HoCP 09-804	8269	29.5	287	1.29	44808
L 11-183	8165	31.0	265	1.75	35393 -
HoCP 18-803	9228	32.7	282	1.55	41858 -
HoCP 18-815	9862	34.8	285	1.62	43106 -
HoCP 18-829	8378	30.6	275	1.47	41858 -
HoCP 18-846	8838	33.7	266	1.70	39363 -
Ho 18-878	11098	37.3	299 +	1.52	49005
Means	8903	32.5	275	1.55	42131

Table 8. Nursery first-stubble means of the 2019 “Ho” and “HoCP” assignment series on a Cancienne silt loam soil at the Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	10389	35.6	293	1.66	42879
HoCP 96-540	10258	33.3	308	2.07	32443
HoCP 09-804	10541	34.8	303	1.54	45148
L 12-201	13250	47.5	280	2.87 +	33124
Ho 12-615	13655	49.5	281	1.60	60122 +
HoCP 19-900	13071	43.9	301	2.43 +	35619
HoCP 19-903	13467	46.2	293	2.26	41745
HoCP 19-907	15941 +	55.5 +	288	2.36 +	46963
HoCP 19-915	9509	34.4	277	1.80	38342
HoCP 19-929	14361	48.5	297	2.38 +	40838
HoCP 19-932	11296	37.8	299	1.82	41745
HoCP 19-938	12272	40.9	300	1.86	44014
HoCP 19-947	14968	49.3	304	2.39 +	41745
HoCP 19-949	12503	41.5	302	1.89	43560
HoCP 19-955	14640	48.6	303	2.21	43787
HoCP 19-956	11306	38.3	295	2.18	35166
HoCP 19-957	12110	39.8	304	2.11	37888
HoCP 19-960	11503	40.4	285	2.26	35846
HoCP 19-963	14685	50.4	291	1.99	50593
HoCP 19-964	13863	47.8	292	2.43 +	39023
Means	12679	43.2	295	2.10	41529

Table 9. Nursery first-stubble means of the 2019 “Ho” and “HoCP” assignment series on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton		Weight/ stalk		Stalks/ acre
	(lbs.)	(tons)	(lbs.)		(lbs.)		(no.)
L 01-299	7223	27.4	263		2.20		24150
HoCP 96-540	5526	20.1	277		1.84		21780
HoCP 09-804	5021	17.4	288		1.56		22914
L 12-201	7751	27.5	281		2.15		25637
Ho 12-615	6704	23.8	282		1.34	-	35846
HoCP 19-900	7769	27.8	281		2.13		25864
HoCP 19-903	7706	26.2	294	+	1.95		27225
HoCP 19-907	11768	42.0	279		2.06		40838
HoCP 19-915	6164	21.6	288		1.76		24276
HoCP 19-929	10886	38.8	279		2.28		33578
HoCP 19-932	7926	27.0	293	+	1.58		34258
HoCP 19-938	8768	29.9	294	+	1.92		31309
HoCP 19-947	5120	17.6	289		1.63		21099
HoCP 19-949	5910	20.2	292	+	1.50		27225
HoCP 19-955	7830	26.9	287		1.54		34712
HoCP 19-956	7262	25.1	285		1.98		25183
HoCP 19-957	5629	20.6	274		2.08		20646
HoCP 19-960	7349	26.6	276		2.46		21553
HoCP 19-963	11024	40.9	270		1.90		43333
HoCP 19-964	4480	17.0	263		1.95		18503
Means	7472	26.4	283		1.88		28347

Table 10. Nursery first-stubble means of the 2019 "Ho" and "HoCP" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2021

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
L 01-299	4721		15.7		299		1.99		14802	
HoCP 96-540	8204		27.7		296		1.70		32670	+
HoCP 09-804	7083		22.8		310		1.36	-	33804	+
L 12-201	4336		14.6		298		2.06		13386	
Ho 12-615	7394		25.2		292		1.37	-	38569	+
HoCP 19-900	9152	+	30.2		303		1.79		33804	+
HoCP 19-903	6423		21.0		306		1.69		24956	
HoCP 19-907	11460	+	38.6	+	297		2.04		37888	+
HoCP 19-915	9033		29.5		306		1.42	-	41518	+
HoCP 19-929	12044	+	40.1	+	300		2.23		36300	+
HoCP 19-932	6614		21.6		307		1.52		28359	
HoCP 19-947	10822	+	35.4	+	305		2.10		33804	+
HoCP 19-949	7885		26.2		301		1.54		34258	+
HoCP 19-955	8267		26.0		317	+	1.50		34712	+
HoCP 19-956	9216	+	31.1	+	298		1.73		36300	+
HoCP 19-957	7037		23.0		307		1.77		25410	
HoCP 19-960	9392	+	32.4	+	290		1.84		35846	+
HoCP 19-963	5370		17.8		302		1.08	-	32443	+
HoCP 19-964	8322		27.0		308		1.37	-	39476	+
Means	8131		26.9		302		1.68		32511	

Table 11. Nursery first-stubble means of the 2019 “Ho” and “HoCP” assignment series across locations (Ardoyne Farm, Iberia Research Station, & Sugar Research Station) in 2021

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
L 01-299	7306		25.6		286		1.83		28950	
HoCP 96-540	7996		27.0		294		1.87		28964	
HoCP 09-804	7548		25.0		300	+	1.49		33956	
L 12-201	8446		29.9		286		2.36	+	24049	
Ho 12-615	9251		32.8		285		1.43	-	44846	+
HoCP 19-900	9997		33.9		295		2.11		31763	
HoCP 19-903	9198		31.1		297		1.96		31309	
HoCP 19-907	13056	+	45.4	+	288		2.15		41896	+
HoCP 19-915	8235		28.5		290		1.66		34712	
HoCP 19-929	12430	+	42.5	+	292		2.29	+	36905	
HoCP 19-932	8612		28.8		300	+	1.64		34788	
HoCP 19-938	9880		32.8		301	+	1.79		36886	
HoCP 19-947	10304	+	34.1		299	+	2.04		32216	
HoCP 19-949	8766		29.3		298		1.64		35014	
HoCP 19-955	10245	+	33.9		302	+	1.75		37737	
HoCP 19-956	9262		31.5		292		1.96		32216	
HoCP 19-957	8258		27.8		295		1.98		27981	
HoCP 19-960	9415		33.2		284		2.18		31082	
HoCP 19-963	10360	+	36.4	+	288		1.65		42123	+
HoCP 19-964	9412		32.3		290		1.91		33682	
Means	9495		32.4		293		1.89		34272	

Table 12. Nursery plant cane means of the 2020 "HoCP" assignment series on a Schriever clay soil at the Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
L 01-299	9912		35.9		277		1.94		37208	
HoCP 09-804	6865	-	24.5	-	281		1.46	-	33578	
L 12-201	12889	+	48.8	+	264		2.65	+	37208	
Ho 12-615	6198	-	23.3	-	264		1.55	-	29948	-
Ho 13-739	7838		27.9	-	281		1.79		31309	
HoCP 20-501	7963		29.0		275		1.86		31082	
HoCP 20-502	9306		35.0		266		1.60		43787	
HoCP 20-504	10183		34.9		292		2.09		33351	
HoCP 20-505	8864		34.7		256	-	2.22		31309	
HoCP 20-507	8778		32.7		268		1.81		36300	
HoCP 20-510	9522		33.8		281		1.75		38569	
HoCP 20-512	8527		34.5		247	-	2.20		31536	
HoCP 20-513	12142	+	41.4		294		1.96		42199	
HoCP 20-519	9303		36.2		257	-	2.27		31989	
HoCP 20-520	7807		28.9		270		1.98		29267	-
HoCP 20-521	8746		31.6		277		1.96		32216	
HoCP 20-523	9595		37.6		255	-	2.59	+	29040	-
HoCP 20-525	7837		29.2		269		1.51	-	38796	
HoCP 20-527	9505		34.0		279		2.16		31763	
HoCP 20-529	6531	-	24.3	-	271		1.66		29267	-
HoCP 20-532	7491	-	28.7		261		2.08		27679	-
HoCP 20-534	9489		33.3		283		2.04		32443	
HoCP 20-535	10104		37.4		271		2.01		37208	
HoCP 20-538	9468		33.7		281		1.91		35393	
HoCP 20-541	11935		42.7		280		2.44	+	34939	
HoCP 20-547	7726	-	30.8		251	-	2.09		29948	-
HoCP 20-548	6991	-	24.7	-	282		1.38	-	35846	
HoCP 20-553	7427	-	27.4	-	272		1.87		29267	-
HoCP 20-554	8673		30.3		287		1.92		31763	
HoCP 20-556	7396	-	28.2		263		1.59		35619	
HoCP 20-557	6088	-	25.5	-	239	-	1.71		29948	-
HoCP 20-558	9016		31.2		290		1.61		38796	
HoCP 20-560	9298		31.4		296		1.81		34712	
HoCP 20-561	6805	-	25.0	-	272		1.81		27679	-
HoCP 20-563	8056		30.3		265		1.59		38342	
HoCP 20-568	10796		37.9		285		2.21		34485	
HoCP 20-570	8787		30.6		287		2.07		29494	-
HoCP 20-571	10569		36.2		292		2.22		32443	
Means	8801		32.2		273		1.93		33572	

Table 13. Nursery plant cane means of the 2020 "HoCP" assignment series on a Cancienne silt loam soil at the Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	9753	35.5	274	2.22	32216
HoCP 09-804	11389	39.9	285	2.09	38115
L 12-201	14300	49.0	292	3.07 +	31989
Ho 12-615	8826	31.0	285	1.95	31309
Ho 13-739	14966 +	52.2 +	286	2.92 +	35846
HoCP 20-501	16299 +	56.9 +	289	2.40	47417 +
HoCP 20-502	12917	46.0	281	2.25	40611
HoCP 20-504	12470	40.5	307 +	2.41	33804
HoCP 20-505	12565	45.2	278	2.64	34258
HoCP 20-507	12664	47.2	269	2.46	38342
HoCP 20-510	9150	34.7	260	2.05	33804
HoCP 20-512	11212	43.0	261	2.48	34712
HoCP 20-513	10696	36.6	292	1.91	38342
HoCP 20-519	12229	45.0	271	2.57	35166
HoCP 20-520	11960	41.2	289	2.35	34939
HoCP 20-521	14353 +	50.3	284	2.65	37888
HoCP 20-523	12915	48.3	268	2.99 +	32443
HoCP 20-525	12437	43.4	286	2.12	41064
HoCP 20-527	13681	48.0	285	2.83 +	34031
HoCP 20-529	16669 +	59.6 +	280	2.81 +	42426
HoCP 20-532	11779	42.5	277	2.74 +	31082
HoCP 20-534	10971	37.3	294 +	2.53	29721
HoCP 20-535	12491	42.7	292	2.48	34485
HoCP 20-538	15602 +	50.9	306 +	2.89 +	35846
HoCP 20-541	15024 +	55.5 +	270	2.82 +	39023
HoCP 20-547	13374	43.6	307 +	2.21	39476
HoCP 20-548	10286	35.1	293	1.59 -	44014 +
HoCP 20-553	10790	36.2	298 +	2.10	34485
HoCP 20-554	14651 +	48.1	305 +	2.38	40611
HoCP 20-556	11182	40.7	275	2.57	31536
HoCP 20-557	8242	32.0	257	1.84	35166
HoCP 20-558	12276	42.6	288	2.08	41064
HoCP 20-560	13920	48.2	288	2.21	43787 +
HoCP 20-561	12451	44.6	279	2.59	34258
HoCP 20-563	10534	42.7	244 -	2.31	36754
HoCP 20-568	18328 +	60.5 +	303 +	2.82 +	42879
HoCP 20-570	12542	42.5	295 +	2.61	32670
HoCP 20-571	9571	32.5	294 +	2.27	28813
Means	12512	44.0	284	2.42	36431

Table 14. Nursery plant-cane means of the 2020 "HoCP" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	12131	40.7	298	1.81	45148
HoCP 09-804	12682	42.0	303	1.92	43333
L 12-201	13014	44.9	290	2.59 +	34712 -
Ho 12-615	13697	45.3	302	1.68	54223
Ho 13-739	9824	32.5	302	2.22 +	29494 -
HoCP 20-501	13074	43.3	302	2.30 +	37888
HoCP 20-502	10893	38.0	287	2.03	38115
HoCP 20-504	12234	39.5	311	2.10	37661
HoCP 20-505	14199	50.7	279 -	2.48 +	40838
HoCP 20-507	10645	39.1	272 -	2.50 +	31309 -
HoCP 20-510	10888	36.6	298	1.86	39476
HoCP 20-512	13454	50.9	265 -	2.41 +	42426
HoCP 20-513	11867	39.7	300	1.75	45148
HoCP 20-519	13021	46.5	280 -	1.98	46963
HoCP 20-520	11490	37.3	308	1.99	37661
HoCP 20-521	13342	44.6	299	2.21 +	40384
HoCP 20-523	15379	56.2 +	273 -	2.94 +	38342
HoCP 20-525	9634	34.0	283	1.60	42653
HoCP 20-527	11843	40.3	297	2.09	38115
HoCP 20-529	11746	41.9	280 -	2.58 +	32443 -
HoCP 20-532	13601	49.0	278 -	2.59 +	37661
HoCP 20-534	12593	42.4	297	2.09	40838
HoCP 20-535	10284	33.9	303	1.84	36754
HoCP 20-538	15286	48.6	314	2.38 +	41064
HoCP 20-541	15852	55.6 +	285	2.71 +	40611
HoCP 20-547	11559	37.3	311	1.68	44241
HoCP 20-548	12905	41.8	311	1.74	47871
HoCP 20-553	9830	33.0	298	1.95	33804 -
HoCP 20-554	15322	48.6	315	2.20 +	44014
HoCP 20-556	11130	40.9	272 -	1.93	42426
HoCP 20-557	9818	37.8	260 -	1.82	41518
HoCP 20-558	12314	41.3	297	1.90	43333
HoCP 20-560	11342	38.4	296	1.87	41518
HoCP 20-561	10878	37.4	291	1.82	41291
HoCP 20-563	9139	33.0	277 -	1.48	44694
HoCP 20-568	12772	42.4	301	2.46 +	34485 -
HoCP 20-570	13377	44.6	300	2.23 +	40384
HoCP 20-571	12361	40.1	308	2.35 +	34031 -
Means	12248	41.8	293	2.10	40181

Table 15. Nursery plant cane means of the 2020 "Ho" and "HoCP" assignment series across locations (Ardoyne Farm Heavy and Light soil & Sugar Research Station) in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	10599	37.4	283	1.99	38191
HoCP 09-804	10312	35.4	290	1.82	38342
L 12-201	13401 +	47.5 +	282	2.77	34636
Ho 12-615	9574	33.2	284	1.73	38493
Ho 13-739	10876	37.6	290	2.31 +	32216
HoCP 20-501	12446	43.1	289	2.19	38796
HoCP 20-502	11039	39.7	278	1.96	40838
HoCP 20-504	11629	38.3	303 +	2.20	34939
HoCP 20-505	11876	43.5	271	2.45 +	35468
HoCP 20-507	10696	39.7	270 -	2.26	35317
HoCP 20-510	9853	35.0	280	1.88	37283
HoCP 20-512	11065	42.8	257 -	2.36 +	36224
HoCP 20-513	11568	39.2	295	1.87	41896
HoCP 20-519	11518	42.6	269 -	2.27	38039
HoCP 20-520	10419	35.8	289	2.11	33956
HoCP 20-521	12147	42.1	287	2.27	36829
HoCP 20-523	12630	47.4 +	265 -	2.84	33275
HoCP 20-525	9969	35.5	279	1.74	40838
HoCP 20-527	11677	40.8	287	2.36 +	34636
HoCP 20-529	11649	41.9	277	2.35 +	34712
HoCP 20-532	10957	40.1	272	2.47 +	32141
HoCP 20-534	11018	37.7	291	2.22	34334
HoCP 20-535	10960	38.0	289	2.11	36149
HoCP 20-538	13452 +	44.4	301 +	2.39 +	37434
HoCP 20-541	14270 +	51.2 +	278	2.66	38191
HoCP 20-547	10886	37.2	290	1.99	37888
HoCP 20-548	10061	33.9	295	1.57 -	42577
HoCP 20-553	9349	32.2	289	1.97	32519
HoCP 20-554	12882	42.3	302 +	2.17	38796
HoCP 20-556	9903	36.6	270	2.03	36527
HoCP 20-557	8049	31.8	252 -	1.79	35544
HoCP 20-558	11202	38.4	291	1.86	41064
HoCP 20-560	11520	39.3	294	1.96	40006
HoCP 20-561	10045	35.7	280	2.07	34409
HoCP 20-563	9243	35.3	262 -	1.79	39930
HoCP 20-568	13965 +	46.9 +	296	2.50 +	37283
HoCP 20-570	11569	39.2	294	2.30 +	34183
HoCP 20-571	10833	36.2	298 +	2.28	31763
Means	11187	39.3	283	2.15	36728

2021 LOUISIANA VARIETY DEVELOPMENT PROGRAM INFIELD TRIALS

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The infield stage of the variety development program is the first stage in which yield estimates are based on plot weights instead of estimated yields derived from stalk population and stalk weight. Varieties from the LSU AgCenter program (L' s) are planted in infield tests the year after assignment while varieties from the USDA program (Ho's) are included two years after assignment. Infield trials are generally planted at three locations. In 2021, tests were planted at USDA's Ardoyne Farm in Schriever (Ho varieties only) and commercial farms located in Vacherie and Maurice, LA, representing three distinct regions and soil types of the Louisiana sugarcane industry.

