AN OVERVIEW OF 2019 ACTIVITIES IN THE LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM

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Unfettered access to new, genetically improved varieties of sugarcane is the bedrock of the Louisiana sugar industry. The sugarcane variety development program at the Louisiana State University Agricultural Center (LSU AgCenter) is accomplished through a multidisciplinary effort drawing from the expertise of scientists and allied professionals from a diversity of disciplines within the LSU AgCenter (Table 1). 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. 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 2). 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 2). The cooperative effort under which the three entities (the LSU AgCenter, the USDA, and the American Sugar Cane League) participate to develop improved sugarcane varieties for the Louisiana sugarcane industry is outlined in the "Three-Way Agreement of 2007".

Table 1. 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
Gert Hawkins	Sugar Research Station	Sucrose Laboratory
Brayden Blanchard	Sugar Research Station	Photoperiod & Crossing
Zachery Taylor	Sugar Research Station	Outfield Variety Testing
Alphonse Coco	Sugar Research Station	Farm Manager

Success in developing new sugarcane varieties 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 May 30, 2019 and continued until September 11, 2019. The first crosses were made in the first week of September and lasted till November 7, 2019. There was a decrease in tassel production with 353 tassels produced in 2019 (Table 2) as compared to 419 tassels in 2018. The 353 tassels from 66 genotypes or parents were used to make 211 crosses with a total of 73,301 viable seeds produced. The number of viable seeds per cross was estimated by counting the number of shoots produced per 0.5 g of seed (fuzz). A total of 64,590 seeds were produced from bi-parental crosses, and 8,711 seeds were produced from polycrosses.

The 2019 crossing campaign was an abnormally in terms of number of, tassels that flowered (353), crosses made (211), and viable seed produced (73,301). The germination rate was 30 seedlings per gram of seed. All the above numbers were on the very low side compared with what has been the norm for quite a number of years. More details about the 2019 crossing campaign can be found in the section titled '**2019 PHOTOPERIOD AND CROSSING IN THE LSU AGCENTER SUGARCANE VARIETY DEVELOPMENT PROGRAM**'.

Seeds (fuzz), most of them from the 2018 crossing campaign, were germinated in the green house in 25 l x 15 w x 4 h inches metal trays filled with 2 inches of potting mix in January of 2019. Individual seedlings were transplanted into styrofoam trays with 128 (1.5 l x 1.5 w x 1.5 h inches per cell) cells in late February to early March. A total of 72,661 seedlings from 70 crosses were transplanted to the field in the spring of 2019. Many of these seedlings were progeny of biparental crosses among commercial varieties as well as superior experimental clones. Individual seedling selection will be carried out next year when these seedlings are in the first stubble crop.

Individual seedling selection was practiced on 67,041 first stubble single stools in the fall of 2019. These seedlings were mostly from the 2016 crossing series that were planted to the field in 2018 allowed to overwinter and were in the first ratoon cane crop in 2019. Family selection, based on accumulated data from family appraisal studies and visual assessment of seedling populations, was used to discard some families prior to selection. The selection criteria included visual appraisal of individual seedlings for disease and insect damage, lodging, yield (stalk number, stalk diameter and height) and then lastly for the absence of pith. This was followed by evaluation of the visually selected clones for Brix using a hand held refractometer. A total of 1076 clones were selected and planted in 10-foot, first line trial plots.

The first line trial plots established last year (mostly from the 2016 crossing series) 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 338 clones were eventually selected and planted into single row, 16-foot second line trial. From the second line trial established the year before (2015 crossing series) 160 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 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 in three on-station nurseries.

Preliminary visual ratings for cane yield and plant type were done in August on the 202 clones from the 2014 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 42 experimental varieties judged to be superior to the checks were assigned permanent variety designations ("L") in the fall of 2019. These newly assigned experimental varieties were entered into replicated on-station nursery trials (2 replicates, 16-foot plots) at two locations (Sugar Research Station, Iberia Research Station) with a third location (USDA-ARS Ardoyne Farm) not planted because of inclement weather conditions. 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 2019**'.

The section titled **'2019 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. Eighteen experimental varieties from the 2018 assignment series (2013 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.

Nine experimental varieties from the 2017 assignment series that performed well in the infield, off-station and on-station nurseries 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 2020. In 2019, no experimental varieties from the 2016 Assignment Series were eligible for planting into the outfield trials or introduced on primary increase stations. One experimental varieties, L 14-267 continue to be tested in the outfield stage and are being increased in primary and secondary stations. The outfield stage of the program is described in the section titled '**2019 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 2019. Of the 3,121 samples processed through the sucrose lab in 2019, close to 80% were from research programs other than the variety development program. Most of the samples were processed using the Spectracane FT-NIR instrument. A subset of samples were 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) found 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 in order 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 program was determined at the Variety Advancement Committee meeting. The 2018 meeting was held in August 8, 2019.

To say the weather had an adverse impact on the 2019 crop is an understatement. Hurricane Barry, a category one storm, arrived on the shores of Louisiana on July 13. Barry made landfall east-southeast of Pecan Island and slowly tracked north, dropping over ten inches of rain over the Bayou Teche area and the northern part of the cane belt. Then, on October 25, a rare late season storm, post-tropical cyclone Olga, hit the southern part of the industry yet again. Terrebonne and Lafourche were the parishes most affected by this system, experiencing winds of 40 to 50 mph with some gusts of up to 70 mph. An average of 6 to 8 inches of rain fell across the area, with some areas getting up to 14 inches. As if that was not enough, the industry had to deal with an early freeze. On November 13, a temperature of 22 F was recorded for 30 minutes in Cheneyville. The southern segment experienced temperatures in the mid 20's. At the time of this freeze, harvest was only about 50% complete. This freeze impacted levels of sugar per ton of cane and sugar recovery in the mills. Although better weather prevailed through the end of the season, allowing all acreage to be harvested, one would have to go back to 2006 (6,464 tons of sugar per acre) to find yield values lower than that obtained in 2019. Because of the excessive wet weather, not all the goals set out for the 2019 season were accomplished. All experiments were harvested as planned however, not all experiments were planted as intended.

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 2. 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.

2019 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 as to encourage 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 characteristics, and disease resistance characteristics as criteria to select parents and to decide what crosses to make. The breeding program strives to produce crosses that will yield superior progeny.

Eyepiece cuttings of breeding genotypes to be used for the 2019 crossing season were planted on October 24, 2018. The cuttings were planted in Styrofoam cell trays and maintained in the greenhouse. On January 31, 2019, 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. On April 24, 2019, when all danger of frost had passed, 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 and longer decline period which began on July 13, 2019. 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 10, 2019. 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 May 30, 2019. 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, artificial day length was 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 and the date on which the decline in day length was initiated (Table 1). All photoperiod treatments were discontinued on September 11, 2019, when natural day length was less than 12 ½ hours and decreasing at a rate conducive to sugarcane flowering.

The flowering season began in the second week of September in 2019, one week later than the previous two years. 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 decreased slightly in 2019 to 1,427 stalks (Table 2) as compared to 1,459 stalks in 2018. On average, there were 4.4 stalks per can with 128 cans producing tassels (Table 2). There was a decrease in tassel production with 353 tassels produced in 2019 (Table 2) as compared to 419 tassels in 2018. This marks the fourth consecutive year that flowering was reduced in comparison to the 2015 crossing season. Typically, flowering percentages are

highest in stalks located in cart position “A” with lower flowering percentages observed in cart position “C” (Table 1). This was the case during the 2019 crossing season. Of a total of 1,427 stalks, 353 tassels were produced (Table 2).

Crossing began on September 11, 2019 and ended on November 7, 2019. A total of 353 tassels comprising 66 genotypes (Table 4) were used to produce 211 crosses (Table 3, Table 5). A total of 73,301 viable seed were produced in 2019 (Table 3). A total of 64,590 seed were produced from bi-parental crosses, a total of 8,711 seed were produced from polycrosses, and no seed was produced 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 2018. Germination rates decreased slightly in 2019 with an average of 30 plants per gram of seed compared to 36 plants per gram of seed in 2018 (Table 3).

As was observed in the previous crossing season (2018), the 2019 crossing season began under less than ideal conditions. Unseasonably cold weather persisted in the spring of 2019 which coincided with the transfer of can cultures to crossing carts. This abnormality in weather patterns may have contributed, in part, to a reduction in flowering. Roosting birds again caused stalk and tassel destruction during the 2019 crossing season. Insect pressure was significant during 2019 crossing season and early infestation was observed. Poor seed set of seed collected from crosses made during the final week (Nov 4 – Nov 7) was due in large part to a leak in the crossing house heating system that caused crosses made during that time to be exposed to an early November freeze event.

Table 1. Summary of the 2019 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
1	A	13-Jun	44	28-Jul	72	290±2	84	54
1	B	13-Jun	44	28-Jul	72	287±1	79	47
1	C	13-Jun	44	28-Jul	72	298±2	77	30
2	A	13-Jun	44	28-Jul	72	298±1	89	51
2	B	13-Jun	44	28-Jul	72	290±3	86	26
2	C	13-Jun	44	28-Jul	72	292±4	89	8
3	A	30-May	37	6-Jul	87	283±3	83	36
3	B	30-May	37	6-Jul	87	276±4	77	10
3	C	30-May	37	6-Jul	87	267±2	76	5
4	A	30-May	37	6-Jul	87	278±2	73	37
4	B	30-May	37	6-Jul	87	284±5	77	8
4	C	30-May	37	6-Jul	87	282±7	78	8
5	A	30-May	41	10-Jul	82	281±3	73	18
5	B	30-May	41	10-Jul	82	272±6	73	3
5	C	30-May	41	10-Jul	82	285±10	74	3
6	A	30-May	41	10-Jul	82	283±3	76	47
6	B	30-May	41	10-Jul	82	281±2	80	29
6	C	30-May	41	10-Jul	82	281±3	83	20

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§
66	324	128	1427	353	4.40 ± 0.98	2.76 ± 1.31	5.67 ± 1.58	87.40 ± 13.03

† 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 2019 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
Biparental	189	64590	342±504	342±504	30±37
Polycross	20	8711	436±636	436±636	45±55
Self	2	0	0	0	0
Total	211	73301	347±515	347±515	31±39

Table 4. Varietal flowering summary in 2019 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	41	.	.	.	4	.	.
CP83-644	42	284	97	8	26	1	4
HO06-530	41	295	105±1	7	4	2	50
HO06-537	42±1	.	.	.	9	.	.
HO06-563	41±1	266	85±7	4	7	6	86
HO07-613	41	.	.	.	6	.	.
HO07-617	44	311	102	6	5	1	20
HO08-711	41±1	.	.	.	7	.	.
HO08-717	41±1	266	91±9	7	14	3	21
HO08-730	40±1	301	115±5	7	11	2	18
HO09-827	43	270	89±3	7	13	9	69
HO09-832	44	.	.	.	4	.	.
HO09-840	41±1	263	78±3	7	20	13	65
HO09-9401	37	256	74±2	8	5	5	100
HO11-532	42±1	287	84±2	4	21	9	43
HO11-573	41±2	.	.	.	5	.	.
HO11-9406	44	287	80±2	6	5	2	40
HO12-615	44	291	86±1	6	23	12	52
HO13-705	44	295	91±3	4	5	4	80
HO13-708	41	.	.	.	6	.	.
HO13-720	44	.	.	.	6	.	.
HO14-835	40±1	.	.	.	9	.	.
HO14-836	37	.	.	.	6	.	.
HO15-943	37	.	.	.	5	.	.
HO15-962	41	275	94±10	8	4	2	50
HO15-963	41	.	.	.	4	.	.
HO15-964	41	.	.	.	3	.	.
HO15-971	41	.	.	.	6	.	.
HO15-972	41	.	.	.	4	.	.
HO16-600	41	.	.	.	5	.	.
HO16-606	41	.	.	.	5	.	.
HO16-608	41	.	.	.	4	.	.
HO16-609	41	.	.	.	3	.	.
HO16-626	41	.	.	.	5	.	.
HO16-647	41	.	.	.	4	.	.
HO16-678	41	.	.	.	5	.	.
HO95-988	41	.	.	.	8	.	.
HOCP00-950	41±1	270	85±3	8	34	7	21
HOCP01-523	41	.	.	.	9	.	.
HOCP02-618	37	.	.	.	4	.	.
HOCP04-838	42±1	273	84±4	4	21	7	33
HOCP04-847	39	295	112±8	8	19	2	11
HOCP05-902	41±1	287	86±5	8	13	3	23
HOCP09-804	41±1	301	93±1	4	14	2	14
HOCP09-814	40	291	100	8	17	1	6
HOCP09-846	41	.	.	.	8	.	.
HOCP13-723	44	.	.	.	5	.	.
HOCP14-802	37	270	90±3	3	5	3	60

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
HOCP14-826	41	.	.	.	5	.	.
HOCP14-830	41	.	.	.	4	.	.
HOCP14-867	41	.	.	.	4	.	.
HOCP14-885	44	.	.	.	5	.	.
HOCP15-519	37	.	.	.	2	.	.
HOCP15-987	41	.	.	.	5	.	.
HOCP16-675	41	.	.	.	5	.	.
HOCP85-845	41	.	.	.	5	.	.
HOCP91-552	44	273	69±1	4	8	7	88
HOCP92-618	39±1	.	.	.	8	.	.
HOCP92-624	41±1	287	104±6	7	36	4	11
HOCP95-951	39±1	277	104±18	7	13	2	15
HOCP96-540	41±1	311	102	4	25	1	4
HOCP96-561	41±1	280	90±2	6	11	8	73
HOCP97-609	41±1	275	98±10	4	23	2	9
HOL14-841	44	.	.	.	11	.	.
HOL15-508	37	.	.	.	3	.	.
L01-283	41	301	110	7	24	1	4
L01-299	41	287	93±5	4	52	5	10
L01-315	37	.	.	.	9	.	.
L03-371	41	.	.	.	6	.	.
L05-448	38±1	263	80±1	4	13	11	85
L05-457	42	256	73±1	7	31	25	81
L06-001	42	270	90±3	4	29	7	24
L06-038	42±1	266	79±0	4	6	2	33
L06-040	42±1	284	89±14	6	9	2	22
L07-057	40±1	268	78±5	7	19	10	53
L08-088	41	277	105±10	7	4	3	75
L08-090	40±1	270	87±3	6	28	13	46
L09-099	40±1	277	98±4	4	25	13	52
L09-112	41±1	277	97±7	6	7	2	29
L09-123	37	261	87±3	8	12	8	67
L09-131	39±1	289	108±10	4	11	2	18
L10-146	39±1	.	.	.	14	.	.
L10-147	39	277	97±6	7	23	5	22
L11-168	44	280	80±4	7	4	3	75
L11-183	40±1	280	83±5	7	17	4	24
L11-187	40±1	277	97±4	6	29	11	38
L12-201	41±1	.	.	.	8	.	.
L12-202	41±1	284	88±3	4	17	6	35
L12-218	39	311	124	8	17	1	6
L12-227	42±1	277	95±3	4	7	4	57
L13-242	40±1	.	.	.	7	.	.
L13-243	44	295	86±0	7	5	3	60
L13-251	38±1	.	.	.	14	.	.
L13-257	44	.	.	.	7	.	.
L14-264	44	301	96±4	7±1	3	2	67
L14-265	41	287	101±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
L14-266	44	296	92±5	4	5	3	60
L14-267	40±1	.	.	.	14	.	.
L14-269	44	301	97±2	6	4	3	75
L14-270	44	.	.	.	4	.	.
L14-273	37	.	.	.	4	.	.
L14-275	44	308	99	7	5	1	20
L14-276	44	.	.	.	6	.	.
L14-282	41±1	296	105	8	15	1	7
L15-298	44	303	94	6	6	1	17
L15-300	37	.	.	.	4	.	.
L15-301	37	.	.	.	5	.	.
L15-302	44	.	.	.	6	.	.
L15-303	37	.	.	.	5	.	.
L15-304	37	.	.	.	5	.	.
L15-305	44	.	.	.	5	.	.
L15-306	44	.	.	.	10	.	.
L15-311	41±1	.	.	.	9	.	.
L15-312	44	.	.	.	3	.	.
L15-317	37	.	.	.	7	.	.
L15-319	37	.	.	.	5	.	.
L15-320	37	.	.	.	4	.	.
L15-328	37	.	.	.	6	.	.
L15-337	37	.	.	.	9	.	.
L16-353	41	.	.	.	5	.	.
L16-360	41	275	90±6	6±2	5	2	40
L16-372	41	.	.	.	4	.	.
L16-375	41	.	.	.	5	.	.
L16-386	41	261	91±8	4	6	4	67
L16-391	41	263	82±4	4	5	4	80
L94-426	39±1	.	.	.	11	.	.
L94-428	37	.	.	.	3	.	.
L94-433	41	.	.	.	7	.	.
L97-128	41±1	282	94±6	7	24	6	25
L98-207	40±1	.	.	.	8	.	.
L98-209	44	.	.	.	5	.	.
L99-226	42	273	91±2	4	41	19	46
L99-233	42	266	79±2	4	35	22	63
LCP81-010	43±1	284	90±4	7	14	10	71
LCP81-030	37	.	.	.	4	.	.
LCP85-384	41±1	280	83±4	4	16	5	31
LCP86-454	41	.	.	.	2	.	.
N27	37	270	85±2	7	6	2	33
US01-040	41	287	103±7	8	5	2	40

Table 5. Crosses and seed made in 2018

Cross	Female	Male	Seed
XL19-001	HO09-9401	19P1	0
XL19-002	L05-457	19P1	25.8
XL19-003	L05-457	19P1	11.46
XL19-004	HO09-9401	L99-233	100.24
XL19-005	L05-457	L99-233	61.44
XL19-006	L05-457	L16-386	6.68
XL19-007	L09-123	L16-386	0
XL19-008	L16-386	L16-386	0
XL19-009	L05-457	L16-391	41.28
XL19-010	HO09-840	L16-391	49.52
XL19-011	HO09-840	L05-448	24.6
XL19-012	HO09-9401	L05-448	42.8
XL19-013	L05-457	HO06-563	330.88
XL19-014	HO09-840	L05-448	10.8
XL19-015	HO09-9401	L05-448	14.16
XL19-016	HO08-717	L06-038	0
XL19-017	L05-457	L99-233	48.56
XL19-018	L09-123	L99-233	241.56
XL19-019	L05-457	L05-448	10.68
XL19-020	L07-057	L05-448	5.5
XL19-021	L05-457	HO06-563	309.76
XL19-022	L07-057	HO06-563	324.26
XL19-023	L08-090	L05-448	194.88
XL19-024	L09-123	L05-448	12.48
XL19-025	L07-057	HOCP14-802	72.24
XL19-026	HO09-827	HOCP14-802	227.7
XL19-027	HOCP00-950	L06-001	147.84
XL19-028	HO08-717	L06-001	472.6
XL19-029	HO09-827	L99-233	827.2
XL19-030	L05-457	L99-233	412.3
XL19-031	L08-090	L99-233	44.8
XL19-032	L07-057	HOCP91-552	574.56
XL19-033	L08-090	HOCP91-552	145.92
XL19-034	L05-457	L99-226	152.64
XL19-035	L08-090	L99-226	0
XL19-036	L07-057	L99-226	207.74
XL19-037	HO08-717	L16-391	17.44
XL19-038	HO09-840	L16-391	95.04
XL19-039	L09-123	L06-001	865.48
XL19-040	L05-457	L06-001	393.08
XL19-041	HOCP04-838	L06-001	814.2
XL19-042	L09-123	L05-448	0
XL19-043	L08-090	L05-448	2.54
XL19-044	L05-457	L05-448	61.8
XL19-045	HOCP00-950	L99-226	0
XL19-046	L05-457	L99-226	280.96
XL19-047	L07-057	L99-226	194.04
XL19-048	HO15-962	HOCP97-609	17.6
XL19-049	L16-360	HOCP97-609	1400.86
XL19-050	L07-057	HOCP97-609	257.6
XL19-051	L07-057	L16-391	176
XL19-052	HO09-827	L99-233	310.2
XL19-053	L05-457	HOCP91-552	468.12
XL19-054	L05-457	L99-226	228
XL19-055	HO09-840	L99-226	37.6
XL19-056	HO09-827	L16-386	247.2
XL19-057	HO09-840	L16-386	174.72
XL19-058	HOCP95-951	L16-386	880.26
XL19-059	L07-057	L11-187	121.98
XL19-060	L05-457	L11-187	111.54
XL19-061	L08-088	L11-187	0
XL19-062	L08-090	L11-187	12.32
XL19-063	L09-112	L12-227	0
XL19-064	L10-147	L12-227	796.86
XL19-065	L05-457	HOCP96-552	763.28
XL19-066	L10-147	HOCP96-552	1186.5
XL19-067	L05-457	L99-233	640.2
XL19-068	HOCP91-552	L99-233	0
XL19-069	HOCP91-552	19P3	2523.9
XL19-070	L09-099	19P3	814.08
XL19-071	L11-168	L99-233	829.92
XL19-072	L11-187	L99-233	581.16
XL19-073	HOCP96-561	L99-233	1438.2
XL19-074	HOCP96-561	L99-226	324.36
XL19-075	HO09-840	L99-226	263.7
XL19-076	L09-123	L99-226	135.6
XL19-077	HO09-840	HOCP04-838	221.76
XL19-078	L05-457	HOCP04-838	412.02
XL19-079	HO09-840	HOCP14-802	1640.1
XL19-080	HOCP96-561	HOCP14-802	35.16
XL19-081	L05-457	HOCP14-802	698.94
XL19-082	L05-457	HOCP91-552	331.28
XL19-083	L11-183	LCP85-384	84.2
XL19-084	L09-123	L99-233	1783.7
XL19-085	L97-128	L99-226	61.76
XL19-086	L08-090	HOCP04-838	174.2
XL19-087	HOCP00-950	L09-099	120.5
XL19-088	HO06-563	19P4	320.32
XL19-089	L11-183	19P4	460.24
XL19-090	L16-391	19P4	668.64
XL19-091	LCP81-010	L99-226	2989.3
XL19-092	L10-147	L06-001	2918.2
XL19-093	L09-123	L99-233	620.64
XL19-094	12-202	HO06-563	1100.9
XL19-095	L11-187	HO06-563	226
XL19-096	L06-040	L16-386	359.5
XL19-097	HOCP05-902	L01-299	0
XL19-098	L16-360	L01-299	1087.5

Table 5. Continued

Cross	Female	Male	Seed
XL19-099	HOCP00-950	L06-001	181.66
XL19-100	LCP81-010	L06-001	1694.9
XL19-101	HOCP92-624	L99-226	200.64
XL19-102	HOCP00-950	L99-226	114.92
XL19-103	L05-457	L99-233	989
XL19-104	LCP81-010	L99-233	2242.4
XL19-105	HO11-9406	L16-386	689.62
XL19-106	L14-265	L16-386	406.08
XL19-107	L11-187	L99-226	245.48
XL19-108	L14-265	L99-226	815.08
XL19-109	US01-040	HO11-532	371.96
XL19-110	L97-128	HO11-532	71.2
XL19-111	LCP81-010	L12-202	833.28
XL19-112	L11-183	L09-099	50.64
XL19-113	HO06-563	HOCP04-838	540.2
XL19-114	L08-090	L99-226	363.78
XL19-115	L09-123	L99-226	945
XL19-116	L08-090	HO11-532	700.72
XL19-117	L09-099	19P5	1561.6
XL19-118	L09-131	19P5	99.96
XL19-119	L12-202	19P5	523.02
XL19-120	L12-227	19P5	440
XL19-121	L99-233	19P5	802.7
XL19-122	HOCP96-561	L99-226	72
XL19-123	HO11-9406	L99-226	285.48
XL19-124	HO12-615	L01-299	113.4
XL19-125	L09-112	L01-299	61.04
XL19-126	HOCP00-950	HO11-532	55.16
XL19-127	HOCP09-814	HO11-532	613.36
XL19-128	L11-168	HO11-532	331.8
XL19-129	HO12-615	HO11-532	54.6
XL19-130	HO12-615	L09-099	57
XL19-131	HO12-615	LCP85-384	142.6
XL19-132	HO15-962	HO11-532	31.26
XL19-133	L11-187	HO11-532	48.96
XL19-134	L12-202	HO11-532	637
XL19-135	HO06-530	HO13-705	421.56
XL19-136	HO12-615	HO13-705	101.6
XL19-137	L14-265	HO13-705	221.6
XL19-138	HO09-827	L09-099	166.94
XL19-139	HOCP04-847	L09-099	138.24
XL19-140	L13-243	L09-099	728.28
XL19-141	L14-265	L09-099	718.5
XL19-142	HO08-717	LCP85-384	115.36
XL19-143	HO12-615	LCP85-384	206.8
XL19-144	L05-457	LCP85-384	113
XL19-145	HOCP05-902	L99-226	32.12
XL19-146	HOCP96-561	L99-226	79.22
XL19-147	L97-128	L99-233	0
XL19-148	L10-147	L99-233	471.96
XL19-149	HOCP92-624	L99-233	221.52
XL19-150	L13-243	HOCP97-609	490
XL19-151	L14-265	HOCP97-609	832.5
XL19-152	HO06-530	L99-226	1541.28
XL19-153	L11-187	L99-226	222.3
XL19-154	L97-128	L99-233	58.66
XL19-155	HOCP96-561	L99-233	425.04
XL19-156	HO12-615	L09-099	33.56
XL19-157	HO09-840	L14-266	10.48
XL19-158	L14-282	L14-266	462.52
XL19-159	L11-187	19P6	0
XL19-160	L08-090	19P6	26.24
XL19-161	L13-243	19P6	323.9
XL19-162	HO12-615	HO11-532	75.6
XL19-163	L11-183	HO11-532	239.4
XL19-164	L01-283	HO11-532	622.48
XL19-165	L97-128	HO11-532	108.48
XL19-166	L08-090	HOCP09-804	14.72
XL19-167	HOCP92-624	HOCP09-804	39.84
XL19-168	L07-057	L09-099	9.06
XL19-169	L97-128	L09-099	0
XL19-170	HO12-615	L12-202	66.5
XL19-171	US01-040	L12-202	73.2
XL19-172	L14-264	L12-202	26.7
XL19-173	HOCP96-561	L12-202	8.16
XL19-174	HO08-730	L16-386	181.72
XL19-175	L16-386	L16-386	0
XL19-176	L14-269	L16-386	57.48
XL19-177	L08-088	19P7	33
XL19-178	HO09-827	19P7	76.08
XL19-179	HO09-840	19P7	0
XL19-180	HOCP05-902	HO13-705	0
XL19-181	L11-187	HO09-804	0
XL19-182	HOCP96-561	L06-001	167.2
XL19-183	L08-090	L09-099	193.62
XL19-184	HO09-827	L99-226	116.8
XL19-185	L15-298	L99-233	407.16
XL19-186	LCP81-010	LCP85-384	405.84
XL19-187	L14-269	19P7	0
XL19-188	L14-269	HO06-563	103.92
XL19-189	L14-275	HO06-563	0
XL19-190	L10-147	HO13-705	618.8
XL19-191	L11-187	HO13-705	214.2
XL19-192	HO09-827	L01-299	113.52
XL19-193	L14-264	L01-299	90
XL19-194	LCP81-010	L06-001	2440.4
XL19-195	HOCP92-624	L99-226	143.36
XL19-196	L97-128	L99-226	0

Table 5. Continued

Cross	Female	Male	Seed
XL19-197	LCP81-010	L99-226	1512.42
XL19-198	L09-123	L99-233	67.3
XL19-199	L14-269	L99-233	206
XL19-200	HOCP04-847	HOCP96-540	0
XL19-201	HOCP92-624	HOCP96-540	0
XL19-202	HO07-617	L01-299	0
XL19-203	HO08-730	L01-299	383.76
XL19-204	L11-187	L01-299	0
XL19-205	L06-040	L09-099	0
XL19-206	L12-218	L09-099	0
XL19-207	L08-088	L12-227	0
XL19-208	LCP81-010	L99-226	0
XL19-209	L15-298	L99-226	0
XL19-210	LCP81-030	L99-226	0
XL19-211	HO09-827	L14-266	0

SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LSU AGCENTER'S SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR 2019

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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 72,661 seedlings from 211 crosses were planted in the field in the spring of 2019. The majority of these seedlings are progeny of bi-parental crosses among commercial and elite experimental varieties. In the fall of 2019, family selection was practiced on the 67,041 stubble seedlings, planted in 2018, surviving the winter. This selection resulted in the planting of 1076 first-line trial plots. At the same time, superior clones were selected and advanced through subsequent stages (338 to second line trials, 160 to the increase stage). Assignments of permanent "L19" numbers were given to the 42 best clones of the 2014 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 72,661 seedlings from 230 crosses of the 2017 crossing series were planted to the field in the spring of 2019 (Table 1). Many of these seedlings were progeny of crosses among commercial and superior experimental varieties. In the fall of 2019, individual selection was practiced on the 72,661 stubble single stools of the 2017 crossing series, planted in 2018, that survived the winter. The 1076 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 1076 first-line trial plots of the 2016 crossing series were visually appraised for cane yield potential in August of 2019 (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 338 clones in single row, 16-foot, second line trials plots.

The 338 plant-cane, second line trial plots of the 2015 crossing series were visually appraised for yield potential August 2019. Based on the field evaluation, comments and sucrose lab data collected in 2018, 160 clones were planted in one single row, 25-foot plots representing the increase stage of the program (Table 4). (Only one increase test was planted, in light soil.) These clones will be candidates for assignment in 2020. Of the 202 candidates from the first stubble crop of the second line trial plots, the best 42 clones from the 2014 crossing series were assigned permanent "L19" numbers (Table 5). These newly assigned "L19" varieties were then planted in replicated nursery trials at two on station locations (Sugar Research Station and Iberia Research Station). (The on-station nursery at USDA-ARS Ardoyne Farm was not planted.)