Personnel from the variety programs at the USDA and LSU AgCenter work cooperatively to evaluate, plant, and harvest infield tests on commercial farms. The test at Ardoyne Farm in Schriever is conducted by the USDA personnel only. Infield tests are planted in a randomized complete block design with two replications and at least three commercial varieties as controls. The plot size in infield tests are two rows wide by 24 feet long with a four-foot alley between plots. A 10-stalk sample is hand-cut from each plot just prior to combine harvesting and sent to the lab at the Ardoyne Farm, where it is weighed to determine stalk weight and processed through the pre-breaker/press for a determination of sucrose content and fiber content. Brix (% w/w) and pol reading (Z°) values are then used to calculate the yield of theoretical recoverable sugar (TRS) per ton of cane. Plots are weighed with a tractor-pulled weigh-wagon equipped with electronic load cells mounted in the axle and hitch. The weight of harvested cane in each plot, stalk weight, and TRS are used to estimate sugar per acre, tons of cane per acre, sugar per ton of cane, and number of stalks per acre.

Table 1 lists planting and harvest dates of infield evaluations. Results of infield trials are presented in Tables 2 to 10. Because there were no active varieties in the 2016 assignment series, second stubble tests were not harvested in 2021. Statistical analyses were done for each test and for each series across locations using PROC MIXED procedures in SAS (version 9.4). Because the commercial variety L 01-299 occupies the largest percentage of the acreage in the Louisiana industry, it is highlighted in each table and all other varieties are compared to it. Yield values that are significantly higher or lower (P=0.05) than values for L 01-299 are noted with a '+' or '- ', respectively.

Table 1. Planting and harvest dates of infield tests in 2021

'Ho' Series	'L' Series	Location[1]	Soil Series [2]	Planting Date	Harvest Dates			
					2018	2019	2020	2021
2017		AFH	ShA	9/26/19			12/11	11/16
2017	2018	BLK	CmA	9/12/19			12/11	11/03
2017	2018	CAF	Co	8/14/19			12/01	11/23
2018		AFH	ShA	9/17/20				11/16
2018	2019	BLK	CmA	9/09/20				11/03
2018	2019	CAF	Co	8/13/20				11/23
2019		AFH	ShA	10/14/21				
2019		BLK	CmA	9/27/21				
2019		CAF	Co	8/19/21				

[1]AFH = Ardoyne Farm heavy soil in Schriever, BLK = Blackberry Farm in Vacherie, CA = Circle A Farm in Maurice.

[2]Co = Coteau-Patoutville-Frost silt loam, CmA = Cancienne silt loam, Sc = Sharkey clay, ShA = Schriever clay.

Table 2. Infield first-stubble means of the 2017 "Ho" assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	5096	21.0	242	1.34	32078	12.3
HoCP 96-540	4699	18.4	254	1.62 +	22658	12.3
HoCP 09-804	5616	20.5	275 +	1.29	31815	12.3
L 12-201	5702	22.6	253	2.26 +	19867	10.8 -
Ho 12-615	6923	26.7	260 +	1.32	40394	12.6
HoCP 17-701	6987	24.0	288 +	1.69 +	28913	12.1
Ho 17-738	6444	24.4	264 +	1.56	31410	12.5
Ho 17-776	5111	19.9	257	2.04 +	19391	11.6
Means	5822	22.2	262	1.64	28316	12.1

Table 3. Infield first-stubble means of the 2017 “Ho” assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	7814	29.9	262	1.46	41438	12.5
HoCP 96-540	5893	23.3	254	1.43	32987	11.1 -
HoCP 09-804	8844	31.7	279	1.29	49406	12.9
L 12-201	7723	26.7	289	2.35 +	22798 -	9.6 -
Ho 12-615	7639	28.7	267	1.37	41912	12.9
HoCP 17-701	8746	28.2	310 +	1.63	34669	11.0 -
Ho 17-738	8292	31.2	265	1.66	37695	12.8
Ho 17-776	7704	26.4	292	2.27 +	23721 -	11.0 -
Means	7832	28.3	277	1.68	35578	11.7

Table 4. Infield first-stubble means of the 2017 “Ho” assignment series on a Coteau-Patoutville-Frost silt loam soil at Circle A Farm in Maurice, LA in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	12731	43.0	296	1.82	47743	12.5
HoCP 96-540	11589	40.5	286	2.23 +	36649	11.2 -
HoCP 09-804	10002	34.9	287	1.69	41088	12.6
L 12-201	13014	43.2	301	2.99 +	29020 -	10.6 -
Ho 12-615	10323	36.5	283	1.95	37511	12.6
HoCP 17-701	10718	34.6	309	2.01	34644 -	11.2 -
Ho 17-738	12124	43.1	281	1.77	48883	12.8
Ho 17-776	9944	33.7	295	2.59 +	26333 -	11.0 -
Means	11306	38.7	292	2.13	37734	11.8

Table 5. Infield first-stubble means of the 2017 "Ho" assignment series across three locations (Ardoyne Farm, Blackberry Farm and Circle A Farm) in 2021

Variety	Sugar/ acre (lbs.)	Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)	Fiber (%)
L 01-299	**8547**	**31.3**	**267**	**1.54**	**40420**	**12.4**
HoCP 96-540	7393	27.4	265	1.76 +	30765 -	11.5 -
HoCP 09-804	8154	29.1	280	1.42	40770	12.6
L 12-201	8813	30.9	281	2.53 +	23895 -	10.3 -
Ho 12-615	8295	30.6	270	1.54	39939	12.7
HoCP 17-701	8817	29.0	303 +	1.77 +	32742	11.4 -
Ho 17-738	8953	32.9	270	1.66	39329	12.7
Ho 17-776	7586	26.6	281	2.30 +	23148 -	11.2 -
Means	8320	29.7	277	1.81	33876	11.9

Table 6. Infield plant-cane means of the 2018 "Ho" assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2021

Variety	Sugar/ acre (lbs.)	Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)	Fiber (%)
L 01-299	**9174**	**37.3**	**246**	**1.81**	**41179**	**12.3**
HoCP 09-804	5671	21.1	269 +	1.39 -	30610	12.2
L 12-201	6887	25.6	270 +	2.80 +	18320 -	10.4 -
Ho 12-615	11177	45.0	249	1.49	59875 +	12.7
HoCP 13-739	6877	25.4	272 +	1.99	25503 -	11.9
Ho 17-776	8502	31.8	268 +	2.22 +	28933	10.4 -
HoCP 18-803	9046	34.6	262	2.19	31775	11.0 -
HoCP 18-815	8957	32.0	280 +	1.70	36744	10.8 -
HoCP 18-829	8898	32.3	275 +	1.97	33398	11.2
HoCP 18-846	9710	38.7	251	2.29 +	34118	12.2
Ho 18-878	8854	31.9	279 +	1.44	44324	11.6
Means	8523	32.3	266	1.93	34980	11.5

Table 7. Infield plant-cane means of the 2018 “Ho” and 2019 “L” assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2021

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre		Fiber	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)		(%)	
L 01-299	**7435**		**30.3**		**245**		**1.86**		**32737**		**12.2**	
HoCP 09-804	9261		33.5		277	+	1.19	-	56456	+	12.7	
L 12-201	9516		32.9		289	+	2.37		29124		9.3	-
Ho 12-615	9909	+	38.6	+	257		1.54		50235	+	12.3	
HoCP 13-739	10857	+	36.7		296	+	1.96		37320		11.1	
Ho 17-776	11129	+	38.4	+	289	+	2.36		32727		10.4	-
HoCP 18-803	13007	+	45.4	+	286	+	2.01		45385		12.6	
HoCP 18-815	8366		28.1		299	+	1.73		32606		8.9	-
HoCP 18-829	9798		39.2	+	250		1.71		48622	+	11.0	-
HoCP 18-846	11045	+	43.0	+	257		2.37		36421		13.0	
Ho 18-878	8437		31.0		274	+	1.39		45077		11.6	
LCP 19-486	9143		35.8		255		1.61		44793		12.0	
L 19-006	8956		33.8		265		1.93		35639		12.3	
L 19-021	8344		30.5		274	+	1.86		32813		10.7	-
Means	9657		35.5		272		1.85		39997		11.4	

Table 8. Infield plant-cane means of the 2018 “Ho” and 2019 “L” assignment series on a Coteau-Patoutville-Frost silt loam soil at Circle A Farm in Maurice, LA in 2021

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre		Fiber	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)		(%)	
L 01-299	**10334**		**39.5**		**261**		**1.81**		**43707**		**13.3**	
HoCP 09-804	10680		39.2		272		1.59		49632		13.3	
L 12-201	12243	+	41.9		292	+	2.88	+	29435	-	10.4	-
Ho 12-615	11107		42.8		260		2.10		41824		13.1	
HoCP 13-739	11300		40.4		279	+	2.41	+	33668		11.3	-
Ho 17-776	10873		37.4		291	+	2.31		32477		10.8	-
HoCP 18-803	13768	+	49.5	+	279	+	2.34	+	43449		12.2	
HoCP 18-815	9745		33.3	-	293	+	2.01		33230		11.1	-
HoCP 18-829	11873		42.6		279	+	2.57	+	33179		12.0	
HoCP 18-846	11145		40.9		272		2.41	+	34336		13.3	
Ho 18-878	10923		38.5		284	+	1.89		40712		12.7	
LCP 19-486	8531	-	32.0	-	267		1.90		33966		12.3	
L 19-006	10567		39.0		272		2.15		36339		11.6	-
Means	11007		39.8		277		2.18		37381		12.1	

Table 9. Infield plant-cane means of the 2018 “Ho” assignment series across three locations (Ardoyne Farm, Blackberry Farm & Circle A Farm) in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	**8981**	**35.7**	**251**	**1.83**	**39207**	**12.6**
HoCP 09-804	8537	31.3	273 +	1.39 -	45566	12.7
L 12-201	9549	33.4	284 +	2.68 +	25626 -	10.0 -
Ho 12-615	10731	42.1	255	1.71	50645 +	12.7
HoCP 13-739	9678	34.2	282 +	2.12 +	32164	11.4 -
Ho 17-776	10168	35.9	283 +	2.30 +	31379	10.5 -
HoCP 18-803	11941	43.1 +	275 +	2.18 +	40203	11.9
HoCP 18-815	9022	31.1	291 +	1.81	34193	10.3 -
HoCP 18-829	10190	38.0	268 +	2.08	38400	11.4 -
HoCP 18-846	10633	40.9	260	2.35 +	34958	12.8
Ho 18-878	9405	33.8	279 +	1.57	43371	12.0
Means	9894	36.3	273	2.00	37792	11.7

Table 10. Infield plant-cane means of the 2018 “Ho” and 2019 “L” assignment series across two locations (Circle A Farm & Blackberry Farm) in 2021

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	**8884**	**34.9**	**253**	**1.83**	**38222**	**12.8**
HoCP 09-804	9970	36.3	275 +	1.39 -	53044 +	13.0
L 12-201	10879 +	37.4	290 +	2.62 +	29280	9.9 -
Ho 12-615	10508	40.7	258	1.82	46030	12.7
HoCP 13-739	11078 +	38.6	288 +	2.18	35494	11.2 -
Ho 17-776	11001 +	37.9	290 +	2.33 +	32602	10.6 -
HoCP 18-803	13388 +	47.4 +	282 +	2.18	44417	12.4
HoCP 18-815	9055	30.7	296 +	1.87	32918	10.0 -
HoCP 18-829	10836 +	40.9	265	2.14	40900	11.5 -
HoCP 18-846	11095 +	42.0 +	265	2.39 +	35379	13.1
Ho 18-878	9680	34.7	279 +	1.64	42894	12.2
LCP 19-486	8837	33.9	261	1.75	39380	12.2
L 19-006	9762	36.4	268	2.04	35989	11.9
Means	10383	37.8	275	2.01	38965	11.8

2021 LOUISIANA SUGARCANE VARIETY DEVELOPMENT PROGRAM OUTFIELD VARIETY TRIALS

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The outfield variety trials are the final stage of testing experimental varieties for their potential commercial production in Louisiana. Results from these trials are used in both variety advancement and crossing decisions. The outfield variety trials are conducted cooperatively by the LSU AgCenter, the USDA-ARS, and the American Sugar Cane League at 12 locations throughout the Louisiana sugarcane belt.

To be considered for release, an experimental variety must equal or exceed the performance of commercial varieties with regards to yield and harvestability across locations, crops, and years. Accurate varietal evaluation requires overall yield performance information in addition to performance under adverse harvest conditions. The objective of this report is to provide overall and specific location yield data by crop for the 2021 outfield tests. Included are multi-year yield analyses for appropriate test varieties.

The experimental design used at each outfield location was a randomized complete block design with three replications. Test plots were two rows wide and 50 feet long with a 5-foot alley between plots. All locations were harvested with a combine harvester and each plot was weighed with a weigh wagon fitted with load cells mounted on each axle and hitch. A 10-stalk, whole-stalk sample, topped but not stripped of leaves, was taken from each plot and sent to the USDA-ARS sucrose laboratory. Samples were hand cut for all tests. The samples were weighed, milled, and the juice analyzed for Brix and pol. Pounds of theoretical recoverable sugar per ton of cane were reported.

Cane yield for each plot was estimated by plot weight, less 14% to adjust for leaf-trash weight and 10% for harvester efficiency. Stalk number was calculated by dividing adjusted cane yield by stalk weight. Adjustments made to cane yield resulted in lower estimated stalk numbers than those achieved by growers.

Interpreting one year of yield data can be misleading because varieties may differ in relative performance from year to year. Across location means can likewise be misleading since a variety, experimental or commercial, may not perform consistently at all locations. Multi-year and multi–location testing mitigates these problems by averaging the inconsistent performances.

The most widely grown varieties in Louisiana in 2021 were HoCP96-540, L01-283, HoCp09-804 and L01-299 occupying 10%, 10%, 10%, and 57% of the state's acreage, respectively. For comparison, L01-299 was used as the check variety and is highlighted in the tables. To adjust for missing data, the SAS analysis calculated least square means (v 9.2, Proc Mixed). Mean separation was done with the Student's t test by using PDIFF option (P=0.05). Varieties that are significantly higher or lower than L01-299 are denoted by a plus (+) or minus (-), respectively, next to the value for each trait.

Eighteen varieties representing the 2019 assignment series were introduced to outfield locations for seed increase in 2021 (Table 1). Nine experimental and ten commercial varieties were planted at 10 outfield locations. Thirty-eight tests were harvested in 2021 including ten plantcane, twelve first-stubble, nine second-stubble, and seven third-stubble crops (Table 2).

Variety yield traits are reported by crop and trait with overall means and individual location data in the same table and in summary tables by crop. A combined analysis of plantcane, first-stubble, second-stubble, and third-stubble crops averaged over several years is also provided.