The advancement summary of clones from crosses made in 2014 through 2018 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 2019 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 (L19 Assignments)
			---------- number of clones ----------					
X14	24	194	85,659	64,206	2,128	557	301	42
X15	20	157	81,783	49,088	1,395	381	160	
X16	20	333	83,214	34,599	776	338		
X17	20	230	71,116	67,041	1,076			
X18	--	70	72,661					

Table 2. Dates of seedling and line trials planted or harvested in 2019

Crossing Series	Test	Crop	Date Planted	Date Harvested
X18	Seedlings	Planted	4/16—4/30/19	
X17	Seedlings	First Stubble	4/12 – 4/19/18	10/1/19-10/4/19
X17	Progeny Test	First Stubble	4/19/18	Not harvested
X16	First Line Trials	Plant-cane	10/5/18	10/22/19
X15	First Line Trials	First Stubble	10/3 – 10/6/17	12/10/19
X16	Second Line Trials	Planted	9/24/19	
X15	Second Line Trials	Plant-cane	10/15/18	11/6/19
X14	Second Line Trials	First Stubble	9/27/17	10/29/19
X13	Second Line Trials	Second Stubble	10/4/16	12/5/19
X15	Light Soil Increase	Planted	11/6/19	
X14	Light Soil Increase	Plant-cane	10/31/18	Not harvested
X13	Light Soil Increase	First Stubble	10/19/17	12/10/19
X12	Light Soil Increase	Second Stubble	9/15/16	12/3/19
X13	Heavy Soil Increase	First Stubble	10/19/17	11/13/19
X12	Heavy Soil Increase	Second Stubble	9/28/16	11/13/19

Table 3. Numbers of experimental clones dropped for identified faults in the 2016 crossing series first-line trials

	Fault	
Trait	Frequency	Percent
---------- 776 clones enter first round of evaluation ----------		
Initial Selection (Rating)	322	41.49
---------- 715 clones enter second round of evaluation ----------		
Pith	52	6.70
Smut	0	0
Lodge / Broken	0	0
Tube	24	3.09
Rating	1	0.13
Other	1	0.13
---------- 76 clones dropped ----------		
----------378 clones enter third round of evaluation ----------		
Ratings	40	5.15
Clones advanced	338	43.56

Table 4. Number of experimental clones dropped for identified faults in the 2015 crossing series of the plant-cane second line trial prior to advancement to the increase stage

	Fault	
Trait	Frequency	Percent
---------- 381 clones enter first round of evaluation ----------		
Lodged	29	7.61
Rating	33	8.66
Pith	51	13.39
Tube	27	7.09
Smut	17	4.46
Leaf Scald	17	4.46
Other	76	19.95
---------- 197 clones dropped ----------		
Clones advanced to Increase stage	184	48.29

Table 5. First stubble second line trial yield data for the 2019 "L" assignments. Assignments were made at the first stubble stage and included data accumulated from preceding stages. The mean, minimum and maximum values reported are for the assigned clones only

Variety	Sugar Per Acre	Cane Yield	Sugar Per Ton	Stalk Weight	Stalk Number	Fiber
HoCP1996540	4538	22.8	183	1.61	28359	10.2
L2001283	6726	30.6	221	1.66	36753	10.3
L2001299	5523	26.4	207	1.52	34939	12.2
HoCP2004838	5923	30.2	198	1.45	41518	11.4
HoCP2009804	5038	22.4	225	0.91	49004	12.9
L2019480	4336	22.2	195	1.81	24502	9.8
L2019481	3477	15.4	226	1.28	24049	12.6
L2019482	4289	18.8	228	1.51	24956	9.7
L2019483	4574	22.7	202	1.54	29494	11.6
L2019484	6602	32.1	206	1.51	42652	9.7
L2019485	3109	15.6	199	1.53	20419	12.1
L2019486	7520	37.2	202	1.69	44014	11.9
L2019487	6139	26.4	232	1.03	51274	10.6
L2019488	4681	23.4	200	1.99	26595	11.5
L2019489	3502	17.3	203	0.91	38115	12.6
L2019490	6896	34.2	202	1.91	35846	10.5
L2019491	5185	25.4	204	1.93	26317	10.4
L2019492	5737	25.7	224	2.09	24502	10.3
L2019494	5292	25.0	212	1.49	33577	10.5
L2019495	6577	31.4	209	1.80	34939	10.5
L2019496	4051	20.7	196	1.86	22234	10.6
L2019497	4448	28.5	223	1.13	35392	10.0
L2019498	5391	27.0	200	2.43	22234	10.6
L2019499	5621	28.5	197	1.51	37661	9.7
L2019001	8390	35.9	233	2.40	29947	11.3
L2019002	3663	17.3	211	0.63	54904	10.6
L2019003	3470	16.7	208	1.21	27679	11.3
L2019004	7127	35.1	203	2.62	26771	10.3
L2019005	5541	25.2	220	1.63	30855	12.5
L2019006	4683	21.2	221	1.36	31309	9.7
L2019007	5808	26.5	219	1.24	42652	11.5
L2019008	4663	23.8	196	1.91	24956	12.1
L2019009	6621	30.8	215	1.49	41291	11.3
L2019010	5100	19.8	258	1.01	39022	10.0
L2019011	4835	19.9	243	1.57	25410	9.8
L2019012	4569	21.1	217	1.72	24502	11.7
L2019013	5250	25.8	203	1.70	30401	10.4
L2019014	5744	32.8	175	1.81	36300	10.1
L2019015	4710	21.2	222	1.42	29947	12.0
L2019016	5141	21.2	243	1.44	29494	11.0

Table 5. Continued

Variety	Sugar Per Acre	Cane Yield	Sugar Per ton	Stalk Weight	Stalk Number	Fiber
L2019017	5640	27.9	202	1.46	38115	12.1
L2019018	5269	23.7	222	1.90	24956	11.6
L2019019	6439	31.9	202	1.56	40837	8.8
L2019020	3269	15.3	214	1.38	22234	11.8
L2019021	3891	17.3	225	1.39	24956	10.2
L2019023	4360	21.4	204	1.93	22234	11.9
L2019025	3933	18.5	212	1.28	29040	11.7
MEAN	5176	24.7	212	1.58	32280	11.0
MIN	3109	15.3	175	0.63	20419	8.8
MAX	8390	37.2	258	2.62	54904	12.9
STD DEV	1180.72	5.83	15.66	0.39	8245	0.98

Table 6. Advancement summary of the crosses in 2014 through 2017 series

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile
2017 Crossing Series										
HO11-512	HO11-532	211	2	34	.	.	.	.	.	.
HOCP14-897	L01-299	382	14	86	.	.	.	.	.	.
HOCP14-897	HO12-630	203	0	6	.	.	.	.	.	.
HOCP09-857	HO09-832	135	5	89	.	.	.	.	.	.
HOCP09-804	HOCP14-885	328	14	92	.	.	.	.	.	.
HO12-630	L01-299	595	23	90	.	.	.	.	.	.
HOCP96-540	HO11-532	428	17	90	.	.	.	.	.	.
L14-282	HO12-630	232	1	17	.	.	.	.	.	.
HOCP16-685	HO12-630	440	0	6	.	.	.	.	.	.
HO11-532	HO12-630	224	9	91	.	.	.	.	.	.
HO11-512	HOCP14-867	190	23	99	.	.	.	.	.	.
HOCP15-506	HOCP14-867	226	4	63	.	.	.	.	.	.
HO15-959	HOCP14-867	421	0	6	.	.	.	.	.	.
HO11-512	HO11-532	415	4	36	.	.	.	.	.	.
L09-112	HO11-532	240	4	61	.	.	.	.	.	.
HO11-515	HO11-532	206	3	56	.	.	.	.	.	.
HO15-959	L12-201	196	0	6	.	.	.	.	.	.
HOCP16-685	L12-201	389	3	26	.	.	.	.	.	.
HOCP16-685	HOL15-993	353	0	6	.	.	.	.	.	.
HO15-964	HOCP14-885	412	11	80	.	.	.	.	.	.
L14-285	HO15-930	373	0	6	.	.	.	.	.	.
HO09-832	HOCP14-885	171	0	6	.	.	.	.	.	.
HOCP13-737	HOCP14-885	200	3	59	.	.	.	.	.	.
HOCP14-901	HOCP14-885	858	26	81	.	.	.	.	.	.
HOCP04-838	09P1	204	7	86	.	.	.	.	.	.
HOCP00-930	11P24	185	0	6	.	.	.	.	.	.
L09-131	12P12	208	1	19	.	.	.	.	.	.
HO09-840	L99-226	94	0	6	.	.	.	.	.	.
HO09-827	HO06-563	177	3	62	.	.	.	.	.	.
HO11-9406	L99-233	189	4	71	.	.	.	.	.	.
L99-233	HO11-9406	264	8	81	.	.	.	.	.	.
L05-457	L99-226	233	5	73	.	.	.	.	.	.
L05-457	L01-299	229	3	50	.	.	.	.	.	.
HO09-832	L06-001	425	12	80	.	.	.	.	.	.
HOCP85-845	L06-001	224	2	30	.	.	.	.	.	.
HOCP92-618	CP83-644	236	1	16	.	.	.	.	.	.
L14-275	HOCP96-540	168	2	46	.	.	.	.	.	.
HOCP92-624	HOCP09-804	194	1	20	.	.	.	.	.	.
L94-433	HOCP09-804	403	5	48	.	.	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L07-057	HOCP04-838	358	0	6	.	.	.	.	.	.
L09-123	HOCP04-838	380	1	13	.	.	.	.	.	.
HO09-840	L99-233	465	10	73	.	.	.	.	.	.
HOCP92-624	L99-233	1240	26	70	.	.	.	.	.	.
L05-457	L99-233	766	7	32	.	.	.	.	.	.
L09-123	HO06-563	391	3	25	.	.	.	.	.	.
L05-457	HOCP04-838	333	6	64	.	.	.	.	.	.
L05-457	L12-202	139	2	54	.	.	.	.	.	.
HO09-827	L99-233	1370	26	66	.	.	.	.	.	.
L15-324	17P5	942	13	51	.	.	.	.	.	.
L05-448	17P5	179	4	74	.	.	.	.	.	.
L07-057	HOCP97-609	901	9	37	.	.	.	.	.	.
HO09-827	L01-299	381	9	77	.	.	.	.	.	.
L05-457	HOCP91-552	462	4	29	.	.	.	.	.	.
L09-123	HOCP91-552	412	2	20	.	.	.	.	.	.
L98-207	L08-090	355	1	14	.	.	.	.	.	.
L09-123	L09-099	209	3	53	.	.	.	.	.	.
L05-457	L99-233	964	11	43	.	.	.	.	.	.
HO11-9406	L99-233	894	18	70	.	.	.	.	.	.
L05-457	L99-233	1035	22	72	.	.	.	.	.	.
HO11-9406	L99-233	613	9	57	.	.	.	.	.	.
L01-315	HOCP96-540	549	6	41	.	.	.	.	.	.
L14-289	L06-001	107	0	6	.	.	.	.	.	.
L14-275	HO09-804	764	9	45	.	.	.	.	.	.
US01-040	HO09-804	143	16	98	.	.	.	.	.	.
HO08-730	L12-202	346	5	55	.	.	.	.	.	.
L98-207	L12-202	175	0	6	.	.	.	.	.	.
L11-183	HOCP91-552	155	4	79	.	.	.	.	.	.
HOCP92-624	L01-299	202	19	97	.	.	.	.	.	.
L01-315	L99-233	232	0	6	.	.	.	.	.	.
L14-276	HOCP04-838	179	2	42	.	.	.	.	.	.
L10-146	HOCP04-838	130	7	95	.	.	.	.	.	.
L05-448	HO11-532	209	5	78	.	.	.	.	.	.
HO09-827	L01-299	313	4	49	.	.	.	.	.	.
US01-040	L01-299	381	14	87	.	.	.	.	.	.
HOCP92-624	L01-299	988	0	6	.	.	.	.	.	.
HO06-530	L11-187	106	1	33	.	.	.	.	.	.
L14-275	HOCP09-804	488	2	15	.	.	.	.	.	.
L13-251	HOCP09-804	1458	33	75	.	.	.	.	.	.
L13-723	L09-099	559	5	31	.	.	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
US01-040	L99-233	1198	5	16	.	.	.	.	.	.
HOCP92-624	HOCP96-540	1786	17	35	.	.	.	.	.	.
HOCP01-523	L13-251	508	12	77	.	.	.	.	.	.
HOCP92-624	HO06-563	1245	15	46	.	.	.	.	.	.
HOCP96-561	L99-226	360	3	26	.	.	.	.	.	.
L14-275	L06-001	849	17	69	.	.	.	.	.	.
L14-296	L01-299	211	3	53	.	.	.	.	.	.
L14-282	HOCP04-838	1262	11	30	.	.	.	.	.	.
HOCP13-723	HOCP04-838	789	6	24	.	.	.	.	.	.
L01-315	L09-099	472	7	58	.	.	.	.	.	.
L15-304	L09-099	452	7	60	.	.	.	.	.	.
L14-282	L09-099	902	17	66	.	.	.	.	.	.
HOCP13-723	L09-099	278	2	23	.	.	.	.	.	.
HO09-840	L09-099	169	3	63	.	.	.	.	.	.
L14-265	L12-227	146	7	93	.	.	.	.	.	.
HO09-840	L12-227	596	6	38	.	.	.	.	.	.
HO09-827	L12-227	104	0	6	.	.	.	.	.	.
CP83-644	LCP85-384	1237	13	40	.	.	.	.	.	.
LCP81-010	LCP85-384	1445	15	39	.	.	.	.	.	.
HO09-840	HOCP97-609	51	1	68	.	.	.	.	.	.
LCP81-010	L99-226	1490	64	93	.	.	.	.	.	.
HOCP92-624	L99-226	536	5	33	.	.	.	.	.	.
LCP81-010	HOCP04-838	703	6	28	.	.	.	.	.	.
HOCP92-624	L99-226	1464	10	23	.	.	.	.	.	.
L05-457	L99-226	867	9	39	.	.	.	.	.	.
L14-282	HOCP04-838	694	8	44	.	.	.	.	.	.
L14-275	L11-187	205	18	96	.	.	.	.	.	.
L14-276	L06-001	696	4	21	.	.	.	.	.	.
L11-183	L99-226	239	16	96	.	.	.	.	.	.
L14-265	HOCP97-609	1151	11	36	.	.	.	.	.	.
L14-265	L12-202	1289	30	76	.	.	.	.	.	.
HOCP92-624	L99-226	709	8	43	.	.	.	.	.	.
L01-283	HOCP13-723	361	7	67	.	.	.	.	.	.
L14-276	HO13-705	124	6	94	.	.	.	.	.	.
HOCP92-624	HO13-705	422	14	84	.	.	.	.	.	.
L14-269	L06-001	245	0	6	.	.	.	.	.	.
HO09-827	L09-099	120	4	85	.	.	.	.	.	.
L14-296	L09-099	522	16	83	.	.	.	.	.	.
HOCP95-951	L99-226	236	2	27	.	.	.	.	.	.
CP83-644	HO11-532	1217	15	47	.	.	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HO09-827	L06-001	1548	21	50	.	.	.	.	.	.
L14-273	L99-226	414	6	56	.	.	.	.	.	.
HOCP13-726	L01-299	652	24	88	.	.	.	.	.	.
L11-183	L01-299	215	0	6	.	.	.	.	.	.
L98-209	L06-001	881	16	65	.	.	.	.	.	.
HOCP13-726	HOCP96-540	820	5	22	.	.	.	.	.	.
L14-295	HOCP96-540	445	2	18	.	.	.	.	.	.
LCP81-010	HO13-705	868	14	60	.	.	.	.	.	.
L05-457	L09-099	214	3	52	.	.	.	.	.	.
HOCP00-950	L09-099	130	4	83	.	.	.	.	.	.
2016 Crossing Series										
HO06-530	L99-233	225	0	7	0	18	.	.	.	.
N27	L06-001	248	0	7	0	18	.	.	.	.
L07-057	L99-233	369	1	22	0	18	.	.	.	.
HO09-840	HOCP04-838	314	1	23	0	18	.	.	.	.
HO09-840	L99-233	824	6	51	4	72	.	.	.	.
L05-457	L99-233	637	11	84	9	94	.	.	.	.
L13-242	HOCP91-552	558	4	50	4	82	.	.	.	.
L05-457	L99-233	937	6	45	4	62	.	.	.	.
L09-123	L01-299	220	3	76	2	86	.	.	.	.
HO09-840	L01-299	167	2	70	0	18	.	.	.	.
L05-457	HOCP91-552	197	1	37	0	18	.	.	.	.
HO09-840	L01-299	395	18	98	2	74	.	.	.	.
L05-457	L01-299	380	5	72	4	89	.	.	.	.
HOCP92-624	L01-299	612	6	64	1	41	.	.	.	.
L05-457	L01-299	240	3	71	1	61	.	.	.	.
L98-209	L05-448	182	1	42	0	18	.	.	.	.
L09-123	HOCP91-552	921	3	24	1	37	.	.	.	.
HOCP91-552	16P1	831	4	31	1	38	.	.	.	.
L06-038	16P1	212	0	7	0	18	.	.	.	.
HO06-563	16P1	232	6	91	2	84	.	.	.	.
HO06-563	16P1	438	5	68	3	80	.	.	.	.
HOCP13-726	HOCP12-647	601	3	36	0	18	.	.	.	.
HOCP91-552	HOCP12-647	284	6	86	0	18	.	.	.	.
L13-243	HOCP12-647	410	0	7	0	18	.	.	.	.
HOCP12-647	HOCP12-647	.	0	.	0	18	.	.	.	.
L12-227	L01-299	209	3	79	5	91	.	.	.	.
L05-457	L01-299	417	9	87	29	90	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
N27	L99-226	2426	59	89	20	88	.	.	.	.
N27	LCP85-384	2110	58	92	1	46	.	.	.	.
L07-057	LCP85-384	420	1	20	6	95	.	.	.	.
L05-457	L08-090	406	12	95	1	57	.	.	.	.
HO09-827	L08-090	280	1	27	0	18	.	.	.	.
L98-209	HOCP11-532	452	0	7	7	97	.	.	.	.
HOCP04-838	16P2	405	9	87	5	55	.	.	.	.
HOCP91-552	16P2	1495	9	44	4	79	.	.	.	.
HOCP91-552	16P2	596	8	74	1	64	.	.	.	.
HOCP97-609	16P2	227	2	56	0	18	.	.	.	.
HOCP97-609	16P2	619	0	7	0	18	.	.	.	.
L07-057	HOCP91-552	382	2	39	0	18	.	.	.	.
HO06-563	HOCP91-552	188	3	82	7	87	.	.	.	.
HOCP97-609	HOCP91-552	764	14	85	0	18	.	.	.	.
L94-428	HOCP91-552	594	5	54	3	74	.	.	.	.
HOCP95-951	L08-090	1169	8	48	5	63	.	.	.	.
L98-209	L08-090	785	12	81	2	48	.	.	.	.
L07-057	L08-090	179	2	67	0	18	.	.	.	.
L98-207	L12-202	376	0	7	0	18	.	.	.	.
L13-260	LCP85-384	289	1	25	1	56	.	.	.	.
HOCP91-552	LCP85-384	376	2	40	1	51	.	.	.	.
HO09-827	LCP81-010	203	0	7	0	18	.	.	.	.
HOCP91-552	LCP81-010	441	1	18	0	18	.	.	.	.
HOCP92-618	HOCP13-726	569	1	16	0	18	.	.	.	.
L05-457	HOCP13-726	340	2	43	1	53	.	.	.	.
L13-260	L08-090	179	2	67	0	18	.	.	.	.
L98-207	L08-090	301	4	73	1	54	.	.	.	.
HOCP92-624	L09-099	591	8	74	0	18	.	.	.	.
L13-260	L99-233	207	2	62	1	71	.	.	.	.
HO09-840	L99-233	550	6	66	1	42	.	.	.	.
HOCP91-552	16P3	179	0	7	0	18	.	.	.	.
HOCP91-552	16P3	229	0	7	0	18	.	.	.	.
L94-428	16P3	219	14	99	8	99	.	.	.	.
HOCP95-951	16P3	411	3	52	1	48	.	.	.	.
HO09-840	L99-226	476	4	53	3	77	.	.	.	.
L14-273	L99-226	251	1	28	0	18	.	.	.	.
L11-183	L99-226	137	2	80	1	82	.	.	.	.
L98-209	L99-226	637	1	15	0	18	.	.	.	.
L05-457	L99-226	1326	12	58	6	66	.	.	.	.
L11-183	L12-202	218	0	7	0	18	.	.	.	.
HOCP92-618	L12-202	461	4	56	1	43	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
LCP81-010	L12-202	2683	15	43	10	58	.	.	.	.
HO09-840	HO06-563	1047	7	47	3	52	.	.	.	.
HOCP92-618	HO06-563	1198	19	82	8	78	.	.	.	.
HO09-827	HO06-563	1248	17	76	5	60	.	.	.	.
HOCP92-618	HOCP96-540	1122	8	49	5	65	.	.	.	.
HOCP09-840	LCP85-384	387	1	21	0	18	.	.	.	.
HOCP00-950	HOCP91-552	333	1	23	0	18	.	.	.	.
HO11-532	HOCP12-647	501	2	29	0	18	.	.	.	.
L06-001	HOCP12-647	213	2	61	1	68	.	.	.	.
L01-299	HOCP12-647	223	0	7	0	18	.	.	.	.
HO11-9406	L99-233	547	1	17	1	43	.	.	.	.
L05-457	L99-233	617	10	83	3	73	.	.	.	.
HOCP02-618	L99-233	369	5	75	0	18	.	.	.	.
HOCP92-618	HOCP04-838	136	0	7	0	18	.	.	.	.
L05-457	L99-226	1128	13	69	7	76	.	.	.	.
LCP85-384	L99-226	418	3	51	0	18	.	.	.	.
L99-233	HO11-9406	386	2	38	1	50	.	.	.	.
HOCP92-624	L99-226	232	2	55	2	84	.	.	.	.
L05-457	L99-226	228	3	72	1	64	.	.	.	.
L05-457	L06-001	453	13	94	11	98	.	.	.	.
L14-295	L06-001	1111	25	88	10	85	.	.	.	.
L05-457	HOCP96-540	364	3	53	1	51	.	.	.	.
L14-275	HOCP96-540	782	7	58	3	58	.	.	.	.
L05-457	L12-202	614	3	35	1	40	.	.	.	.
L05-457	L99-226	387	4	65	4	89	.	.	.	.
US01-040	L99-226	207	1	33	1	71	.	.	.	.
HOCP92-618	HOCP96-540	216	1	30	1	66	.	.	.	.
HOCP92-624	LCP85-384	607	2	25	0	18	.	.	.	.
L01-283	HO06-563	419	6	79	2	69	.	.	.	.
L14-265	L99-226	586	6	64	3	75	.	.	.	.
L12-218	L99-226	213	2	61	1	68	.	.	.	.
HOCP85-845	L01-299	365	2	41	0	18	.	.	.	.
L05-457	HOCP09-804	222	0	7	0	18	.	.	.	.
LCP85-384	16P6	404	1	20	0	18	.	.	.	.
L05-457	L01-299	723	5	48	3	61	.	.	.	.
L97-128	L01-299	214	8	97	3	94	.	.	.	.
L14-265	L99-226	657	17	92	8	92	.	.	.	.
L98-209	L99-226	413	4	63	1	47	.	.	.	.
L14-265	L08-090	587	14	89	8	92	.	.	.	.
HO09-832	L06-001	570	18	97	9	96	.	.	.	.
HOCP92-618	L06-001	1478	17	69	10	79	.	.	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L01-283	HOCP01-517	218	2	60	0	18	.	.	.	.
HOCP96-561	HOCP01-517	207	1	33	0	18	.	.	.	.
HOCP97-609	HOCP09-804	213	1	30	1	68	.	.	.	.
L05-457	HO11-532	438	6	77	3	80	.	.	.	.
HOCP00-950	HO13-705	388	0	7	0	18	.	.	.	.
N27	HOCP96-540	458	3	46	1	44	.	.	.	.
HO09-840	L12-227	983	9	59	3	53	.	.	.	.
HOCP92-618	L12-227	892	0	7	0	18	.	.	.	.
HOCP00-950	L13-251	589	0	7	0	18	.	.	.	.
HOCP92-618	L13-251	755	5	46	4	76	.	.	.	.
HOCP92-624	L99-226	565	5	57	2	56	.	.	.	.
L94-433	L99-226	180	0	7	0	18	.	.	.	.
HOCP92-624	HOCP91-552	530	1	17	0	18	.	.	.	.
L01-283	L09-099	414	2	33	1	46	.	.	.	.
L11-183	L99-226	136	4	94	1	83	.	.	.	.
HOCP85-845	L06-001	184	1	41	0	18	.	.	.	.
HOCP01-523	CP83-644	239	6	90	4	97	.	.	.	.
HOCP04-847	HOCP97-609	218	0	7	0	18	.	.	.	.
L14-269	HOCP97-609	850	3	26	1	38	.	.	.	.
HOCP85-845	L09-099	212	0	7	0	18	.	.	.	.
N27	L09-099	866	26	96	12	93	.	.	.	.
HOCP92-618	CP83-644	611	3	35	1	41	.	.	.	.
L14-282	CP83-644	214	3	78	2	87	.	.	.	.
HO09-9402	L15-301	254	7	93	1	59	.	.	.	.
HOCP01-517	HOCP96-540	830	14	84	4	70	.	.	.	.
L14-275	HOCP96-540	388	2	38	1	49	.	.	.	.
L05-457	LCP85-384	178	0	7	0	18	.	.	.	.
HOCP92-624	HOCP09-804	824	4	34	1	39	.	.	.	.
L94-433	HOCP09-804	263	1	28	0	18	.	.	.	.
HOCP92-624	CP83-644	435	1	19	1	45	.	.	.	.
2015 Crossing Series										
HO14-9243	HO14-824	177	0	9	0	22	0	31	.	.
HOCP11-544	L99-233	637	11	61	2	58	1	66	.	.
HOCP11-541	HOCP04-838	680	6	38	0	22	0	31	.	.
HOCP00-950	HOCP04-838	469	5	45	0	22	0	31	.	.
HO12-629	HOCP12-676	195	2	43	0	22	0	31	.	.
HOCP11-541	HOCP12-674	848	5	29	0	22	0	31	.	.
HO14-811	HO11-508	475	16	87	0	22	0	31	.	.
HO11-517	HOCP04-838	219	4	63	1	68	0	31	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HO12-628	HO14-852	699	15	72	7	87	4	89	.	.
HO11-517	HO13-705	165	0	9	0	22	0	31	.	.
HOCP13-749	HO13-705	277	2	31	0	22	0	31	.	.
HOCP13-764	HOCP10-900	706	27	89	14	97	7	97	.	.
HOCP13-726	HO14-807	497	4	35	1	53	1	71	.	.
HO14-805	L99-233	328	9	80	1	57	0	31	.	.
HO13-731	L99-233	199	0	9	0	22	0	31	.	.
HO11-508	HOCP13-749	735	19	78	1	48	0	31	.	.
HO12-628	HO13-705	425	1	19	0	22	0	31	.	.
HO11-508	L99-233	478	2	23	0	22	0	31	.	.
HO11-536	L99-233	428	4	40	1	55	1	74	.	.
HO14-913	L99-233	472	2	24	0	22	0	31	.	.
HOCP11-541	HO13-702	514	6	48	0	22	0	31	.	.
HOCP11-565	HO13-702	431	0	9	0	22	0	31	.	.
HO10-937	HOCP05-918	266	2	32	2	81	2	94	.	.
HOCP11-545	HOCP05-918	549	9	58	1	51	1	69	.	.
HOCP12-676	HOCP14-892	388	0	9	0	22	0	31	.	.
HOCP00-950	HOCP11-536	273	3	46	1	62	1	81	.	.
HOCP04-814	HO07-613	688	17	75	5	80	2	78	.	.
HOCP12-643	HOCP13-767	709	4	28	1	48	0	31	.	.
HOCP12-654	HOCP13-767	478	3	30	1	53	0	31	.	.
HOCP14-892	HO14-9219	198	1	27	0	22	0	31	.	.
HO13-713	HOCP96-540	.	0	.	2	.	0	31	.	.
HO11-556	HOCP14-865	434	0	9	0	22	1	70	.	.
HOCP12-654	HOCP14-865	501	8	57	5	87	0	31	.	.
HO12-633	HOCP14-865	204	6	83	0	22	0	31	.	.
HOCP14-815	HOCP13-726	135	2	56	0	22	0	31	.	.
HOCP13-751	HOCP13-726	261	2	34	0	22	0	31	.	.
HO12-626	HO13-704	372	3	36	0	22	0	31	.	.
HO13-718	HO13-704	715	15	70	6	82	2	77	.	.
HOCP05-918	HOCP96-540	710	28	90	3	65	0	31	.	.
L05-457	HO11-556	902	12	52	1	46	0	31	.	.
L14-265	HOCP91-552	795	2	20	1	47	0	31	.	.
L05-457	HOCP91-552	615	31	94	3	70	2	74	.	.
L14-265	HOCP91-552	853	35	91	11	92	0	31	.	.
L14-275	HOCP91-552	191	0	9	0	22	1	79	.	.
L14-265	HOCP91-552	301	1	22	1	61	0	31	.	.
HO12-9401	HOCP91-552	158	0	9	0	22	3	83	.	.
L14-275	L07-057	748	6	34	5	78	4	96	.	.
L07-057	15P1	426	4	41	4	86	0	31	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L09-099	15P1	1552	4	21	0	22	0	31	.	.
L99-233	15P1	396	3	33	0	22	4	95	.	.
L11-168	L09-099	490	27	94	12	98	0	31	.	.
HO09-9401	L09-099	189	11	96	0	22	0	31	.	.
L14-272	L09-099	217	1	25	0	22	0	31	.	.
HO12-9410	L09-099	162	0	9	0	22	0	31	.	.
L14-272	L99-233	203	4	68	1	71	0	31	.	.
L07-057	L01-299	365	4	46	0	22	0	31	.	.
L14-275	HOCP04-838	293	0	9	0	22	0	31	.	.
L99-233	L01-299	168	5	84	1	74	0	31	.	.
L13-251	L13-234	157	0	9	0	22	0	31	.	.
L01-299	L99-233	169	5	84	0	22	0	31	.	.
L09-123	L99-233	381	0	9	0	22	0	31	.	.
L98-207	HOCP04-838	241	4	58	0	22	0	31	.	.
L13-234	HOCP04-838	357	5	53	3	82	0	31	.	.
HO12-9410	HOCP96-540	286	8	82	5	96	2	93	.	.
L11-178	HOCP91-552	175	0	9	0	22	0	31	.	.
L01-315	LCP85-384	191	0	9	0	22	0	31	.	.
HO12-9410	L08-090	190	0	9	0	22	0	31	.	.
HOCP92-624	L01-299	605	9	56	4	77	1	67	.	.
L14-275	L06-038	142	0	9	0	22	0	31	.	.
L11-178	L14-291	119	1	36	0	22	0	31	.	.
L11-178	L09-099	352	5	53	1	56	0	31	.	.
L13-251	L09-099	703	10	54	8	91	6	96	.	.
L07-057	15P2	121	0	9	0	22	0	31	.	.
L11-178	15P2	216	1	25	0	22	0	31	.	.
HOCP95-951	LCP85-384	158	0	9	0	22	0	31	.	.
L99-233	L01-299	385	7	63	2	72	1	75	.	.
L13-241	L11-172	330	3	39	1	56	0	31	.	.
L13-243	15P3	158	0	9	0	22	0	31	.	.
L14-268	15P3	137	2	55	0	22	0	31	.	.
L09-099	15P3	108	0	9	0	22	0	31	.	.
HO11-556	15P3	594	26	93	4	79	1	68	.	.
L11-172	15P4	571	7	49	2	62	0	31	.	.
L11-187	15P4	197	5	77	2	88	1	87	.	.
N27	L99-226	720	12	59	0	22	0	31	.	.
HOCP92-624	L99-226	254	3	48	0	22	0	31	.	.
L13-234	15P5	281	17	96	4	93	1	81	.	.
L99-233	L01-299	143	6	92	1	79	1	93	.	.
L01-283	L99-226	377	5	51	1	55	0	31	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L05-457	L99-226	1453	35	74	7	69	5	80	.	.
HO08-709	L99-226	1147	24	69	18	94	7	91	.	.
L11-168	L99-226	226	1	24	1	66	0	31	.	.
L14-282	HO11-532	249	9	89	4	95	4	98	.	.
L14-285	HO11-532	226	5	74	1	66	1	86	.	.
L12-202	L08-090	127	0	9	0	22	0	31	.	.
L14-282	HOCP97-609	223	10	93	9	99	4	99	.	.
L14-276	HOCP97-609	153	3	67	2	93	1	91	.	.
N27	L99-226	1067	20	65	7	77	4	82	.	.
L13-246	L99-226	235	8	87	2	83	0	31	.	.
L05-457	15P6	1830	11	29	2	45	0	31	.	.
HOCP85-845	15P6	631	9	55	2	59	2	79	.	.
HOCP95-951	15P6	230	5	73	0	22	0	31	.	.
HOCP96-540	15P6	958	1	18	1	44	1	64	.	.
L05-457	L99-226	342	7	68	0	22	0	31	.	.
HO06-530	L99-226	671	2	22	0	22	0	31	.	.
L98-209	L99-226	1904	25	51	12	76	4	72	.	.
L01-283	L99-233	1117	13	47	2	51	1	63	.	.
HO06-530	L99-233	222	4	62	0	22	0	31	.	.
L13-246	L06-038	992	21	71	6	75	4	84	.	.
L14-282	L06-038	222	8	88	2	85	1	86	.	.
L14-286	HOCP97-609	431	1	18	0	22	0	31	.	.
HOCP00-950	L06-001	413	1	20	0	22	0	31	.	.
HO08-709	HO06-563	594	5	37	3	72	0	31	.	.
L05-457	L99-226	1035	9	37	5	70	1	63	.	.
L06-040	L99-226	184	0	9	0	22	0	31	.	.
L01-283	L08-090	238	5	70	1	64	1	84	.	.
HO08-709	L08-090	521	5	42	1	52	1	70	.	.
L05-457	L99-233	189	2	44	0	22	0	31	.	.
L15-302	HOCP04-838	250	22	99	4	94	2	94	.	.
HOCP92-624	L01-283	1163	6	27	1	44	1	62	.	.
HO08-717	L99-226	132	1	33	0	22	0	31	.	.
HOCP97-609	L99-226	140	0	9	0	22	0	31	.	.
L15-298	L99-226	345	22	97	0	22	0	31	.	.
L15-298	L99-233	619	17	81	2	60	1	67	.	.
L12-218	L06-001	1939	63	86	35	96	13	92	.	.
HO07-613	L06-001	998	25	76	8	81	6	90	.	.
N27	L06-001	3221	80	75	10	58	7	73	.	.
L06-040	L06-001	360	10	81	2	73	1	76	.	.
L99-233	HOCP96-540	1405	26	64	12	84	4	77	.	.

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L15-302	HOCP96-540	429	0	9	0	22	0	31	.	.
L14-286	HOCP96-540	796	17	72	5	75	2	75	.	.
L15-302	LCP81-010	235	4	60	0	22	0	31	.	.
HO12-641	L14-268	167	3	62	0	22	0	31	.	.
L14-269	HOCP04-838	383	10	79	4	89	2	87	.	.
HO09-840	HOCP96-561	229	3	50	1	65	0	31	.	.
L06-040	L06-001	1011	33	86	12	91	4	82	.	.
L15-302	LCP81-010	451	12	79	2	67	0	31	.	.
L14-269	HOCP96-540	235	20	98	2	83	0	31	.	.
L11-183	L99-226	175	0	9	0	22	0	31	.	.
HO11-515	L99-226	178	3	60	1	74	1	89	.	.
HOCP96-561	L99-226	955	9	41	2	54	0	31	.	.
L98-209	L14-294	807	4	26	1	46	0	31	.	.
L14-269	L09-099	692	39	95	18	98	10	98	.	.
L14-286	HOCP96-540	388	5	50	0	22	0	31	.	.
HOCP00-950	L01-283	212	4	66	0	22	0	31	.	.
HOCP11-516	L01-283	437	11	77	2	68	0	31	.	.
L94-433	L01-283	180	15	98	2	90	1	88	.	.
L15-298	L99-226	533	10	65	2	63	0	31	.	.
HOCP01-517	L99-226	938	37	91	9	86	4	85	.	.
N27	L01-299	248	8	85	1	63	0	31	.	.
L14-286	L99-233	773	7	39	0	22	0	31	.	.
L94-433	L99-233	1400	41	82	15	89	3	72	.	.
L01-283	L99-226	173	0	9	0	22	0	31	.	.
HOCP92-624	L99-226	672	13	67	1	50	1	65	.	.
HOCP85-845	HOCP04-838	223	0	9	0	22	0	31	.	.
LCP81-010	HOCP96-540	704	7	43	1	49	0	31	.	.
L94-433	L99-226	568	6	44	1	50	1	68	.	.
HO07-613	L99-226	910	6	31	3	60	1	65	.	.
L14-282	LCP85-384	134	0	9	0	22	0	31	.	.
2014 Crossing Series										
HOCP09-804	HOCP96-540	458	0	15	0	23	0	27	0	43
HOCP01-517	HOCP96-540	134	8	92	1	66	0	27	0	43
L08-90	HOCP96-540	186	19	98	2	73	0	27	0	43
L03-371	HOCP04-852	147	0	15	0	23	0	27	0	43
HOCP01-517	HOCP05-918	410	0	15	0	23	0	27	0	43
L03-371	HOCP05-918	165	0	15	0	23	0	27	0	43
L11-183	L99-226	207	0	15	0	23	0	27	0	43
HO11-512	HOCP05-920	227	0	15	0	23	0	27	0	43

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HO05-961	HOCP09-814	198	0	15	0	23	0	27	0	43
HOCP05-920	HO05-961	133	0	15	0	23	0	27	0	43
L09-112	HO05-961	374	0	15	0	23	0	27	0	43
L09-112	HO07-613	171	0	15	0	23	0	27	0	43
HO11-512	HOCP09-814	186	0	15	0	23	0	27	0	43
L10-156	HO06-530	103	0	15	0	23	0	27	0	43
L10-156	HO07-613	182	0	15	0	23	0	27	0	43
LCP85-384	L10-141	162	0	15	0	23	0	27	0	43
HO11-511	HO07-613	348	0	15	0	23	0	27	0	43
HO11-512	HO07-613	138	0	15	0	23	0	27	0	43
HO07-613	HOCP09-814	287	0	15	0	23	0	27	0	43
HO07-613	HOCP09-814	203	0	15	0	23	0	27	0	43
HO10-925	HO09-832	.	0	.	1	.	1	.	0	43
HO09-840	HOCP11-542	136	6	81	2	82	1	77	1	96
HO09-840	HOCP11-504	105	0	15	0	23	0	27	0	43
L11-191	HOCP11-504	141	2	43	1	65	1	75	0	43
HO10-908	L09-099	218	12	89	3	80	3	93	0	43
HOCP11-504	L09-099	172	4	56	0	23	0	27	0	43
HO08-717	L09-099	210	0	15	0	23	0	27	0	43
L09-099	14P18	112	2	48	2	89	1	86	0	43
L11-191	14P18	134	6	82	2	83	1	78	0	43
HOCP09-804	HO11-556	202	0	15	0	23	0	27	0	43
HO11-563	HO10-937	121	0	15	0	23	0	27	0	43
L09-099	HOCP09-804	111	0	15	0	23	0	27	0	43
L10-156	HOCP09-804	193	0	15	0	23	0	27	0	43
L11-191	HOCP12-666	199	0	15	0	23	0	27	0	43
L08-90	HOCP11-504	245	0	15	0	23	0	27	0	43
L09-099	HOCP11-504	118	6	87	5	97	3	96	0	43
HO11-556	HOCP04-838	132	5	73	4	95	3	95	1	96
L08-90	HOCP04-838	228	0	15	0	23	0	27	0	43
HO11-556	HO11-529	235	0	15	0	23	0	27	0	43
HO11-556	HO10-937	143	0	15	0	23	0	27	0	43
L12-201	HO10-937	181	0	15	0	23	0	27	0	43
L12-202	HO10-937	249	0	15	0	23	0	27	0	43
HOCP01-517	HOCP04-838	222	0	15	0	23	0	27	0	43
L08-90	HOCP04-838	467	1	30	0	23	0	27	0	43
L09-112	HOCP04-838	256	13	87	4	84	2	80	0	43
L12-201	HO11-529	271	2	33	0	23	0	27	0	43
L01-299	HO11-529	257	3	39	2	67	1	66	0	43
L09-112	HO11-529	105	0	15	0	23	0	27	0	43

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HOCP03-743	HO11-529	243	0	15	0	23	0	27	0	43
L01-299	L09-112	451	11	58	5	74	2	69	0	43
L12-202	L09-112	239	16	93	11	98	8	98	0	43
HO11-556	HOCP01-517	125	5	77	2	87	1	81	0	43
L12-201	HOCP01-517	127	2	45	2	85	2	94	1	97
L01-299	HOCP01-517	243	1	32	0	23	0	27	0	43
L11-183	HOCP10-917	154	0	15	0	23	0	27	0	43
L11-183	HO11-532	340	7	53	2	63	1	65	0	43
HO08-730	L11-172	388	4	36	1	53	1	63	0	43
HO08-730	HOCP10-917	257	3	39	1	58	1	66	0	43
L09-112	L09-112	264	18	94	10	96	3	90	1	93
L12-201	HO11-532	248	0	15	0	23	0	27	0	43
L11-172	L11-187	133	4	65	4	94	4	98	3	99
HO10-937	HO11-556	.	0	.	2	.	0	.	.	.
L12-202	HO10-937	.	0	.	2	.	0	.	.	.
HO11-556	HO11-529	.	0	.	2	.	0	.	.	.
L08-090	HOCP04-838	.	0	.	1	.	0	.	.	.
HOCP03-743	HO11-529	.	0	.	1	.	1	.	.	.
HOCP08-726	HOCP10-900	262	3	38	0	23	0	27	0	43
HOCP08-726	L99-226	232	1	33	0	23	0	27	0	43
HOCP12-674	L99-226	107	0	15	0	23	0	27	0	43
HO12-621	LCP85-384	341	13	74	6	88	4	91	0	43
LCP85-384	HO11-528	117	0	15	0	23	0	27	0	43
HO11-573	HOCP96-540	242	11	83	0	23	0	27	0	43
L11-187	HOCP96-540	244	0	15	0	23	0	27	0	43
HO11-528	HOCP01-517	246	14	90	11	97	7	97	0	43
HO11-531	HOCP96-540	131	5	74	1	67	1	79	0	43
HO05-961	HOCP01-517	85	0	15	0	23	0	27	0	43
HOCP92-624	L99-233	359	4	36	0	23	0	27	0	43
HOCP92-624	L04-425	509	18	70	8	85	3	71	2	93
L05-457	L99-233	375	22	91	9	91	3	81	0	43
L05-457	L04-425	259	7	63	3	77	1	66	0	43
HOCP92-624	L99-233	138	0	15	0	23	0	27	0	43
LCP81-010	L99-233	381	15	76	4	72	3	80	0	43
LCP81-010	LCP85-384	767	10	42	2	54	1	56	0	43
LCP85-384	HOCP00-950	187	5	62	0	23	0	27	0	43
L01-315	10P12	466	2	32	0	23	0	27	0	43
HOCP91-552	10P12	666	5	34	1	49	0	27	0	43
HOCP91-552	10P13	127	3	57	0	23	0	27	0	43
HOCP96-540	10P22	706	9	41	1	48	0	27	0	43

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HO06-530	10P26	419	6	44	1	52	0	27	0	43
HOCP96-540	10P27	244	12	85	0	23	0	27	0	43
L94-432	10P31	112	0	15	0	23	0	27	0	43
L09-118	10P31	458	23	86	12	93	5	90	0	43
HOCP92-624	HOCP04-838	133	0	15	0	23	0	27	0	43
HOCP91-552	L99-233	135	0	15	0	23	0	27	0	43
N27	L99-233	1636	29	47	5	55	3	60	0	43
N27	L99-233	369	0	15	0	23	0	27	0	43
L01-315	11P7	172	0	15	0	23	0	27	0	43
L94-428	11P11	708	8	37	3	60	1	57	1	87
LCP85-384	11P15	1103	27	59	4	57	2	60	0	43
L09-112	HOCP96-540	235	0	15	0	23	0	27	0	43
HO09-827	HOCP01-523	154	2	41	0	23	0	27	0	43
LCP85-384	11P22	704	10	44	1	48	1	57	0	43
HOCP00-930	11P24	1224	52	79	17	81	8	73	3	91
L09-121	11P24	1012	12	40	3	55	2	61	0	43
L09-121	11P25	1135	4	31	2	50	2	59	0	43
LCP81-010	11P25	919	22	58	3	56	2	61	0	43
LCP81-010	L09-125	2063	78	73	2	46	1	54	0	43
HOCP96-540	11P27	557	11	51	0	23	0	27	0	43
HOL08-723	11P27	882	36	77	14	86	6	74	1	87
L94-433	11P27	241	0	15	0	23	0	27	0	43
HOCP96-540	11P30	602	0	15	0	23	0	27	0	43
LCP85-384	11P30	685	23	69	2	54	2	64	0	43
HO09-840	L08-090	375	8	55	0	23	0	27	0	43
N27	L99-233	252	3	40	0	23	0	27	0	43
N27	L99-233	691	2	30	0	23	0	27	0	43
L11-174	L99-226	134	6	82	1	66	1	78	0	43
HOCP91-552	12P11	618	0	15	0	23	0	27	0	43
L10-148	12P17	186	0	15	0	23	0	27	0	43
HOCP91-552	L99-233	169	3	48	0	23	0	27	0	43
L05-448	13P10	170	0	15	0	23	0	27	0	43
HOCP92-624	HOCP92-618	112	11	97	0	23	0	27	0	43
HOCP95-951	HOCP92-618	184	6	68	1	62	1	70	0	43
L13-239	L07-057	443	4	35	0	23	0	27	0	43
HO09-9401	L99-233	171	5	64	1	63	0	27	0	43
L07-057	L99-233	374	40	98	3	68	3	82	0	43
HO09-9401	HOCP04-838	464	8	46	1	50	0	27	0	43
L12-232	HOCP04-838	370	12	68	4	74	3	82	0	43
HO09-9402	L11-191	618	22	71	11	89	6	88	3	95

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
HOCP04-838	L07-057	178	2	37	0	23	0	27	0	43
L05-457	HOCP11-504	1376	53	75	16	78	4	64	0	43
L05-457	L99-233	1806	37	52	6	56	1	54	0	43
HOCP92-624	HOCP91-552	227	7	66	0	23	0	27	0	43
HO09-9401	HOCP91-552	441	24	89	5	76	3	74	0	43
L13-234	L98-209	460	8	47	1	51	0	27	0	43
HOCP92-624	L07-057	896	20	55	2	51	1	55	0	43
L09-123	L05-448	1230	25	52	3	53	1	55	0	43
HOCP92-624	L99-233	1338	56	78	15	75	6	69	2	88
L09-123	HOCP11-548	434	8	49	3	65	3	75	0	43
L05-448	HOCP11-548	368	25	93	12	95	10	96	0	43
L05-457	L99-226	447	7	45	1	52	1	62	1	91
HOCP95-951	L01-299	242	12	86	1	59	1	68	0	43
L09-123	HOCP04-838	1057	37	70	12	77	8	78	0	43
HOCP97-609	HO06-563	392	9	56	0	23	0	27	0	43
L13-239	HO11-532	199	6	65	1	62	1	70	0	43
HOCP91-552	L199-226	224	11	85	6	93	5	95	1	94
HO06-563	L199-226	162	0	15	0	23	0	27	0	43
L99-233	L01-299	199	0	15	0	23	0	27	0	43
N27	L99-226	214	5	57	2	72	2	87	0	43
L05-457	L99-226	415	22	88	6	81	3	76	0	43
L13-251	HOCP92-624	172	16	96	13	99	5	97	2	98
L09-123	HOCP96-540	591	44	95	13	91	6	88	2	92
L11-172	HOCP96-540	687	6	34	3	61	1	58	0	43
HO10-937	L06-001	375	20	88	6	87	4	89	0	43
HO11-532	L11-172	349	15	80	3	71	3	85	0	43
L13-241	LCP85-384	964	44	83	9	71	3	65	0	43
L05-457	L09-099	437	30	94	2	61	1	62	0	43
L11-183	L13-261	236	5	54	0	23	0	27	0	43
HOCP02-618	L99-233	476	40	96	12	92	7	93	1	90
L05-457	L99-226	477	16	69	3	64	3	71	1	90
L12-197	L99-226	438	18	78	7	86	3	74	0	43
HO10-937	HOCP96-540	178	7	75	2	76	0	27	0	43
HOCP92-624	L13-248	183	30	99	12	98	7	99	1	95
L13-261	14P2	1249	5	31	2	49	2	58	0	43
LCP85-384	14P2	664	29	80	10	83	8	91	1	88
HO12-9411	14P2	247	8	67	0	23	0	27	0	43
HOCP01-517	L06-001	212	3	43	0	23	0	27	0	43
HOCP01-517	L01-299	961	18	50	1	47	0	27	0	43
L13-239	L01-299	230	13	90	1	60	0	27	0	43

Table 6. Continued

			1st Line		2nd Line		Increases		Assignments	
Female	Male	Survive	No.	Rank Percentile	No.	Rank Percentile	No.	Rank Percentile	No.	Rank
L13-237	L01-299	244	4	46	0	23	0	27	0	43
L01-283	L99-226	254	0	15	0	23	0	27	0	43
L12-218	L99-226	228	7	66	0	23	0	27	0	43
L12-197	L99-226	243	14	91	0	23	0	27	0	43
L98-209	HO11-556	190	0	15	0	23	0	27	0	43
L09-099	HOCP04-838	474	17	72	4	70	3	72	0	43
HOCP91-552	14P3	217	3	42	0	23	0	27	0	43
HOCP92-624	LCP85-384	1789	84	84	15	69	7	67	2	86
L01-283	HO12-615	222	6	63	4	90	2	86	0	43
HO08-709	L99-226	242	6	60	2	68	2	83	0	43
HO12-512	L81-010	479	19	76	6	78	4	84	0	43
HOCP96-561	HO09-832	235	5	54	2	70	0	27	0	43
HOCP95-951	HOCP96-540	224	4	48	3	80	3	92	0	43
L13-246	HOCP92-624	140	0	15	0	23	0	27	0	43
L01-299	L99-226	232	11	84	7	94	3	92	0	43
L98-207	L99-226	875	8	35	1	47	1	56	0	43
HOCP92-618	HOCP04-838	239	5	53	3	79	2	84	1	94
L01-299	L06-001	146	9	92	1	64	0	27	0	43
LCP85-384	L06-001	204	5	60	3	82	0	27	0	43
HOCP00-950	HOCP96-540	237	0	15	0	23	0	27	0	43
HOCP00-950	L06-001	228	23	97	8	96	4	94	2	98
HOCP85-845	L06-001	1500	56	72	27	90	16	89	3	89
HOCP92-624	L06-001	1535	55	71	24	84	11	76	4	92
HO07-613	L06-001	476	15	67	5	73	3	72	0	43
HO09-840	L06-001	1078	48	81	12	75	10	87	2	89
HO10-937	L06-001	479	9	51	4	69	2	68	0	43
HOCP92-624	HOCP96-540	1631	48	64	6	57	4	63	1	86
HOCP11-516	14P4	241	19	95	4	88	2	83	0	43
L13-246	HO12-9411	242	6	60	1	59	0	27	0	43
L94-433	HOCP04-838	162	3	50	0	23	0	27	0	43
L13-254	HOCP96-540	116	3	62	3	92	1	85	1	97
L94-433	HOCP96-540	241	6	61	0	23	0	27	0	43

2019 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. Five commercial check varieties, HoCP96-540, L01-299, HoCP04-838, HoCP09-804 and L11-183 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 Louisiana Sugar Industry received higher than normal rainfall amounts throughout the 2019 growing season. Baton Rouge recorded 64.09" of rainfall in 2019. Spring temperatures were cooler than average, and the crop was short throughout the summer. Planting was delayed for most growers until weather conditions improved in September. Hurricane Barry moved onshore on July 13, 2020 near the Bayou Teche area and lodged cane in most areas of the Louisiana sugarcane growing region. Warmer than average temperatures in September and October improved the crop tremendously. The sugar industry also experienced a severe freeze on November 13, 2020, with temperatures reaching 22 F in Cheneyville,, La. All mills in the Louisiana industry completed grinding by January 3, 2020. Recommended cultural practices were followed at all test locations. The most widely grown varieties in Louisiana in 2019 were L01-299 and HoCP96-540 and, occupying 56% and 15% of the state's acreage, respectively. L01-299 was used as a standard for comparison and is highlighted in the tables. To adjust for missing data, the statistical analysis calculated least square means (SAS 9 Proc Mixed). Mean separation used least square means probability differences where 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.

References:

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

Table 1. 2019 Location, soil texture, and planting and harvest dates for the nursery and infield tests

Series	Location†	Stage	Soil Texture	Planting Date	Harvest Date	Varieties	
					2019	No. Planted	No. Harvested
2014	Blackberry Farms	Infield	Commerce silt loam	08/25/15	10/11/19	36	2
2014	Newton Cane, Inc.	Nursery	Norwood silt loam	08/11/15	9/17/19	77	2
2014	Michael Melancon	Nursery	Loreauville silt loam	09/01/15	Not Harvested	77	0
2014	Landry Farms	Nursery	Sharkey silty clay loam	08/28/15	10/4/19	77	2
2015	Sugar Research Station	Nursery	Commerce silt loam	10/12/15	12/3/19	38	1
2015	Ardoyne Farm – U.S.D.A.	Nursery	Commerce silt loam	10/22/15	11/20/19	38	1
2015	Iberia Research Station	Nursery	Baldwin silty clay	10/15/15	10/23/19	38	1
2015	Blackberry Farms	Infield	Commerce silt loam	09/21/16	10/11/19	37	2
2015	Sugar Research Station	Infield	Commerce Silty Clay loam	09/30/16	12/5/19	37	2
2015	Newton Cane, Inc.	Nursery	Norwood silt loam	09/12/16	11/8/19	75	3
2015	Michael Melancon	Nursery	Loreauville silt loam	09/23/16	11/4/19	75	3
2015	Landry Farms	Nursery	Sharkey silty clay loam	08/25/16	11/25/19	75	3
2016	Sugar Research Station	Nursery	Commerce silt loam	11/07/16	Not Harvested	34	0
2016	Ardoyne Farm – U.S.D.A.	Nursery	Commerce silt loam	11/14/16	Not Harvested	34	0
2016	Iberia Research Station	Nursery	Baldwin silty clay	11/09/16	Not Harvested	33	0
2016	Blackberry Farms	Infield	Commerce silt loam	09/06/17	12/4/19	47	2
2016	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/24/17	12/10/19	47	2
2016	Newton Cane, Inc.	Nursery	Norwood silt loam	08/16/17	11/11/19	64	7
2016	Michael Melancon	Nursery	Loreauville silt loam	08/18/17	11/4/19	64	7
2016	Landry Farms	Nursery	Sharkey silty clay loam	09/08/17	11/25/19	64	7
2017	Sugar Research Station	Nursery	Commerce silt loam	11/18/17	12/12/19	42	9
2017	Ardoyne Farm – U.S.D.A	Nursery	Commerce silt loam	11/13/17	11/20/19	42	9
2017	Iberia Research Station	Nursery	Baldwin silty clay	11/7/17	10/23/19	42	9
2017	Blackberry Farms	Infield	Commerce silt loam	09/17/18	12/4/19	39	16
2017	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	08/15/18	12/10/19	39	16
2017	Newton Cane, Inc	Nursery	Norwood silt loam	08/16/18	11/11/19	60	24
2017	Michael Melancon	Nursery	Loreauville silt loam	09/18/18	11/18/19	60	24
2017	Landry Farms	Nursery	Sharkey silty clay loam	09/19/18	11/25/19	60	24
2018	Sugar Research Station	Nursery	Commerce silt loam	11/16/18	12/12/19	28	18
2018	Iberia Research Station	Nursery	Baldwin silty clay	11/19/18	11/7/19	28	18
2018	Blackberry Farms	Infield	Commerce silt loam	9/12/19		31	
2018	Circle A Farm	Infield	Coteau-Patoutville-Frost silt loam	8/14/19		31	
2018	Newton Cane, Inc	Nursery	Norwood silt loam	8/13/19		54	
2018	Michael Melancon	Nursery	Loreauville silt loam	9/5/19		54	
2018	Landry Farms	Nursery	Sharkey silty clay loam	9/14/19		54	
2019	Sugar Research Station	Nursery	Commerce silt loam	11/11/19		42	
2019	Ardoyne Farm—U.S.D.A	Nursery	Commerce silt loam	11/20/19		42	
2019	Iberia Research Station	Nursery	Baldwin silty clay	11/7/19		42	

† 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 third-stubble means of the 2014 “Ho” and “HoCP” assignment series on a Commerce silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2019

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	2706	14.5	179	1.28	21962	10.7
L01-283	4501	21.8	206	1.01	43560	10.8
L01-299	4680	23.4	199	1.09	42471	11.3
HoCP04-838	3429	20.7	163	1.16	35756	11.7
L 14-267	6591	36.6	179	1.63 +	45012	9.9
HoCP 14-885	6890	33.2	207	1.36	49005	10.3

Table 3. Off-station nursery third-stubble means of the 2014 “L” and “HoCP” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2019

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	3470	16.7	210	1.21	27588	9.1
L01-283	4908	23.1	214	1.22	37843	10.8
L01-299	4785	27.6	175	1.42	38932	11.4
HoCP04-838	3439	19.4	179	1.10	34848	12.0
L 14-267	5734	25.1	226	1.39	35756	9.8
HoCP 14-885	6111	31.4	195	1.37	45920 +	10.0 -

Table 4. Off-station nursery third-stubble means of the 2014 “L” and “HoCP assignment series across 2 locations (Newton and Landry) in 2019

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	3088 -	15.6 -	195	1.25	24775 -	9.9 -
L01-283	4705	22.5	210	1.11	40701	10.8
L01-299	4733	25.5	187	1.25	40701	11.3
HoCP04-838	3434	20.0	171	1.13	35302	11.9
L 14-267	6163	30.8	203	1.51	40384	9.8 -
HoCP 14-885	6501 +	32.3	201	1.36	47462	10.1

Table 5. Off-station nursery second-stubble means of the 2015 “L”, “Ho”and “HoL” assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2019

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	4092	15.3	266	1.66	17969	-	11.6	-
L01-283	9226	32.7	281	1.81	36119	-	12.2	
L01-299	10603	37.9	281	1.68	45466		13.2	
HoCP04-838	8505	30.5	282	1.70	35756	-	13.9	
HoCP09-804	8420	29.4	285	1.40	42380		13.4	
L 15-306	8315	27.3	305	1.72	31672	-	12.1	
HoL 15-508	9267	32.0	287	1.50	42562		9.9	-
Ho 15-971	7981	27.3	294	1.57	34757	-	11.9	

Table 6. Off-station nursery second-stubble means of the 2015 “L”, “Ho”and “HoL” assignment series on a Commerce silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2019

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	12857	48.5	265	2.27	42743	11.2	
L01-283	13385	49.6	269	1.82	54178	10.2	
L01-299	8802	34.6	268	1.55	44558	11.3	
HoCP04-838	9144	43.4	249	2.14	40565	13.3	
HoCP09-804	12424	49.6	251	1.85	53724	13.6	+
L 15-306	13289	49.3	268	2.41	41564	10.0	
HoL 15-508	14555	51.2	284	2.00	51183	9.1	-
Ho 15-971	9922	38.5	262	2.05	37298	10.9	

Table 7. Off-station nursery second-stubble means of the 2015 “L”, “Ho”and “HoL” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2019

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	9316	35.3	265	1.79	39386	10.6	-
L01-283	10310	38.8	268	1.49	52454	10.9	
L01-299	12142	45.9	264	1.65	55811	11.8	
HoCP04-838	10883	42.5	256	1.61	53180	12.5	
HoCP09-804	9050	35.1	258	1.40	50639	13.8	+
L 15-306	10020	39.3	251	1.97	39658	10.2	-
HoL 15-508	11358	41.5	274	1.64	51092	9.0	-
Ho 15-971	10822	39.7	273	1.62	49822	11.3	

Table 8. Off-station nursery second-stubble means of the 2015 “L”, “Ho”and “HoL” assignment series across 3 locations (Melancon, Newton and Landry) in 2019

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	8755	33.0	265	1.91	+	33366	-	11.1	-
L01-283	10974	40.4	273	1.70		47583		11.1	-
L01-299	11213	39.5	271	1.63		48612		12.2	
HoCP04-838	9939	38.8	264	1.82		43167		13.2	+
HoCP09-804	9965	38.0	265	1.55		48914		13.6	+
L 15-306	10541	38.6	275	2.03	+	37631	-	10.7	-
HoL 15-508	11727	41.5	282	1.71		48279		9.3	-
Ho 15-971	9575	35.2	276	1.75		40626		11.4	-

Table 9. Off-station nursery first-stubble means of the 2016 “Ho”and “HoCP” assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2019