The 2021 Louisiana sugarcane industry had a cold start, with an ice storm that covered a portion of the state in freezing rain and ice. Spring months were cooler and wetter than average, with May and April bringing over double the average monthly rainfall to Baton Rouge. The 2021 Hurricane season brought Louisiana one tropical storm, one hurricane, and one major hurricane (Claudette, Nicholas, and Ida). Starting off Hurricane season was Tropical Storm Claudette, making landfall in southeast Louisiana on June 19th. On August 29th category 4 Hurricane Ida made landfall in Port Fourchon, bringing with it gusts of up to 172 mph and up to 12 feet of storm surge in some coastal parishes. Ida hit the Louisiana industry hard and has been regarded as the 5th costliest Hurricane in U.S. history. The last hurricane to impact the industry in 2021 was Hurricane Nicholas, which brought heavy rain to the lower half of the state. Baton Rouge received 79.85” of rain in 2021, which is 17.91” over the 30 year average. Harvest season was warmer than average, with the month of December being one of the warmest on record. The outfield harvest was completed on January 4, 2022. All mills in the Louisiana industry completed grinding by January 21, 2022.

Varieties HoCP17-701and Ho17-738 (both eligible for commercial release in 2023) were harvested in the plant cane trials.

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Data were obtained through a cooperative effort of personnel from the LSU AgCenter, USDA-ARS, Sugarcane Research Laboratory, and the American Sugar Cane League in accordance to the provisions of the “Three-way Agreement of 2007.”

Table 1. Commercial and experimental varieties planted in the outfield in 2021.

Commercial Varieties		Experimental Varieties		Experimental Varieties Introduced to the Outfield			
HoCP96-540	Ho13-739	L15-306	HoCP18-846	L19-486	HoCP19-929	HoCP19-957	
L01-299	L14-267	HoL15-508	Ho18-878	L19-006	HoCP19-932	HoCP19-960	
HoCP09-804	HoCP14-885	HoCP17-701		L19-021	HoCP19-938	HoCP19-963	
Ho12-615		Ho17-738		HoCP19-900	HoCP19-947	HoCP19-964	
L12-201		HoCP18-803		HoCP19-903	HoCP19-949		
HoCP04-838		HoCP18-815		HoCP19-907	HoCP19-955		
HoCP09-804		HoCP18-829		HoCP19-915	HoCP19-956		

Table 2. Harvest and planting dates for all outfield locations harvested in 2020.

Location	Parish	Plantcane			First-stubble		Second-stubble		Third-stubble	
		2021 Planting Date	2021 Harvest Date	2020 Planting Date	2021 Harvest Date	2019 Planting Date	2021 Harvest Date	2018 Planting Date	2021 Harvest Date	2017 Planting Date
Al Landry	Iberville	8/27	12/14	8/17	10/26	09/11	10/26	08/28	*	09/13
Allains	St. Mary	10/22	11/3	9/10	11/3	09/18	*	*	11/3	09/21
Alma	Pointe Coupee	8/25	10/15	8/12	10/15	09/03	10/15	09/21	*	09/20
Brunswick	Pointe Coupee	9/13	12/16	9/9	12/16	09/12	10/14	09/24	10/14	09/22
Domingue	Vermilion	*	*	*	12/3	09/13	12/3	10/12	*	*
Glenwood	Assumption	9/23	11/30	8/19	11/30	09/20	*	*	11/30	08/24
Harper Farms	Rapides	9/24	1/4/22	9/14	1/4/22	09/16	11/1	09/14	11/1	09/18
Lanaux	St. John	8/26	12/17	9/4	12/17	08/23	11/11	08/15	11/11	09/07
Levert-St. John	St. Martin	9/27	12/3	8/18	12/3	08/30	10/6	09/18	*	09/08
Magnolia	Terrebonne	*	*	*	10/19	09/23	10/19	10/15	*	09/11
Mary	Lafourche	8/19	10/21	9/11	10/21	09/23	*	*	10/21	09/28
Ronald Hebert	Iberia	10/20	12/15	9/3	12/15	09/18	11/16	09/19	11/16	09/14

*No test planted at this location. **No test harvested at this location.

Table 3. Plantcane sugar per acre for eleven commercial and four experimental varieties at ten outfield locations in 2021.

	HEAVY				LIGHT						
Variety	Allains	Alma	Landry	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(tons/A)						
HoCP96-540					10863		6901				7906
CP01-1372	7214	5767	9340		8865	7356		7300 -	11353	10190	8028
L01-299	7678	6740	9475	4819	10310	8570	7577	8690	10524	9318	8373
HoCP04-838					9488		8331				7933
Ho05-961	7658	5946	7321 -	5670 +	9815	7212		7422 -	12511	10509	8233
HoCP09-804	7010	6080	7059 -	6147 +	9518	9107	8015	7414 -	11438	9201	8099
L12-201	7739	6225	9242	4657	10783	7356	9606	8513	10473	8855	8335
Ho12-615	8933	8292	10590	5445	11301	7016	10040	8355	11848	11359 +	9318 +
Ho13-739	7451	6022	8345	5307	10197	7176	9724	8512	12279	8591	8376
L14-267	8201	6327	10543	4230	11625	8101	8424	7784	9556	10001	8476
HoCP14-885	9752 +	7955	9850	4864	12435 +	7381	11280 +	9061	12848	11170 +	9660 +
L15-306	7571	9013	9800		9709	7746	6519	9166	11172	9695	8581
HoL15-508	9069 +	8989	10885	6110 +	10676	8177	8102	7693	10911	11669 +	9228 +
HoCP 17-701	8539	7188	8562	6456 +	10480	8118	7172	8758	10160	8470	8412
Ho 17-738	7604	6225	8980	5330	10856	6866	10069	8780	10962	10012	8588

Table 4. Plantcane cane yield for nine commercial and six experimental varieties at ten outfield locations in 2021

	HEAVY				LIGHT						
Variety	Allains	Alma	Landry	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)					
HoCP96-540					38.2		22.3				27.4
CP01-1372	25.4	25.4	30.1		34.3	26.2		24.0 -	39.5	33.3	28.5
L01-299	26.7	27.4	31.0	19.7	35.8	32.4	26.4	28.5	35.5	33.8	29.7
HoCP04-838					35.3		28.1				28.9
Ho05-961	25.2	21.0	24.8 -	19.7	32.3	25.1		23.2 -	41.5	35.0	27.5
HoCP09-804	22.9	23.0	23.2 -	20.8	33.8	31.3	27.7	24.5 -	39.2	30.6	27.7
L12-201	27.4	27.1	32.4	20.2	36.7	26.9	31.7	27.1	34.5	31.6	29.6
Ho12-615	30.6 +	34.6	37.4 +	20.2	40.3	25.5	36.2 +	26.2	41.0	40.2 +	33.2
Ho13-739	24.8	22.6	29.7	17.7	34.1	24.6	33.7	26.4	41.5	31.1	28.7
L14-267	26.5	25.7	34.6	17.8	38.7	28.4	28.7	24.6 -	32.5	36.6	29.4
HoCP14-885	31.2 +	31.4	33.4	19.3	40.3	26.3	35.1 +	27.6	42.0	41.6 +	32.8
L15-306	25.5	35.4 +	33.2		32.6	27.8	22.8	29.1	37.5	35.9	30.0
HoL15-508	29.1	30.5	33.7	20.9	36.0	28.1	27.4	23.1 -	36.2	36.0	30.1
HoCP 17-701	26.3	25.6	26.7	21.8	31.8	26.7	22.5	26.9	33.4	30.1	27.2
Ho 17-738	24.7	26.4	30.3	20.0	36.5	27.1	34.2	28.0	36.8	35.7	30.1

Table 5. Plantcane sugar per ton for nine commercial and six experimental varieties at ten outfield locations in 2021

	HEAVY				LIGHT						
Variety	Allains	Alma	Landry	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(tons/A)										
HoCP96-540					285		304 +				289
CP01-1372	283	229	310		258 -	283		305	288	306 +	281
L01-299	287	237	305	244	288	264	288	306	297	276	279
HoCP04-838					268 -		297				278
Ho05-961	304 +	283 +	296	288 +	304	288		320 +	302	300 +	299 +
HoCP09-804	306 +	265	303	295 +	282	292 +	288	302	292	300 +	293 +
L12-201	282	233	285 -	232	290	273	304 +	314	304	282	280
Ho12-615	292	239	283 -	268	280	275	279	319 +	290	283	281
Ho13-739	301	272 +	281 -	300 +	300	291 +	289	323 +	295	276	293 +
L14-267	309 +	244	305	244	301	285	293	317	294	275	287
HoCP14-885	312 +	253	296	253	309 +	281	322 +	329 +	306	269	293 +
L15-306	297	257	295		298	278	286	314	298	269	286
HoL15-508	312 +	296 +	323 +	292 +	296	291 +	296	333 +	301	324 +	306 +
HoCP 17-701	325 +	279 +	321	296 +	329 +	304 +	317 +	324 +	305	288	309 +
Ho 17-738	291	235	297	267	298	254	295	313	298	282	283

Table 6. Plantcane stalk weight for nine commercial and six experimental varieties at ten outfield locations in 2021.

	HEAVY				LIGHT						
Variety	Allains	Alma	Landry	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(tons/A)										
HoCP96-540					3.49		2.92				2.85 +
CP01-1372	2.09	1.80 -	1.87		2.47	1.72		1.90	2.06	2.08	1.99
L01-299	1.85	2.23	1.90	1.74	2.57	1.99	2.41	1.95	2.29	2.14 B	2.11
HoCP04-838					2.72		2.26				2.14
Ho05-961	1.84	1.66 -	2.11	1.78	2.33	1.75		2.10	2.33	2.36	2.07
HoCP09-804	1.33 -	1.29 -	1.43 -	1.29 -	1.96	1.30 -	1.98	1.63	1.83 -	1.58 -	1.56 -
L12-201	2.28 +	2.35	2.62 +	2.09 +	2.89	2.42	2.69	2.29	2.97 +	3.16 +	2.58 +
Ho12-615	1.55	1.92	1.95	1.27 -	2.35	2.19	2.44	1.70	2.10	2.04	1.95
Ho13-739	1.73	1.83 -	2.15	1.84	2.50	2.10	2.76	1.98	2.52	2.42	2.18
L14-267	2.08	1.92	2.61 +	1.90	2.86	2.59 +	2.71	2.21	3.15 +	2.47	2.45 +
HoCP14-885	1.73	2.09	1.94	1.94	2.61	2.38	2.68	2.29	2.77 +	2.09	2.25
L15-306	1.82	2.28	2.17		2.28	1.86	2.54	2.18	2.65	2.39	2.19
HoL15-508	1.95	2.13	2.07	1.59	2.20	1.90	2.63	2.15	2.88 +	2.17	2.17
HoCP 17-701	2.18	2.19	1.95	1.82	2.72	2.26	2.82	2.10	2.18	2.09	2.24
Ho 17-738	1.57	2.08	1.88	1.63	2.40	2.00	2.52	2.02	2.11	2.12	2.03

Table 7. Plantcane stalk number for nine commercial and six experimental varieties at ten outfield locations in 2021.

	HEAVY				LIGHT						
Variety	Allains	Alma	Landry	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)					
HoCP96-540					22996		15535 -				20963 -
CP01-1372	24585	28229	32934		28034	30977		26127	38611	32512	29223
L01-299	28838	24922	33031	22670	28950	32903	22401	30034	31033	31801	28658
HoCP04-838					26011		24774				27091
Ho05-961	27369	25520	23439	22179	28070	28907		23147	36593	30179	26791
HoCP09-804	35177	35681 +	33634	32717 +	34373	49395 +	27968	30804	42765 +	38881	36140 +
L12-201	24155	22994	24968	19266	26368	23022 -	23584	23887	23226 -	19990 -	23091 -
Ho12-615	39515 +	36217 +	38482	31824 +	34364	23533 -	29699 +	30863	38749	39601 +	34285 +
Ho13-739	29406	24311	28095	19439	27349	23455 -	24895	26676	33084	25818	26299
L14-267	25732	26560	26680	18986	28070	22434 -	21182	22693	20867 -	30194	24278 -
HoCP14-885	36581 +	30659	34515	20029	30852	22067 -	26328	24240	30508	39882 +	29566
L15-306	28036	30863	30599		28814	29882	18250	26887	28259	30801	27605
HoL15-508	30341	28724	32778	26312	33931	29866	20831	21588	25421	33281	28307
HoCP 17-701	24007	23334	27457	23975	23438	23770 -	16087	25868	31041	29053	24778 -
Ho 17-738	31877	27156	32946	25290	30509	27123	27254	27774	35281	34141	29888

Table 8. First-stubble sugar per acre for five commercial and six experimental varieties at twelve outfield locations in 2021

	HEAVY						LIGHT						
Variety	Allains	Alma	Domingue	Landry	Magnolia	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)							
HoCP96-540	5222	5663	6024 -	6616	3001	6094	8216	9290	9271	5719	7434 -	7710 -	6688 -
L01-299	5979	4648	8573	7602	3404	5911	8271	11476	13194	5759	10916	9708	7937
HoCP04-838												9099	7806
Ho05-961		4485	6639 -	6840	4083		7738		11072	6603	9363		7101 -
HoCP09-804	5558	5355	8727	7481	3529	6373	8090	7868	13037	6684	10581	9631	7743
L11-183	5083	3468	6006 -	7591	3026	5332	7557	8928	11478	5038	8446 -	7829 -	6648 -
L12-201	5710	7065 +	6521 -	5970	3232	5478	7393	7992	10442	6253	9099 -	8877	7003 -
Ho12-615	5422	5019	7816	7795	4030	6799	8126	8829	11772	6530	9885	8299 -	7527
Ho13-739	5788	5128	7508	7035	3136	6713	8039	10030	11127	7192	9161 -	7949 -	7400
L14-267	6446	5049	7978	7210	3899	5755	8761	9370	12173	6906	10752	9291	7793
HoCP14-885	6454	5220	9401	6323	3903	6411	8390	8933	13923	6552	9592	10369	7956
L15-306	6092	5270	8952	7091	4478	7101	9207	9500	12310	6320	9729	8717	7897
HoL15-508	6461	6753	8367	7445	4248	7314 +	9174	9065	14887	5663	10665	8816	8238

Table 9. First-stubble cane yield for five commercial and six experimental varieties at twelve outfield locations in 2021

	HEAVY						LIGHT						
Variety	Allains	Alma	Domingue	Landry	Magnolia	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)							
HoCP96-540	22.2	23.4	22.0 -	24.9	14.2	24.7	28.7	32.3	33.4	18.9	26.3 -	28.3 -	25.0 -
L01-299	22.7	18.4	28.6	25.4	14.0	25.8	27.5	38.6	45.1	19.2	35.8	33.0	27.8
HoCP04-838												31.5	26.6
Ho05-961		17.8	22.6 -	23.4	14.9		26.4		38.8	20.9	31.3		25.0 -
HoCP09-804	19.5	20.2	29.3	26.4	13.7	23.7	27.1	26.8	44.6	22.5	34.1	32.9	26.7
L11-183	20.5	14.5	20.6 -	26.6	13.9	23.9	26.9	30.7	39.5	16.4	28.2 -	29.0 -	24.2 -
L12-201	21.8	27.4 +	22.3 -	21.4	14.5	21.1	25.3	25.7	35.4	19.5	29.1 -	30.8	24.5 -
Ho12-615	20.8	19.4	27.0	27.1	14.8	26.7	28.3	31.0	40.8	20.3	35.1	31.4	26.9
Ho13-739	20.2	19.3	26.5	23.6	11.3	23.9	27.9	33.3	39.0	22.5	30.1 -	28.5 -	25.5 -
L14-267	23.4	18.7	27.6	24.8	14.3	22.8	29.0	30.9	41.1	21.5	35.1	32.4	26.8
HoCP14-885	23.5	20.5	28.4	21.2	15.2	23.6	26.7	30.5	44.6	19.8	28.9 -	35.1	26.5
L15-306	22.3	19.9	29.9	24.4	16.6	27.9	30.0	31.9	41.4	20.1	32.3	31.1	27.3
HoL15-508	23.0	24.5 +	26.8	24.8	16.5	27.3	28.8	31.5	47.5	16.9	34.1	30.2	27.7

Table 10. First-stubble sugar per ton for five commercial and six experimental varieties at twelve outfield locations in 2021