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	6093		19.5		313		1.59		24503	-	10.2	-
L 01-283	9510		29.8		320		1.45		41201	+	11.2	
L01-299	8408		26.0		324		1.60		32579		12.0	
HoCP04-838	8260		26.3		315		1.47		35665	+	11.8	
HoCP09-804	10241		31.8		322		1.58		40747		12.9	
Ho16-600	11605	+	32.4		359	+	2.45	+	26590		9.2	-
Ho16-608	8466		28.4		298	-	1.74		32852		11.6	
Ho16-626	7254		22.3		323		1.62		30764		10.1	-
Ho16-647	7723		23.5		329		1.88	+	25229	-	9.1	-
HoCP06-675	4950	-	15.6	-	317		1.17	-	26681		11.3	
Ho16-678	7199		24.1		298	-	1.42		34304		12.0	
Ho16-680	10965	+	33.2		330		1.98	+	33396		11.8	

Table 10. Off-station nursery first-stubble means of the 2016 “Ho”and “HoCP” assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2019

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	11160		42.5		263		2.34		38206		11.4	
L 01-283	14532	+	55.3	+	263		2.18		50639		11.4	
L01-299	10367		41.3		251		1.79		46283		12.4	
HoCP04-838	9184		38.4		240		1.83		42653		11.9	
HoCP09-804	10483		42.7		245		1.52		56265	+	12.6	
Ho16-600	12716		40.8		313	+	2.55		31853	-	9.6	-
Ho16-608	11220		44.4		253		2.14		41564		11.6	
Ho16-626	10848		37.3		291	+	1.76		43016		10.2	-
Ho16-647	11404		41.1		278		2.27		36300	-	8.7	-
HoCP06-675	10613		39.4		271		1.71		46192		11.6	
Ho16-678	9170		34.4		267		1.79		38387		12.2	
Ho16-680	13075		46.9		279		2.10		44740		12.2	

Table 11. Off-station nursery first-stubble means of the 2016 “Ho”and “HoCP” assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2019

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	8089	33.3	244	1.83	36572	9.5	-
L 01-283	7628	37.2	207	1.72	43016	10.7	
L01-299	9341	41.5	226	1.66	49550	11.7	
HoCP04-838	8737	38.0	230	1.90	40021	11.5	
HoCP09-804	8501	32.9	254	1.39	46736	12.6	
Ho16-600	12592	48.4	260	2.52 +	38387	8.8	-
Ho16-608	8680	36.9	235	2.06	35846	10.6	
Ho16-626	10723	45.5	240	2.09	43197	9.1	-
Ho16-647	10205	43.5	235	2.08	42108	8.3	-
HoCP06-675	6712	29.1	231	1.67	35302	10.9	
Ho16-678	8466	35.2	241	1.77	40656	11.8	
Ho16-680	6762	29.3	231	1.88	31218	11.5	

Table 12. Off-station nursery first-stubble means of the 2016 “Ho”and “HoCP” assignment series across 3 locations (Newton, Melancon and Westfield) in 2019

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	8447	31.8	273	1.92	33094 -	10.4	-
L 01-283	10556	40.8	263	1.78	44952	11.1	-
L01-299	9372	36.2	267	1.68	42804	12.0	
HoCP04-838	8727	34.2	262	1.73	39446	11.7	
HoCP09-804	9742	35.8	273	1.50	47916	12.7	+
Ho16-600	12305	40.5	310	+ 2.51 +	32277 -	9.2	-
Ho16-608	9455	36.6	262	1.98 +	36754	11.3	-
Ho16-626	9755	35.5	286	1.83	38992	9.7	-
Ho16-647	9777	36.0	281	2.08 +	34546 -	8.7	-
HoCP06-675	7425	28.0	273	1.52	36058	11.3	-
Ho16-678	8278	31.2	269	1.66	37782	12.0	
Ho16-680	10267	36.5	280	1.99 +	36451	11.9	

Table 13. Off-station nursery plantcane means of the 2017 “L”, “Ho” and “HoCP”, assignment series on a Baldwin silty clay soil at Melancon Farms in Henderson, Louisiana in 2019

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)		Stalk Number (stalks/A)		Fiber (%)	
HoCP 96-540	7477	32.7	231	2.53	+	25864	-	11.5	
L01-299	7323	28.7	255	1.81		31672		11.8	
HoCP04-838	9368	35.2	266	2.24		31490		11.8	
HoCP09-804	6751	25.6	263	1.48	-	34757		12.8	
L 11-183	8974	34.6	260	2.09		33396		11.9	
L 17-398	7950	26.7	299	+ 1.93		27588		10.5	-
L 17-400	9453	33.1	286	+ 2.29		28949		10.3	-
L 17-405	10113	37.0	273	2.40		31127		11.2	
L 17-410	8594	31.8	269	1.94		33033		11.1	
L 17-419	8552	28.6	299	+ 1.74		32942		11.4	
L 17-424	9260	31.9	292	+ 2.20		29222		11.1	
L 17-426	8186	32.0	256	2.05		31309		12.2	
L 17-428	8738	34.6	252	2.48	+	28314		10.5	-
L 17-435	7477	27.0	279	1.79		30220		10.8	
HoCP17-701	8582	27.5	313	+ 1.71		32216		10.6	-
HoCP17-702	8883	30.2	297	+ 2.11		28496		9.3	-
HoCP17-705	7498	28.4	264	1.51		37843	+	12.7	
HoCP17-710	7966	28.3	280	2.01		28405		11.1	
HoCP17-714	8617	32.1	269	2.10		30583		9.2	-
HoCP17-716	8876	33.4	267	2.35	+	28496		10.1	-
Ho17-724	9617	38.0	253	2.25		33941		10.0	-
Ho17-725	7101	28.6	248	1.93		29494		10.5	-
Ho17-738	10421	38.7	268	2.15		35846		10.7	-
Ho17-755						32579			
Ho17-756	9984	35.1	284	+ 2.56	+	27316		11.8	

Table 14. Off-station nursery plantcane means of the 2017 “L”, “Ho” and “HoCP”, assignment series on a Moreland silt loam soil at Newton Cane, Inc. in Bunkie, Louisiana in 2019

Variety	Sugar per Acre (lbs./A)		Cane Yield (tons/A)		Sugar Per Ton (lbs/ton)		Stalk Weight (lbs)		Stalk Number (stalks/A)		Fiber (%)	
HoCP 96-540	8130		33.0		244		2.22		30220		10.8	-
L01-299	6581		27.8		238		1.93		29585		12.3	
HoCP04-838	10553	+	38.4		274		1.75		42380	+	12.1	
HoCP09-804	8374		32.0		262		1.73		37117		12.3	
L 11-183	9720	+	35.8		271		2.14		33487		10.3	-
L 17-398	8822		28.6		308	+	1.69		34031		11.5	
L 17-400	6501		25.1		258		1.97		25682		10.3	-
L 17-405	8456		34.0		249		2.23		30583		12.3	
L 17-410	11722	+	41.8	+	286	+	2.49		33215		9.7	-
L 17-419	8730		31.5		278	+	1.88		33850		12.3	
L 17-424	8984		33.6		267		2.50		27044		11.2	
L 17-426	6586		23.9		268		1.76		27407		10.5	-
L 17-428	10028	+	38.9		257		2.48		31400		9.5	-
L 17-435	4980		24.4		199	-	1.75		27316		9.6	-
HoCP17-701	11287	+	38.0		297	+	1.87		40656	+	10.2	-
HoCP17-702	12107	+	47.8	+	253		2.25		42562	+	9.4	-
HoCP17-705	8815		31.9		276	+	1.49		43197	+	12.3	
HoCP17-710	9893	+	39.0		255		2.48		32126		10.3	-
HoCP17-714	9427		37.0		255		2.04		37026		9.5	-
HoCP17-716	8467		31.6		264		1.80		34667		10.9	-
Ho17-724	13160	+	52.0	+	253		2.37		43832	+	10.4	-
Ho17-725	7082		35.6		204		1.81		38841		11.1	
Ho17-738	14226	+	53.5	+	266		2.18		49187	+	11.3	
Ho17-755									39023			
Ho17-756	13569	+	48.6	+	279	+	2.53		38478		10.5	-
17-774	8435		37.9		222		2.59	+	29222		11.5	
17-776	12129	+	41.1	+	295	+	2.25		36572		10.3	-

Table 15. Off-station nursery plantcane means of the 2017 “L”, “Ho” and “HoCP”, assignment series on a Commerce silt loam soil at Landry Farms in Paincourtville, Louisiana in 2019

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	7393	36.1	203	2.56	28133	10.3	-
L01-299	7328	37.3	197	1.87	40112	11.8	
HoCP04-838	7560	38.2	196	2.00	37934	11.0	
HoCP09-804	6088	26.5	229	+ 1.65	32398	13.0	
L 11-183	8041	39.7	203	2.09	38024	10.5	
L 17-398	7730	28.4	273	+ 2.08	27044	10.4	
L 17-400	8359	37.6	222	2.10	35846	9.6	-
L 17-405	7142	32.4	219	2.16	29585	11.1	
L 17-410	11083	47.5	233	+ 2.53	37389	10.0	-
L 17-419	8299	32.4	255	+ 1.85	35302	10.9	
L 17-424	7707	33.2	235	+ 2.24	29766	11.3	
L 17-426	8012	32.4	247	+ 2.05	31763	10.3	-
L 17-428	8680	42.4	207	2.44	34394	9.1	-
L 17-435	5071	26.0	195	1.64	31672	9.3	-
HoCP17-701	9612	36.8	261	+ 2.26	32579	9.0	-
HoCP17-702	8644	37.0	238	+ 1.78	41110	8.5	-
HoCP17-705	6310	28.7	222	1.49	37934	12.0	
HoCP17-710	7597	34.0	224	2.02	33759	10.1	-
HoCP17-714	7728	33.5	232	+ 2.18	30492	8.7	-
HoCP17-716	5896	27.3	215	1.78	30401	10.6	
Ho17-724	6799	35.4	192	1.76	40202	10.5	
Ho17-725	6432	29.9	214	1.82	32852	10.3	-
Ho17-738	9710	40.6	239	+ 2.21	36663	10.3	-
Ho17-755					35756		
Ho17-756	8626	33.6	258	+ 2.24	30038	11.4	

Table 16. Off-station nursery plantcane means of the 2017 “L”, “Ho” and “HoCP”, assignment series across 3 locations (Newton, Melancon and Westfield) in 2019

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	7666		33.9		226		2.44	+	28072		10.9	-
L01-299	7077		31.3		230		1.87		33789		12.0	
HoCP04-838	9030		37.2		242		2.04		37268		11.6	
HoCP09-804	7071		28.1		251		1.62		34757		12.7	
L 11-183	8912		36.7		245		2.10		34969		10.9	-
L 17-398	8168		27.9		293	+	1.90		29554		10.8	-
L 17-400	8105		31.9		255	+	2.12		30159		10.1	-
L 17-405	8570		34.5		247		2.26	+	30432		11.5	
L 17-410	10466	+	40.4	+	263	+	2.32	+	34546		10.3	-
L 17-419	8527		30.8		277	+	1.82		34031		11.5	
L 17-424	8651		32.9		265	+	2.31	+	28677		11.2	
L 17-426	7595		29.4		257	+	1.95		30159		11.0	-
L 17-428	9148	+	38.6		239		2.46	+	31369		9.7	-
L 17-435	5843		25.8		224		1.73		29736		9.9	-
HoCP17-701	9827	+	34.1		291	+	1.95		35151		9.9	-
HoCP17-702	9878	+	38.3		262	+	2.05		37389		9.1	-
HoCP17-705	7541		29.7		254	+	1.50	-	39658	+	12.3	
HoCP17-710	8485		33.8		253	+	2.17		31430		10.5	-
HoCP17-714	8591		34.2		252		2.11		32700		9.1	-
HoCP17-716	7746		30.8		248		1.97		31188		10.5	-
Ho17-724	9859	+	41.8	+	233		2.13		39325	+	10.3	-
Ho17-725	6872		31.4		222		1.85		33729		10.6	-
Ho17-738	11452	+	44.2	+	258	+	2.18		40565	+	10.8	-
Ho17-755									35786			
Ho17-756	10726	+	39.1		274	+	2.44	+	31944		11.3	
17-774	7676		36.3		215		2.59	+	27549		11.5	-
17-776	11370	+	39.5		287	+	2.25		34900		10.2	-

Table 17. On-station nursery third-stubble means of the 2015 “L” assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2019

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	3831		15.8	257	1.25	23822		10.6	-
L 01-283	5374		20.9	260	1.30	31989		10.9	-
L 01-299	4468		17.0	263	1.23	27452		12.0	
HoCP 04-838	4050		17.6	228	1.23	28586		12.8	
L 15-306	8277	+	29.2	284	1.42	41064	+	11.0	-

Table 18. On-station nursery third-stubble means of the 2015 “L” assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2019

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	4058	-	15.2	- 261	1.55	19058	-	12.4	
L 01-283	7787		27.2	288	1.46	37208		10.6	-
L 01-299	9178		34.1	269	1.78	38796		13.6	
HoCP 04-838	8949		33.9	264	1.81	37434		12.8	
L 15-306	9371		33.8	277	1.87	36527		11.2	-

Table 19. On-station nursery third-stubble means of the 2015 “L” assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2019

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	4517		23.5	196	1.52	30855		11.1	-
L 01-283	7428		30.2	248	1.47	40611		11.1	-
L 01-299	6561		31.5	204	1.49	42199		12.3	
HoCP 04-838	8867		38.8	229	1.69	45375		12.2	
L 15-306	8456		40.0	212	1.63	49232		10.1	-

Table 20. On-station nursery third-stubble means of the 2014 "L" assignment series across 3 locations (St. Gabriel, Iberia and U.S.D.A- Ardoyne Farms) in 2018

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	4135 -	18.1 -	238	1.44	24578 -	11.4 -
L 01-283	6863	26.1	265	1.41	36603	10.8 -
L 01-299	6736	27.6	245	1.50	36149	12.6
HoCP 04-838	7288	30.1	240	1.58	37132	12.6
L 15-306	8701	34.3	258	1.64	42274	10.8 -

Table 21. On-station nursery first-stubble means of the 2017 "L" assignment series on a Commerce silt loam soil at U.S.D.A-Ardoyne Farm in Chacahoula, Louisiana in 2019

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	5792 -	21.7 -	268	2.42	17923 -	9.7 -
L 01-283	7438 -	25.4 -	293	1.96	25864 -	10.9
L01-299	11523	40.5	284	1.92	42199	12.0
HoCP04-838	8075 -	28.7 -	280	1.93	29721 -	12.9
HoCP09-804	9884	34.9	283	1.95	35846	12.5
L17-398	7412 -	26.6 -	278	1.76	30174 -	12.5
L17-400	9264	30.0 -	309	2.47	24276 -	10.6 -
L17-405	7353 -	25.1 -	293	1.90	27452 -	11.9
L17-410	11884	40.6	292	2.67 +	30401 -	10.1 -
L17-419	7857 -	25.6 -	304	1.80	29040 -	11.4
L17-424	7726 -	26.7 -	290	2.29	23141 -	11.4
L17-426	5033 -	17.0 -	293	1.62	20873 -	11.8
L17-428	10016	35.4	283	2.33	30628 -	10.2 -
L17-435	7733 -	27.8 -	277	2.05	27225 -	10.1 -

Table 22. On-station nursery first-stubble means of the 2017 "L" assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2019

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	5743	23.3	247	2.02	23141	10.9
L 01-283	6713	24.1	278	1.59	30401	11.1
L01-299	6509	25.6	258	1.84	27679	11.8
HoCP04-838	7254	30.5	237	1.66	36300 +	12.0
HoCP09-804	8195	29.5	280	1.25	47190 +	13.0 +
L17-398	6539	22.5	292 +	1.44	30628	11.6
L17-400	7786	26.4	297 +	1.94	27225	10.6 -
L17-405	5789	20.2	286 +	1.56	26318	11.3
L17-410	6871	24.7	278	1.66	29721	9.8 -
L17-419	7158	24.8	288 +	1.70	29267	11.4
L17-424	7252	26.6	275	1.80	29494	11.4
L17-426	6330	24.8	256	1.58	31309	10.7 -
L17-428	6054	24.4	247	1.53	31989	9.7 -
L17-435	5762	23.6	246	1.68	28133	9.8 -

Table 23. On-station nursery first-stubble means of the 2017 "L" assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2019

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	7358	37.6	200	2.42 +	33275	10.6 -
L 01-283	7652	31.3	245	1.85	33804	11.2 -
L01-299	6416	28.2	226	1.57	35846	12.6
HoCP04-838	7720	33.9	227	1.83	36754	12.6
HoCP09-804	6508	30.0	212	1.43	41745	12.2 -
L17-398	5769	23.4	250	1.38	33804	11.4 -
L17-400	6861	30.4	224	2.03 +	30174	11.1 -
L17-405	7322	28.7	256	1.61	35393	11.8
L17-410	9237	36.3	256	2.03 +	35619	10.2 -
L17-419	8675	32.5	266	1.64	39703	12.5
L17-424	7744	32.7	239	2.02 +	32897	12.5
L17-426	6427	25.5	256	1.56	32897	11.3 -
L17-428	10099	43.4	233	2.35 +	36981	10.4 -
L17-435	5656	28.9	197	1.61	35846	11.0 -

Table 24. On-station nursery first-stubble means of the 2017 “L” assignment series across 3 locations (St. Gabriel, Iberia and U.S.D.A. - Ardoyne Farms) in 2019

Variety	Sugar per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	6298	27.5	238	2.29 +	25267 -	10.4 -
L 01-283	7267	26.9	272	1.80	30023	11.1 -
L01-299	8149	31.4	256	1.78	35241	12.1
HoCP04-838	7683	31.0	248	1.81	34258	12.5
HoCP09-804	8196	31.5	258	1.54	41594 +	12.6
L17-398	6573	24.2	273	1.53	31536	11.8
L17-400	7971	28.9	277	2.14 +	27225 -	10.7 -
L17-405	6821	24.7	278 +	1.69	29721	11.7
L17-410	9331	33.9	275	2.12 +	31914	10.1 -
L17-419	7897	27.7	286 +	1.71	32670	11.8
L17-424	7574	28.7	268	2.03	28511 -	11.8
L17-426	5930	22.4	268	1.59	28359 -	11.2 -
L17-428	8723	34.4	254	2.07	33199	10.1 -
L17-435	6384	26.8	240	1.78	30401	10.3 -

Table 25. On-station nursery plantcane means of the 2018 “L” assignment series on a Baldwin silty clay soil at Iberia Research Station in Jeanerette, Louisiana in 2019

Variety	Sugar Per Acre (lbs./A)		Cane Yield (tons/A)		Sugar Per Ton (lbs/ton)		Stalk Weight (lbs)		Stalk Number (stalks/A)		Fiber (%)	
HoCP 96-540	6891		28.6	-	242		2.33		24503	-	9.5	-
L 01-299	8977		41.2		219		2.18		37888		11.0	
HoCP04-838	6993		29.5	-	239		2.05		28586	-	11.2	
HoCP09-804	7297		27.4	-	266	+	1.38	-	39930		11.5	
L 11-183	6170		25.5	-	241		2.08		24729	-	10.6	
L 18-438	8221		28.5	-	288	+	1.68	-	34031		10.5	
L 18-439	6322		23.8	-	265	+	1.63	-	29267	-	11.5	
L 18-441	5685		21.6	-	263	+	1.72		25183	-	9.7	-
L 18-443	4722		19.3	-	244		1.80		21780	-	8.6	-
L 18-450	5815		23.4	-	251	+	1.33	-	34939		9.8	-
L 18-451	7812		36.6		220		2.22		32670		8.9	-
L 18-452	6422		26.1	-	244		1.89		27225	-	11.9	
L 18-453	8616		33.0		261	+	2.04		32216		10.1	
L 18-455	7119		31.0		230		2.17		28586	-	9.3	-
L 18-458	6949		30.4	-	227		2.70	+	22461	-	11.5	
L 18-460	6569		24.1	-	273	+	1.79		26998	-	10.5	
L 18-468	7277		31.0		235		2.18		28359	-	11.1	
L 18-469	5016		23.0	-	218		1.87		24729	-	10.9	
L 18-471	6034		23.8	-	254	+	1.82		26318	-	10.0	
L 18-472	6458		25.2	-	257	+	1.83		27906	-	9.5	-
L 18-474	7870		36.4		220		2.02		35393		11.0	
L 18-475	8613		34.8		246		2.87	"+	24729	-	10.2	
L 18-477	5664		26.7	-	212		1.90		28133	-	12.0	

Table 26. On-station nursery plantcane means of the 2018 “L” assignment series on a Commerce silt loam soil at Sugar Research Station in St. Gabriel, Louisiana in 2019

Variety	Sugar Per Acre (lbs./A)	Cane Yield (tons/A)	Sugar Per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)	Fiber (%)
HoCP 96-540	7577	35.8	210	2.15	33124	11.5
L 01-299	9062	39.8	227	2.26	35166	12.4
HoCP04-838	9282	49.6	187	2.47	40157	12.3
HoCP09-804	7622	37.1	208	1.72	43106 +	12.2
L 11-183	8324	41.9	200	2.48	33578	11.8
L 18-438	7190	32.3	225	2.12	30401	10.9 -
L 18-439	8259	37.8	217	2.44	28813	13.8
L 18-441	9110	40.0	229	2.19	36300	10.4 -
L 18-443	5366 -	29.4	176	1.99	29494	10.1 -
L 18-450	6724	30.6	220	1.83	33351	10.0 -
L 18-451	10383	55.3	188	3.10 +	35619	9.5 -
L 18-452	7439	38.0	196	2.39	31763	12.5
L 18-453	8141	36.5	222	2.28	32443	10.8 -
L 18-455	6924	34.0	206	2.37	28586	10.1 -
L 18-458	7235	36.5	205	2.49	29267	12.3
L 18-460	6275 -	33.4	190	2.14	31309	11.9
L 18-468	5525 -	32.6	171	2.28	28359	11.8
L 18-469	6717	35.6	190	2.33	30401	10.8 -
L 18-471	8350	40.1	211	2.34	34258	12.1
L 18-472	5860 -	26.0	224	1.61	32216	9.8 -
L 18-474	6003 -	34.5	172	2.27	30401	13.1
L 18-475	6549	39.9	164	2.88	27906	11.9
L 18-477	5973	42.1	140	2.94	32216	12.2

Table 27. On-station nursery plantcane means of the 2018 “L” assignment series across 2 locations (St.Gabriel, and Iberia) in 2019

Variety	Sugar Per Acre (lbs./A)		Cane Yield (tons/A)		Sugar Per Ton (lbs/ton)		Stalk Weight (lbs)		Stalk Number (stalks/A)		Fiber (%)	
HoCP 96-540	7234		32.2		226		2.24		28813	-	10.5	-
L 01-299	9020		40.5		223		2.22		36527		11.7	
HoCP04-838	8138		39.5		213		2.26		34372		11.8	
HoCP09-804	7459		32.3		237		1.55	-	41518		11.8	
L 11-183	7247		33.7		220		2.28		29153	-	11.2	
L 18-438	7705		30.4	-	256	+	1.90		32216		10.7	-
L 18-439	7062		30.1	-	243		1.96		29040	-	12.5	
L 18-441	7398		30.8		246		1.96		30742		10.1	-
L 18-443	5044		24.4	-	210		1.89		25637	-	9.4	-
L 18-450	6270		27.0	-	236		1.58	-	34145		9.9	-
L 18-451	9098		45.9		204		2.66		34145		9.2	-
L 18-452	6930		32.0		220		2.14		29494	-	12.2	
L 18-453	8378		34.7		242		2.16		32330		10.5	-
L 18-455	7021		32.5		218		2.27		28586	-	9.7	-
L 18-458	7092		33.5		216		2.60		25864	-	11.9	
L 18-460	6422		28.8	-	231		1.96		29153	-	11.2	
L 18-468	6401		31.8		203		2.23		28359	-	11.5	
L 18-469	5867		29.3	-	204		2.10		27565	-	10.8	
L 18-471	7192		32.0		232		2.08		30288		11.1	
L 18-472	6159		25.6	-	240		1.72	-	30061		9.7	-
L 18-474	6937		35.4		196		2.15		32897		12.1	
L 18-475	7581		37.4		205		2.87	+	26318	-	11.0	
L 18-477	5800		33.5		181	-	2.31		30174		12.2	

2019 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) 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. These trials are normally established in the same year permanent variety numbers are assigned. Plots 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 or higher than the control varieties and not susceptible to diseases are advanced for further testing.

Table 1 lists planting and harvest dates of USDA nursery evaluations. Results of these trials are presented in Tables 2 to 17. 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. Two varieties have a "HoL" prefix and 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 2018

Series	Location[1]	Soil Series[2]	Planting Date	Harvest Dates			
				2016	2017	2018	2019
2015	AFH	ShA	10/21/15	11/21	10/24	10/17	10/15
2015	IRS	Bsc	10/23/15	11/29	11/08	10/17	10/17
2015	STG	Csl	11/13/15	12/09	12/12	11/15	11/21
2016	AFH	ShA	10/20/16		11/20	10/24	10/15
2016	IRS	Bsc	10/26/16		11/16	10/19	10/17
2016	STG	Csl	10/27/16		11/28	11/15	11/25
2017	AFH	ShA	10/20/17			12/12	10/24
2017	IRS	Bsc	11/02/17			12/11	10/17
2017	STG	Csl	10/27/17			12/17	11/25
2018	AFL	CbA	11/21/18				12/16
2018	IRS	Bsc	10/19/18				11/4
2019	AFL	CbA	11/07/19				
2019	IRS	Bsc	11/19/19				
2019	STG	Csl	11/21/19				

[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 2015 "Ho" and "HoL" assignment series on a Schriever clay soil at the Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	3917	15.4	252	0.89	34145
HoCP 96-540	2721	14.3	190 -	1.46	18037
L 01-283	3335	13.3	252	0.97	27565
HoCP 04-838	3362	13.1	250	1.12	22347
HoL 15-508	4798	18.5	260	1.16	31876
Ho 15-971	5502	21.1	262	1.42	29721
Means	3939	15.9	244	1.17	27282

Table 3. Nursery third-stubble means of the 2015 "Ho" and "HoL" assignment series on a Baldwin silty clay loam soil at the Iberia Research Station in Jeanerette, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	9222	35.3	262	1.15	61029
HoCP 96-540	4535 -	20.0 -	227	1.30	31195 -
L 01-283	6457 -	21.9 -	295	0.89 -	49572
HoCP 04-838	6824	26.5 -	256	1.33	40043 -
HoL 15-508	8186	27.0 -	304	1.10	49232
Ho 15-971	6609 -	22.5 -	293	1.28	35393 -
Means	6972	25.5	273	1.17	44411

Table 4. Nursery third-stubble means of the 2015 "Ho" and "HoL" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	7414	32.6	228	1.50	43673
HoCP 96-540	6267	29.0	215	1.94	29948 -
L 01-283	8264	32.8	252 +	1.75	40611
HoCP 04-838	7385	30.7	240	1.30	47644
HoL 15-508	8494	31.7	268 +	1.57	40497
Ho 15-971	8367	34.6	242	1.37	50593
Means	7647	31.8	240	1.55	42161

Table 5. Nursery third-stubble means of the 2015 "Ho" and "HoL" assignment series across locations (Ardoyne Farm, Iberia Research Station, & Sugar Research Station) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	6851	27.7	247	1.18	46283
HoCP 96-540	4507 -	21.1 -	211 -	1.57 +	26393 -
L 01-283	5848	22.0	267	1.18	39249
HoCP 04-838	5857	23.5	249	1.25	36678
HoL 15-508	7159	25.7	278 +	1.28	40535
Ho 15-971	6826	26.0	265	1.36	38569
Means	6144	24.2	253	1.29	37951

Table 6. Nursery second-stubble means of the 2016 "Ho" and "HoCP" assignment series on a Schriever clay soil at the Ardoyne Farm in Schriever, LA in 2019.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	4304	17.0	253	1.21	28473
HoCP 96-540	1887	10.3	182 -	1.16	18037
L 01-283	3524	13.4	251	1.07	25070
HoCP 04-838	1494	6.5	232	1.05	12818
HoCP 09-804	3311	13.3	249	0.98	27792
Ho 16-600	5254	18.1	290 +	1.36	26658
Ho 16-608	4814	20.3	236	1.67 +	24956
Ho 16-626	3681	17.0	217	1.34	25183
Ho 16-647	3469	13.4	256	1.50	17696
HoCP 16-675	3701	13.3	272	1.04	25070
Ho 16-678	4811	17.7	270	1.10	31989
Ho 16-680	3535	14.1	246	1.24	22801
Means	3649	14.6	246	1.23	23879

Table 7. Nursery second-stubble means of the 2016 "Ho" and "HoCP" assignment series on a Baldwin silty clay loam soil at the Iberia Research Station in Jeanerette, LA in 2019.

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	8379	30.0	280	1.15	51841
HoCP 96-540	6182	28.0	220 -	1.69 +	33464 -
L 01-283	9052	32.4	280	1.25	52068
HoCP 04-838	5807 -	21.3 -	272	1.06	40497 -
HoCP 09-804	8987	30.8	293	1.02	60008
Ho 16-600	10031	33.9	296	1.80 +	37548 -
Ho 16-608	9384	34.7	270	1.55 +	44808
Ho 16-626	7744	27.8	278	1.42	40384 -
Ho 16-647	8787	30.1	292	1.69 +	35506 -
HoCP 16-675	6847	25.3	270	1.30	39136 -
Ho 16-678	7697	29.7	259 -	1.34	44354
Ho 16-680	9134	33.8	271	1.71 +	40270 -
Means	8169	29.8	274	1.41	43324

Table 8. Nursery second-stubble means of the 2016 "Ho" and "HoCP" assignment series on a Commerce silt loam soil at the Sugar Research Station in St. Gabriel, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	6925	32.0	216	1.66	38682
HoCP 96-540	9386	44.2	213	1.98	44581
L 01-283	7024	28.2	249 +	1.55	36754
HoCP 04-838	7676	30.7	250 +	1.61	38228
HoCP 09-804	6497	27.0	243 +	1.51	35960
Ho 16-600	8175	30.4	268 +	1.56	37434
Ho 16-608	7270	30.4	239 +	1.66	36867
Ho 16-626	7303	32.5	226	1.71	38002
Ho 16-647	10144	38.7	262 +	2.04	38228
HoCP 16-675	6426	25.9	249 +	1.34	38909
Ho 16-678	9013	35.9	251 +	1.59	45035
Ho 16-680	7966	32.1	249 +	1.79	35393
Means	7817	32.3	243	1.66	38673

Table 9. Nursery second-stubble means of the 2016 "Ho" and "HoCP" assignment series across locations (Ardoyne Farm, Iberia Research Station, & Sugar Research Station) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	6536	26.3	250	1.34	39665
HoCP 96-540	5818	27.5	205 -	1.61 +	32027
L 01-283	6534	24.7	260	1.29	37964
HoCP 04-838	4993	19.5	251	1.24	30515 -
HoCP 09-804	6265	23.7	262	1.17	41253
Ho 16-600	7820	27.5	285 +	1.57	33880
Ho 16-608	7156	28.5	248	1.63 +	35544
Ho 16-626	6243	25.8	240	1.49	34523
Ho 16-647	7467	27.4	270	1.74 +	30477 -
HoCP 16-675	5658	21.5	264	1.22	34372
Ho 16-678	7174	27.8	260	1.34	40459
Ho 16-680	6878	26.7	255	1.58	32821
Means	6545	25.6	254	1.43	35292

Table 10. Nursery first-stubble means of the 2017 “Ho” and “HoCP” assignment series on a Sharkey clay soil at the Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton		Weight/ stalk	Stalks/ acre	
	(lbs.)	(tons)	(lbs.)		(lbs.)	(no.)	
L 01-299	6096	25.4	240		1.50	33804	
HoCP 96-540	3197	13.4	234		1.46	18263	
L 01-283	5224	20.8	254		1.30	30628	
HoCP 04-838	4208	17.0	237		1.21	25750	
HoCP 09-804	2704	10.4	259		0.82	25637	
HoCP 17-701	6992	24.1	289	+	1.51	32103	
HoCP 17-702	8352	33.3	251		1.67	39817	
HoCP 17-705	1844	7.2	258		0.62	23368	
HoCP 17-710	5701	22.1	258		1.39	31876	
HoCP 17-714	4767	18.7	255		1.16	31649	
HoCP 17-716	1683	7.1	236		1.32	10890	-
Ho 17-724	5716	22.4	251		1.35	31989	
Ho 17-725	4459	18.0	247		1.07	33351	
Ho 17-738	4385	17.7	247		1.16	31195	
Ho 17-755	3045	12.6	241		1.17	19738	
Ho 17-756	1971	7.6	259		1.11	13839	-
Means	4397	17.4	251		1.24	27119	

Table 11. Nursery first-stubble means of the 2017 “Ho” and “HoCP” assignment series on a Baldwin silty clay loam soil at the Iberia Research Station in Jeanerette, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton		Weight/ stalk		Stalks/ acre
	(lbs.)	(tons)	(lbs.)		(lbs.)		(no.)
L 01-299	10986	43.8	251		1.83		47871
HoCP 96-540	6615	26.8	248		1.73		30855
L 01-283	7686	27.6	278	+	1.55		35960
HoCP 04-838	5765	22.9	253		1.40	-	31876
HoCP 09-804	9571	33.1	289	+	1.27	-	52068
HoCP 17-701	9930	32.2	307	+	1.64		38455
HoCP 17-702	10115	36.8	272		1.78		41858
HoCP 17-705	8022	28.6	281	+	1.19	-	47984
HoCP 17-710	12211	42.5	288	+	1.82		46623
HoCP 17-714	10173	37.1	275	+	1.71		43106
HoCP 17-716	8254	29.4	281	+	1.60		36754
Ho 17-724	8532	31.1	277		1.73		39136
Ho 17-725	7833	29.6	266		1.46	-	40043
Ho 17-738	11446	42.1	269		1.79		44241
Ho 17-755	10435	38.3	273	+	2.00		38796
Ho 17-756	10635	37.9	280	+	1.89		40157
Means	9117	33.3	273		1.64		40986

Table 12. Nursery first-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 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton		Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)		(lbs.)	(no.)
L 01-299	8646	35.0	247		2.07	33918
HoCP 96-540	4852	23.1	210	-	2.39	19284
L 01-283	8838	33.4	265	+	1.85	36300
HoCP 04-838	9020	35.4	255		1.61	44014
HoCP 09-804	9495	41.0	231		1.71	44694
HoCP 17-701	12922	50.4	256		2.13	47303
HoCP 17-702	9793	41.8	233		2.05	40270
HoCP 17-705	6143	25.1	245		1.68	33691
HoCP 17-710	13064	51.0	256		2.38	41632
HoCP 17-714	11261	45.6	247		1.95	43220
HoCP 17-716	8135	32.5	251		1.90	34598
Ho 17-724	7797	36.4	214	-	1.84	40611
Ho 17-725	8874	39.2	227	-	1.92	40724
Ho 17-738	8734	39.8	221	-	1.80	44241
Ho 17-755	11807	53.1	222	-	2.47	38796
Ho 17-756	14438	55.8	259		2.03	38228
Means	9286	38.7	239		1.99	38845

Table 13. Nursery first-stubble means of the 2017 “Ho” and “HoCP” assignment series across locations (Ardoyne Farm, Iberia Research Station, & Sugar Research Station) in 2019

Variety	Sugar/ acre		Tons/ acre		Sugar/ ton		Weight/ stalk		Stalks/ acre	
	(lbs.)		(tons)		(lbs.)		(lbs.)		(no.)	
L 01-299	8576		34.8		246		1.80		38531	
HoCP 96-540	4888	-	21.1	-	231		1.86		22801	-
L 01-283	7249		27.2		266	+	1.56		34296	
HoCP 04-838	6331		25.1	-	248		1.41	-	33880	
HoCP 09-804	7070		27.1		261		1.24	-	40800	
HoCP 17-701	10183		36.8		284	+	1.79		39287	
HoCP 17-702	9543		38.1		252		1.86		40648	
HoCP 17-705	5556	-	21.3	-	262		1.13	-	35014	
HoCP 17-710	10060		37.4		267	+	1.83		40043	
HoCP 17-714	8501		32.8		259		1.61		39325	
HoCP 17-716	6024		23.0	-	256		1.61		27414	-
Ho 17-724	7430		30.5		246		1.62		37245	
Ho 17-725	7055		28.9		247		1.48	-	38039	
Ho 17-738	7909		32.3		246		1.55		39892	
Ho 17-755	8063		32.6		246		1.83		32443	
Ho 17-756	8327		31.0		265	+	1.67		30742	
Means	7412		29.0		255		1.59		35650	

Table 14. Nursery plant cane means of the 2018 “Ho” and “HoCP” assignment series on a Cancienne silt loam soil at the Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	8411	36.1	235	2.02	35506
HoCP 96-540	8258	43.0	191 -	2.80 +	30742
HoCP 04-838	12134 +	47.9 +	253	2.18	43900 +
HoCP 09-804	10352	40.9	253	2.16	38002
L 11-183	9899	41.9	236	2.54 +	33010
HoCP 18-801	12098 +	53.7 +	226	2.60 +	41972
HoCP 18-803	10773	47.0 +	229	2.11	44468 +
HoCP 18-806	10979	48.8 +	225	2.47 +	39590
HoCP 18-808	9560	43.6	219	2.08	42085
HoCP 18-810	11711	50.5 +	232	2.52 +	40157
HoCP 18-811	12402 +	60.7 +	205 -	2.82 +	43106 +
HoCP 18-815	11530 +	46.7	247	2.21	42312
HoCP 18-817	9303	40.7	228	2.14	38002
HoCP 18-818	11178 +	58.8 +	192 -	2.66 +	44354 +
HoCP 18-822	10962	45.4	241	2.37	38342
HoCP 18-823	10508	49.2 +	214	2.22	44354 +
HoCP 18-824	11739 +	50.4 +	233	2.45	41178
HoCP 18-826	9192	41.8	221	1.93	43106 +
HoCP 18-827	11082	48.9 +	226	2.80 +	34939
HoCP 18-829	13776 +	58.3 +	239	2.46	47417 +
HoCP 18-834	9402	42.8	220	2.55 +	33578
HoCP 18-835	10759	43.1	250	2.38	36073
HoCP 18-837	10488	43.5	241	2.31	37661
HoCP 18-839	12389 +	47.3	262 +	2.54 +	37208
HoCP 18-840	11412 +	56.3 +	204 -	3.31 +	34258
HoCP 18-842	13560 +	57.0 +	238	2.94 +	38796
HoCP 18-846	10345	41.7	247	2.21	37775
HoCP 18-847	11929 +	53.5 +	223	2.65 +	40384
HoCP 18-852	9042	36.1	251	1.72	41972
HoCP 18-856	10344	48.8 +	211 -	2.16	45035 +
HoCP 18-857	11733 +	54.2 +	216	2.45	44241 +
HoCP 18-859	12285 +	53.1 +	232	2.79 +	38115
HoCP 18-861	9145	41.5	220	2.02	41178
HoCP 18-862	11442 +	47.8 +	239	2.37	40724
HoCP 18-863	8975	37.7	238	2.13	35393
HoCP 18-865	10210	53.6 +	191 -	2.74 +	39023
HoCP 18-866	12252 +	54.8 +	223	2.68 +	40951
HoCP 18-869	10441	46.2	226	2.39	38796
HoCP 18-872	13432 +	54.8 +	245	2.43	45262 +
Ho 18-877	9399	37.2	253	2.39	31082
Ho 18-878	10940	42.5	257 +	2.06	41632
Means	10872	47.5	230	2.41	39651

Table 15. Nursery plant-cane means of the 2018 "Ho" and "HoCP" assignment series on a Baldwin silty clay loam soil at the Iberia Research Station in Jeanerette, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	7250	29.7	243	1.77	33351
HoCP 96-540	9927 +	47.5 +	209 -	2.47 +	38455
HoCP 04-838	8206	33.6	245	2.10	32443
HoCP 09-804	7095	28.4	250	1.66	34485
L 11-183	8688	36.7	237	1.90	38682
HoCP 18-801	9459	39.3	240	2.30 +	34145
HoCP 18-803	11316 +	44.9 +	252	2.36 +	38002
HoCP 18-806	8194	34.8	235	2.11	33010
HoCP 18-808	9542 +	41.8 +	229	2.27 +	36754
HoCP 18-810	9307	37.2	251	2.22	33804
HoCP 18-811	9668 +	41.5 +	233	2.36 +	35166
HoCP 18-815	8387	33.8	248	1.93	35279
HoCP 18-817	9513 +	39.9	239	2.09	38228
HoCP 18-818	10394 +	47.6 +	220	2.26 +	42199 +
HoCP 18-822	8502	35.3	247	2.10	33351
HoCP 18-823	9683 +	40.5 +	240	2.18	36867
HoCP 18-824	9544 +	33.9	282 +	1.91	35506
HoCP 18-826	7771	35.4	220	2.00	35506
HoCP 18-827	12248 +	51.4 +	238	2.57 +	40043
HoCP 18-829	12082 +	48.5 +	249	2.08	46623 +
HoCP 18-834	10185 +	45.5 +	223	2.50 +	36413
HoCP 18-835	10311 +	41.2 +	250	2.42 +	34031
HoCP 18-837	9028	39.9 +	233	2.57 +	30855
HoCP 18-839	8726	32.0	272 +	2.14	29948
HoCP 18-840	9705 +	41.6 +	233	2.49 +	33464
HoCP 18-842	11255 +	43.7 +	258	2.58 +	33804
HoCP 18-846	10056 +	41.8 +	241	2.20	38569
HoCP 18-847	10655 +	42.5 +	251	1.99	42879 +
HoCP 18-852	9276	38.9	238	2.06	38115
HoCP 18-856	8659	34.9	248	1.70	41064 +
HoCP 18-857	9100	38.9	235	2.28 +	34598
HoCP 18-859	10135 +	42.4 +	239	2.56 +	33124
HoCP 18-861	8128	32.9	247	1.59	41405 +
HoCP 18-862	10217 +	40.6 +	252	2.12	38115
HoCP 18-863	8150	35.1	235	2.11	32897
HoCP 18-865	10645 +	46.7 +	228	2.30 +	40724 +
HoCP 18-866	12570 +	52.6 +	239	3.11 +	33804
HoCP 18-869	8759	36.8	238	2.20	33578
HoCP 18-872	9536 +	41.6 +	229	2.44 +	34485
Ho 18-877	8674	37.2	233	2.11	35393
Ho 18-878	9309	34.9	267	1.90	37434
Means	9509	39.6	241	2.19	36259

Table 16. Nursery plant cane means of the 2018 “Ho” and “HoCP” assignment series across two locations (Ardoyne Farm, & Iberia Research Station) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)
L 01-299	7831	32.9	239	1.89	34428
HoCP 96-540	9092	45.3 +	200 -	2.63 +	34598
HoCP 04-838	10170 +	40.7	249	2.14	38172
HoCP 09-804	8724	34.7	251	1.91	36243
L 11-183	9293	39.3	237	2.22	35846
HoCP 18-801	10778 +	46.5 +	233	2.45 +	38058
HoCP 18-803	11045 +	45.9 +	241	2.23	41235 +
HoCP 18-806	9587	41.8 +	230	2.29 +	36300
HoCP 18-808	9551	42.7 +	224	2.17	39420
HoCP 18-810	10509 +	43.9 +	241	2.37 +	36981
HoCP 18-811	11035 +	51.1 +	219	2.59 +	39136
HoCP 18-815	9959 +	40.2	248	2.07	38796
HoCP 18-817	9408	40.3	234	2.11	38115
HoCP 18-818	10786 +	53.2 +	206 -	2.46 +	43276 +
HoCP 18-822	9732	40.3	244	2.24	35846
HoCP 18-823	10096 +	44.8 +	227	2.20	40611
HoCP 18-824	10641 +	42.1 +	257	2.18	38342
HoCP 18-826	8482	38.6	220	1.96	39306
HoCP 18-827	11665 +	50.1 +	232	2.68 +	37491
HoCP 18-829	12929 +	53.4 +	244	2.27	47020 +
HoCP 18-834	9793	44.2 +	221	2.52 +	34995
HoCP 18-835	10535 +	42.1 +	250	2.40 +	35052
HoCP 18-837	9758	41.7	237	2.44 +	34258
HoCP 18-839	10557 +	39.7	267 +	2.34 +	33578
HoCP 18-840	10559 +	48.9 +	219	2.90 +	33861
HoCP 18-842	12407 +	50.3 +	248	2.76 +	36300
HoCP 18-846	10200 +	41.7	244	2.20	38172
HoCP 18-847	11292 +	48.0 +	237	2.32 +	41632 +
HoCP 18-852	9159	37.5	244	1.89	40043
HoCP 18-856	9501	41.9 +	230	1.93	43050 +
HoCP 18-857	10417 +	46.5 +	225	2.36 +	39420
HoCP 18-859	11210 +	47.8 +	235	2.67 +	35619
HoCP 18-861	8636	37.2	234	1.81	41291 +
HoCP 18-862	10829 +	44.2 +	246	2.25	39420
HoCP 18-863	8563	36.4	236	2.12	34145
HoCP 18-865	10427 +	50.2 +	209 -	2.52 +	39873
HoCP 18-866	12411 +	53.7 +	231	2.89 +	37378
HoCP 18-869	9600	41.5	232	2.29 +	36187
HoCP 18-872	11484 +	48.2 +	237	2.43 +	39873
Ho 18-877	9037	37.2	243	2.25	33237
Ho 18-878	10124 +	38.7	262 +	1.98	39533
Means	10191	43.6	236	2.30	37955

2019 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 2019, tests were planted at USDA's Ardoyne Farm in Schriever, LA (Ho varieties only) and commercial farms located in Vacherie, LA and Maurice, LA representing three distinct regions and soil types of the Louisiana sugarcane industry.

Infield evaluations on commercial farms are conducted cooperatively with LSU AgCenter Sugarcane Variety Development Program personnel. Infield tests are planted in a randomized complete block design with two replications and with 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 sucrose 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 fitted 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 through 18. Statistical analyses were completed for each test and for each series across locations using PROC MIXED procedures in SAS (version 9.4). The commercial variety L 01-299 occupies the largest percentage of the acreage in the Louisiana sugarcane industry, as such, 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 2019

'Ho' Series	'L' Series	Location[1]	Soil Series [2]	Planting Date	Harvest Dates			
					2016	2017	2018	2019
2013		AFH	ShA	9/25/15	11/16	10/18	10/24	10/24
2013	2014	BLK	CmA	8/25/15	12/07	10/16	10/03	10/11
2014		AFH	ShA	10/06/16		11/22	10/24	10/24
2014	2015	BLK	CmA	9/21/16		12/04	10/03	10/11
2014	2015	STG	Sc	9/30/16		11/16	12/13	12/05
2015		AFH	ShA	8/23/17			12/14	10/24
2015	2016	BLK	CmA	9/06/17			12/05	10/11
2015	2016	CAF	Co	8/24/17			11/28	12/10
2016		AFH	ShA	8/23/18				12/05
2016	2017	BLK	CmA	9/17/18				12/04
2016	2017	CAF	Co	8/15/18				12/10
2017		AFH	ShA	9/26/19				
2017	2018	BLK	CmA	9/12/19				
2017	2018	CAF	Co	8/14/19				

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

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

Table 2. Infield third-stubble means of the 2013 "Ho" assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	4425	20.7	213	1.05	39493	12.4
HoCP 96-540	3465	15.7	221	1.32	23777	12.1
L 01-283	5193	22.3	230	0.97	46600	13.8
HoCP 04-838	3367	14.7	231	1.04	28212	12.9
Ho 13-739	5244	20.8	252	1.24	33944	12.0
Mean	4339	18.8	229	1.12	34405	12.6

Table 3. Infield third-stubble means of the 2013 "Ho" assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	6045	30.1	201	1.21	49863	12.3
HoCP 96-540	5393	26.9	198	1.56	34508	11.8
L 01-283	6311	26.4	239	1.05	51654	11.5
HoCP 04-838	5942	26.8	222	1.39	38618	12.3
Ho 13-739	6691	28.5	236	1.54	36884	11.4
L 14-267	6348	27.6	230	1.67	33080	11.2
Mean	6122	27.7	221	1.40	40768	11.8

Table 4. Infield third-stubble means of the 2013 "Ho" assignment series across two locations (Ardoyne Farm and Blackberry Farm) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	5235	25.4	207	1.13	44678	12.4
HoCP 96-540	4429	21.3	210	1.44 +	29142 -	11.9
L 01-283	5752	24.3	235 +	1.01	49127	12.7
HoCP 04-838	4654	20.7	226	1.22	33415	12.6
Ho 13-739	5968	24.6	244 +	1.39 +	35414	11.7
Mean	5208	23.3	224	1.24	38355	12.3

Table 5. Infield second-stubble means of the 2014 “Ho” assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber	
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)	
L 01-299	6955	25.4	271	1.35	37767	10.3	
HoCP 96-540	4368	17.8	245	1.60	22549	9.8	
L 01-283	6032	21.6	282	1.27	34137	10.4	
HoCP 04-838	6135	23.0	267	1.32	34955	10.2	
HoCP 09-804	5843	21.0	278	1.22	34250	10.6	
HoCP 14-885	6541	22.8	283	1.62	27913	8.6	-
Mean	5979	21.9	271	1.39	31928	10.0	

Table 6. Infield second-stubble means of the 2014 “Ho” and 2015 “L” assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber	
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)	
L 01-299	6440	26.8	240	1.23	44356	12.1	
HoCP 96-540	5993	27.0	222	1.80	30662	12.0	
L 01-283	5704	24.3	235	1.29	38145	12.7	
HoCP 04-838	5179	23.2	223	1.20	38749	12.4	
HoCP 09-804	6807	27.8	245	1.06	53822	13.5	+
HoCP 14-885	10341 +	39.2 +	263 +	1.52	51612	10.6	-
L 15-306	9121 +	34.5	265 +	1.74	39813	11.4	
Mean	7084	29.0	242	1.41	42451	12.1	

Table 7. Infield second-stubble yields[1] of the 2014 "Ho" and 2015 "L" assignment series on a Sharkey clay soil at St. Gabriel Research Station in St. Gabriel, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	4434	37.1	120	2.02	36717	13.4
HoCP 96-540	4885	27.7	177	1.55	35819	11.1
L 01-283	3615	29.5	123	1.31	45157	10.2
HoCP 04-838	6207	36.1	172	1.48	48921	11.5
HoCP 09-804	5396	32.4	166	1.37	47349	13.5
HoCP 14-885	5754	36.7	157	1.88	39109	8.9
L 15-306	6830	32.4	211	1.30	49829	10.2
Mean	5303	33.1	161	1.56	43272	11.3

[1] Only one rep harvested at St. Gabriel in 2019.

Table 8. Infield second-stubble means[1] of the 2014 "Ho" and 2015 "L" assignment series across two locations (Blackberry Farm and St. Gabriel Research Station) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	5771	30.2	200	1.50	41810	12.5
HoCP 96-540	5624	27.2	207	1.72	32381	11.7
L 01-283	5008	26.0	198	1.30	40482	11.8
HoCP 04-838	5521	27.5	206	1.29	42140	12.1
HoCP 09-804	6337	29.4	219	1.16	51664	13.5
HoCP 14-885	8812	38.4	227	1.64	47444	10.0 -
L 15-306	8357	33.8	247	1.60	43151	11.0 -
Mean	6490	30.4	215	1.46	42725	11.8

[1] Only one rep harvested at St. Gabriel in 2019.

Table 9. Infield second-stubble means[1] of the 2014 "Ho" assignment series across three locations (Ardoyne Farm, Blackberry Farm and St. Gabriel Research Station) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	6245	28.3	228	1.44	40193	11.6
HoCP 96-540	5121	23.5	222	1.67	28448 -	11.0
L 01-283	5417	24.2	231	1.28	37944	11.3
HoCP 04-838	5767	25.7	230	1.30	39266	11.3
HoCP 09-804	6139	26.0	242	1.19	44699	12.3
HoCP 14-885	7903	32.1	250	1.63	39632	9.5 -
Mean	6099	26.6	234	1.42	38363	11.2

[1] Only one rep harvested at St. Gabriel in 2019.

Table 10. Infield first-stubble means of the 2015 "Ho" assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	5574	22.2	252	1.31	34722	13.0
HoCP 96-540	5080	23.2	220 -	1.42	34219	12.0
L 01-283	8009 +	29.1	275	1.56	37912	11.5
HoCP 04-838	7470	28.6	261	1.42	40538	12.4
HoCP 09-804	7433	28.5	260	1.38	41511	12.9
HoL 15-508	7576 +	26.2	289 +	1.77	30004	9.3
Ho 15-971	9350 +	33.9	277	1.41	49740	10.8
Mean	7213	27.4	262	1.47	38378	11.7

Table 11. Infield first-stubble means of the 2015 "Ho" assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	6225	31.4	198	1.50	42685	13.0
HoCP 96-540	4529	22.5 -	201	1.38	32914	11.9 -
L 01-283	6364	27.2	235 +	1.27	43184	12.6
HoCP 04-838	5768	25.5	226 +	1.44	35011	13.1
HoCP 09-804	7003	28.4	248 +	1.39	40740	13.7
HoL 15-508	9908 +	36.4	272 +	2.03 +	35914	10.3 -
Ho 15-971	5108	22.0 -	231 +	1.58	28058	12.1
Mean	6415	27.6	230	1.51	36929	12.4

Table 12. Infield first-stubble means of the 2015 "Ho" assignment series on a Coteau-Patoutville-Frost silt loam soil at Circle A Farm in Maurice, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	9165	40.4	227	1.41	58100	13.4
HoCP 96-540	5024	24.5	206	2.13 +	23071 -	12.5
L 01-283	6913	29.8	233	2.01 +	30121 -	12.6
HoCP 04-838	7213	31.7	228	1.96 +	32306 -	12.9
HoCP 09-804	8106	33.6	240	1.68	40174 -	13.6
HoL 15-508	10858	38.9	279	2.26 +	34629 -	10.5 -
Ho 15-971	6038	29.5	202	2.28 +	25837 -	12.4
Mean	7617	32.6	231	1.96	34891	12.6

Table 13. Infield first-stubble means of the 2015 "Ho" assignment series across three locations (Ardoyne Farm, Blackberry Farm and Circle A Farm) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	6988	31.3	225	1.40	45169	13.2
HoCP 96-540	4878	23.4	209	1.64	30068 -	12.1 -
L 01-283	7096	28.7	248	1.61	37072	12.2 -
HoCP 04-838	6817	28.6	238	1.61	35952	12.8
HoCP 09-804	7514	30.2	249 +	1.48	40808	13.4
HoL 15-508	9447 +	33.8	280 +	2.02 +	33516	10.0 -
Ho 15-971	6832	28.5	237	1.76 +	34545	11.7 -
Mean	7082	29.2	241	1.65	36733	12.2

Table 14. Infield plant-cane means of the 2016 "Ho" assignment series on a Schriever clay soil at Ardoyne Farm in Schriever, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	10590	44.5	238	2.12	43213	11.8
HoCP 96-540	8722	39.5	220	2.78	28483 -	12.6
HoCP 04-838	8868	36.0	247	2.10	34109	13.2 +
HoCP 09-804	10081	40.3	250	1.98	40800	13.4 +
L 11-183	9376	36.1	260 +	2.50	29062 -	10.8
Ho 16-600	10345	38.3	272 +	3.56 +	22609 -	10.1 -
Ho 16-608	10681	43.5	246	2.43	36010	11.6
Ho 16-626	8880	36.5	243	2.13	34422	10.4 -
Ho 16-647	9092	35.2 -	259 +	3.04 +	23160 -	9.7 -
Ho 16-675	7083 -	28.8 -	247	2.23	25894 -	13.2 +
Ho 16-678	10443	43.0	243	1.91	45054	13.1
Ho 16-680	4993 -	22.6 -	222	3.27 +	13991 -	11.8
Mean	9096	37.0	246	2.50	31401	11.8

Table 15. Infield plant-cane means of the 2016 “Ho” and 2017 “L” assignment series on a Cancienne silt loam soil at Blackberry Farm in Vacherie, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	7797	33.3	234	1.95	34451	12.8
HoCP 96-540	8733	33.2	263 +	2.30	28914	10.9 -
HoCP 04-838	8327	33.0	252	1.76	37834	12.8
HoCP 09-804	7872	30.8	256 +	1.79	34401	12.8
L 11-183	9692 +	35.2	276 +	2.06	34154	10.4 -
Ho 16-600	10244 +	33.6	305 +	2.61 +	25838 -	9.5 -
Ho 16-608	8934	35.1	254	2.29	31241	12.2
Ho 16-626	7914	28.7	276 +	2.30	24922 -	10.5 -
Ho 16-647	8326	30.6	272 +	2.83 +	21829 -	9.1 -
Ho 16-675	6084	23.7 -	256 +	2.00	23770 -	11.9
Ho 16-678	5864 -	23.6 -	249	1.96	24107 -	11.8 -
Ho 16-680	7317	29.1	252	2.24	25980 -	11.5 -
L 17-398	7661	26.6 -	289 +	1.85	28853	11.1 -
L 17-400	7853	29.4	270 +	2.24	26189	11.5 -
L 17-405	6241	22.7 -	275 +	1.70	26973	11.0 -
L 17-410	6485	24.6 -	263 +	2.37 +	20785 -	11.1 -
L 17-419	6338	23.5 -	270 +	1.85	25906 -	12.6
L 17-424	6443	26.2 -	247	1.95	26715	11.2 -
L 17-426	7557	28.9	262 +	1.98	29200	12.7
L 17-428	7089	29.1	244	2.44 +	23846 -	10.1 -
L 17-435	5060 -	21.3 -	237	1.78	24828 -	10.7 -
Mean	7516	28.7	262	2.10	27654	11.4

Table 16. Infield plant-cane means of the 2016 “Ho” and 2017 “L” assignment series on a Coteau-Patoutville-Frost silt loam soil at Circle A Farm in Maurice, LA in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	9701	41.0	236	1.82	46352	12.6
HoCP 96-540	8913	40.7	219	2.36	34616 -	11.6 -
HoCP 04-838	9834	42.7	235	1.63	51460	12.4 -
HoCP 09-804	6635	31.3	211	1.68	37272	14.0
L 11-183	10496	43.9	239	2.26	38875	11.5
Ho 16-600	12454	49.3	252	2.58 +	38906	10.9 -
Ho 16-608	12877	51.5	250	2.23	46281	12.1
Ho 16-626	9315	41.3	226	2.24	36898	10.8
Ho 16-647	8853	35.4	249	2.37	29958 -	8.7
Ho 16-675	7786	33.6	232	1.89	35558	13.0 -
Ho 16-678	6700	30.9	218	1.95	31686 -	12.7
Ho 16-680	9936	43.6	229	2.21	39995	12.7 -
L 17-398	7731	30.1	257	1.77	34098 -	11.9
L 17-400	10324	42.1	245	2.02	42375	12.0 -
L 17-405	7355	32.6	228	1.81	35765	13.3
L 17-410	6954	29.4	236	2.23	25361 -	10.3
L 17-419	8788	34.1	257	1.88	36001	12.4
L 17-424	10037	39.8	252	2.38	33530 -	11.6
L 17-426	8402	34.9	239	2.17	31916 -	12.4 -
L 17-428	9075	39.6	229	2.96 +	26832 -	10.8
L 17-435	10284	46.7	222	2.09	44794	11.8
Mean	9164	38.8	236	2.12	37073	11.9

Table 17. Infield plant-cane means of the 2016 “Ho” and 2017 “L” assignment series across two locations (Circle A Farm & Blackberry Farm) in 2019

Variety	Sugar/ acre (lbs.)	Tons/ acre (tons)	Sugar/ ton (lbs.)	Weight/ stalk (lbs.)	Stalks/ acre (no.)	Fiber (%)
L 01-299	8749	37.2	235	1.88	40402	12.7
HoCP 96-540	8823	37.0	241	2.33 +	31765 -	11.2 -
HoCP 04-838	9081	37.8	244	1.69	44647	12.6
HoCP 09-804	7254	31.0	234	1.74	35836	13.4
L 11-183	10094	39.5	257	2.16	36514	11.0 -
Ho 16-600	11349 +	41.4	279 +	2.59 +	32372 -	10.2 -
Ho 16-608	10906 +	43.3	252	2.26 +	38761	12.2
Ho 16-626	8615	35.0	251	2.27 +	30910 -	10.7 -
Ho 16-647	8589	33.0	260 +	2.60 +	25893 -	8.9 -
HoCP 16-675	6935	28.7 -	244	1.95	29664 -	12.5
Ho 16-678	6282 -	27.2 -	234	1.95	27897 -	12.2
Ho 16-680	8626	36.3	240	2.22 +	32988 -	12.1
L 17-398	7696	28.3 -	273 +	1.81	31476 -	11.5
L 17-400	9089	35.8	257	2.13	34282	11.8
L 17-405	6798	27.6 -	251	1.75	31369 -	12.2
L 17-410	6719	27.0 -	250	2.30 +	23073 -	10.7 -
L 17-419	7563	28.8 -	264 +	1.86	30954 -	12.5
L 17-424	8240	33.0	249	2.17	30122 -	11.4 -
L 17-426	7979	31.9	250	2.08	30558 -	12.5
L 17-428	8082	34.4	236	2.70 +	25339 -	10.5 -
L 17-435	7672	34.0	230	1.93	34811	11.2 -
Mean	8340	33.7	249	2.11	32363	11.6

Table 18. Infield plant-cane means of the 2016 “Ho” assignment series across three locations (Ardoyne Farm, Blackberry Farm & Circle A Farm) in 2019

Variety	Sugar/ acre	Tons/ acre	Sugar/ ton	Weight/ stalk	Stalks/ acre	Fiber
	(lbs.)	(tons)	(lbs.)	(lbs.)	(no.)	(%)
L 01-299	9363	39.6	236	1.96	41339	12.4
HoCP 96-540	8789	37.8	234	2.48	30671 -	11.7
HoCP 04-838	9010	37.2	245	1.83	41134	12.8
HoCP 09-804	8196	34.1	239	1.82	37491	13.4
L 11-183	9855	38.4	258 +	2.27	34030	10.9
Ho 16-600	11014	40.4	276 +	2.91 +	29118 -	10.1 -
Ho 16-608	10831	43.4	250	2.32	37844	12.0
Ho 16-626	8703	35.5	248	2.22	32081	10.6
Ho 16-647	8757	33.7	260 +	2.74 +	24982 -	9.2
HoCP 16-675	6985 -	28.7 -	245	2.04	28407 -	12.7 -
Ho 16-678	7669	32.5	237	1.94	33616	12.5
Ho 16-680	7415	31.8	234	2.57 +	26655 -	12.0
Mean	8882	36.1	247	2.26	33114	11.7

2019 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 2019 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 2019 were HoCP96-540, L01-283, and L01-299 occupying 15%, 14%, and 56% 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.