	HEAVY						LIGHT						
Variety	Allains	Alma	Domingue	Landry	Magnolia	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(tons/A)												
HoCP96-540	235 -	243	271 -	266	212 -	247	286	289	281	303	283 -	272	266 -
L01-299	263	252	300	300	243	232	301	297	292	298	310	294	282
HoCP04-838												289	290
Ho05-961		253	294	291	276 +		293		285	316 +	299		284
HoCP09-804	285 +	265	298	283	259	269 +	300	294	292	298	311	293	287
L11-183	248 -	238	291	285	220 +	224	282 -	291	292	307	299	270	270 -
L12-201	262	257	292	279	224	260 +	294	310	295	320 +	312	288	283
Ho12-615	260	258	290	287	273 +	255 +	288	285	289	322 +	282 -	264	279
Ho13-739	287 +	265	283 -	299	277 +	282 +	286	301	285	320 +	305	279	289
L14-267	276	270	291	290	274 +	253	303	303	296	320 +	307	286	289
HoCP14-885	274	255	332 +	302	256	272 +	315	292	312 +	330 +	332 +	296	297 +
L15-306	273	263	299	290	270 +	254	308	298	297	314 +	303	280	287
HoL15-508	281 +	276	312	301	257	268 +	319 +	286	313 +	336 +	313	291	296 +

Table 11. First-stubble stalk weight for five commercial and six experimental varieties at twelve outfield locations in 2021

	HEAVY						LIGHT						
Variety	Allains	Alma	Domingue	Landry	Magnolia	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)							
HoCP96-540	1.65	1.80 +	2.55 +	1.87	1.74 +	1.45	2.23	2.46 +	3.09 +	1.80	2.64 +	2.47 +	2.15 +
L01-299	1.45	1.25	1.85	1.56	1.13	1.62	1.86	1.45	2.45	1.36	2.14	1.58	1.64
HoCP04-838												1.94 +	1.77
Ho05-961		1.43	2.07	1.56	1.23		2.07		2.31	1.88	2.18		1.82 +
HoCP09-804	1.46	1.22	1.45 -	1.36	1.10	1.36	1.67	1.71	2.00 -	1.34	1.51 -	1.70	1.49 -
L11-183	1.85 +	1.61 +	1.90	1.48	1.74 +	1.98	2.13	1.85	2.47	1.95	2.18	1.93 +	1.92 +
L12-201	2.06 +	1.95 +	2.48 +	1.99 +	2.00 +	1.68	2.25	2.42 +	3.08 +	1.71	2.87 +	2.52 +	2.25 +
Ho12-615	1.28	1.37	1.64	1.28	0.95	1.59	1.81	1.77	1.98 -	1.47	2.24	1.48	1.57
Ho13-739	1.77 +	1.50	2.25 +	1.81	1.32	1.78	1.94	1.91 +	2.70	1.95	2.29	2.14 +	1.95 +
L14-267	2.09 +	1.44	2.08	1.72	1.60 +	1.68	2.48 +	1.77	2.91 +	1.83	2.59	2.12 +	2.02 +
HoCP14-885	1.64	1.51	2.09	1.57	1.28	1.71	1.94	1.94 +	2.41	1.78	2.08	2.31 +	1.85 +
L15-306	1.66	1.62 +	1.99	1.48	1.38 +	1.39	1.95	1.73	2.17	1.78	1.69	1.93 +	1.73
HoL15-508	1.56	1.47	1.76	1.58	1.29	1.51	1.98	1.83	2.19	1.66	1.87	1.99 +	1.72

Table 12. First-stubble stalk number for five commercial and six experimental varieties at twelve outfield locations in 2021

	HEAVY						LIGHT						
Variety	Allains	Alma	Domingue	Landry	Magnolia	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(tons/A)							
HoCP96-540	27269	25919	17222 -	27235	16280	34137	26216	26276 -	21459 -	21347	19921 -	23162 -	23870 -
L01-299	31558	29041	30786	32535	24525	31899	29545	56091	37255	28200	34763	42453	34054
HoCP04-838												32531 -	29802
Ho05-961		24415	21775 -	30139	23981		25446		33676	22383	28771		27216 -
HoCP09-804	26737	33580	40530 +	39276	25159	35205	32814	32140 -	44665	34458	45007 +	39454	35752
L11-183	22371	18189 -	21759 -	36793	16321	23942	25450	33219 -	31586	17045	26481 -	30408 -	25297 -
L12-201	21232	28510	17926 -	21397 -	14452 -	25475	22901 -	21588 -	23092 -	26296	20459 -	24478 -	22317 -
Ho12-615	33342	27818	33422	42488 +	31471	34629	32312	35322 -	41338	27410	31513	43052	34510
Ho13-739	22755	26509	23448 -	25979	16591	27002	28814	34919 -	29017	23079	26302 -	26833 -	25937 -
L14-267	22421	25511	27471	28879	17996	27369	23527	35521 -	28273	23664	27130	30604 -	26570 -
HoCP14-885	28896	27545	27619	27457	23575	27942	27825	32042 -	37143	22596	28364	30699 -	28475 -
L15-306	27224	24551	30006	33045	24225	40406 +	30661	37820 -	38169	22646	39679	32202 -	31719
HoL15-508	29789	33389	30546	32059	25573	37218	29347	34501 -	43567	20317	36609	30399 -	31943

Table 13. Second-stubble sugar per acre for seven commercial and three experimental varieties at nine outfield locations in 2021

	HEAVY				LIGHT					
Variety	Alma	Dominguez	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(lbs./A)									
HoCP96-540	3241 -	4105 -	4379 -	2075	4125 -	3654 -	3865	6514 -	5712	4185 -
L01-299	5829	7743	7782	1938	6219	8196	5328	8758	9786	6842
HoCP04-838	5280	6384	5232	1795	4669 -	7469	3437	7084 -	10144	5722
HoCP09-804	5568	6140	8209	2201	5583	8654	5678	7700	11115	6761
L11-183	4975	7423	8504	2482	5187	6525	3489	7357	7185	5903
Ho11-573		5948	4518 -			6960	3555	7087 -		5614
L12-201	6439	7143	5874	1979	4032 -	6064 -	4023	7457	9793	5737
Ho12-615	5880	6873	10196	2641	5842	8329	5775	8595	11545	7297
Ho13-739	5710	6962	5892	2724	4809 -	5388 -	5833	8298	10644	6102
L14-267	6300	7115	6973	2766	6140	9002	5045	9994	10069	7045
HoCP14-885	6924	7832	7849	2353	5553	10368 +	5805	8390	9926	7205
L15-306	6491	7470	7525	2965	6109	7664	5875	8816	10135	7006
HoL15-508	5771	7363	7694	3507	7079	8618	4482	9652	11684	7317

Table 14. Second-stubble cane yield for seven commercial and three experimental varieties at nine outfield locations in 2021

	HEAVY				LIGHT					
Variety	Alma	Dominguez	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs./A)					
HoCP96-540	14.1	14.6 -	14.0 -	9.0	20.7 -	16.0 -	15.3	28.7	26.0	17.6 -
L01-299	22.8	25.2	24.0	7.7	26.7	34.3	18.5	31.5	37.7	25.4
HoCP04-838	20.8	22.7	17.6	7.2	20.6 -	28.3	12.2	27.4	39.4	21.8
HoCP09-804	20.8	20.0	25.4	9.0	21.5 -	32.9	19.8	28.4	45.5	24.8
L11-183	21.5	25.0	27.2	11.1	22.7	27.8	13.2	28.8	30.5	23.1
Ho11-573		20.6	14.9			28.1	13.0	27.6		20.8
L12-201	24.5	23.9	18.3	9.0	18.3 -	24.1 -	13.9	26.6	35.9	21.3
Ho12-615	21.9	23.8	32.2	10.6	23.7	33.4	20.1	32.6	43.5	26.9
Ho13-739	20.9	24.0	18.9	9.8	19.0 -	22.3 -	19.4	30.8	37.1	22.5
L14-267	22.9	23.2	21.3	9.9	24.3	34.7	16.7	35.4	36.3	25.0
HoCP14-885	24.9	24.1	25.2	9.1	22.1	33.9	18.9	29.1	38.1	25.1
L15-306	23.4	25.2	24.2	11.1	23.9	30.8	19.9	31.2	39.3	25.4
HoL15-508	20.8	22.8	24.6	13.0	26.0	32.7	14.4	33.0	39.4	25.2

Table 15. Second-stubble sugar per ton for seven commercial and three experimental varieties at nine outfield locations in 2021

	HEAVY				LIGHT					
Variety	Alma	Dominguez	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(lbs./A)									
HoCP96-540	232 -	280 -	321	231 -	200 -	229	255 -	227 -	213 -	243 -
L01-299	256	307	325	250	235	239	291	278	262	271
HoCP04-838	258	281 -	304	250	227	263 +	281	258 -	257	264
HoCP09-804	273	306	321	246	260 +	262 +	289	270	247	275
L11-183	234 -	297	312	223 -	230	235	263	255 -	232	253 -
Ho11-573		289 -	304			247	273	258 -		274
L12-201	264	299	322	221 -	221	255	289	278	273	269
Ho12-615	270	289 -	316	251	249	247	287	264	266	271
Ho13-739	275	290 -	308	279 +	254	243	302	269	274	278
L14-267	278 +	307	325	279 +	251	259	302	282	277	284
HoCP14-885	279 +	324 +	318	259	252	305 +	308	289	261	288 +
L15-306	275	296	312	268 +	257	250	297	283	256	277
HoL15-508	278 +	323 +	314	269 +	272 +	263 +	311 +	293	292	291 +

Table 16. Second-stubble stalk weight seven commercial and three experimental varieties at nine outfield locations in 2021

	HEAVY				LIGHT					
Variety	Alma	Dominguez	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs./A)					
HoCP96-540	1.46	2.15 +	1.56 +	1.36	1.92	2.29	1.69 +	2.43	2.39 +	1.92
L01-299	1.19	1.51	1.24	1.05	1.93	1.91	1.23	1.79	1.69	1.51
HoCP04-838	1.41	1.64	1.15	1.04	1.29 -	1.99	1.04	1.86	1.45	1.43
HoCP09-804	1.13	1.40	1.14	0.90	1.42 -	1.60	1.16	1.90	1.33 -	1.33
L11-183	1.66 +	1.89 +	1.48	1.70 +	1.62	2.06	1.48	2.05	1.96	1.77
Ho11-573		2.05 +	1.65 +			2.20	1.81 +	2.28		2.00
L12-201	1.81 +	2.35 +	1.51	1.39 +	1.74	2.20	1.76 +	2.68	2.19 +	1.96
Ho12-615	1.27	1.40	1.23	0.96	1.42 -	1.58	1.28	1.90	1.28 -	1.37
Ho13-739	1.32	1.63	1.20	1.12	1.41 -	2.42 +	1.35	2.36	1.96	1.64
L14-267	1.76 +	1.70	1.62 +	1.26	1.89	2.37 +	1.80 +	2.28	1.84	1.84
HoCP14-885	1.60	2.15 +	1.37	1.20	1.34 -	2.08	1.40	1.99	2.02 +	1.68
L15-306	1.61	1.69	1.22	1.27	1.79	1.86	1.50	1.96	1.70	1.62
HoL15-508	1.61	1.52	1.31	1.23	1.37 -	1.55	1.78 +	1.86	1.51	1.53

Table 17. Second-stubble stalk number for seven commercial and three experimental varieties at nine outfield locations in 2021

	HEAVY				LIGHT					
Variety	Alma	Dominguez	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs./A)					
HoCP96-540	18733	13580 -	17566 -	13428	21486	13959 -	19215	23575 -	22108	18183 -
L01-299	38433	34166	38912	14876	27470	36144	29837	35310	44776	33325
HoCP04-838	29465	28003	29465	13860	32115	28522	23180	29454	54245	29812
HoCP09-804	36839	28850	43761	20203	30108	41729	33910	32729	68115	37360
L11-183	26508	26503	36743	13627	28232	27137	18313 -	28263 -	31304	26292 -
Ho11-573		20287 -	18188 -			25688 -	14435 -	24179 -		20555 -
L12-201	27785	20394 -	25977	12944	19528	21730 -	16162 -	20223 -	33705	21420 -
Ho12-615	34541	34098	52563 +	21802	32578	43085	31634	34419	68998	39302 +
Ho13-739	31476	29960	32064	17505	26961	18799 -	28209	26707 -	38951	27848
L14-267	26494	27318	26666	16268	26210	29451	18316 -	32144	41796	27185 -
HoCP14-885	33749	22263 -	37920	15068	33837	32726	27666	29517	38146	29798
L15-306	29845	29921	40093	17580	27426	33661	25969	32069	46079	31405
HoL15-508	26768	30141	39791	21643	41183 +	42529	16729 -	35679	53248	34190

Table 18. Third-stubble sugar per acre for nine commercial varieties at seven outfield locations in 2021

	HEAVY		LIGHT					
Variety	Allains	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	Overall Mean
				(lbs./A)				
HoCP96-540	5121	7705	1032 -	5797 -	2206 -	2710 -	4194	4109 -
L01-283	6272	7098	5168	8786	6015	4579	7100	6431
L01-299	6246	6383	3990	9089	7101	5380	7999	6598
HoCP04-838	4713	6428	3646	7358 -	3169 -	3245 -	5014	4796 -
HoCP09-804	7217	6684	4989	7794	6092	6495	7292	6652
L11-183	4463 -	6952	2887	7409 -	3070 -	3813 -	5261	4836 -
Ho11-573	5663	6566		8417	2677 -	3509 -	5244	5346 -
L12-201	6354	6706	4679	8580	4533 -	4278	5899	5861
Ho12-615	8075 +	7411	3361	7934	4023 -	4667	6668	6020
Ho13-739	6936	6860	4230	7327 -	3248	5405	6018	5718
L14-267	7778	7253	3264	7359 -	8169	5616	7209	6664
HoCP14-885	6506	6576	5902	8806	6328	5982	6342	6645

Table 19. Third-stubble cane yield for nine commercial varieties at seven outfield locations in 2021

	HEAVY		LIGHT					
Variety	Allains	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	Overall Mean
				(lbs./A)				
HoCP96-540	20.6	30.6	5.3 -	19.7 -	12.9 -	11.3 -	17.3 -	16.8 -
L01-283	22.3	26.2	22.3	26.7	26.7	15.4	23.9 -	23.3
L01-299	23.5	25.3	19.3	28.7	33.1	19.7	29.3	25.6
HoCP04-838	17.4	25.3	15.3	22.8 -	14.6 -	12.1 -	18.7 -	18.0 -
HoCP09-804	24.5	25.3	19.5	24.3 -	25.9	23.4	26.6	24.2
L11-183	17.3 -	28.5	14.9	25.0 -	13.9 -	14.7	22.1 -	19.5 -
Ho11-573	21.9	28.4		26.6	12.4 -	12.4 -	21.5 -	20.5 -
L12-201	23.4	27.0	24.0	26.8	19.2 -	15.8	21.5 -	22.5
Ho12-615	28.5	31.3 +	16.0	27.4	20.8 -	16.9	24.8	23.7
Ho13-739	23.9	25.5	19.1	23.4 -	15.3 -	18.3	22.3 -	21.1 -
L14-267	26.4	25.8	14.3	23.5 -	33.3	18.6	25.4	23.9
HoCP14-885	21.6	26.2	23.5	26.9	25.3	20.7	22.5 -	23.8

Table 20. Third-stubble sugar per ton for nine commercial varieties at seven outfield locations in 2021

	HEAVY			LIGHT				
Variety	Allains	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	Overall Mean
				(lbs./A)				
HoCP96-540	252	252	195	293 -	174 -	240 -	245 -	236 -
L01-283	282	271	230	329	225	298 +	298 +	276
L01-299	267	253	206	316	214	272	275	258
HoCP04-838	271	254	234 +	324	216	269	269	262
HoCP09-804	293 +	266	255 +	321	237	277	275	275
L11-183	259	243	194	295 -	220	260	239 -	244
Ho11-573	261	231 -		317	213	285 +	245 -	259
L12-201	271	248	191	321	232	273	275	258
Ho12-615	283	237	211	287 -	193	275	270	251
Ho13-739	290 +	269	222	313	213	296 +	270	268
L14-267	294 +	281 +	231 +	314	245 +	301 +	284	279
HoCP14-885	301 +	251	246 +	327	251 +	291 +	294	280 +

Table 21. Third-stubble stalk weight for nine commercial varieties at seven outfield locations in 2021

	HEAVY			LIGHT				
Variety	Allains	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	Overall Mean
				(lbs./A)				
HoCP96-540	1.67	1.50 +	1.72	1.81 +	2.49 +	1.94 +	1.99 +	1.87 +
L01-283	1.49	1.46 +	1.57	1.42	1.76	1.26	1.42	1.48
L01-299	1.40	1.09	1.51	1.26	1.63	1.23	1.47	1.37
HoCP04-838	1.13	1.23	1.27	1.39	1.77	1.54	1.65	1.43
HoCP09-804	1.15	1.25	1.14 -	1.17	1.38	1.48	1.47	1.29
L11-183	1.42	1.58 +	1.58	1.54	2.48 +	1.71 +	2.36 +	1.81 +
Ho11-573	1.89 +	1.82 +		1.83 +	2.15 +	1.49	1.97 +	1.86 +
L12-201	1.96 +	2.10 +	2.00 +	2.05 +	1.99	1.79 +	2.14 +	2.00 +
Ho12-615	1.41	1.37 +	1.39	1.28	1.81	1.26	1.48	1.43
Ho13-739	1.49	1.67 +	1.51	1.49	1.97	1.66	1.83 +	1.66 +
L14-267	1.77	1.68 +	1.55	1.69 +	2.02 +	1.54	1.99 +	1.75 +
HoCP14-885	1.66	1.56 +	1.18 -	1.69 +	2.08 +	1.70 +	1.69	1.65 +

Table 22. Third-stubble stalk number for nine commercial varieties at seven outfield locations in 2021

	HEAVY		LIGHT					
Variety	Allains	Mary	Brunswick	Glenwood	Harper	Lanaux	Ronald Hebert	Overall Mean
	(lbs./A)							
HoCP96-540	24853	41222	6359 -	21805 -	10628 -	12266 -	17677 -	19259 -
L01-283	29932	36031 -	28315	37772	30312 -	24816 -	33815	31570 -
L01-299	33705	47308	25287	47371	41205	32725	39992	38228
HoCP04-838	30744	41027	25337	33477 -	16580 -	15921 -	23128 -	26602 -
HoCP09-804	43763	40521	35402	41600	37366	31933	36264	38121
L11-183	24232	36217 -	18848	32534 -	12187 -	17417 -	18764 -	22885 -
Ho11-573	23031	31398 -		29218 -	11568 -	16440 -	21915 -	22262 -
L12-201	25128	25758 -	23918	26593 -	19357 -	17536 -	20302 -	22656 -
Ho12-615	40966	45754	22487	43440	23130 -	27011	33632	33774
Ho13-739	32141	30789 -	25185	31442 -	15598 -	22291 -	24651 -	26014 -
L14-267	30208	30682 -	18737	27928 -	33096	24587 -	25597 -	27262 -
HoCP14-885	26777	33592 -	41104 +	32610 -	24370 -	24582 -	26905 -	29991 -

Table 23. Plantcane means from ten outfield locations in 2021: Allains, Alma, Landry, Mary, Brunswick, Glenwood, Harper, Lanaux, R. Hebert, and St. John

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	7906	27.4	289	2.85 +	20963 -
CP01-1372	8028	28.5	281	1.99	29223
L01-299	8373	29.7	279	2.11	28658
HoCP04-838	7933	28.9	278	2.14	27091
Ho05-961	8233	27.5	299 +	2.07	26791
HoCP09-804	8099	27.7	293 +	1.56 -	36140 +
L12-201	8335	29.6	280	2.58 +	23091 -
Ho12-615	9318 +	33.2	281	1.95	34285 +
Ho13-739	8376	28.7	293 +	2.18	26299
L14-267	8476	29.4	287	2.45 +	24278 -
HoCP14-885	9660 +	32.8	293 +	2.25	29566
L15-306	8581	30.0	286	2.19	27605
HoL15-508	9228 +	30.1	306 +	2.17	28307
HoCP 17-701	8412	27.2	309 +	2.24	24778 -
Ho 17-738	8588	30.1	283	2.03	29888

Table 24. First-stubble means from twelve outfield locations in 2021: Allains,Alma,Domingue,Landry,Magnolia,Mary, Brunswick, Glenwood, Harper, Lanaux, R.Hebert, and St. John

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	6688 -	25.0 -	266 -	2.15 +	23870 -
L01-299	7937	27.8	282	1.64	34054
Ho05-961	7806	26.6	290	1.77	29802
HoCP04-838	7101 -	25.0 -	284	1.82 +	27216 -
HoCP09-804	7743	26.7	287	1.49 -	35752
L11-183	6648 -	24.2 -	270 -	1.92 +	25297 -
L12-201	7003 -	24.5 -	283	2.25 +	22317 -
Ho12-615	7527	26.9	279	1.57	34510
Ho13-739	7400	25.5 -	289	1.95 +	25937 -
L14-267	7793	26.8	289	2.02 +	26570 -
HoCP14-885	7956	26.5	297 +	1.85 +	28475 -
L15-306	7897	27.3	287	1.73	31719
HoL15-508	8238	27.7	296 +	1.72	31943

Table 25. Second-stubble means from nine outfield locations in 2021: Alma, Domingue, Landry, Magnolia, Brunswick, Harper, Lanaux, R. Herbert, and St. John

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	4185 -	17.6 -	243 -	1.92	18183 -
L01-299	6842	25.4	271	1.51	33325
HoCP04-838	5722	21.8	264	1.43	29812
HoCP09-804	6761	24.8	275	1.33	37360
L11-183	5903	23.1	253 -	1.77	26292 -
Ho11-573	5614	20.8	274	2.00	20555 -
L12-201	5737	21.3	269	1.96	21420 -
Ho12-615	7297	26.9	271	1.37	39302 +
Ho13-739	6102	22.5	278	1.64	27848
L14-267	7045	25.0	284	1.84	27185 -
HoCP14-885	7205	25.1	288 +	1.68	29798
L15-306	7006	25.4	277	1.62	31405
HoL15-508	7317	25.2	291 +	1.53	34190

Table 26. Third-stubble means from seven outfield locations in 2021: Allains, Mary, Brunswick, Glenwood, Harper, Lanaux, and R. Hebert

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	4109 -	16.8 -	236 -	1.87 +	19259 -
L01-283	6431	23.3	276	1.48	31570 -
L01-299	6598	25.6	258	1.37	38228
HoCP04-838	4796 -	18.0 -	262	1.43	26602 -
HoCP09-804	6652	24.2	275	1.29	38121
L11-183	4836 -	19.5 -	244	1.81 +	22885 -
Ho11-573	5346 -	20.5 -	259	1.86 +	22262 -
L12-201	5861	22.5	258	2.00 +	22656 -
Ho12-615	6020	23.7	251	1.43	33774
Ho13-739	5718	21.1 -	268	1.66 +	26014 -
L14-267	6664	23.9	279	1.75 +	27262 -
HoCP14-885	6645	23.8	280 +	1.65 +	29991 -

Table 27. Combined plantcane means across outfield locations from 2019 to 2021

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	7896 -	30.4	259 -	2.71 +	22888 -
L01-299	8546	32.0	266	2.17	29966
HoCP04-838	8862	33.1	267	2.19	30521
Ho05-961	8542	30.5	280 +	2.32 +	26412 -
HoCP09-804	8463	30.5 -	277 +	1.76 -	35231 +
L12-201	8482	31.2	270	2.64 +	23716 -
Ho12-615	9372 +	35.7 +	262	2.02 -	35806 +
Ho13-739	8451	30.6	276 +	2.42 +	25537 -
L14-267	8885	32.3	275 +	2.57 +	25291 -
HoCP14-885	10311 -	36.1 +	284 +	2.44 +	30261
L15-306	9103 -	33.0	276 +	2.36 +	28254
HoL15-508	9127 -	31.5	290 +	2.23	28695

Table 28. Combined first-stubble means across outfield locations from 2020 to 2021

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	7001 -	26.7 -	262 -	2.26 +	24102 -
L01-299	8586	31.1	277	1.80	34700
HoCP04-838	7701 -	28.2 -	274	1.79	31670 -
Ho05-961	7716 -	27.8 -	280	1.98 +	27830 -
HoCP09-804	8072 -	28.7 -	281	1.59 -	36210
L11-183	7372 -	27.1 -	271	2.03 +	26674 -
L12-201	7679 -	27.5 -	279	2.43 +	23110 -
Ho12-615	8346	31.0	271	1.69	36833
Ho13-739	8098 -	28.6 -	285 +	2.11 +	26953 -
L14-267	8404	29.5	285 +	2.23 +	26771 -
HoCP14-885	8838	30.1	293 +	2.10 +	28999 -
L15-306	8556	30.4	282	1.95 +	31449 -
HoL15-508	8728	29.7	293 +	1.88 +	31887 -

Table 29. Second-stubble means across outfield locations in 2021

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	4185 -	17.6 -	243 -	1.92	18183 -
L01-299	6842	25.4	271	1.51	33325
HoCP04-838	5722	21.8	264	1.43	29812
HoCP09-804	6761	24.8	275	1.33	37360
L11-183	5903	23.1	253 -	1.77	26292 -
Ho11-573	5614	20.8	274	2.00	20555 -
L12-201	5737	21.3	269	1.96	21420 -
Ho12-615	7297	26.9	271	1.37	39302 +
Ho13-739	6102	22.5	278	1.64	27848
L14-267	7045	25.0	284	1.84	27185 -
HoCP14-885	7205	25.1	288 +	1.68	29798
L15-306	7006	25.4	277	1.62	31405
HoL15-508	7317	25.2	291 +	1.53	34190

SUCROSE LABORATORY AT THE SUGAR RESEARCH STATION

Mavis Daigle[1], Michael Pontif[1], and Collins Kimbeng[1]
Sugar Research Station

The Sugar Research Station Sucrose Laboratory processed 3,344 samples during the 2021 harvest season (Table 1).

A total of 3,308 samples were analyzed using a Spectracane FT-NIR instrument. The samples were shredded using a Dedini shredder then analyzed for Brix, pol, sucrose percent, fiber, moisture, purity, and theoretical recoverable sugar using Near InfaRed (NIR) spectroscopy technoloy.

Standard laboratory (wet chemistry) procedures were used to analyze 36 samples. The samples were shredded using a Dedini shredder and the juice was extracted using a Honiron sugarcane hydraulic press. Octapol® was used for juice clarification. Brix was measured with a refractometer and pol was measured using a saccharimeter (Autopol 880). Sucrose percent and theoretical recoverable sugar (lbs/ton of cane) were calculated based on the Brix and pol values. The sucrose laboratory processed samples from August 2021 to December 2021.

Table 1. Number of sugarcane samples processed at the Sugar Research Station sucrose laboratory during the 2021 harvest season

Unit/Project Area	Leader	Number of Samples
School of Plant, Environmental, and Soil Sciences	Niranjan Baisakh	1,379
	Brenda Tubana	266
Plant Pathology and Crop Physiology	Jeff Hoy	88
LSU AgCenter Southeast Region	Albert Orgeron	285
LCES	Kenneth Gravois	103
Sugar Research Station/Variety Development	Line Trials	635
	Increase	114
	Nursery	398
Contract Services		76
TOTAL		3,344

LAES SUGARCANE TISSUE CULTURE LABORATORY

A. Parco[1], D. P. Fontenot[1], C. Kimbeng[2], M. J. Pontif[2], and J. W. Hoy[2]
[1]Certis USA, LLC and [2]Sugar Research Station

During 2021-2022 production season, more than 7,000 sugarcane plantlets that were propagated in the Louisiana Agricultural Experiment Station Tissue Culture Laboratory were turned over to Certis USA, LLC, Kleentek Division for transplanting in the greenhouse at Houma, LA. The number of plantlets transplanted for each sugarcane cultivar is listed in Table 1. Fewer plantlets were sent to the greenhouse this season since many propagules were discarded because they exhibited hyperhydricity or produced spindly shoots. Such malformations were attributed to unfavorable conditions in the tissue culture growth room. The causative factors were subsequently identified and rectified.

Table 1. Number of tissue culture-derived plantlets of different sugarcane cultivars transplanted in the greenhouse

Cultivar	Number of Plantlets
Ho 13-739	261
HoCP 14-885	5,256
HoL 15-508	360
L 01-299	737
L 12-201	444
Total	7,058

THE 2021 LOUISIANA SUGARCANE VARIETY SURVEY

Kenneth A. Gravois
Sugar Research Station

Each year a sugarcane variety survey is conducted by county agents in sugarcane-growing parishes of Louisiana to determine variety makeup and distribution. Surveys were obtained from 24 parishes. There was sugarcane grown in West Feliciana parish (Turnbull Island), but this acreage is reported in Pointe Coupee parish. According to USDA-Farm Service Agency (FSA), there were 510,351 acres planted to sugarcane in Louisiana in 2021.

Agents collected acreage according to variety and crop. A total of nine sugarcane varieties, HoCP 96-540, L 01-283, L 01-299, HoCP 04-838, HoCP 09-804, L 11-183, L 12-201, Ho 12-615, and Ho 13-739 were listed along with "Others" in the survey. The category of "Others" included, but was not limited to, small acreages of HoCP 85-845, L 99-226, HoCP 00-950, L 03-371, Ho 05-961, Ho 07-613, and potential new sugarcane varieties on primary and secondary seed cane increase stations. The crop was divided into four categories: plant-cane, first-stubble, second-stubble, and third-stubble and older crops.

Total State Acreage

Total sugarcane acreage for each parish, region and the statewide total is shown in Table 1. Statewide, the area planted to sugarcane in 2021 was 510,351 acres, representing an increase of 2.84% compared to acreage in 2020.

Sugarcane Distribution by Variety

Statewide sugarcane acreage in percent by variety and crop is shown in Table 2. The leading variety for 2021 was L 01-299, which occupied 58% of the Louisiana sugarcane acreage. This percentage was one point lower than the acreage of L 01-299 in 2019 (Gravois, 2021). HoCP 96-540, L 01-283, and HoCP 09-804 were next in total acreage, each planted on 10% of the state's acreage. The varieties planted in the next largest areas were HoCP 04-838, L 11-183, and Ho 12-615, each occupying 3%, 2%, and 3% of the state's acreage, respectively. All other varieties in the survey had less than 1% or less of the planted area for the 2021 crop.

Sugarcane Distribution by Region and Crop

The total sugarcane acreage was highest for the Teche region (194,873 acres), followed by the River-Bayou Lafourche region (160,693 acres), and the Northern region (146,003 acres) [Table 3]. The northern area showed the greatest increase (>5%) in acreage, with Avoyelles, Concordia, Evangeline, Lafourche, Pointe Coupee, and St. Landry parishes showing the largest percentage increases compared to 2020.

In 2021, 23.0% of the state's acreage was grown as third and older stubble crops, which was higher than the acreage of the same category for 2020. In 2021, 27.3%,

25.5%, and 24.3% of the state's acreage was in plant-cane, first-stubble, and second-stubble crops, respectively.

For the current survey, plant-cane percentage was highest in the River-Bayou Lafourche region (29.0%). For the third and older stubble crops, the Bayou Teche region had the highest percentage at 26.8%, whereas the River-Bayou Lafourche had the lowest acreage devoted to third and older stubble crops at 20.3%.

Sugarcane Distribution by Variety and Crop for the Three Regions

L 01-299 was the most widely grown variety in all three regions in all crop categories (Tables 4-6). The most notable variety trend in sugarcane acreage was the continued planting of L 01-299 and increased older stubble crops devoted to L 01-299. The River-Bayou Lafourche and Northern growing areas had more acres devoted to L 01-283 than the Bayou Teche region. HoCP 96-540 was more widely grown (17.6%) in the Bayou Teche region, followed by the northern region and the River-Bayou Lafourche region at 5.6% and 6.2%, respectively. The survey showed more acres of HoCP 09-804 planted in the Northern region, followed by the Bayou Teche region where mosaic did not affect initial seed cane distribution.