Twenty experimental varieties representing the 2017 assignment series were introduced to outfield locations for seed increase in 2019 (Table 1). Thirteen experimental and seven commercial varieties were planted at 12 outfield locations. Thirty-nine tests were harvested in 2019 including nine plantcane, eleven first-stubble, ten second-stubble, and nine 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 2019 Louisiana sugarcane industry started out warmer than average in January and February, experiencing many above average high temperatures. During the Spring months there were weeks of cooler than average as well as warmer than average temperatures. On June 13 category 1 Hurricane Barry hit, bringing with it over 10 inches of rain as well as high winds. Record high temperatures in September and October were highly beneficial to the crop. October ended with Post-Tropical Cyclone Olga, which brought high winds and rain on southern parts of the state. The industry received high amounts of rainfall during the 2019 season. Baton Rouge received 64.09" of rain, which is roughly 4" above average. Harvesting of the trials began on September 27. On November 13, a hard freeze hit the state. During the freeze southern areas of the state hit lows in the mid 20's, while northern areas bottomed out at 21°F. At the time of the freeze harvest was only 50% complete. This weather event greatly impacted sugar yields in mills across the state. The outfield harvest was completed on December 19. All mills in the Louisiana industry completed grinding by January 3, 2020.

Varieties HoCP 14-885 and L 14-267 (both eligible for commercial release in 2021) were harvested in the plant cane and 1st stubble 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 2019

Commercial Varieties	Experimental Varieties		Experimental Varieties Introduced to the Outfield		
HoCP96-540	Ho13-739	Ho 16-608	L 17-398	L 17-428	HoCP 17-716
L01-299	L14-267	Ho 16-626	L 17-400	L 17-435	Ho 17-724
HoCP09-804	HoCP14-885	Ho 16-647	L 17-405	HoCP 17-701	Ho 17-725
Ho12-615	L15-306	HoCP 16-675	L 17-410	HoCP 17-702	Ho 17-738
L12-201	HoL15-508	HoCP 16-678	L 17-419	HoCP 17-705	Ho 17-755
HoCP04-838	Ho15-971	HoCP16-680	L 17-424	HoCP 17-710	Ho 17-756
L11-183	Ho 16-600		L 17-426	HoCP 17-714	

Table 2. Harvest and planting dates for all outfield locations harvested in 2019

			Plantcane		First-stubble		Second-stubble		Third-stubble	
Location	Parish	2019 Planting Date	2019 Harvest Date	2018 Planting Date	2019 Harvest Date	2017 Planting Date	2019 Harvest Date	2016 Planting Date	2019 Harvest Date	2015 Planting Date
Al Landry	Iberville	09/11	11/6	08/28	10/2	09/13	**	09/28	10/2	09/02
Allains	St. Mary	09/18	**	*	11/13	09/21	11/13	10/11	11/13	09/23
Alma	Pointe Coupee	09/03	11/20	09/21	11/20	09/20	9/27	10/04	9/27	09/26
Brunswick	Pointe Coupee	09/12	11/26	09/24	11/26	09/22	10/30	09/19	10/30	09/09
Domingue	Vermilion	09/13	12/19	10/12	**	*	**	*	**	*
Glenwood	Assumption	09/20	**	*	11/25	08/24	11/25	09/21	10/28	09/16
Harper Farms	Rapides	09/16	12/16	09/14	11/01	09/18	11/01	09/21	**	*
Lanaux	St. John	08/23	12/05	08/15	12/05	09/07	10/23	08/31	10/23	08/19
Levert-St. John	St. Martin	08/30	11/05	09/18	11/05	09/08	10/16	09/20	10/16	09/15
Magnolia	Terrebonne	09/23	11/11	10/15	11/11	09/11	10/14	10/01	10/14	09/17
Mary	Lafourche	09/23	**	*	10/01	09/28	10/01	10/10	**	10/08
Ronald Hebert	Iberia	09/18	12/04	09/19	12/04	09/14	10/24	08/25	10/24	09/01

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

Table 3. Plantcane sugar per acre for six commercial and nine experimental varieties at ten outfield locations in 2019

	HEAVY						LIGHT													
Variety	Alma		Domingues		Landry		Magnolia		Brunswick	Harper		Lanaux		Ronald Hebert		St. John		Overall Mean		
									(lbs./A)											
HoCP96-540	7981	-	5093		6159	-	6352		5150	4558		8747		5830		6912		6309	-	
L01-299	10707		5331		9366		6189		6122	4344		9571		4867		8051		7172		
HoCP04-838	11641		6094		7461		4951		6296	5289		8734		6468	+	10632	+	7507		
HoCP09-804	9429		5147		8250		5796		6104	5323		10217		5412		9757		7271		
L11-183	9984		6944	+	7951		6347		6900	6548	+	9395		6937	+	8758		7752		
L12-201	8417	-	4177	-	6829	-	5830		6315	5599	+	9019		6428	+	9333		6883		
Ho12-615	10824		5719		9086		6284		5868	6568	+	9862		6980	+	10635	+	7980	+	
Ho13-739	9703		5493		8299		5143		6207	5128		8660		6196		9310		7127		
L14-267	11707		5760		7250	-	5594		6826	6764	+	10411		6551	+	10083	+	7883		
HoCP14-885	11065		6672	+	7384		6736		7652	6928	+	10774		7743	+	12690	+	8627	+	
L15-306	11237		6526	+	9470		5462		6625	6385	+	10365		7343	+	10806	+	8247	+	
HoL15-508	10653		6094		8143		6245		7735	5637	+	8049		6336	+	11054	+	7772		
Ho15-971	10934		5912		9142		5492		5693	5566	+	9620		5898		10727	+	7665		

Table 4. Plantcane cane yield for six commercial and nine experimental varieties at ten outfield locations in 2019

	HEAVY				LIGHT					
Variety	Alma	Domingues	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(tons/A)					
HoCP96-540	33.2	19.4	30.5	27.1	24.1	24.1	35.2	25.7	27.3 -	27.4 -
L01-299	41.9	20.1	39.2	26.6	26.1	24.0	37.6	21.0	35.0	30.2
HoCP04-838	44.0	23.3	34.1	19.6 -	26.3	27.1	33.8	25.5	43.0 +	30.7
HoCP09-804	37.3	19.1	33.2	22.5	25.2	23.6	37.3	21.2	39.3	28.7
L11-183	37.4	27.3 +	37.9	24.8	27.6	29.7 +	35.9	28.8 +	37.6	31.9
L12-201	34.1	16.5 -	30.2	22.4	25.2	25.9	33.4	25.4	35.5	27.7
Ho12-615	44.8	23.3	42.6	24.6	27.1	29.7 +	42.8	30.0 +	44.8 +	34.4 +
Ho13-739	37.0	20.6	33.1	19.4 -	25.2	25.9	31.5	24.6	35.7	28.1
L14-267	42.1	21.2	32.5	22.6	27.7	28.1	41.1	25.5	39.4	31.1
HoCP14-885	41.2	23.7 +	31.5	25.7	30.7	27.2	37.0	31.2 +	45.4 +	32.6
L15-306	41.4	24.8 +	36.1	20.4 -	26.7	29.2 -	39.9	28.3 +	41.5	32.0
HoL15-508	38.3	21.3	32.5	24.0	28.2	23.7	28.2 -	23.8	40.7	29.0
Ho15-971	39.5	22.9	36.8	21.7 -	23.3	26.3	37.0	23.8	41.7	30.4

Table 5. Plantcane sugar per ton for six commercial and nine experimental varieties at ten outfield locations in 2019

	HEAVY				LIGHT					
Variety	Alma	Domingues	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs./tons)					
HoCP96-540	240	263	202 -	234	214	189	248	227	253	230
L01-299	256	265	240	234	235	181	254	232	229	236
HoCP04-838	264	262	222	253	239	195	258	253 +	248	244
HoCP09-804	253	269	249	258	243	225 +	274	256 +	249	253 +
L11-183	267	255	210	256	248	221 +	261	241	233	244
L12-201	248	251	226	261	250	217 +	271	253 +	265 +	249 +
Ho12-615	240	246 -	214	255	217	221 +	230 -	233	237	233
Ho13-739	262	267	251	262	247	198	274	252 +	261 +	253 +
L14-267	278 +	272	223	247	248	241 +	255	257 +	256 +	253 +
HoCP14-885	269	281	230	262	249	254 +	291 +	248	280 +	263 +
L15-306	272	263	262	269	249	218 +	261	259 +	261 +	257 +
HoL15-508	279 +	287 +	250	260	273	240 +	285 +	266 +	270 +	268 +
Ho15-971	276	257	248	252	244	212 +	260	247	257 +	251 +

Table 6. Plantcane stalk weight for six commercial and nine experimental varieties at ten outfield locations in 2019

	HEAVY				LIGHT					
Variety	Alma	Domingues	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
	(lbs.)									
HoCP96-540	2.59 +	2.28 +	2.70 +	2.13	3.22 +	2.43 +	2.55	2.66 +	2.86 +	2.60 +
L01-299	2.04	1.74	1.79	1.74	2.58	1.82	2.13	2.04	1.94	1.98
HoCP04-838	2.14	1.76	2.10	1.73	2.38	1.91	2.02	2.11	1.96	2.01
HoCP09-804	1.74	1.51	1.58	1.67	1.94 -	1.55	1.97	1.63	1.58	1.69 -
L11-183	2.11	2.00	2.02	2.01	2.66	2.22 +	3.02 +	2.20	2.32	2.28 +
L12-201	2.61 +	1.96	2.44 +	2.08	2.72	2.22 +	3.02 +	2.49	2.66 +	2.46 +
Ho12-615	2.19	1.85	1.76	1.75	1.88 -	1.86	2.31	1.89	1.79	1.92
Ho13-739	2.22	2.45 +	2.61 +	2.10	2.29	2.45 +	2.16	2.41	2.14	2.31 +
L14-267	2.66 +	2.17 +	2.60 +	2.22 +	2.66	2.38 +	2.68 +	2.04	2.29	2.41 +
HoCP14-885	2.66 +	2.46 +	1.34	2.06	2.63	2.09	2.74 +	2.38	2.50 +	2.32 +
L15-306	2.84 +	1.78	2.23	1.69	2.50	2.17 +	2.14	2.48	2.11	2.22 +
HoL15-508	2.31	1.88	1.85	1.92	2.46	2.01	2.05	1.95	1.87	2.03
Ho15-971	2.30	1.98	2.49 +	2.47 +	2.76	2.34 +	3.24 +	2.47	2.67 +	2.52 +

Table 7. Plantcane stalk number for six commercial and nine experimental varieties at ten outfield locations in 2019

	HEAVY				LIGHT					
Variety	Alma	Domingues	Landry	Magnolia	Brunswick	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(stalks/A)					
HoCP96-540	26037 -	17017 -	23121 -	25695	15054 -	19919 -	27708	19503	19097 -	21461 -
L01-299	42130	23382	44601	30711	20691	26476	36020	20562	36104	31186
HoCP04-838	41525	27044	32614	22784	22309	28523	34608	24611	43920	30882
HoCP09-804	43136	25234	42631	27148	26525 +	30444	38708	26325	49761 +	34435 +
L11-183	35517	27242	39801	24756	20649	27002	23941 -	26785	32585	28697
L12-201	26814 -	16732 -	24705 -	21733	18610	23377	22429 -	20846	26758	22547 -
Ho12-615	41242	25482	49406	29131	28776 +	31955 +	37174	32975	50791 +	36326 +
Ho13-739	33699	16816 -	26377 -	18466	22047	21215 -	29390	20645	33568	24692 -
L14-267	31716 -	19770	25087 -	21103	21333	23625	30737	25144	34515	25892 -
HoCP14-885	31124 -	19231	49653	26659	23740	26513	27524	26645	37101	29799
L15-306	29161 -	28308	32716	24258	21396	27098	38055	23132	39760	29320
HoL15-508	34295	22774	35418	24991	23592	23396	27605	24929	44621	29069
Ho15-971	34372	23259	32526	17630	17954	22603	23361 -	19321	31476	24723 -

Table 8. First-stubble sugar per acre for five commercial and six experimental varieties at ten outfield locations in 2019

	HEAVY					LIGHT						
Variety	Allains	Alma	Landry	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(lbs./A)						
HoCP96-540	5159	6392 -	2336 -	4311 -	3911	3821 -	5701 -	5882 -	5463 -	4902 -	4601 -	4788 -
L01-283	6235	8729	4585	5076	4713	8209	8462	8511	6103	7377	7385	6832
L01-299	5331	9240	4209	5117	4473	7073	9831	8349	7687	6954	7946	6928
HoCP04-838	4507	8283	3157 -	4116 -	4687	6836	8559	9173	5997	7006	7049	6306
HoCP09-804	5731	7163 -	5798 +	3246 -	5554 +	6541	6788 -	9625 +	8015	8292	7915	6788
L11-183	5122	6208 -	3054 -	3950 -	4851	5870	7963 -	7190 -	6211	7222	7500	5922 -
L12-201	5878	6968 -	2858 -	5177	4792	7071	8575	8142	5391 -	6309	8151	6301
Ho12-615	6392 +	8331	4771	4873	5697 +	5640	8960	8756	8275 +	8360	8076	7103
Ho13-739	5352	6849 -	4913	5001	4549	7021	8290 -	8824	8067	7043	8158	6733
L14-267	6434 +	9371	5125	5426	5730 +	6378	8886	8900	8572 +	8349	8812 +	7453
HoCP14-885	5683	8185	4731	4859	4195	8620	8611	6884 -	9530 +	8860 +	9101 +	7205

Table 9. First-stubble cane yield for five commercial and six experimental varieties at ten outfield locations in 2019

	HEAVY					LIGHT					
Variety	Allains	Alma	Landry	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(lbs./A)						
HoCP96-540	21.8	26.7 -	17.1 -	17.1	25.7	18.8	23.0 -	25.5 -	24.0	22.5	16.2 -	21.7 -
L01-283	22.4	30.3	29.1	18.0	25.9	28.0	30.0	35.2	22.1 -	27.7	22.8 -	26.5
L01-299	20.5	32.4	27.3	19.1	26.4	28.5	35.2	34.9	29.0	26.9	25.7	27.8
HoCP04-838	18.2	31.0	22.3 -	16.6	26.7	27.3	32.0	35.0	23.5	26.7	23.6	25.7
HoCP09-804	21.3	27.9	28.0	12.5 -	25.2	24.6	25.1 -	37.2	28.8	30.5	25.4	26.0
L11-183	19.9	24.1 -	21.6 -	15.3 -	27.2	23.7	31.5	30.5	23.1	29.2	25.5	24.7 -
L12-201	22.6	24.7 -	17.7 -	19.7	26.2	28.3	30.9	31.0	20.7 -	24.9	26.3	24.8 -
Ho12-615	24.6	33.2	28.1	19.9	30.1	25.5	36.7	37.4	32.6	32.6 +	28.3	29.9
Ho13-739	19.9	26.2 -	26.0	16.8	21.7 -	28.3	30.2	34.3	29.8	27.3	25.7	26.0
L14-267	22.8	33.1	27.4	18.7	28.1	23.5	31.3	34.3	29.5	31.5	27.9	28.0
HoCP14-885	20.5	29.7	27.0	17.7	24.0	34.5	30.8	30.3	32.5	32.4 +	28.3	28.0

Table 10. First-stubble sugar per ton for five commercial and six experimental varieties at ten outfield locations in 2019

	HEAVY					LIGHT					
Variety	Allains	Alma	Landry	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(lbs./ton)						
HoCP96-540	236.8 -	240.5 -	136.5	252.0	152.4	212.7 -	247.2 -	231.2	224.6 -	216.7 -	283.7 -	221.5 -
L01-283	278.5	288.3	157.6	282.1	182.1	272.2 +	282.0	242.1	276.6	266.2	324.6 +	259.1 +
L01-299	260.1	284.5	155.2	268.4	170.2	247.9	279.3	238.6	264.7	258.7	309.6	248.8
HoCP04-838	247.8	266.5	140.0	248.1 -	177.3	250.6	267.6	262.5 +	254.1	262.9	298.5	243.3
HoCP09-804	270.0	256.4 -	207.0 +	258.9	220.6 +	266.0	269.4	260.2	278.7	272.0	311.6	261.0 +
L11-183	257.4	257.6 -	141.7	258.7	178.8	248.9	255.0	235.9	269.1	248.1	294.3 -	240.5
L12-201	260.9	281.2	161.5	264.0	182.4	248.8	278.6	262.5 +	259.6	253.6	309.9	251.2
Ho12-615	262.3	251.7 -	169.4	245.1 -	189.5	222.1 -	243.2 -	234.4	254.1	257.0	284.9 -	237.6 -
Ho13-739	269.4	261.3 -	189.1 +	297.1 +	210.0 +	248.4	274.8	258.1	270.2	258.0	317.7	259.5 +
L14-267	282.3 +	282.7	186.3 +	289.6 +	203.2 +	273.3 +	284.6	259.7	287.7	265.4	316.1	266.5 +
HoCP14-885	277.4	275.3	174.6	274.5	175.8	246.9	280.2	228.6	294.1 +	272.6	322.3	256.6

Table 11. First-stubble stalk weight for five commercial and six experimental varieties at ten outfield locations in 2019

	HEAVY					LIGHT						
Variety	Allains	Alma	Landry	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(lbs.)						
HoCP96-540	1.77	2.26	1.43	1.37	1.74	2.18	2.11 +	2.51 +	2.03	2.15	1.81	1.94 +
L01-283	1.55	1.80	1.44	1.34	1.72	1.81	2.00	1.82	1.91	1.69	1.54	1.69
L01-299	1.58	1.94	1.50	1.33	1.70	1.81	1.48	1.96	1.91	1.79	1.48	1.68
HoCP04-838	1.51	1.79	1.54	1.23	1.36	1.89	1.76	1.85	1.95	1.66	1.74	1.66
HoCP09-804	1.20	1.68	1.40	1.40	1.49	1.67	1.63	1.76	1.73	1.84	1.17	1.54
L11-183	1.42	1.56	1.61	1.26	1.59	2.14	1.69	1.88	2.45	1.80	1.86	1.75
L12-201	1.82	2.50 +	1.71	1.70	1.76	2.66 +	2.53 +	2.33	2.14	2.53 +	1.88 +	2.14 +
Ho12-615	1.26	1.93	1.26	1.13	1.37	1.52	1.74	1.66	1.94	1.70	1.48	1.54
Ho13-739	1.66	2.30	1.36	1.31	1.71	2.02	2.05 +	2.28	2.32	2.07	1.72	1.89 +
L14-267	1.70	2.02	1.80 +	1.55	1.84	2.07	2.28 +	2.62 +	2.22	2.07	1.77	1.99 +
HoCP14-885	1.57	1.84	1.60	1.35	1.40	2.27	2.22 +	1.80	2.20	2.11	1.93 +	1.84 +

Table 12. First-stubble stalk number for five commercial and six experimental varieties at ten outfield locations in 2019

	HEAVY					LIGHT						
Variety	Allains	Alma	Landry	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
						(stalks/A)						
HoCP96-540	25867	23752 -	24169 -	25130	30820	17203	22851 -	20734 -	24907	20819	18059 -	23119 -
L01-283	29028	33677	41490	26833	30362	31020	30160 -	39634	23118	33346	29875	31686
L01-299	27231	34601	36727	28913	31270	33074	48144	35782	30854	31859	36951	34128
HoCP04-838	24132	34607	29341 -	27474	40526	29604	36851	38675	24419	32354	27219 -	31382
HoCP09-804	35885	33283	40041	18038 -	33991	29483	33549 -	42087	33225	34056	43421	34278
L11-183	28163	30983	26867 -	25065	34329	22472	41282	33135	18919 -	32609	27498 -	29211 -
L12-201	25114	19724 -	21358 -	23285	29874	21469	24399 -	26579	19811 -	19740 -	28010 -	23578 -
Ho12-615	39232	34570	45268 +	35751	44352 +	34254	42615	47120 +	34184	38934	38548	39530 +
Ho13-739	24645	22851 -	38477	26616	25624	28318	29615 -	30179	25809	26393	30119	28059 -
L14-267	27429	35502	31047 -	24380	31332	22261	27485 -	26291	26756	31387	32111	28726 -
HoCP14-885	26972	32374	33792	26478	35172	30712	27709 -	33902	30005	30761	29620	30682

Table 13. Second-stubble sugar per acre for seven commercial and three experimental varieties at eight outfield locations in 2019

	HEAVY				LIGHT																				
Variety	Allains		Alma		Magnolia		Mary		Brunswick		Glendwood		Harper		Lanaux		Ronald Hebert		St. John		Overall Mean	
									(lbs./A)																
HoCP96-540	5666		4979		5223		4566	-	4295	-	6403	-	4616	-	6004	-	5224	-	4958	-	5193	-			
L01-283	6480	+	5817		5950		4629	-	5637		9068		8485		8149	-	6058	-	6620	-	6689	-			
L01-299	5588		6128		5660		5465		7160		9764		9264		9975		7144		8232		7438				
HoCP04-838	4283	-	5312		4255		4467	-	7258		8368		8634		7096	-	6012	-	7751		6343	-			
HoCP09-804	5744		6373		5234		6425	+	8745		8401		11034	+	9556		6492		9093		7710				
L11-183	4685	-	4596	-	4962		4484	-	5890		8179		8250		7461	-	5462	-	6093	-	6006	-			
L12-201	5454		6920		6177		5479		7844		8759		7377	-	7240	-	6120	-	7473		6884				
Ho12-615	5804		5416		5448		5676		7120		9684		9480		9360		6586		7791		7237				
Ho13-739	5567		6061		5465		4917		7966		9152		9096		8728	-	8395	+	7395		7274				

Table 14. Second-stubble cane yield for seven commercial and three experimental varieties at eight outfield locations in 2019

	HEAVY				LIGHT																				
Variety	Allains		Alma		Magnolia		Mary		Brunswick		Glendwood		Harper		Lanaux		Ronald Hebert		St. John		Overall Mean	
									(tons/A)																
HoCP96-540	22.3		21.8		16.6		23.7		20.2	-	24.3		23.7	-	28.8	-	26.1	-	22.4	-	23.0	-			
L01-283	23.4	+	25.2		18.4		21.3		20.4	-	31.4		34.6		28.4	-	24.6	-	28.3	-	25.6	-			
L01-299	21.0		24.8		17.8		26.5		30.1		34.1		39.2		39.2		31.5		36.0		30.0				
HoCP04-838	17.2	-	22.6		13.4		21.1		29.4		31.6		37.8		29.2	-	26.5	-	35.2		26.4	-			
HoCP09-804	20.7		24.4		17.2		26.9		32.2		29.1		42.6		35.4		27.0	-	34.4		29.0				
L11-183	18.1	-	19.3	-	15.7		23.3		25.9		30.1		34.8		31.6	-	26.3	-	26.8	-	25.2	-			
L12-201	20.5		26.7		19.1		23.9		32.3		31.5		32.2	-	29.5	-	26.5	-	30.2	-	27.2	-			
Ho12-615	21.9		25.2		18.2		26.6		30.5		36.0		44.5		36.1		29.5		34.2		30.3				
Ho13-739	20.1		22.0		16.5		20.7		31.9		31.5		36.2		31.4	-	34.0		28.7	-	27.3	-			

Table 15. Second-stubble sugar per ton for seven commercial and three experimental varieties at eight outfield locations in 2019

	HEAVY				LIGHT						
Variety	Allains	Alma	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs./ton)						
HoCP96-540	254.7	228.2	312.2	194.2	213.9 -	263.9 -	194.6 -	209.2 -	200.8 -	221.8	229.3 -
L01-283	276.9	232.1	323.2	217.8	275.7 +	288.4	245.9	286.9 +	245.9	233.9	262.7 +
L01-299	267.5	248.9	317.7	208.0	237.7	286.2	236.4	254.0	227.2	228.5	251.2
HoCP04-838	249.7 -	234.5	316.6	211.6	245.8	265.1 -	228.2	242.9	227.3	220.6	244.2
HoCP09-804	277.8	261.5	303.9	239.5 +	272.0 +	289.0	258.8	270.1	240.7	264.6 +	267.8 +
L11-183	258.7	236.3	314.3	192.7	228.7	272.2	239.2	236.3	207.8	226.5	241.3 -
L12-201	265.7	258.7	322.9	229.8	242.2	277.5	229.9	244.8	230.7	247.7 +	255.0
Ho12-615	264.7	216.0	299.6	213.4	233.5	268.7 -	213.9	259.5	222.9	228.1	242.0
Ho13-739	277.7	274.7	333.0	237.2 +	250.6	290.2	250.8	277.3	249.2	258.0 +	269.9 +

Table 16. Second-stubble stalk weight seven commercial and three experimental varieties at eight outfield locations in 2019

	HEAVY				LIGHT						
Variety	Allains	Alma	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean
					(lbs.)						
HoCP96-540	1.46	1.39	1.50 +	1.72 +	2.45 +	2.05	2.11	1.88 +	1.99 +	1.88	1.84 +
L01-283	1.58	1.45	1.24	1.23 -	1.38	1.45	1.74	1.59	1.30	1.64	1.46
L01-299	1.39	1.45	1.22	1.43	1.79	1.64	1.79	1.54	1.32	1.64	1.52
HoCP04-838	1.45	1.61	1.18	1.37	2.00	1.68	1.74	1.92 +	1.71 +	1.76	1.64
HoCP09-804	1.39	1.04 -	1.18	1.19 -	1.46	1.42	1.34	1.41	1.30	1.20	1.29 -
L11-183	1.40	1.37	1.23	1.67 +	1.92	1.77	1.60	1.71	2.07 +	1.59	1.63
L12-201	1.91 +	1.80	1.76 +	1.92 +	2.41 +	2.44 +	2.04	2.28 +	2.49 +	1.96	2.10 +
Ho12-615	1.33	1.34	0.94 -	1.17 -	1.62	1.52	1.85	1.46	1.36	1.55	1.41
Ho13-739	1.59	1.59	1.47 +	1.58	1.80	1.70	1.99	2.11 +	1.84 +	1.73	1.74 +

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Table 17. Second-stubble stalk number for seven commercial and three experimental varieties at eight outfield locations in 2019

	HEAVY					LIGHT							
Variety	Allains	Alma	Magnolia	Mary	Brunswick	Glendwood	Harper	Lanaux	Ronald Hebert	St. John	Overall Mean		
					(stalks/A)								
HoCP96-540	31242	31818	22096 -	27678 -	16318 -	24035 -	22680 -	30802 -	26267 -	24611 -	25755	-	
L01-283	29903	36346	29782	34696	30526	43499	40456	35736 -	37950 -	34862	35376	-	
L01-299	30579	34808	29712	37376	34357	42378	44263	52628	48142	45658	39990		
HoCP04-838	23732 -	28196	22800	30990	29666	37997	45985	30588 -	30984 -	39909	32085	-	
HoCP09-804	29979	49281 +	29505	45133 +	44505 +	42493	63866 +	51342	41846	57176	45513	+	
L11-183	26150	29047	25404	28173 -	26932	35195	44274	37637 -	25418 -	34768	31300	-	
L12-201	21448 -	30549	21736 -	24982 -	27813	26734 -	32097	26014 -	21354 -	32372	26510	-	
Ho12-615	33094	39612	38929 +	46117 +	38182	47983	49011	49579	43509	45785	43180		
Ho13-739	25970	28185	22866	26793 -	37337	37283	36585	30479 -	37657 -	33456	31661	-	

Table 18. Third-stubble sugar per acre for nine commercial varieties at five outfield locations in 2019.