Variety Trends

HoCP 96-540, released for commercial planting in 2003, occupied 10% of the state's 2021 acreage, a decrease of two percentage points from the previous year. The variety continues to perform well for some growers. The main reasons for growers limiting acreage in HoCP 96-540 are weak performance and poor overwintering in older stubble crops. HoCP 96-540 is better adapted to sandier soils. Rust infections can be a problem in its plantcane crop. HoCP 96-540 possesses superior cold tolerance.

L 01-283, released for commercial planting in 2008, occupied 10 percent of the Louisiana acreage in 2021. The variety is more popular on the River-Bayou Lafourche and Northern regions. L 01-283 has excellent stubbling ability, good sugar yield, erectness, and cold tolerance. Naturally occurring, environmentally induced off-types have been increasing in L 01-283. The variety has performed best in well-drained sandier soils along with good fertility programs, all of which reduce stress. The variety is especially susceptible to late-season brown rust disease, especially after mild winters.

L 01-299 was grown on 58% of the state's acreage in 2021. The variety has outstanding stubbling ability and is well suited for both light and heavy soils. The variety has an erect growth habit and is not the best shading variety. L 01-299 has difficulty establishing after planting. When cut for harvest, the variety stubbles extremely well. Early spring growth of L 01-299 plantcane and seedcane is susceptible to several stress factors, such as cool weather, wet soils, damage from herbicides, and poor fertility (especially pH). Brown stripe is a disease that takes advantage of these stress factors in L 01-299 and further slows growth. L 01-299 responds well to ripening with glyphosate.

HoCP 04-838 was released in 2011. This variety has good sugar recovery and stubbles

well, with its most notable attribute being superior cold tolerance. HoCP 04-838 had the best juice quality for the greatest length of time following the freeze on November 13, 2019. Cane yield in stubble crops can be erratic; the variety does not take the drought well.

HoCP 09-804 was released to growers in 2016. This variety has a high population of small diameter stalks with excellent sugar yield potential. Sucrose content and maturity is like L 01-283. HoCP 09-804 performs well in stubble crops. The variety did have some mosaic disease, primarily in the River-Bayou Lafourche region. Growers are encouraged to plant HoCP 09-804 from healthy seed cane sources. This variety was planted on a larger scale in 2021, especially in the Norther parishes.

L 11-183 was released to growers in 2018. The new variety was derived from the cross HoCP 92-624 x LCP 85-384. Stalks of L 11-183 are larger, and the population is lower than L 01-299. The variety has good sugar yield and is considered a mid- to late-maturing variety. L 11-183 has a good disease package, but it tends to lodge. Sugar yield in L 11-183 has been lower in older stubble crops. Regrowth in older stubble crops of L 11-183 was negatively affected by the freezes experienced in mid-February 2021.

L 12-201 was released in 2019. The new variety was derived from the cross HoCP 96-540 x L 97-128. It is characterized as having a moderate population of larger diameter stalks. The yield potential and disease package are very good. In a freeze test conducted in 2019 in Cheneyville, the variety was rated as having poor cold tolerance.

Ho 12-615 was released in 2019. The new variety was derived from the cross HoCP 96-540 x TucCP 77-42. This variety is characterized as having a high population of small diameter stalks. The yield potential and disease package are very good. In a freeze test conducted in 2019 in Cheneyville, the variety was rated as having poor cold tolerance. Ho 12-615 was widely planted in 2021.

Ho 13-739 was released in 2020. Growers are encouraged to continue to increase the Ho 13-739 to determine where it might fit on their farms. Ho 13-739 is noted for a good disease package and early high sucrose content.

New sugarcane varieties L 14-267 and HoCP 14-885 were released, and seed cane was distributed in 2021. Growers are encouraged to increase both new sugarcane varieties to determine where each might fit on their farms. Both L 14-267 and HoCP 14-885 have good disease packages and sugar yield. HoCP 14-885 has early maturity. Both new varieties had very good sugar yield in third stubble outfield yield trials in 2021.

Relying on a single variety can lead to changing disease reactions and insect infestations. This was seen with brown rust in LCP 85-384, HoCP 96-540, and L 01-283. With acreage of L 01-299 over 50%, growers are cautioned to diversify their sugarcane variety choices. With the release of many new sugarcane varieties in recent years, growers have good choices to diversify their sugarcane plantings in 2022.

ACKNOWLEDGMENTS

We acknowledge the assistance of the county agents for conducting the sugarcane variety survey in their parishes. We also thank the sugarcane growers and/or their consultants who took the time and effort to respond to the survey. We also acknowledge the assistance of the USDA-FSA offices in the sugarcane parishes for certified acreages.

REFERENCES

Gravois, K.A. 2021. The 2020 Louisiana sugarcane variety survey. Sugar Bulletin 99(9):27-31.

Table 1. Total area planted to sugarcane in Louisiana by region and parish, 2021[1]

Region	Parish	2021 Total Acres	% Change from 2020
Bayou Teche	Acadia	5,456	-6.05
River-Bayou Lafourche	Ascension	18,784	4.72
River-Bayou Lafourche	Assumption	34,595	4.61
Northern	Avoyelles	20,709	12.64
Bayou Teche	Calcasieu	37	-66.08
Bayou Teche	Cameron	33	0.00
Northern	Concordia	363	96.97
Northern	Evangeline	1,366	36.28
Bayou Teche	Iberia	56,853	0.54
River-Bayou Lafourche	Iberville	38,826	0.08
Bayou Teche	Jefferson Davis	581	-17.38
Bayou Teche	Lafayette	8,838	1.43
River-Bayou Lafourche	Lafourche	26,336	6.05
Northern	Pointe Coupee	70,521	5.80
Northern	Rapides	19,155	1.14
River-Bayou Lafourche	St. Charles	1,276	-0.31
River-Bayou Lafourche	St. James	26,039	2.80
River-Bayou Lafourche	St. John the Baptist	6,500	1.04
Northern	St. Landry	26,875	5.05
Bayou Teche	St. Martin	31,978	0.52
Bayou Teche	St. Mary	45,970	0.34
River-Bayou Lafourche	Terrebonne	8,337	-0.17
Bayou Teche	Vermilion	45,127	0.99
Northern	West Baton Rouge	15,796	3.56
	State Total	510,351	2.84

[1]Acreage based on USDA-FSA estimates obtained by the county agents. There were 1,468 acres reported as failed.

Table 2. Estimated statewide sugarcane percentage by variety and crop, all regions, 2021[1]

Variety	Plant-cane	First-stubble	Second-stubble	Third-stubble and older	Total
	---------- Percentage ----------				
HoCP96-540	11,906.7	14,038.1	13,928.0	12,996.7	10.4
L01-283	8,039.4	11,798.8	15,466.5	14,767.8	9.8
L01-299	73,476.2	79,107.7	72,178.9	68,898.4	57.5
HoCP04-838	3,763.8	2,967.3	2,577.3	6,233.2	3.0
HoCP09-804	15,892.4	12,109.2	12,594.5	9,751.0	9.9
L11-183	2,730.5	2,980.5	1,808.8	518.3	1.6
L 12-201	3,335.0	894.8	244.5	106.9	0.9
Ho 12-615	11,274.8	1,815.1	365.9	145.5	2.7
Ho 13-739	1,450.8	57.7	5.0	0.0	0.3
Others	7,230.5	4,271.7	4,731.1	3,896.5	3.9
% Crop	27.3	25.5	24.3	23.0	

[1] Based on information obtained in variety surveys by county agents.

Table 3. Estimated sugarcane distribution by region and crop in Louisiana, 2021[1]

Crop	Bayou Teche	River-Bayou Lafourche	Northern	State Total
Plant-cane Area (acres) Percent (%)	53,302 27.3	46,667 29.0	39,131 25.3	139,100 27.3
First-stubble Area (acres) Percent (%)	46,095 23.7	44,862 27.9	39,083 25.2	130,036 25.5
Second-stubble Area (acres) Percent (%)	43,230 22.2	36,582 22.8	44,088 28.5	123,901 24.3
Third-stubble and older Area (acres) Percent (%)	52,246 26.8	32,581 20.3	32,488 21.0	117,314 23.0
Total area (acres) Percent (%)	194,873 39.1	160,693 31.4	146,003 29.4	510,351

[1] Based on information obtained in variety surveys by county agents.

Table 4. Estimated area planted to sugarcane in percent by variety and crop for the Bayou Teche region, 2021[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	15.5	19.4	17.6	18.0	17.6
L01-283	3.5	4.2	5.3	6.8	5.0
L01-299	50.6	55.6	55.6	52.7	53.4
HoCP04-838	3.9	1.5	3.4	6.9	4.0
HoCP09-804	10.3	9.5	10.6	10.9	10.3
L11-183	2.5	3.1	1.6	0.0	1.8
L 12-201	1.4	0.5	0.0	0.0	0.5
Ho 12-615	5.7	1.2	0.0	0.0	1.9
Ho 13-739	1.3	0.0	0.0	0.0	0.4
Others	5.3	5.0	5.8	4.7	5.2

[1] Based on information obtained in variety surveys by county agents.

Table 5. Estimated area planted to sugarcane in percent by variety and crop for the River/Bayou Lafourche region, 2021[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	5.0	6.0	8.4	5.9	6.2
L01-283	6.5	9.4	16.9	16.9	11.8
L01-299	63.0	69.3	62.3	66.0	65.2
HoCP04-838	2.1	2.5	1.6	4.6	2.6
HoCP09-804	3.8	4.6	5.3	3.7	4.3
L11-183	2.2	2.4	2.1	0.8	1.9
L 12-201	2.2	1.1	0.3	0.1	1.1
Ho 12-615	9.9	2.4	0.6	0.1	3.7
Ho 13-739	1.1	0.1	0.0	0.0	0.3
Others	4.3	2.3	2.4	1.9	2.8

[1] Based on information obtained in variety surveys by county agents.

Table 6. Estimated area planted to sugarcane in percent by variety and crop for the Northern region, 2021[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	3.4	6.1	7.3	5.2	5.6
L01-283	8.0	14.5	15.9	17.6	13.9
L01-299	43.7	57.3	57.5	61.2	54.8
HoCP04-838	1.8	3.0	1.1	3.4	2.3
HoCP09-804	22.0	14.6	13.8	8.7	15.0
L11-183	1.0	1.3	0.8	0.7	1.0
L 12-201	3.9	0.4	0.2	0.2	1.2
Ho 12-615	9.3	0.5	0.3	0.3	2.6
Ho 13-739	0.7	0.0	0.0	0.0	0.2
Others	6.1	2.4	3.1	2.6	3.5

[1] Based on information obtained in variety surveys by county agents.

Table 7. Louisiana sugarcane variety trends, by variety and years, all regions, 2016-2021[1]

	Area planted to sugarcane by variety and year (%)						
Variety	2016	2017	2018	2019	2020	2021	1 Year Change
HoCP96-540	30	25	20	15	12	10	-2
L01-283	12	12	14	14	10	10	0
L01-299	36	45	51	56	59	58	-1
HoCP04-838	10	8	5	4	3	3	0
HoCP09-804	<1	1	3	5	9	10	+1
L11-183			<1	<1	1	2	+1
L 12-201				<1	<1	1	+1
Ho 12-615				<1	<1	3	+3
Ho 13-739					<1	<1	0

[1] Based on annual variety surveys by county agents, 2016-2021.

PERFORMANCE OF FLORIDA SUGARCANE VARIETIES IN LOUISIANA

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Sugarcane varieties developed in Florida are generally unadapted to Louisiana soils and growing conditions. However, Florida sugarcane varieties have been used by breeders to expand the germplasm base of Louisiana sugarcane varieties, often appearing as grandparents or older generations in the lineage of Louisiana sugarcane varieties. Additionally, the *Bru1* QTL (quantitative trait loci) is more prevalent in Florida sugarcane varieties. Before using a sugarcane variety not developed in Louisiana for crossing, it is important to evaluate those varieties in Louisiana.

Each year a few stalks of Florida sugarcane varieties are obtained from the Kleentek quarantine greenhouse and used to plant a small seed cane increase at the Sugar Research Station, St. Gabriel, LA. Yield trials are planted each subsequent year during August. Each test was planted as a randomized complete block (two replications) design. Plots were paired rows that were 25 feet in length, and a four-foot alley separated plots. The soil type was a Commerce silt loam. In 2021, a new trial was planted on August 27th.

Standard cultural practices were followed during each growing season. The first and second stubble trials were harvested on October 19, 2021; the plantcane trial was harvested on November 8, 2021. The third stubble trial was accidently plowed out during the summer. Plots were combine-harvested and weighed to determine cane yield (tons/acre). A 6-stalk sample was hand-cut out of each plot for a quality analysis via NIR. Each sample was then sent to the laboratory to estimate fiber content (%), and sucrose content (lbs./ton of cane). Sugar yield was estimated as the product of cane yield and sucrose content.

Each year the data are summarized and sent to the sugarcane breeders.

In 2019, seed cane of CP 01-1372 was sent to Alma Plantation. From this increase, a larger field of CP 01-1372 was planted in 2020. The field at Alma was harvested – the cane yield was 33 tons/acre with a sugar recovery of 262 lbs./ton of cane.

Table 1. Plantcane Florida variety yield trial harvested on November 8, 2021, at the Sugar Research Station, St. Gabriel, LA

Variety	Sugar Yield	Cane Yield	TRS	Fiber
Second Stubble	(lbs./acre)	(tons/acre)	(lbs./ton of cane)	(%)
CP01-1372	8088	37.2	217	10.7
CP09-1385	7218	33.8	213	12.3
CP09-4758	7412	35.3	210	12.2
CP10-1208	7494	34.2	219	12.9
CP10-1619	7100	33.0	215	11.5
HO12-615	9720	44.6	218	12.5
HOCP09-804	8484	36.5	232	12.3
HOCP14-885	7705	33.5	232	10.3
L01-299	8363	40.7	208	11.8

Table 2. First Stubble Florida variety yield trial harvested on October 19, 2021, at the Sugar Research Station, St. Gabriel, LA

Variety	Sugar Yield	Cane Yield	TRS	Fiber
Plantcane	(lbs./acre)	(tons/acre)	(lbs./ton of cane)	(%)
CP01-1372	7928	32.8	243	11.8
CP06-2042	6653	29.4	227	14.4
CP07-2137	6156	25.7	240	11.2
CP07-2320	5754	24.2	237	9.6
CP08-1110	5510	27.8	198	12.8
CP08-1968	5148	24.6	209	14.6
CP96-1252	4284	22.1	193	11.5
Ho12-615	8125	32.0	253	14.1
HoCP09-804	8946	35.1	255	14.0
L01-299	6967	30.1	232	14.0

Table 3. Second stubble Florida variety yield trial harvested on October 19, 2021, at the Sugar Research Station, St. Gabriel, LA

Variety	Sugar Yield	Cane Yield	TRS	Fiber
First Stubble	(lbs./acre)	(tons/acre)	(lbs./ton of cane)	(%)
CP01-1372	5439	23.6	233	11.3
CP06-2042	3164	15.8	200	13.2
CP07-2137	2519	11.8	215	11.8
CP07-2320	3325	14.8	225	9.7
CP08-1110	3210	16.5	195	12.6
CP08-1968	4309	21.3	201	13.8
CP96-1252	1787	11.2	159	10.4
HoCP09-804	3929	17.8	220	13.8
HoCP96-540	2976	14.7	203	12.3
L01-299	5475	25.2	218	13.2
L11-183	3219	14.1	228	11.7

COLD TOLERANCE OF COMMERCIAL SUGARCANE VARIETIES ASSESSED DURING THE 2021/2022 HARVEST SEASON

James Todd[1], Mike Duet[1], Jeanie Stein[2], Harold Birkett[2], Herman Waguespack[3], and Kenneth Gravois[4]
[1]USDA-ARS, Sugarcane Research Unit (SRU), [2]Audubon Sugar Institute, [3] American Sugar Cane League, [4]Sugar Research Station

Louisiana has a short growing season (7-9 months) and short milling season (about 3 months) that can prematurely end by prolonged sub-freezing temperatures. To measure post-freeze deterioration of juice within the stalks of commercial varieties, collaborative work is conducted at the USDA-ARS, Sugarcane Research Unit at Houma, the LSU AgCenter, and the American Sugar Cane League.

On January 13, 2022, a temperature of 23.7° F was recorded for 30 min inside of the cold tolerance test in Houma, LA. The plantcane trial had nine commercial sugarcane varieties. The trial was planted as a randomized complete block design with four replications; each plot is three rows wide (18 feet), 30 feet long and has a 5-foot alley between plots.