	HEAVY			LIGHT					
Variety	Allains	Alma	Magnolia	Brunswick	Glendwood	Lanaux	Ronald Hebert	St. John	Overall Mean
				(lbs./A)					
HoCP96-540	4438	4133 -	4221 -	5110 -	4416 -	3272 -	4236 -	5090 -	3869 -
L01-283	5322	6517	4011 -	7691 -	6259	5971	7393	5700 -	6356
L01-299	4683	6291	6506	9852	6438	6747	7938	7508	6851
HoCP04-838	3873	5845	5134	8253	6708	7003	6848	6161 -	5612 -
Ho07-613	4684	6024	4701 -	6671 -	6012	5972	4721 -	4965 -	6567
HoCP09-804	5187	5064 -	3780 -	8767	6965	6643	7885	5632 -	6324
L11-183	5236	4482 -	4655 -	7057 -	4728 -	5916	4896 -	5790 -	5122 -
L12-201	5387	6231	4467 -	8079	7915	5464 -	7083	6460	5466 -
Ho12-615	5682	6118	5692	8418	6792	6347	6294 -	7192	6430

Table 19. Third-stubble cane yield for nine commercial varieties at five outfield locations in 2019

	HEAVY			LIGHT					
Variety	Allains	Alma	Magnolia	Brunswick	Glendwood	Lanaux	Ronald Hebert	St. John	Overall Mean
				(tons/A)					
HoCP96-540	18.5	18.6 -	14.9	21.6 -	19.9 -	16.9 -	17.1 -	23.6 -	19.2 -
L01-283	19.2	26.5	13.5	28.4 -	23.9	23.1 -	28.7	25.0 -	30.1
L01-299	18.5	28.8	21.3	38.3	26.6	29.9	32.1	31.4	32.1
HoCP04-838	15.0	24.3 -	17.8	32.0	26.6	27.3	26.5 -	26.1 -	29.3
Ho07-613	17.1	23.4 -	14.5	24.1 -	22.7	23.3 -	18.1 -	20.8 -	28.0
HoCP09-804	18.2	21.5 -	12.9	31.9	28.4	25.0 -	30.4	24.7 -	27.0
L11-183	19.2	19.8 -	16.9	29.9 -	20.3 -	27.4	19.3 -	28.3 -	26.0 -
L12-201	20.3	25.3	14.9	32.5	30.2	20.8 -	26.2 -	26.3 -	23.6 -
Ho12-615	22.7	25.5	20.5	34.5	28.3	26.1	24.0 -	31.1	31.4

Table 20. Third-stubble sugar per ton for nine commercial varieties at five outfield locations in 2019

Variety	HEAVY			LIGHT					Overall Mean	
	Allains	Alma	Magnolia	Brunswick	Glendwood	Lanaux	Ronald Hebert	St. John		
				(lbs./ton)						
HoCP96-540	240	222	286	238	222 -	192	248	215	201	
L01-283	277 +	247	296	271	262 +	260	258	228	211	
L01-299	254	219	305	260	241	226	248	239	215	
HoCP04-838	260	240	291	256	252	256	261	236	193	-
Ho07-613	273 +	258	324	277	265 +	255	261	239	236	+
HoCP09-804	284 +	234	291	274	245	265 +	260	227	234	
L11-183	271	226	276	236	232	220	254	204	197	
L12-201	265	246	301	248	262 +	263 +	271	245	231	
Ho12-615	253	240	280	245	239	243	262	232	206	

Table 21. Third-stubble stalk weight for nine commercial varieties at five outfield locations in 2019

Variety	HEAVY			LIGHT					Overall Mean	
	Allains	Alma	Magnolia	Brunswick	Glendwood	Lanaux	Ronald Hebert	St. John		
				(lbs.)						
HoCP96-540	1.73	1.42	1.18	1.55	1.56 +	2.04	1.42	1.83 +	1.82	+
L01-283	1.38	1.22	1.12	1.57	1.28	1.66	1.50	1.52	1.42	
L01-299	1.29	1.37	0.95	1.65	1.22	1.74	1.28	1.43	1.30	
HoCP04-838	1.31	1.18	1.11	1.58	1.33	1.60	1.43	1.59	1.47	
Ho07-613	1.55	1.56	1.19	2.05	1.68 +	1.80	1.44	1.86 +	1.84	+
HoCP09-804	1.17	0.97 -	0.90	1.32	1.20	1.38	1.27	1.39	1.26	
L11-183	1.37	1.30	1.12	1.71	1.19	1.75	1.13	1.68	1.48	
L12-201	1.74	1.78 +	1.17	1.90	1.72 +	1.66	1.68	2.25 +	1.69	+
Ho12-615	1.29	1.03 -	1.04	1.42	1.29	1.67	1.07	1.32	1.21	

Table 22. Third-stubble stalk number for nine commercial varieties at five outfield locations in 2019

Variety	HEAVY			LIGHT					Overall Mean
	Allains	Alma	Magnolia	Brunswick	Glendwood	Lanaux	Ronald Hebert	St. John	
				(stalks/A)					
HoCP96-540	21626	26225 -	25535	27767 -	25376 -	16650 -	24322 -	26104 -	21235 -
L01-283	27998	43714	24562	36406	37392	27637	38300	33376 -	42231
L01-299	28959	42365	44591	47574	44378	34362	50297	43926	49648
HoCP04-838	23221	46308	32768	40881	40349	34881	37047	32973 -	40875
Ho07-613	22761	29968	24450	23477 -	27064 -	25875	26502 -	22754 -	30619 -
HoCP09-804	31443	45402	29700	48229	48029	36533	49306	35796 -	42970
L11-183	28969	31259	30835	35813	34611 -	31834	37099	34017 -	35383 -
L12-201	23401	28667 -	28326	34399 -	36095	25132 -	31955 -	23540 -	28232 -
Ho12-615	37154	50051	41335	49170	43707	32451	46399	49066	51779

Table 23. Plantcane means from ten outfield locations in 2019: Alma, Domingues, Landry, Magnolia, Brunswick, Harper, Lanaux, Ronald Hebert, and St. John

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	6309 -	27.4 -	230	2.60 +	21461 -
L01-299	7172	30.2	236	1.98	31186
HoCP04-838	7507	30.7	244	2.01	30882
HoCP09-804	7271	28.7	253 +	1.69 -	34435 +
L11-183	7752	31.9	244	2.28 +	28697
L12-201	6883	27.7	249 +	2.46 +	22547 -
Ho12-615	7980 +	34.4 +	233	1.92	36326 +
Ho13-739	7127	28.1	253 +	2.31 +	24692 -
L14-267	7883	31.1	253 +	2.41 +	25892 -
HoCP14-885	8627 +	32.6	263 +	2.32 +	29799
L15-306	8247 +	32.0	257 +	2.22 +	29320
HoL15-508	7772	29.0	268 +	2.03	29069

Table 24. First-stubble means from ten outfield locations in 2019: Allains, Alma, Landry, Magnolia, Mary, Brunswick, Glenwood, Harper, Lanaux, Ronald Hebert, and St. John

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	4788 -	21.7 -	221.5 -	1.94 +	23119 -
L01-283	6832	26.5	259.1 +	1.69	31686
L01-299	6928	27.8	248.8	1.68	34128
HoCP04-838	6306	25.7	243.3	1.66	31382
HoCP09-804	6788	26.0	261.0 +	1.54	34278
L11-183	5922 -	24.7 -	240.5	1.75	29211 -
L12-201	6301	24.8 -	251.2	2.14 +	23578 -
Ho12-615	7103	29.9	237.6 -	1.54	39530 +
Ho13-739	6733	26.0	259.5 +	1.89 +	28059 -
L14-267	7453	28.0	266.5 +	1.99 +	28726 -
HoCP14-885	7205	28.0	256.6	1.84 +	30682

Table 25. Second-stubble means from eight outfield locations in 2019: Allains, Alma, Magnolia, Mary, Brunswick, Glenwood, Harper, Lanaux, R. Hebert, and St. John

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	5193 -	23.0 -	229 -	1.84 +	25755 -
L01-283	6689 -	25.6 -	263 +	1.46	35376 -
L01-299	7438	30.0	251	1.52	39990
HoCP04-838	6343 -	26.4 -	244	1.64	32085 -
HoCP09-804	7710	29.0	268 +	1.29 -	45513 +
L11-183	6006 -	25.2 -	241 -	1.63	31300 -
L12-201	6884	27.2 -	255	2.10 +	26510 -
Ho12-615	7237	30.3	242	1.41	43180
Ho13-739	7274	27.3 -	270 +	1.74 +	31661 -

Table 26. Third-stubble means from five outfield locations in 2019: Allains, Alma, Magnolia, Brunswick, Glenwood, Lanaux, Landry, R. Hebert, and St. John

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
HoCP96-540	4310 -	18.9 -	229 -	1.62 +	23871 -
L01-283	6136 -	24.3 -	257 +	1.41	34624 -
L01-299	6979	28.8	245	1.36	42900
HoCP04-838	6160 -	25.0 -	249	1.40	36589 -
Ho07-613	5591 -	21.3 -	265 +	1.66 +	25941 -
HoCP09-804	6250 -	24.5 -	257 +	1.21 -	40823
L11-183	5320 -	23.0 -	235 -	1.41	33313 -
L12-201	6283 -	24.5 -	259 +	1.73 +	28861 -
Ho12-615	6552	27.1	245	1.26	44568

Table 27. Combined plantcane means across outfield locations from 2017 to 2019

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	8103	31.8	252 -	2.82 +	23114 -
L01-283	8661	31.7	275 +	2.09 -	30620
L01-299	8476	32.3	262	2.30	28843
HoCP04-838	8993 +	33.4	268 +	2.29	29519
HoCP09-804	8892	32.1	276 +	1.94 -	33646 +
L11-183	9034 +	34.3 +	263	2.46 +	28482
L12-201	9033 +	33.5	269 +	2.95 +	22948 -
Ho12-615	9883 +	37.9 +	260	2.12 -	36034 +
Ho12-630	9192 +	33.6	273 +	2.61 +	26293 -

Table 28. Combined first-stubble means across outfield locations from 2018 to 2019

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	6396 -	27.2 -	232 -	2.31 -	23911 -
L01-283	8327	31.2 -	266 +	1.92	33075
L01-299	8604	33.3	256	1.95	34822
HoCP04-838	7616 -	30.1 -	251	2.00	30932 -
HoCP09-804	8506	31.4 -	270 +	1.73 -	36671
L11-183	7450 -	30.1 -	246 -	2.08 +	29773 -
L12-201	7684 -	29.9 -	255	2.51 +	24190 -
Ho12-615	8689	34.9	247 -	1.79 -	39636 +
Ho12-630	7373 -	28.7 -	255	2.30 +	25934 -

Table 29. Second-stubble means across outfield locations in 2019

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
HoCP96-540	5193 -	23.0 -	229 -	1.84 +	25755 -
L01-283	6689	25.6 -	263 +	1.46	35376
L01-299	7438	30.0	251	1.52	39990
HoCP04-838	6343 -	26.4 -	244	1.64	32085 -
HoCP09-804	7710	29.0	268 +	1.29 -	45513 +
L11-183	6006 -	25.2 -	241	1.63	31300 -
L12-201	6884	27.2 -	255	2.10 +	26510 -
Ho12-615	7237	30.3	242	1.41	43180
Ho13-739	7274	27.3 -	270 +	1.74 +	31661 -

SUCROSE LABORATORY AT THE SUGAR RESEARCH STATION

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

The Sugar Research Station sucrose laboratory processed 3,121 samples during the 2019 harvest season (Table 1). Standard laboratory (wet chemistry) procedures were used to analyze 198 samples, of which, 38 were also processed through the Spectracane FT-NIR instrument. The cane was shredded using a Dedini shredder and the juice 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) was calculated based on the Brix and pol values. The sucrose laboratory processed samples from September 2019 to February 2020.

A total of 2,961 samples were analyzed using the Spectracane FT-NIR instrument of which 31 were energy cane samples. The sample was prepared using a Dedini shredder then fed into the Spectracane unit containing NIR technology to analyze the sample for Brix, pol, sucrose percent, fiber, moisture, purity, and theoretical recoverable sugar. Samples that were spectral outliers were automatically sent into a bin and reanalyzed using wet chemistry procedures.

Table 1. Number of sugarcane samples processed at the Sugar Research Station sucrose laboratory during the 2019 harvest season.

Unit/Project Area	Leader	Number of Samples
School of Plant, Environmental, and	Niranjan Baisakh	322
Soil Sciences	Brenda Tubana	674
	Energy Cane	31
Iberia Research Station	Jeff Hoy	128
Plant Pathology and Crop Physiology	Albert Orgeron	349
LCES	Kenneth Gravois	88
Sugar Research Station/Variety Development	Line Trials	597
	Increase	84
	Nursery	492
	Infield	7
Contract Services		24
TOTAL		3,121

LAES SUGARCANE TISSUE CULTURE LABORATORY

A.Parco[1], D.P.Fontenot[1], and K.A.Gravois[2]
[1]Certis USA, LLC and [2]Sugar Research Station

During 2019-2020 production season, more than 19,000 sugarcane plantlets that were propagated in the Louisiana Agricultural Experiment Station Tissue Culture Laboratory were turned over to Certis USA, LLC, Kleentek Div. for transplanting in the greenhouse at Houma, LA. The number of plantlets transplanted for each sugarcane cultivar is listed in Table 1.

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

Cultivar	Number of Plantlets
Ho 05-961	2,250
Ho 12-615	4,302
Ho 13-739	1,008
HoCP 09-804	1,512
HoCP 14-885	5,490
L 01-299	2,088
L 12-201	1,242
L 14-267	1,782
Total	19,674

THE 2019 LOUISIANA SUGARCANE VARIETY SURVEY

Kenneth A. Gravois[1]
[1]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. According to USDA Farm Service Agency (FSA), there were 482,111 acres planted to sugarcane in Louisiana in 2019.

Agents collected acreage according to variety and crop. A total of nine sugarcane varieties, HoCP 96-540, L 99-226, HoCP 00-950, L 01-283, L 01-299, HoCP 04-838, Ho 07-613, HoCP 09-804, and L 11-183 were listed along with "Others" in the survey. The category of "Others" included, but was not limited to, small acreages of LCP 85-384, HoCP 85-845, CP 89-2143, L 03-371, Ho 05-961, and potential new sugarcane varieties being increased 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 2019 was 482,111 acres.

Sugarcane Distribution by Variety

Statewide sugarcane acreage in percent by variety and crop is shown in Table 2. The leading variety for 2019 was L 01-299, which occupied 56% of the Louisiana sugarcane acreage. This percentage was five points higher than the acreage of L 01-299 in 2018 (Gravois, 2019). HoCP 96-540 was next in total acreage, planted on 15% of the state's acreage. The varieties planted in the next largest areas were L 01-283, HoCP 04-838, and HoCP 09-804, occupying 14%, 4%, and 5% of the state's acreage, respectively. All other varieties in the survey had less than 2% of the planted area for the 2019 crop.

Sugarcane Distribution by Region and Crop

The total sugarcane acreage was highest for the Teche region (195,692 acres), followed by the River-Bayou Lafourche region (158,763 acres), and the Northern region (127,656 acres) [Table 3]. Total FSA reported sugarcane acreage for Louisiana in 2019 was about 23,000 acres higher than in 2018. The northern area showed the greatest increase in acreage, with Pointe Coupee, St. Landry, Avoyelles, and Rapides parishes showing the largest percentage increases compared to 2018.

In 2019, 20.9% of the state's acreage was grown as third and older stubble crops, which was higher than the acreage of the same category for 2018. In 2019, 26.5%, 27.6%, and 25.0% 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 northern region (35.0%) where most new expansion is occurring. For the third and older stubble crops, the Bayou Teche

region had the highest percentage at 23.4%, whereas the River-Bayou Lafourche and Northern regions each had 19.3%.

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 increased planting of L 01-299 and increased older stubble crops devoted to L 01-299. The River-Bayou Lafourche and Northern growing areas planted more L 01-283 than the Bayou Teche region. HoCP 96-540 was more widely grown (22.2%) in the Bayou Teche region, followed by the northern region and the River-Bayou Lafourche region at 10.3% and 8.5%, respectively. The survey showed more HoCP 09-804 in the Bayou Teche and northern regions, areas where mosaic was less prevalent.

Variety Trends

HoCP 96-540, released for commercial planting in 2003, now occupies 15% of the state's 2019 acreage, which is a decrease of five percentage points from the previous year. The variety continues to perform well, but HoCP 96-540 is better adapted to sandier soils because of average stubbling ability. Rust infections can be a problem in its plantcane crop. HoCP 96-540 is an important variety for Louisiana and was re-planted by many growers in 2019.

L 99-226 decreased in acreage by two percentage point from 2018. Sucrose content is very good in the variety, but cane yield at times has been disappointing. There are better varieties out now; therefore, L 99-226 is no longer recommended for planting.

HoCP 00-950 occupied one percent of the state's acreage in 2019. This variety has high sugar per ton of cane and is early maturing. HoCP 00-950 does not grow as well in poorly drained soils and is better suited to the sandier soils in the sugar belt. The variety has a fit for early harvest on better-drained land.

L 01-283, released for commercial planting in 2008, occupied 14 percent of the Louisiana acreage in 2017. 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 rust and sugarcane borer infestations.

L 01-299 was grown on 56% of the state's acreage in 2018. The variety has outstanding stubbling ability and is well suited for both light and heavy soils. The variety has an erect growth habit. L 01-299 can have difficulty establishing after planting and in fields used for seed cane in sandier soils. When cut for harvest, the variety stubbles extremely well. L 01-299 is susceptible to the disease brown stripe and smut – take advantage of healthy seed cane programs. L 01-299 responds well to ripening with glyphosate. Because of plantcane stand establishment and seed cane regrowth problems, growers are cautioned to keep planted acres below 50% and diversify their variety choices.

HoCP 04-838 was released in 2011. This variety has good sugar and cane yield potential, with its most notable attribute being cold tolerance. Cane yield in stubble crops can be erratic; the variety does not appear to take the drought well. HoCP 04-838 had the best juice quality for the greatest length of time following the freeze on November 13, 2019.

Ho 07-613 was released to Louisiana sugarcane growers in 2014. The new variety has good sucrose content but does not stubble well. Ho 07-613 is not recommended for planting.

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. This variety is on the increase. Growers are encouraged to plant HoCP 09-804 from healthy seed cane sources.

L 11-183 was released to growers in 2018. The new variety was derived from the cross HoCP 92-624 and 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. Growers are encouraged to expand acreage of this variety and see where it might fit in their operation.

New sugarcane varieties were released in 2019: L 12-201 and Ho 12-615. Growers are encouraged to increase both varieties and determine where each might fit on their farms. Because both new varieties have a poor cold tolerance rating, keep placement on the farm is important in the event of an early freeze.

The dominance of a single variety can lead to disease and insect shifts. This was seen with brown rust in LCP 85-384 and HoCP 96-540. With acreage of L 01-299 over 50%, growers are cautioned to diversify their sugarcane variety choices. L 01-299 is susceptible to brown stripe disease and was negatively affected by stalk rot and root rot in the spring of 2020. With the release of many new sugarcane varieties in recent years, growers have good choices to diversify.

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.

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Table 1. Total area planted to sugarcane in Louisiana by region and parish, 2019[1]

Region	Parish	2019 Total Acres	% Change from 2018
Bayou Teche	Acadia	5,070.2	14.5
River- Bayou Lafourche	Ascension	18,007.1	-0.5
River- Bayou Lafourche	Assumption	33,656.5	-0.2
Northern	Avoyelles	15,389.3	37.4
Bayou Teche	Calcasieu	99.7	-34.0
Bayou Teche	Cameron	33.4	1.2
Northern	Concordia	175.0	-7.9
Northern	Evangeline	757.2	44.2
Bayou Teche	Iberia	57,726.2	2.5
River- Bayou Lafourche	Iberville	38,110.2	1.6
Bayou Teche	Jefferson Davis	714.8	-3.0
Bayou Teche	Lafayette	9,099.9	-5.5
River- Bayou Lafourche	Lafourche	25,208.1	-1.7
Northern	Pointe Coupee	60,360.1	12.6
Northern	Rapides	15,957.5	25.2
River- Bayou Lafourche	St. Charles	1,387.3	-4.4
River- Bayou Lafourche	St. James	26,739.3	-4.9
River- Bayou Lafourche	St. John the Baptist	6,696.7	3.7
Northern	St. Landry	20,731.3	31.4
Bayou Teche	St. Martin	31,694.4	2.3
Bayou Teche	St. Mary	46,674.8	-1.5
River-Bayou Lafourche	Terrebonne	8,922.8	-3.5
Bayou Teche	Vermilion	43,665.6	7.6
Northern	West Baton Rouge	15,233.3	1.6
	State Total	482,110.6	

[1]Acreage based on USDA, FSA estimates obtained by the county agents.

Table 2. Estimated statewide sugarcane percentage by variety and crop, all regions, 2019[1]

Variety	Plant-cane	First-stubble	Second-stubble	Third-stubble and older	Total
	Percentage				
HoCP96-540	10.3	11.9	18.7	19.0	14.7
L99-226	0.3	0.7	1.8	3.0	1.4
HoCP00-950	0.9	1.3	1.8	3.0	1.5
L01-283	12.3	14.5	15.5	14.8	14.2
L01-299	59.8	60.0	53.4	48.7	55.9
HoCP04-838	2.4	3.5	4.0	7.8	4.3
Ho07-613	0.2	0.1	0.4	1.1	0.5
HoCP09-804	9.5	5.3	3.0	1.3	5.0
L11-183	1.4	0.3	-	-	0.5
Others	2.8	2.3	1.7	1.9	2.2
% Crop	**26.5**	**27.6**	**25.0**	**20.9**	

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

Table 3. Estimated sugarcane distribution by region and crop, 2019[1]

Crop	Bayou Teche	River-Bayou Lafourche	Northern	State Total
Plant-cane Area (acres) Percent (%)	46,191.1 23.6	39,548.4 24.9	42,146.2 33.0	127,885.4 26.5
First-stubble Area (acres) Percent (%)	52,289.0 26.7	45,877.3 28.9	34,803.4 27.3	132,969.8 27.6
Second-stubble Area (acres) Percent (%)	51,475.6 226.3	47,752.5 26.9	26,084.5 20.4	120,312.6 25.0
Third-stubble and older Area (acres) Percent (%)	45,736.1 23.4	30,584.9 19.3	24,3622.2 19.3	100,943.2 20.9
Total area (acres) Percent (%)	195,691.9 40.6	158,762.8 32.9	127,656.3 26.5	482,111

[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, 2019[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	19.3	17.6	24.5	28.0	22.2
L99-226	0.9	1.4	2.9	3.4	2.1
HoCP00-950	2.1	2.6	1.9	3.5	2.5
L01-283	4.8	6.8	6.9	5.5	6.1
L01-299	52.2	55.5	51.5	48.3	52.0
HoCP04-838	3.9	5.7	4.5	6.7	5.2
Ho07-613	0.2	0.2	0.1	0.9	0.4
HoCP09-804	10.4	6.5	5.3	1.7	6.0
L11-183	1.6	0.1	0.0	0.0	0.4
Others	4.5	3.6	2.3	1.8	3.0

[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, 2019[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	5.3	9.6	15.0	11.1	10.3
L99-226	0.0	0.1	0.8	3.3	0.9
HoCP00-950	0.3	0.2	0.5	1.3	0.5
L01-283	14.1	16.6	20.0	20.0	17.5
L01-299	69.4	66.3	57.3	51.5	61.8
HoCP04-838	2.1	2.3	3.9	9.0	4.0
Ho07-613	0.0	0.1	0.4	0.6	0.3
HoCP09-804	5.5	3.4	1.3	1.3	3.0
L11-183	1.9	0.5	0.1	0.0	0.6
Others	1.4	0.8	0.8	1.7	1.1

[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, 2019[1]

Variety	Plant-cane crop (%)	First-stubble crop (%)	Second-stubble crop (%)	Third-stubble crop & older (%)	Total (%)
HoCP96-540	5.1	6.3	13.5	11.9	8.5
L99-226	0.0	0.6	1.4	1.7	0.8
HoCP00-950	0.2	0.9	1.8	1.6	1.0
L01-283	18.8	23.2	24.9	25.6	22.5
L01-299	59.2	58.6	50.7	45.7	54.7
HoCP04-838	1.1	1.9	3.4	8.4	3.2
Ho07-613	0.3	0.1	1.2	2.0	0.8
HoCP09-804	12.3	6.1	1.4	0.7	6.1
L11-183	0.8	0.2	0.0	0.0	0.3
Others	2.2	2.1	1.8	2.4	2.1

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

Table 7. Louisiana sugarcane variety trends, by variety and years, all regions, 2015 - 2019[1]

Variety	Area planted to sugarcane by variety and year (%)						1 Year Change
	2015	2016	2016	2017	2018	2019	
HoCP96-540	33	30	30	25	20	15	-5
L99-226	11	6	6	4	3	1	-2
HoCP00-950	3	4	4	3	2	1	-1
L01-283	9	12	12	12	14	14	0
L01-299	30	36	36	45	51	56	+5
HoCP04-838	9	10	10	8	5	4	-1
Ho07-613	<1	1	1	1	<1	<1	0
HoCP09-804	-	<1	<1	1	3	5	+2
L11-183	-	-	-	-	<1	<1	0

[1] Based on annual variety surveys by county agents, 2015-2019.

PERFORMANCE OF FLORIDA SUGARCANE VARIETIES IN LOUISIANA

Kenneth Gravois[1]
[1]Sugar Research Station

Sugarcane brown rust continues to be a problem for sugarcane growers in Louisiana. The primary means of combatting this disease has been fungicides and breeding resistant varieties. Previous work has identified a QTL (quantitative trait loci) *Bru1* that is associated with resistance to brown rust disease in sugarcane. Unfortunately, the prevalence of *Bru1* is low in the clones used for breeding sugarcane in Louisiana. In fact, the only commercial Louisiana variety that has *Bru1* is L 01-299. The prevalence of *Bru1* in Florida sugarcane varieties is much higher.

Each year a few stalks of each sugarcane variety are obtained from the Kleentek quarantine greenhouse and used to plant a small seed cane increase. Yield trials were planted each subsequent year during August at the Sugar Research Station in St. Gabriel, Louisiana. 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 2019, a new trial was planted on August 19.

Standard cultural practices were followed during each growing season. The first, second, and third stubble trials were harvested on October 3, 2019; the plantcane trial was harvested on November 25, 2019. 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. Each sample was then sent to the laboratory to determine juice Brix (% w/w) by refractometer and pol reading (Zº) by saccharimeter. Sucrose content (lbs/ton of cane) and fiber content were determined by the pre-breaker press method.

Table 1. Plantcane Florida variety yield trials harvested on November 25, 2019 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	8645	39.1	222	10.1
CP06-2042	7443	37.6	198	13.2
CP07-2137	8554	36.0	239	9.6
CP07-2320	9245	35.7	258	7.7
CP08-1110	9650	40.9	236	12.0
CP08-1968	9785	47.5	205	12.5
CP96-1252	9654	41.4	233	9.8
HoCP09-804	11652	45.8	254	14.1
HoCP96-540	7958	37.5	212	11.9
L01-299	11632	49.3	236	11.6
L11-183	10237	46.7	219	11.0

Table 2. First stubble Florida variety yield trials harvested on October 3, 2019 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	6572	32.4	202	10.3
CP04-1935	3516	23.5	152	12.9
CP06-2042	7577	36.4	208	13.2
CP07-2137	4636	25.5	182	10.9
CPCL02-0926	3344	26.5	126	10.3
CPCL05-1102	5773	34.6	167	10.8
CPCL95-2287	3158	19.3	158	11.4
HoCP04-838	5706	32.6	175	12.0
HoCP09-804	7731	42.5	182	13.7
HoCP96-540	3400	18.7	178	10.9
L01-299	7880	42.8	186	12.5

Table 3. Second stubble Florida variety yield trials harvested in 2018 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	6317	38.5	166	9.4
CP03-1912	4404	34.9	127	10.3
CP04-1844	4761	35.5	134	11.2
CP05-1526	4024	26.4	153	11.7
CP05-1791	4862	26.8	183	11.5
CP06-2400	5895	41.4	143	13.0
CP96-1252	4104	30.9	133	11.0
CPCL02-6848	5458	36.8	148	11.9
CPCL05-1102	4403	29.0	153	10.6
CPCL05-1201	5339	33.3	161	10.5
CPCL95-2287	6838	39.3	174	11.4
HoCP04-838	5557	33.0	168	12.1
HoCP96-540	5796	37.2	157	11.4
L01-299	6077	38.1	159	11.7

Table 4. Third stubble Florida variety yield trial harvested on October 3, 2019 at the Sugar Research Station, St. Gabriel, LA

Variety	Sugar Yield	Cane Yield	TRS	Fiber
Third Stubble	lbs/acre	tons/acre	lbs/ton of cane	%
CP00-1101	3866	22.9	167	10.7
CP01-1372	3813	27.5	138	9.6
CP03-1912	3282	27.0	121	9.8
CP04-1566	4753	29.9	157	12.7
CP04-1844	3382	32.2	106	11.1
CP04-1935	5053	34.6	145	12.3
CP05-1791	3914	24.5	160	11.6
CP89-2143	1715	14.3	118	10.6
CPCL02-0926	4218	28.9	146	10.4
CPCL02-1295	3025	24.6	123	12.5
CPCL02-6848	3531	21.8	162	13.4
CPCL05-1102	5017	36.2	139	10.4
CPCL05-1201	5050	35.1	144	11.6
CPCL97-2730	3335	25.5	131	11.7
HoCP04-838	3306	24.3	137	12.4
H0CP96-540	4030	24.9	162	11.3
L01-299	5478	33.9	161	11.9

COLD TOLERANCE OF COMMERCIAL SUGARCANE VARIETIES DURING THE 2019 HARVEST SEASON

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

On November 13, 2020, a temperature of 22° F was recorded for 30 min inside of the outfield test in Cheneyville, LA. The plantcane trial had seven commercial sugarcane varieties and six experimental clones., Outfield trials are planted in a randomized complete block design with three replications; each plot is two rows wide (12 feet), 50 feet long, and has a 5 foot alley between plots.

A decision was made to convert the outfield plantcane test into a cold tolerance test. The test was sampled on November 14, November 21, December 2, December 9, and December 16. The first sampling date served as a baseline for comparison. Eight-stalk samples were cut from 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 Sugar Research Station, St. Gabriel, LA. Each sample was weighed to estimate stalk weight (lbs./stalk). Quality analyses were done using the pre-breaker-press method. Juice was analyzed for Brix by refractometer and pol reading 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 was used to determine sucrose content (lbs./ton of cane).

To evaluate the effect of freezing temperatures on cane deterioration quality, the following 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 December 9 and December 16 sampling dates were 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 year. The growing point and canopy were viable for all varieties prior to the freeze. The varieties in the outfield trial were lodged, which would enhance damage from cold temperature because cold air sinks and pools toward the ground (drainage).

Varieties that were rated as having good cold tolerance were HoCP 96-540 and HoCP 04-838. Varieties with moderate cold tolerance were L 01-299, HoCP 09-804, L 11-183, L 14-267, HoCP 14-885, L 15-306, HoL 15-508, Ho 15-971. Varieties with poor cold tolerance were L 12-201 and Ho 12-615.

Table 1. Sucrose content (lbs./ton) of commercial and near-commercial sugarcane varieties following sub-freezing temperatures (22 F) on November 13, 2019 at Cheneyville, LA

	Sucrose Content (lbs./ton)					Percent change from 11/14	
	Harvest Dates						
Variety	**11/14**	**11/21**	**12/2**	**12/9**	**12/16**	**12/09**	**12/16**
HoCP96-540	189	192	199	177	170	-6.3	-10.2
L01-299	181	192	186	183	145 -	1.0	-5.0
HoCP04-838	195	221	198	192	216	-1.3	9.1
HoCP09-804	225	199	164 -	203	213	-9.7	-20.1
L11-183	221	195	177 -	202	204	-8.5	-12.9
L12-201	217	217	168 -	190	168 -	-12.1	-4.4
Ho12-615	221	196	183 -	140 -	128 -	-36.7	-2.4
Ho13-739	198	204	208	195	173	-1.2	-8.0
L14-267	241	224	222	201 -	193 -	-16.6	-5.0
HoCP14-885	254	246	206 -	232	226	-8.9	-9.0
L15-306	218	211	196	184 -	204	-15.6	-16.3
HoL15-508	240	244	202 -	237	215	-1.1	-9.8
Ho15-971	212	220	197	192	193	-9.3	-11.2

Table 2. Juice purity (%) of commercial and near-commercial sugarcane varieties following sub-freezing temperatures (22 F) on November 13, 2019 at Cheneyville, LA

	Juice Purity (%)					Percent change from 11/14	
	Harvest Dates						
Variety	**11/14**	**11/21**	**12/2**	**12/9**	**12/16**	**12/09**	**12/16**
HoCP96-540	80.7	81.4	82.2	80.4	80.7	0.1	0.1
L01-299	80.5	82.0	78.7	79.9	70.3 -	-0.8	-12.6
HoCP04-838	85.4	86.2	81.0	84.8	89.0	-0.7	4.3
HoCP09-804	89.5	82.5	73.8 -	87.1	86.3	-2.6	-3.6
L11-183	84.7	81.1	75.7 -	83.6	84.4	-1.3	-0.3
L12-201	85.8	85.0	76.1 -	79.9	74.8 -	-6.8	-12.7
Ho12-615	86.7	82.1	78.3	70.5 -	66.1 -	-18.7	-23.7
Ho13-739	82.8	81.7	81.5	84.8	80.2	2.4	-3.1
L14-267	87.9	84.5	84.8	83.4	82.2	-5.2	-6.5
HoCP14-885	88.5	86.0	83.8	85.6	84.0	-3.3	-5.1
L15-306	83.2	82.1	79.6	79.3	81.1	-4.7	-2.5
HoL15-508	85.7	85.1	80.8	84.9	81.1	-0.9	-5.4
Ho15-971	87.0	86.9	82.3	81.4	83.1	-6.4	-4.5

Table 3. Juice pH of commercial and near-commercial sugarcane varieties following sub-freezing temperatures (22 F) on November 13, 2019 at Cheneyville, LA

	pH					Percent change from 11/14	
	Harvest Dates						
Variety	**11/14**	**11/21**	**12/2**	**12/9**	**12/16**	**12/09**	**12/16**
HoCP96-540	5.63	5.46	4.75	5.08	5.16	-9.8	-8.3
L01-299	5.64	5.32	4.82	4.74	4.41	-15.9	-21.8
HoCP04-838	5.59	5.50	4.62	4.92	5.11	-11.9	-8.6
HoCP09-804	5.68	5.42	4.62	4.91	5.13	-13.6	-9.7
L11-183	5.80	5.50	4.54	5.06	5.08	-12.8	-12.4
L12-201	5.64	5.53	4.98	4.76	4.46	-15.6	-20.9
Ho12-615	5.78	5.34	4.82	4.66	4.45	-19.3	-22.9
Ho13-739	5.60	5.39	4.87	5.18	4.90	-7.5	-12.6
L14-267	5.83	5.52	4.69	4.99	4.74	-14.3	-18.6
HoCP14-885	5.70	5.51	4.97	4.92	4.78	-13.8	-16.1
L15-306	5.66	5.45	4.81	4.80	4.95	-15.3	-12.6
HoL15-508	5.62	5.34	4.68	4.57	4.84	-18.7	-13.8
Ho15-971	5.60	5.23	4.88	4.56	4.83	-18.5	-13.8

Table 4. Titratable acidity (ml 0.1 N NaOH/ 10 ml juice to bring pH to 8.3) of commercial and near-commercial sugarcane varieties following sub-freezing temperatures (22 F) on November 13, 2019 at Cheneyville, LA

	Titratable Acidity (ml)					Percent change from 11/14	
	Harvest Dates						
Variety	**11/14**	**11/21**	**12/2**	**12/9**	**12/16**	**12/09**	**12/16**
HoCP96-540	1.80	1.54	1.74	1.58	1.24	-12.2	-31.1
L01-299	1.34	1.83	1.74	1.95	2.41	45.3	79.6
HoCP04-838	1.59	1.81	1.76	1.74	1.27	9.2	-20.5
HoCP09-804	1.38	1.81	2.13	1.93	1.57	39.6	13.5
L11-183	1.31	1.36	2.07	1.49	1.43	13.8	9.2
L12-201	1.45	1.51	1.58	1.91	2.25	31.8	55.3
Ho12-615	1.31	1.89	1.70	2.49	2.86	89.8	117.8
Ho13-739	1.63	1.41	1.65	1.39	1.79	-14.3	10.2
L14-267	1.39	1.34	1.45	1.57	1.95	12.4	40.2
HoCP14-885	1.83	1.39	1.52	1.93	1.95	5.5	6.5
L15-306	1.89	1.71	1.80	2.41	2.07	27.9	9.9
HoL15-508	1.47	1.38	1.87	2.08	1.79	41.8	21.8
Ho15-971	1.67	1.75	1.70	2.09	1.74	25.2	4.4

Table 5. Polysaccharides (ppm/Brix) of commercial and near-commercial sugarcane varieties following sub-freezing temperatures (22 F) on November 13, 2019 at Cheneyville, LA

Variety	Polysaccharides (ppm/Brix) Harvest Dates			Percent change from 11/14	
	11/14	12/9	12/16	12/09	12/16
HoCP96-540	7140	8550	7494	19.7	5.0
L01-299	5775	7517	7414	30.2	28.4
HoCP04-838	7452	8298	6579	11.3	-11.7
HoCP09-804	5678	8478	8403	49.3	48.0
L11-183	4457	7432	8880	66.8	99.2
L12-201	5317	8273	8468	55.6	59.3
Ho12-615	5138	8581	9114	67.0	77.4
Ho13-739	7339	8308	7504	13.2	2.3
L14-267	7135	8401	7406	17.7	3.8
HoCP14-885	5677	6642	7131	17.0	25.6
L15-306	5857	9697	6635	65.6	13.3
HoL15-508	5283	6788	7591	28.5	43.7
Ho15-971	6427	8207	7810	27.7	21.5

Table 6. Sugarcane variety ratings for cold tolerance based on the freeze on November 13, 2019

Variety	Cold Tolerance Category
HoCP96-540	**GOOD**
L01-299	**MODERATE**
HoCP04-838	**GOOD**
HoCP09-804	**MODERATE**
L11-183	**MODERATE**
L12-201	**POOR**
Ho12-615	**POOR**
Ho13-739	**MODERATE**
L14-267	**MODERATE**
HoCP14-885	**MODERATE**
L15-306	**MODERATE**
HoL15-508	**MODERATE**
Ho15-971	**MODERATE**

AN ENRICHED SUGARCANE DIVERSITY PANEL FOR UTILIZATION IN GENETIC IMPROVEMENT OF LOUISIANA SUGARCANE

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Introduction

Modern cultivars have limited genetic variation. Fewer than 20 *S. officinarum* clones are involved in the genealogy of sugarcane cultivars with only a few being used extensively. Basic crosses are made with clones of *S. spontaneum, S. robustum,* and species of other genera within the *Saccharum* complex to broaden the genetic base. In Louisiana, the basic breeding program utilizes wild (basic) clones as nonrecurrent parents, where selected recurrent interspecific hybrids are used for backcrossing.

Commercial sugarcane breeding is labor-intensive and time consuming. In Louisiana, it takes 13 years from crossing to the release of a new variety. Phenotype-based trait selection in conventional breeding can be problematic because of confounding environmental effects. Therefore, accurate phenotypic selection in the early stages of breeding remains a challenge. Selection in the early stages of breeding using family appraisal followed by mass selection attempts to separate the environmental components of total phenotype, but there is typically limited improvement in the genetic gains in sugarcane primarily due to the quantitative nature of the traits with low to moderate heritability. Marker-assisted selection (MAS), on the other hand, could enhance the efficiency of early stage selection as well as selection response of difficult-to-phenotype traits.

Quantitative trait locus (QTL) mapping is widely used to understand the genetics of complex polygenic traits, and it is the first step toward development of trait-based markers for use in MAS. Use of SNP genotyping by sequencing has improved the resolution of QTLs with generation of high-density linkage maps. However, traditional biparental linkage mapping in heterozygous species, such as sugarcane, with only single-dose markers, may identify low-resolution QTLs due to the lack of information on the number/type of alleles at the segregating locus and limited genetic variation in the biparental population.

Genome-wide association study (GWAS), on the other hand, has been used recently to identify marker-trait associations (MTAs) in several plants. GWAS allows identification of QTLs with resolution at the gene level, as it takes advantage of historical and evolutionary recombination events in a genetically diverse population (diversity panel). Further, a diversity panel allows study at the same time of allelic diversity and haplotypes of genes/alleles associated with traits. GWAS is based on linkage disequilibrium (LD), which is high in sugarcane mainly due to relatively few generations between modern cultivars and the limited number of initial clones used in hybridization. The high LD of sugarcane has been exploited to identify markers associated with various traits using a regional diversity panel or core collection.

Saccharum spp. and related genera from countries around the world have been collected into a "World Collection of Sugarcane and Related Grasses" (WCSRG) maintained at the National Germplasm Repository of the USDA-ARS Subtropical Horticulture Research Station, Miami, FL, USA. Various studies have described the diversity in the WCSRG. A 300-clone diversity panel was created based on genetic diversity of 1,002 clones of WCSRG using 231 SSR alleles. A similar panel was developed through phenotypic characterization of the collection. However, these panels did not include clones outside of the world collection. For example, clones that have been procured and maintained by the base broadening (basic breeding) program at the USDA-ARS Sugarcane Research Unit in Houma, Louisiana and elite cultivars and parents used in breeding programs in Louisiana were not included in the diversity analysis. Moreover, ~250 additional clones have been collected into the WCSRG in the last 4-5 years. Therefore, the core collections previously developed may not fully account for the range of variation among the subtropical and temperate sugarcane clones currently being used in Louisiana. Louisiana represents the far northern limit of sugarcane cultivation in the U.S. with frequent freezing during the crop season. Therefore, a sugarcane diversity panel developed from WCSRG and clones in Louisiana breeding programs would facilitate GWAS studies for identification of trait-specific markers for use in marker-assisted breeding in Louisiana and possibly other sugarcane industries. Here, we report on the development of an inclusive sugarcane diversity panel (SDP1) for its utilization in genetic improvement of sugarcane.

Methods

Plant materials

For the diversity panel, 1,485 clones within the *Saccharum* complex, including *Saccharum, Miscanthus*, *Coix*, *Imperata*, and *Sorghum*, were used (Fig. 1). Of these, 1,236 were clones from the WCSRG, 113 clones were elite and historic breeding clones from the Louisiana sugarcane breeding program, 119 were clones of wild/exotic species (not present in WCSRG), and 17 were hybrids from the base-broadening introgression program of the USDA-ARS Sugarcane Research Unit. *Saccharum* spp. previously classified as *Erianthus* spp. including *S. arundinaceum*, *S. bengalense*, *S. ravennae*, *S. rufipilum*, *S. brevibarbe, S. kanashiroi,* and *S. procerum* were grouped together as *Erianthus*-like *S.* spp. (ELSS) for simplicity of analysis.

DNA purification and genotyping

Total genomic DNA was extracted from ~100 mg leaf tissues using the CTAB miniprep and checked for quality and quantity using a ND-100 spectrophotometer (Nanodrop Technologies Inc, Wilmington, DE), as described previously [36]. Four-hundred-fifty SSR primer pairs, including 277 genomic SSRs, 127 eSSRs from sugarcane cold-responsive genes, and 46 eSSRs from brown rust-responsive genes, were initially tested for polymorphism among 113 Louisiana clones. Eleven SSR primer pairs mapped on nine out of 10 sugarcane monoploid homeologous groups and 17 out of 32 pseudochromosomes that had high polymorphism index were selected to evaluate genetic diversity of the 1,485 clones.

The polymerase chain reaction (PCR) and resolution of PCR products were performed following a method described in Gutierrez et al. (2018). Briefly, 50 ng of genomic DNA was used as the template in 10 µl PCR containing 2 µl of 5× buffer, 1 µl of 25 mM $MgCl_2$, 1 µl of 2 mM dNTP mix, 0.1 µl of Taq DNA polymerase and 0.5 µl of 10 µM forward and reverse primer.

A thermal profile of 95°C for 5 min followed by 35 cycles of 95°C for 15 s, 58°C for 15 s, and 72°C for 30 s, and 72°C for 10 min was used. The amplification products were resolved in a 13% polyacrylamide gel using a high-efficiency gel electrophoresis system. Amplified fragments (alleles) were manually scored as "1" (present, dominant) and "0" (absent) in a binary matrix.

Genetic diversity analysis

Alleles at SSR loci occurring in less than 1% of the clones were discarded prior to downstream analysis to reduce false similarity between clones due to shared absence of alleles while still capturing rare alleles. The polymorphism information content (PIC) was computed for each SSR marker following.

GeneAlEx 6.502 was used to compute gene diversity (h), Shannon's information index (I), Nei's genetic distance (D), principal coordinate analysis (PCoA), and an analysis of molecular variance (AMOVA). The AMOVA was done for species groups by recorded names: *S. spontaneum, S. officinarum,* hybrid cultivar*, S. robustum,* ELSS*, S. sinense, S. barberi, Miscanthus* spp., 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 for the mini-core by F_{ST} and N_m values, respectively. For the mini-core, 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 using PopGene 1.32.

Genetic diversity was also analyzed using DARwin 6.0.12 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. Bootstrap analysis was implemented at 1,000 iterations to compute the minimum number of SSR alleles needed to differentiate the species using Bootsie software and the allele numbers were plotted against their corresponding CV values in a bi-plot curve.

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 other was less consistent and occurred three times. An average of the seven runs from the first mode was used for the final result.

Results

SSR genotyping

The 11 SSR primer pairs resulted in a total of 423 polymorphic alleles. The number of alleles per SSR ranged from 13 to 65 with an average of 38. Three sugarcane SSRs on

homeologous group (HG) 4 generated 106 alleles. All other HGs were represented by a single SSR producing 18 (HG 9) to 58 (HG 5) alleles with an average major allele frequency of 0.76. The PIC values ranged from 0.17 to 0.38 with an average of 0.25. The average number of alleles per clone-SSR pair was 8.01 with the maximum being 30.16. The maximum average number of alleles per clone for an SSR was 16.28, which is typical of sugarcane where the basic chromosome number of the species in the population ranges from x = 7 to x = 19. *Saccharum spontaneum*, representing one-third of the population, has a basic chromosome number of 8.

The low frequencies of *S. sinense, S. barberi*, and *Miscanthus* spp. necessitated maintaining minor alleles. Thus, alleles with frequencies between 0.990 and 0.010 were retained for analysis. These bounds were equivalent to the frequency of *Miscanthus* spp. in the population, which was 0.009. All SSR primers produced at least one polymorphic allele with a frequency at or above 0.348, higher than the average allele frequency (0.210).

Gene diversity and allele polymorphism by species

The gene diversity (h) ranged from 0.16 for *Miscanthus* spp. to 0.24 for *S. spontaneum* indicating that *Miscanthus* spp. were the least diverse and *S. spontaneum* the most diverse. The overall average gene diversity of all species groups was 0.21. The number of accessions evaluated for each species apparently influenced the gene diversity. For example, number of *Miscanthus* accessions (14) were 37-fold less than the *S. spontaneum* (516).

The entropy measured by Shannon's information index (I) followed the same trend with those species having higher gene diversity also exhibiting higher entropy. The only exceptions were *S. officinarum* and *S. barberi*, where *S. officinarum* had h = 0.21 but an I = 0.33, and *S. barberi* had an h = 0.21 but an I = 0.33. The I value ranged from 0.25 (*Miscanthus* spp.) to 0.39 for (*S. spontaneum*), with an average of 0.33.

The percentage of polymorphic alleles within a species was apparently directly proportionate to its population size. Again, the polymorphic alleles were highest for *S. spontaneum* (99.3%) and lowest for *Miscanthus* spp. (54.4%).

Genetic distance between species

Based on Nei's pairwise genetic distance (D), the greatest distance was between the hybrid cultivar groups and *Miscanthus* spp. at 0.105, while the shortest genetic distance was between *S. officinarum* and hybrid cultivar groups (0.009), followed by the D between *S. officinarum* and *S. robustum* (0.011). *Miscanthus* spp. were the farthest from the other species groups. *Miscanthus* spp. were closest to ELSS and *S. spontaneum* at D = 0.038 and D = 0.049, respectively, but farthest from *S. sinense* (D = 0.101). The D value between the rest of the species groups and *Miscanthus* spp. ranged from 0.07 to 0.105. The next farthest from the others was ELSS (0.024 to 0.086) followed by *S. spontaneum* (0.032 to 0.060).

Phylogeny and population structure

Neighbor joining with a Dice dissimilarity matrix was also used to evaluate genetic diversity. ELSS, *Miscanthus* spp., and *S. spontaneum* each showed distinct separation from the other species. *Saccharum robustum, S. officinarum,* hybrid cultivars, and *S. edule* grouped together in a major cluster with subclusters concentrated independently with *S. robustum* and hybrid cultivars. *Saccharum sinense* and *S. barberi* also showed distinction, but overall had little

intra-species diversity. *Miscanthus* spp. were most distant from other clones followed by ELSS and *S. spontaneum*.

The eight sub-populations delineated by the structure analysis had near direct correspondence to species groups. The first two sub-populations corresponded to both *S. officinarum* and *S. robustum* with no clear distinction between them. Other sub-populations corresponded to hybrid cultivars, *S. sinense,* and *S. barberi.* ELSS and *Miscanthus* spp. comprised one sub-population, whereas *S. spontaneum* was delineated by two sub-populations.

Principal coordinate analysis (PCoA) showed definite variance between species groups. The coordinates cumulatively accounted for 12.8% of the total variation, with the first three accounting for 8.04, 2.55, and 2.21%, respectively. *Saccharum spontaneum* grouped by itself with some outliers that grouped with the cluster comprising ELSS and *Miscanthus* spp. *Saccharum officinarum, S. robustum,* and hybrid cultivars grouped together but with distinct centroids. *Saccharum sinense* and *S. barberi* formed separate clusters that were close to each other bordering the clusters of the *S. officinarum* and *S. robustum* clones and between the *S. spontaneum* and *S. officinarum* and *S. officinarum*/ *S. robustum*/ hybrid cultivars cluster.

Analysis of molecular variance (AMOVA) was conducted on the 1,485 clones with the sub-populations derived from three independent diversity analysis-based divisions. The first division was based on the clones with nine groups consisting of *S. spontaneum, S. officinarum,* hybrid cultivars*, S. robustum,* ELSS*, S. sinense, S. barberi, Miscanthus,* and others, which included *Coix lacryma-jobi, Imperata* sp*., Sorghum polumosum, Saccharum edule*, and unknown species (Fig. 2). The second division was based on the DARwin neighbor-joining on Dice dissimilarities. Here clones grouping together were considered part of the same species groups. This eliminated the 'other' group and combined *S. officinarum* and *S. robustum* leaving seven groups. Clones falling in the *S. officinarum / S. robustum /* hybrid cultivar complex that were not hybrid cultivars were considered part of the *S. officinarum / S. robustum* group. The third grouping was based on STRUCTURE model estimates using the group that was estimated to contribute the largest proportion to the genome. All three AMOVA showed significant differences within sub-populations with p-values ≤ 0.001. Genetic variation within a sub-population was high (85.1 – 90.7%), whereas 9.3, 14.4, and 14.9% of the variance was attributable to between sub-population variance in the name-based division (groups by species), the DARwin and the STRUCTURE divisions, respectively.

Sugarcane diversity panel (SDP1) selection

A 309-clone diversity panel designated as SDP1 was selected by a combination of the molecular markers-based genetic diversity using the maximum length subtree algorithm in DARwin (238 clones) and Louisiana sugarcane breeders wherein clones (57 Louisiana commercials and 14 basic F1 progeny) were picked from different subclusters maximizing the clones existent in Louisiana to minimize the number of clones to be imported from the WCSRG. SDP1 consisted of 284 clones from Louisiana that represent clusters of clones within WCSRG and Louisiana breeding programs. The remaining 25 clones require importation from the WCSRG. Over 100 of the SDP1 clones were Louisiana hybrid cultivars that consisted of both historic and current clones. Louisiana clones exhibited some clustering, but were fairly well dispersed across the entire study population (Fig. 2). *Saccharum spontaneum*, being a noxious weed, cannot be grown in the field making accurate phenotyping of traits more difficult. Therefore, *S. spontaneum* clones' representation in the SDP1 were intentionally minimized in the panel where hybrids x *S.*

spontaneum F_1s developed by the base-broadening introgression breeding program of the USDA-ARS replaced 31 *S. spontaneum* clones. Representation of the ELSS and *Miscanthus* spp. from the WCSRG were intentionally kept to a minimum. The remainder of SDP1 was proportionally distributed over other species groups (Fig. 1).

The gene diversity (h) for different species groups were comparable, ranging from 0.13 for *Erianthus-like* species to 0.15 for hybrids. The overall average gene diversity of all species groups was lower (0.16). The polymorphic alleles were highest for *S. spontaneum* (88%) followed by 77.8% for hybrids. *Erianthus-like* species had lowest allele polymorphism (40.2%).

Nei's genetic distance (D) showed that *Erianthus-like* group was the most genetically distant from other species (0.029 – 0.041) with the highest D (0.041) with *S. robustum*. Expectedly, D (0.007) was the smallest between hybrid cultivar groups and *S. officinarum*, followed by the equal D (0.016) between *S. officinarum* and *S. robustum* and between *S. officinarum* and *S. barberi*. *Saccharum sinense* and *S. barberi* were genetically close at D = 0.018. Analysis of variance showed significant differences within sub-populations with high genetic variation among the clones within a sub-population (83.0 – 89%), whereas 11-17% variation was attributed to sub-populations by species groups, and DARwin and the STRUCTURE defined divisions.

Taken together, the genetic diversity analysis based on genotypic data of 1,485 clones helped Louisiana breeders in the selection of 309 clones (20.8%) as the SDP1 that, with an average h at 0.163, captured the diversity found in the population (average h at 0.208), including the Louisiana core collections. SDP1 and mini-core shared 324 and 319 alleles, respectively out of 423 alleles in the entire collection of 1,485 clones. The percentage of variation among the populations in the entire collection and SDP1 were comparable. The genetic diversity of the mini-core by cold-responsive genes-derived SSR markers, which potentially affected the function of the cold-responsive proteins, suggested the diversity present for phenotypic traits, in this case cold response, within SDP1. It is now being used for phenotyping of various traits of agronomic importance for GWAS studies to identify markers associated with those traits. Phenotypic characterization within SDP1 can then be used to identify clones of special interest for particular traits, and these results will allow more effective introgression of useful alleles from wild/exotic clones in the already existing sugarcane base-broadening program of Louisiana to improve commercial sugarcane or energy cane variety development. In addition, another important value of SDP1 will be to serve as the validation platform for trait-markers identified from QTL mapping studies involving biparental mapping populations. This function will allow the realization of the potential for molecular breeding for improved cultivar development in sugarcane.

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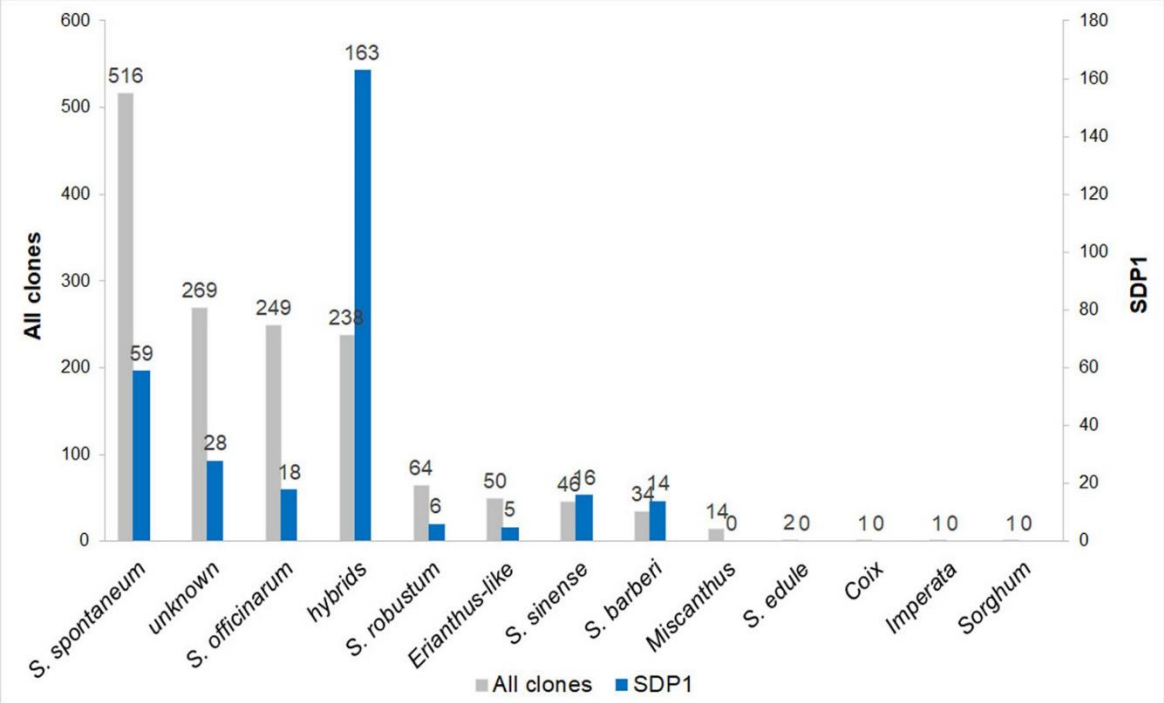

Figure 1. Frequency of species groups for both the full population (1,485 clones) and the diversity panel (309 clones). The two axes are proportional based on set size for comparison. *Erianthus*-like *Saccharum* spp. included *S. arundinaceum*, *S. bengalense*, *S. ravennae*, *S. rufipilum*, *S. brevibarbe, S. kanashiroi, S. procerum,* and unknown species previously identified as *Erianthus.*

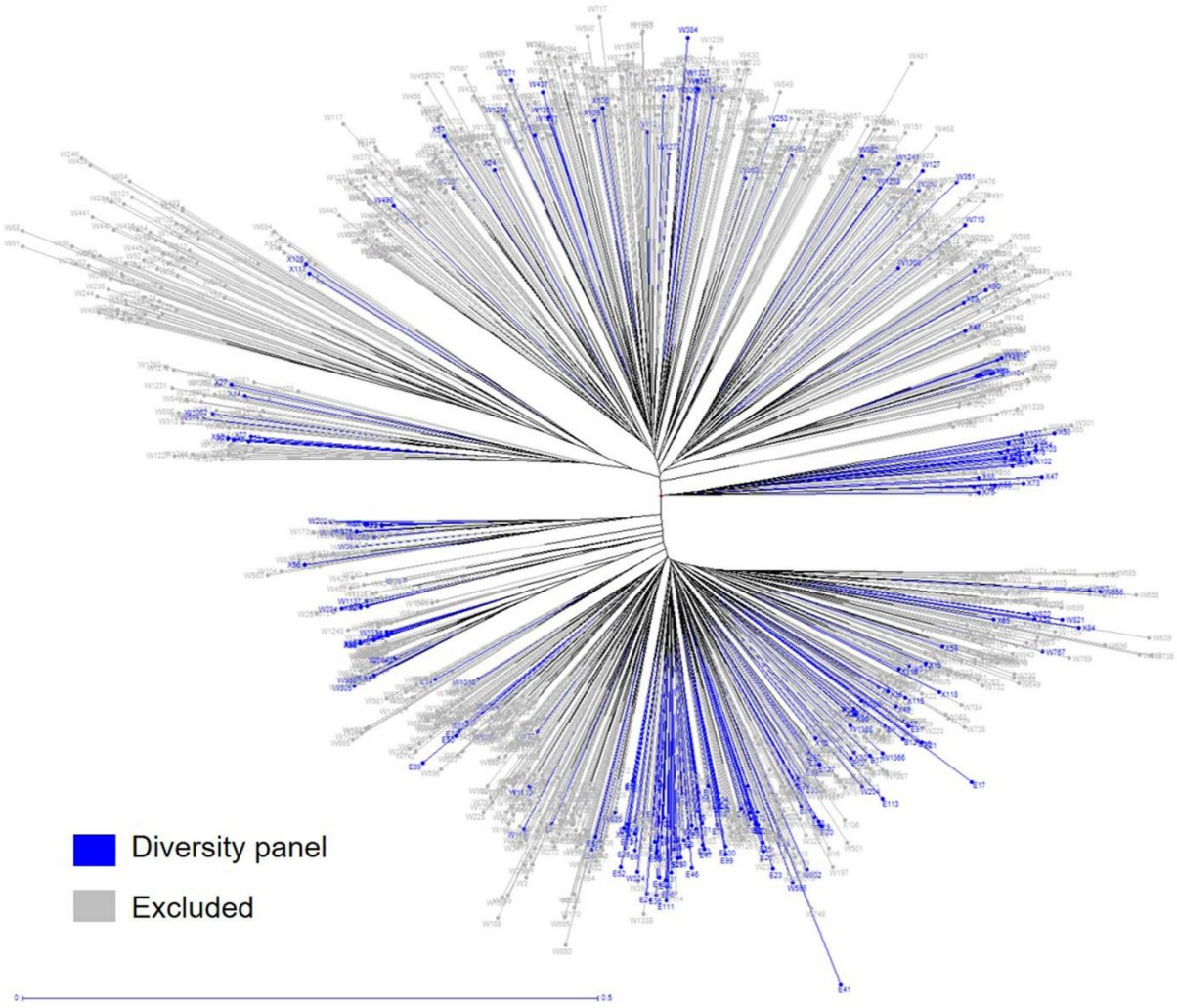

Figure 2. Neighbor-joining tree of 1,485 clones showing 309-clone diversity panel. Two-hundred thirty-eight clones (blue) were selected based on maximum length subtree program with representation from different subclusters. Fifty-seven Louisiana commercial cultivars and 14 F_1 clones from basic based broadening program were included to maximize representation of Louisiana clones and minimize representation of *Saccharum spontaneum*.