The test was sampled on January 25, February 15, and February 25. The first sampling date served as a baseline for comparison. Ten-stalk samples were cut from the center row of each plot. Each sample was hand-cut at the base, not stripped of leaves, and tops were cut off at the leaf whorl. Laboratory analyses were done at the USDA-ARS sucrose lab for the first two sampling dates, and the third sampling date was analyzed at the Sugar Research Station. Quality analyses were done using the pre-breaker-press method. Juice was analyzed for Brix by refractometer and pol reading (Z) by polarimetry. Juice sucrose (%) was determined from Brix and pol reading values. Juice purity (%) was the proportion of juice sucrose to juice Brix. The pressed sample residue (bagasse) was weighed, dried, and weighed again to determine moisture content. From these data, Brix %cane, pol %cane, and fiber %cane were used to determine sucrose content (lbs./ton of cane).

Additional analyses were done. Juice samples are analyzed to determine pH. Titratable acidity (ml of 0.1 N NaOH/10 ml juice to take the pH to 8.3) was estimated using 50 ml of juice and converting back to 10 ml. Total soluble polysaccharides (gums) was estimated by the phenol-sulfuric acid method.

Trait means were estimated for each sampling date. Percent change from the initial sampling date (January 25, 2022) to the final sampling date (February 25, 2022) was estimated and used to order varieties by rank. Rank numbers were summed for each variety across the five quality traits. Post-freeze deterioration was determined by setting ranges: low numbers for good freeze tolerance and high numbers for poor freeze tolerance.

This was the first freeze event of the 2021/2022 grinding season. The growing point and canopy were viable for all varieties prior to the freeze. The varieties in the cold tolerance trial were lodged, which would enhance damage from cold temperature because cold air sinks and pools toward the ground.

Varieties rated as having good cold tolerance were HoCP 04-838 and HoCP 09-804. Varieties with moderate cold tolerance were Ho 13-739, L 14-267, and L 15-306. Varieties with poor cold tolerance were L 01-299, L 12-201, Ho 12-615, and HoCP 14-885.

Table 1. Post-freeze changes in purity % cane of nine commercial varieties in a plant-cane crop following freezing temperatures (23.7ºF) at the USDA-ARS research farm in Schriever, Louisiana during the 2021/2022 harvest

	Purity (%)			Actual and percent change		
	Harvest Dates					
Variety	25-Jan	15-Feb	25-Feb	Change	%	Rank
L 01-299	90.58 AB*	88.41 B	93.04 A	-2.17	-2.4	7
HoCP 04-838	90.76 B	91.43 B	94.64 A	3.88	4.3	1
HoCP 09-804	90.50 A	91.67 AB	92.74 A	2.24	2.5	2
L 12-201	91.48 A	89.79 A		-1.69	-1.8	6
Ho 12-615	90.71 A	88.52 BC	91.49 A	-2.20	-2.4	8
Ho 13-739	92.21 A	91.94 A	93.12 A	-0.27	-0.3	3
L 14-267	91.02 A	89.45 A	91.27 A	-1.57	-1.7	5
HoCP 14-885	91.90 A	87.57 A	87.14 A	-4.77	-5.2	9
L 15-306	91.20 A	89.65 A	91.93 A	-1.55	-1.7	4
Average	91.15 A	89.83 BC	91.92 A	-1.32	-1.4	

[1]Means followed by the same letter group are not significant across harvest dates at p=0.05. *indicates not significant.
[2]Change represents the difference between initial sampling date and the final sampling date.
[3]Rank based on least amount of change from initial sampling date.

Table 2. Post-freeze changes in yield of theoretical recoverable sugar per ton of cane (TRS/TC) of nine commercial varieties in a plant-cane crop following freezing temperatures (23.7ºF) at the USDA-ARS research farm in Schriever, Louisiana during the 2021/2022 harvest

	TRS (lbs./ton)			Actual and percent change		
	Harvest Dates					
Variety	25-Jan	15-Feb	25-Feb	Change	%	Rank
L 01-299	265.4 A	253.6 A	271.4 A	-11.86	-4.5	6
HoCP 04-838	258.9 B	258.0 B	276.3 A	-0.87	-0.3	2
HoCP 09-804	264.5 A	271.8 A	268.6 A	7.33	2.8	1
L 12-201	284.7 A	276.7 A		-7.97	-2.8	5
Ho 12-615	269.5 A	255.8 B	260.9 AB	-13.75	-5.1	7
Ho 13-739	281.6 A	268.8 B	263.0 B	-18.60	-6.6	8
L 14-267	273.8 A	272.7 A	276.0 A	-1.13	-0.4	3
HoCP 14-885	287.1 A	261.0 B	257.8 B	-29.28	-10.2	9
L 15-306	282.5 A	279.0 A	288.1 A	-3.49	-1.2	4
Average	274.2 A	265.7 B	270.3 AB	-3.95	-1.4	

Table 3. Post-freeze changes in juice pH of nine commercial varieties in a plant-cane crop following freezing temperatures (23.7ºF) at the USDA-ARS research farm in Schriever, Louisiana during the 2021/2022 harvest

	pH			Actual and percent change		
	Harvest Dates					
Variety	25-Jan	15-Feb	25-Feb	Change	%	Rank
L 01-299	5.49 A	5.16 B	5.25 B	-0.34	-6.1	7
HoCP 04-838	5.46 AB*	5.45 B	5.48 A	-0.01	-0.2	1
HoCP 09-804	5.44 A	5.42 A	5.33 B	-0.11	-2.0	2
L 12-201	5.51 A	4.88 B		-0.63	-11.5	8
Ho 12-615	5.42 A	5.15 B	5.21 B	-0.27	-5.0	4
Ho 13-739	5.35 A	5.38 A	5.24 A	-0.11	-2.1	3
L 14-267	5.45 A*	5.12 B	5.25 AB	-0.33	-6.1	6
HoCP 14-885	5.52 A	4.67 B	4.80 B	-0.86	-15.5	9
L 15-306	5.51 A	5.29 B	5.23 C	-0.28	-5.1	5
Average	5.46 A	5.18 B	5.22 B	-0.28	-5.2	

Table 4. Post-freeze changes in titratable acidity of nine commercial varieties in a plant-cane crop following freezing temperatures (23.7ºF) at the USDA-ARS research farm in Schriever, Louisiana during the 2021/2022 harvest.

	Titratable Acidity (ml 0.1 N NaOH/10 ml juice)			Actual and percent change		
	Harvest Dates					
Variety	25-Jan	15-Feb	25-Feb	Change	%	Rank
L 01-299	2.05 B	2.58 A	2.29 AB	0.53	25.9	6
HoCP 04-838	2.04 A	2.08 A	1.86 A	0.04	2.0	1
HoCP 09-804	2.01 A	2.14 A	2.10 A	0.13	6.2	2
L 12-201	1.71 B	2.74 A		1.03	60.6	8
Ho 12-615	2.17 B	2.54 A	2.23 B	0.36	16.7	4
Ho 13-739	1.79 A	1.94 A	1.89 A	0.15	8.4	3
L 14-267	1.93 B	2.65 A	2.29 AB	0.72	37.0	7
HoCP 14-885	1.94 B	3.34 A	3.00 A	1.40	72.4	9
L 15-306	2.19 B	2.62 A	2.50 A	0.43	19.4	5
Average	1.98 C	2.50 A	2.27 B	0.52	26.5	

Table 5. Post-freeze changes in total soluble polysaccharides of 9 commercial varieties in a plant-cane crop following freezing temperatures (23.7ºF) at the USDA-ARS research farm in Schriever, Louisiana during the 2021/2022 harvest

	Total Soluble Polysaccharides (ppm/Brix) Harvest Dates			Actual and percent change		
Variety	25-Jan	15-Feb	25-Feb	Change	%	Rank
L 01-299	3109.39 B	5745.10 A	5076.74 A	2635.71	84.8	8
HoCP 04-838	4007.10 A	4062.38 A	4453.19 A	446.09	11.1	1
HoCP 09-804	4625.40 A	4862.85 A	6998.26 A	2372.86	51.3	5
L 12-201	4438.26 A	5921.24 A		1482.98	33.4	3
Ho 12-615	3140.69 B	5354.45 A	5695.01 A	2554.32	81.3	7
Ho 13-739	4873.30 B	5187.06 B	6619.44 A	1746.14	35.8	4
L 14-267	5923.09 B	6038.26 B	7069.07 A	1145.98	19.3	2
HoCP 14-885	2862.94 B	5203.12 A	5820.16 A	2957.22	103.3	9
L 15-306	3073.10 B	4016.92 AB	4987.14 A	1914.04	62.3	6
Average	4005.92 C	5132.69 B	5839.88 A	1833.96	45.8	

Table 6. Reaction of commercial sugarcane varieties to subfreezing temperatures during the 2021/2022 harvest

Resistant	**Intermediate**	**Susceptible**
HoCP 04-838 (6)[1]	Ho 13-739 (21)	L 01-299 (34)
Ho 09-804 (12)	L 14-267 (23)	L 12-201 (30)
	L 15-306 (24)	Ho 12-615 (30
		HoCP 14-885 (45)

[1] Varieties were ranked for cold tolerance for each of the five traits; the number in parenthesis is the sum from of these rankings. The lower the number, the better to stalk cold tolerance.

GENETIC DIVERSITY FOR COLD TOLERANCE IN THE SUGARCANE DIVERSITY PANEL 1

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Introduction

Sugarcane (*Saccharum* interspecific hybrids) is a tropical crop, and it grows well in the (sub)tropics where the climate is moderated by surrounding water masses. The optimum temperature for growth is about 35 °C. Any temperature below freezing (chilling temperature) is cold enough to produce injury, suppress growth, and reduce yield by impacting developmental and physiological processes. The magnitude of cold (chilling and freezing) damage is dependent on the severity and duration of the low temperature, cultivar resistance to post-freezing deterioration, and time lapse and temperature fluctuations between the freeze event and cane harvest.

Saccharum spontaneum, the wild ancestor of sugarcane, is adapted to harsh climatic conditions and it has been used as a source of stress resistance genes in sugarcane breeding. Sugarcane varieties differing in their tolerance to cold suggest that alleles from *S. spontaneum* genome might help this tropical crop to tolerate cold stress. Unselected F_1 populations of cultivar x *S. spontaneum* crosses possess relatively higher levels of freeze tolerance, but in the subsequent backcross breeding, cold tolerance traits disappear due to heavy selection on sugar content. This is further evidenced by the survival of early generation energy cane clones (derived from hybrids x *S. Spontaneum*) through the second-ratoon crop during the winter months in cooler climates at multiple northern locations. Louisiana represents the far northern limit of sugarcane cultivation in the U.S. with periodic freezing during the crop season. Therefore, wild (basic) clones of *S. spontaneum, S. robustum,* and species of other genera within the *Saccharum* complex are being used as nonrecurrent parents in introgression breeding (basic breeding) in Louisiana with an aim to transfer genes for cold tolerance (and other stress resistance) to modern sugarcane hybrids.

Modern sugarcane cultivars have limited genetic variation. Previously, we developed a sugarcane diversity panel 1 (SDP1) to capture maximum variations of the clones within the World Collection of Sugarcane and Related Grasses (WCSRG) maintained at the National Germplasm Repository of the USDA-ARS Subtropical Horticulture Research Station, Miami, FL and the wild/exotic clones maintained in USDA-ARS, Houma, LA. This study was undertaken to identify the genetic diversity of the SDP1 for cold tolerance by utilizing markers derived from the cold tolerance genes identified in sorghum, a genetically close relative of sugarcane.

Materials and Methods

Plant materials

For diversity analysis with cold responsive genes, a mini core of 190 clones was selected based on the genetic diversity analysis of 1,485 clone-collection where clones from each subclusters in all species groups were represented. The mini core comprised of 96 Louisiana sugarcane elite and historic breeding clones, 47 *S. spontaneum*, 15 *S. officinarum*, seven *Erianthus*, five each of *S. robustum* and *S. bengalense*, three each of *S. arundinaceum* and

Miscanthus, two each of *S. kanashiroi* and *S. ravennae*, and one clone each of *S. edule*, *S. barberi*, *S. rufipilum*, *Coix* and *Imperata*.

DNA purification and genotyping

Total genomic DNA was extracted from ~100 mg leaf tissues using the CTAB miniprep and checked for quality and quantity. A total of 9,974 cold responsive genes reported in sorghum were searched for the presence of simple sequence repeat (SSR) motifs with criteria set to at least five repeats for dinucleotide motifs and three repeats for tri, tetra, penta and hexa nucleotide motifs. Primers flanking SSR motifs ≥ 16 nt from 52 genes were designed using BatchPrimer3 v1.0. In addition, 48 EST-derived SSRs from cold responsive genes of sugarcane, identified by our group, were included.

Polymerase chain reaction (PCR) and resolution of PCR products in a 13% polyacrylamide gel were performed following in-house optimized methods. Amplified fragments (alleles) were manually scored as "1" (present) and "0" (absent) in a binary matrix.

Genetic diversity analysis

Alleles at SSR loci occurring in less than 1% of the clones were filtered out prior to downstream analysis to reduce false similarity between clones due to shared absence of alleles while still capturing the rare alleles. The polymorphism information content (PIC) for each SSR marker, gene diversity (h), Shannon's information index (I), and Nei's genetic distance (D) were computed. Principal coordinate analysis (PCoA) and an analysis of molecular variance (AMOVA) were also conducted. The AMOVA was done for species groups by recorded names: *S. spontaneum, S. officinarum,* hybrid cultivar*, S. robustum*, *S. sinense*, *S. barberi*, *Miscanthus*, and other. Analysis of molecular variance was also conducted on species groups devised from the neighbor-joining analysis, and on groups devised from the population structure analysis (described below). Private alleles, population differentiation and gene flow were estimated by F_{ST} and N_m values, respectively. Furthermore, h and I for every locus, genetic diversity within a population (H_s), total heterozygosity (H_t), gene flow (N_m), and G_{st} were calculated. Genetic diversity was also analyzed using Dice dissimilarity scores to validate the clustering of the clones. Weighted neighbor-joining algorithms were used to construct a phylogenetic tree with 1,000 bootstrap repetitions to evaluate the robustness and significance of each node.

Population structure analysis

Assignment of clones to a specified number of clusters (K) and population structure were determined using Structure ver. 2.3.4. Models were run using Bayesian algorithm for K = 2 - 10, and K = 8 was selected as per the software's documentation and eight species groups. A standard admixture model was used with an inferred alpha. To accommodate minor alleles, lambda was evaluated at different levels, and a lambda of 0.5 yielded the best models based on the log of the probability of the data. The Markov chain Monte Carlo program converged well before 50,000 iterations, so 50,000 iterations were used for 'burn-in', and 25,000 subsequent iterations were used for model parameter estimation. To estimate the number of clusters, an admixture model with correlated allele frequencies was run in 10 models, and two non-symmetric modes were found. One mode occurred seven times and the others were less consistent and occurred three times. An average of the seven runs from the first mode was used for the result.

Results

Genetic diversity of the mini core

SSR search of the cold stress tolerance response genes in *Sorghum* identified 93 different kinds of SSR motifs in the cold responsive genes. Trinucelotide repeats were the highest (55%), of which the GCC/GGC motif had the highest frequency (22), followed by tetra (24%), hexa (10%), penta (6%), and di (5%) (Fig. 1).

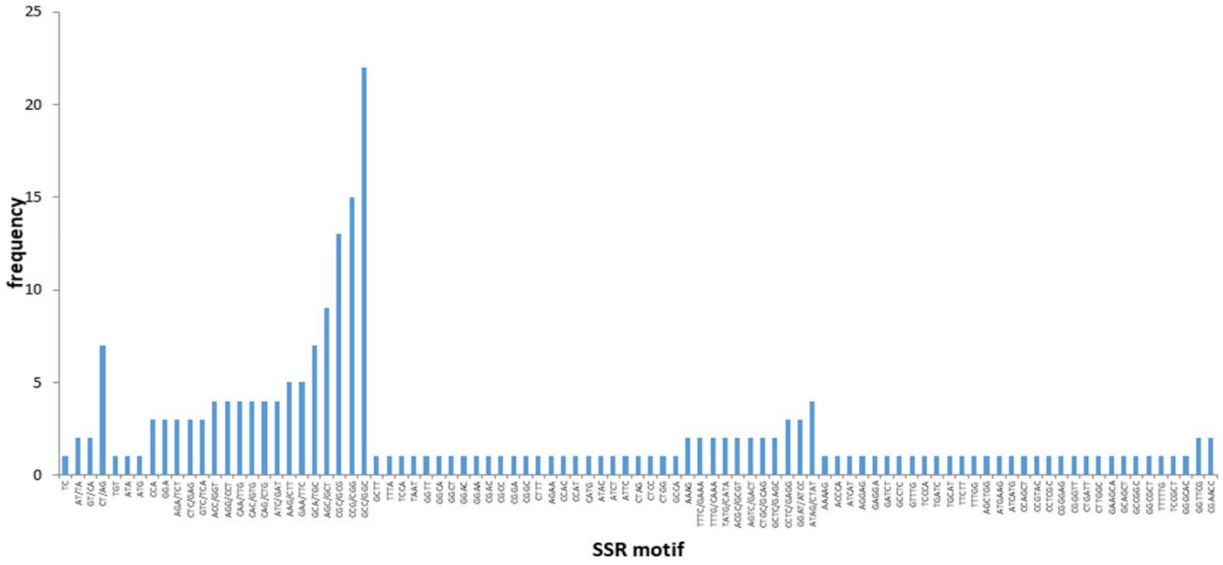

Fig. 1. Frequency of SSR motifs in cold-responsive genes of sorghum and sugarcane

Of the 100 SSR primer pairs used to genotype the mini,core, 67 were polymorphic producing a total of 1,377 alleles with 37.8 and 27.8 as the average and effective number of alleles, respectively. Polymorphism information content (Nei's gene diversity, h) of the markers ranged between 0.005 and 0.484 with a mean of 0.211 (Table 1).

The dendrogram generated through unweighted pair group method of arithmetic mean (UPGMA) exhibited three distinct clusters (Fig. 2). Cluster I contained two subclusters, where subcluster IA was predominated by *Saccharum* hybrids and close to the subcluster IB containing mostly *S. officinarum*. *Saccharum spontaneum* populated subcluster IIA, which was close to Cluster IIB with clones listed as unknowns. The third cluster consisted of two subclusters, where *Miscanthus*, *S. edule*, *S. kanashiroi*, and *S. robustum* formed subcluster IIIA, and *S. arundinaceum*, *S. erianthus*, *S. bengalense*, *S. barberi*, *S. imperata*, *S. rufipilum*, *S. coix*, *S. ravennae*, and *S. kanashiroi* grouped together as subcluster IIIB (Fig. 2). On the other hand, Bayesian model of structure grouped the clones into five clusters with Louisiana hybrids in a separate cluster (Fig. 3). The principal coordinate analysis (PCoA) based on Euclidean distance between clones was in agreement with the cluster analysis, and coordinates 1, 2, and 3 explained 14.24%, 3.87%, and 1.97% of the variation, respectively (Fig. 4).

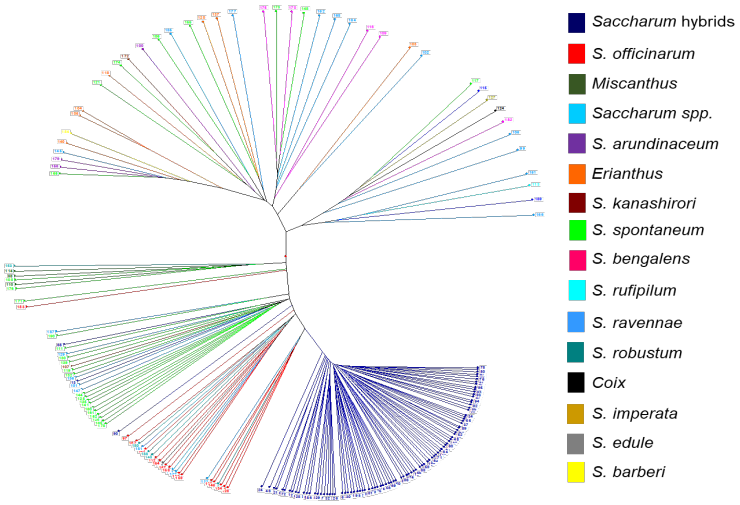

Fig. 2. Dendrogram generated with an unweighted pair group method analysis (UPGMA) of the 190-clone sugarcane mini core based on cold tolerance gene-derived SSR markers

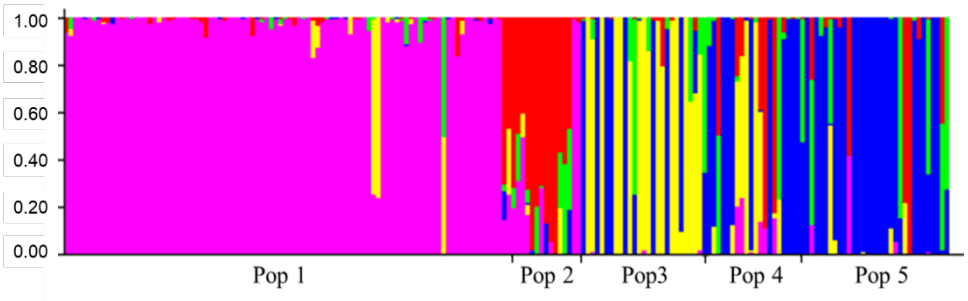

Fig. 3. Population structure of the 190-clone sugarcane mini core. Pop 1=*Saccharum* hybrids, Pop 2 = *S. officinarum*, Pop 3 = *S. spontaneum*, Pop 4 = *Saccharum sp*., Pop 5 = *S. robustum*, *Erianthus*, *Miscanthus*, *S. arundinaceum*, *S. kanashiroi*, *S. ravennae*, *S. rufipilum*, *S. imperata*, *Coix*, *S. edule*, *S. barberi*

Table 1. Polymorphism assay with 67 SSR loci in the 190-clone mini core

Primer	N_a	h (PIC)	I	H_t	H_s	G_{st}	N_m
CS1006	49	0.364	0.541	0.394	0.335	0.14	5.758
CS1008	8	0.098	0.172	0.126	0.077	0.15	9.964
CS1010	19	0.067	0.131	0.09	0.075	0.071	12.466
CS1014	55	0.128	0.227	0.144	0.12	0.101	8.473
CS1020	13	0.078	0.154	0.089	0.08	0.07	15.744
CS1027	5	0.085	0.176	0.109	0.097	0.084	9.189
CS1029	13	0.106	0.185	0.121	0.104	0.071	11.969
CS1035	7	0.215	0.317	0.176	0.139	0.107	18.107
CS1042	10	0.254	0.374	0.215	0.175	0.132	6.954
CS1046	22	0.04	0.089	0.047	0.046	0.036	15.486
CS1061	25	0.179	0.296	0.181	0.15	0.109	10.448
CS1062	5	0.186	0.307	0.177	0.128	0.168	6.807
CS1068	2	0.375	0.557	0.355	0.259	0.271	1.403
CS1072	4	0.387	0.572	0.401	0.309	0.222	3.102
CS1074	42	0.249	0.375	0.258	0.234	0.076	9.613
CS1075	9	0.218	0.358	0.238	0.199	0.132	5.958
CS1081	4	0.192	0.341	0.247	0.222	0.1	4.517
CS1082	1	0.484	0.677	0.377	0.293	0.223	1.738
CS1089	48	0.272	0.426	0.277	0.251	0.081	11.139
CS1092	18	0.164	0.29	0.193	0.168	0.101	10.753
CS1103	38	0.417	0.606	0.418	0.385	0.077	10.117
CS1109	22	0.229	0.354	0.202	0.142	0.192	6.709
CS1115	23	0.145	0.238	0.156	0.113	0.131	10.359
CS1118	10	0.22	0.344	0.201	0.149	0.172	6.939
CS1119	33	0.16	0.269	0.145	0.118	0.12	7.65
CS1120	27	0.163	0.285	0.204	0.177	0.092	10.397
CS1126	63	0.218	0.359	0.231	0.197	0.105	10.638
CS1164	23	0.165	0.287	0.209	0.175	0.116	6.229
CS1171	40	0.305	0.475	0.296	0.27	0.081	10.366
CS1174	37	0.337	0.508	0.36	0.306	0.131	7.507
CS1183	36	0.175	0.301	0.217	0.179	0.125	6.685
CS1185	28	0.272	0.429	0.289	0.24	0.127	8.693
CS1191	25	0.251	0.396	0.235	0.198	0.119	9.025
CS1200	41	0.454	0.644	0.465	0.432	0.072	12.191
CS1201	9	0.182	0.311	0.135	0.124	0.058	11.206
CS1204	18	0.208	0.341	0.207	0.17	0.125	8.364
CS1206	65	0.303	0.465	0.322	0.28	0.114	8.206

Primer	N_a	h (PIC)	I	H_t	H_s	G_{st}	N_m
CS1209	41	0.312	0.476	0.319	0.283	0.093	10.019
CS1210	49	0.299	0.47	0.323	0.295	0.075	20.546
CS1211	67	0.279	0.434	0.292	0.256	0.099	10.683
CS1212	76	0.336	0.508	0.351	0.327	0.064	14.654
CS1214	31	0.219	0.356	0.185	0.144	0.146	8.033
CS1215	45	0.322	0.491	0.319	0.281	0.102	8.947
ESSR_So3	7	0.229	0.369	0.241	0.214	0.095	8.335
ESSR_So11	2	0.433	0.623	0.478	0.404	0.157	5.441
ESSR_So12	3	0.076	0.162	0.109	0.1	0.057	14.431
CS10	4	0.045	0.102	0.067	0.063	0.054	9.386
CS52	7	0.021	0.058	0.031	0.03	0.037	14.153
CS56	15	0.082	0.159	0.058	0.053	0.061	12.386
CS83	3	0.064	0.143	0.122	0.102	0.138	3.928
CS103	7	0.033	0.08	0.046	0.043	0.05	11.476
CS115	10	0.184	0.326	0.17	0.133	0.147	5.983
CS118	7	0.111	0.199	0.145	0.117	0.122	5.869
CS153	15	0.102	0.195	0.135	0.115	0.09	8.745
CS168	3	0.138	0.245	0.155	0.144	0.072	6.685
CS170	7	0.278	0.416	0.266	0.144	0.281	8.037
CS176	11	0.114	0.212	0.121	0.107	0.072	11.517
CS181	2	0.466	0.659	0.303	0.172	0.432	0.657
CS205	1	0.367	0.554	0.452	0.297	0.344	0.954
CS237	24	0.063	0.129	0.093	0.079	0.072	13.394
CS286	2	0.351	0.535	0.228	0.189	0.178	2.387
CS297	14	0.1	0.185	0.104	0.089	0.085	12.348
CS321	3	0.138	0.225	0.176	0.126	0.126	12.568
CS334	10	0.192	0.304	0.176	0.136	0.125	10.326
CS351	2	0.005	0.016	0.01	0.01	0.04	11.875
CS557	7	0.253	0.389	0.28	0.162	0.268	7.107
CS583	5	0.154	0.265	0.199	0.152	0.14	6.906
Total/Mean	1377	0.211	0.335	0.216	0.177	0.123	9.084

Na: number of alleles, h: Nei's (1973) gene diversity, I: Shannon's Information index, Ht: total heterozygosity, Hs: genetic diversity, Gst: proportion of genetic diversity, Nm: gene flow. PIC: polymorphism information content

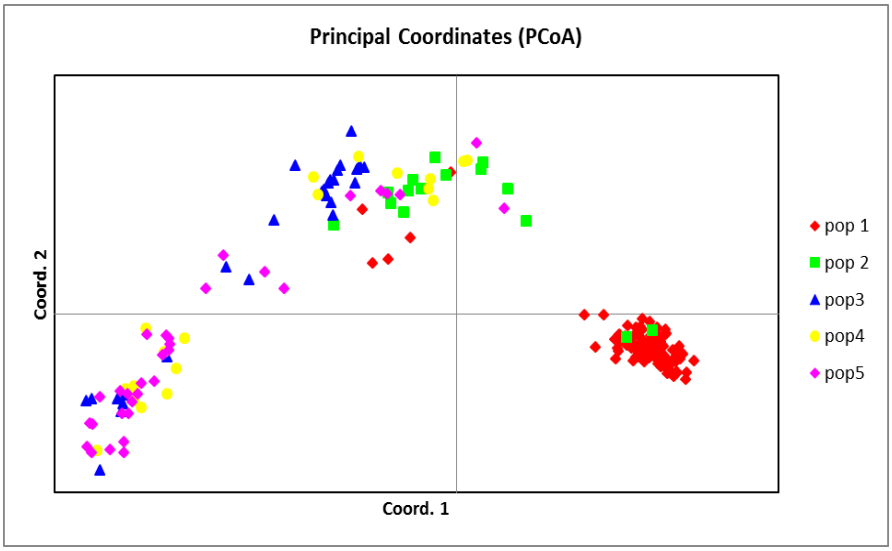

Fig. 4. Principal coordinate analysis of the 190-clone sugarcane mini core. Coordinate 1 = 14.24, Coordinate 2 = 3.87, Coordinate 3 = 1.97. Pop 1: *Saccharum* hybrids, Pop 2: *S. officinarum*, Pop 3: *S. spontaneum*, Pop 4: *Saccharum* sp., Pop 5: *S. robustum*, *Erianthus*, *Miscanthus*, *S. arundinaceum*, *S. kanashiroi*, *S. ravennae*, *S. rufipilum*, *S. imperata*, *Coix*, *S. edule*, *S. barberi*.

Louisiana hybrid clones had the highest number of unique alleles (37 of the population total 67) (Table 2) when the mini core was analyzed with the alleles generated by the 11 SSR primers used for the entire 1,485 clones. On the other hand, the population group containing *Miscanthus* and *Erianthus* had the highest number of unique alleles when analyzed with cold-responsive genes-derived SSR primer pairs (Table 2). The mean diversity among the populations with cold responsive genes-derived SSRs (0.218) was higher than that with 11 SSRs (0.182). Hierarchical AMOVA showed equal amount of variation among and within populations at 19% and 81%, respectively with both cold-responsive genes-derived SSRs and 11 SSRs used for the entire population of 1,485 clones. Nei's genetic identity between populations was 0.900–0.984 with cold-responsive genes-derived SSRs compared to 0.942 – 0.981 with the SSRs used for entire population of 1,485 clones. The average gene diversity in the mini core (H at 0.156) and SDP1 (H at 0.163) with the alleles generated with 11 SSR primer pairs were comparable.

Table 2. Sample size, various index of genetic diversities in different populations in the 190-clone mini core

with cold stress-responsive genes-derived SSRs

Pop	N	N_a	N_e	P_a	h	uh
pop 1	95	971	761	10	0.180	0.182
pop 2	15	979	979	8	0.214	0.229
Pop 3	27	1191	994	24	0.237	0.246
Pop 4	20	1128	1128	13	0.235	0.247
Pop 5	32	1175	984	32	0.226	0.233
Total	189			87		
Average			969.200	17.4	0.218	0.227

with 11 SSRs used for the entire population of 1,485 clones

Pop	N	N_a	N_e	P_a	h	uh
pop 1	95	392	328	37	0.221	0.229
pop 2	15	300	300	0	0.184	0.195
Pop 3	27	333	245	13	0.153	0.156
Pop 4	20	358	285	9	0.188	0.191
Pop 5	32	271	271	8	0.166	0.176
Total	189			67		
Average			285.8	13.4	0.182	0.189

N: sample size, N_a: no. alleles, N_e: no. effective alleles, P_a: no. private alleles, h: mean diversity and uh: mean unbiased diversity by population.

Genetic diversity of the mini core by cold-responsive genes-derived SSR markers, which potentially affect the function of the cold-responsive proteins, suggested that diversity exists for cold tolerance traits within SDP1. The SDP1 can be used for phenotyping of various cold tolerance traits, such as stubble tolerance, juice degradation etc. for GWAS studies to identify markers associated with those traits. Such phenotypic characterization of the SDP1 can also be used to identify clones of special interest for more effective introgression of useful alleles from wild/exotic clones in the already existing sugarcane base-broadening program of Louisiana to improve commercial sugarcane variety development.

Acknowledgement
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