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Evaluation of New Canal Point Sugarcane Clones

2009–2010 Harvest Season

Abstract

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Thirty replicated experiments were conducted on 11 farms (representing 4 muck and 3 sand soils) to evaluate 27 new Canal Point (CP) and 41 new Canal Point and Clewiston (CPCL) clones of sugarcane from the CP 05, CP 04, CP 03, CP 02, CPCL 05, CPCL 02, CPCL 01, CPCL 00, CPCL 99, and CPCL 95 series. Experiments compared the cane and sugar yields of the new clones, complex hybrids of *Saccharum* spp., primarily with yields of CP 89-2143 on muck soils and with CP 78-1628 on sand soils, and to a lesser extent, with CP 72-2086 on both soil types. All three reference clones were major sugarcane cultivars in Florida. Each clone was tested for its fiber content and its tolerance to diseases and freezing temperatures. Based on results of these and previous years' tests, CPCL 00-4411 was released for commercial production on muck soils, and CP 03-1912 was released for commercial production on sand soils in Florida.

The audience for this publication includes growers, geneticists and other researchers, extension agents, and individuals who are interested in sugarcane cultivar development.

Keywords: Brown rust, histosol, muck soil, orange rust, organic soil, *Puccinia kuehnii, Puccinia melanocephala, Saccharum* spp., *Sporisorium scitaminea,* sugarcane cultivars, sugarcane smut, sugarcane yields, sugar yields.

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While supplies last, single copies of this publication can be obtained at no cost from Barry Glaz, USDA-ARS-SAA, U.S. Sugarcane Field Station, 12990 U.S. Highway 441 N, Canal Point, FL 33438; or by e-mail at Barry.Glaz@ars.usda.gov.

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Abbreviations

ARS	Agricultural Research Service
CP	Canal Point
CPCL	Canal Point and Clewiston
CV	Coefficient of variation
KS/T	Theoretical recoverable yield of 96° sugar in kg per metric ton of cane
LSD	Least significant difference
NIRS	Near infrared reflectance spectros copy
TC/H	Cane yields in metric tons per hectare
TS/H	Theoretical yields of 96° sugar in metric tons per hectare
USSC	United States Sugar Corporation

Contents

Evaluation of New Canal Point Sugarcane Clones

2009–2010 Harvest Season

B. Glaz, R.W. Davidson, S. Sood, S.J. Edmé, J.C. Comstock, R.A. Gilbert, D. Zhao, N.C. Glynn, and I.A. del Blanco

Breeding and selection for clones that can be used for commercial production of sugarcane, complex hybrids of *Saccharum* spp., support the continued success of this crop in Florida. Though production of sugar per unit area is a principal selection characteristic, it is not the only factor on which sugarcane is evaluated. In addition, analyses are made on the concentration of sugar and on the fiber content of the cane. The economic value of each clone integrates its harvesting, transportation, and milling costs with its expected returns from sugar production. Deren et al. (1995) developed an economic index for clonal evaluation in Florida. Evaluation of clonal suitability also includes its reactions to endemic pathogens.

This report summarizes the cane production and sugar yields of the clones in the plant-cane, first-ratoon, and second-ratoon stage 4 experiments sampled in Florida's 2009-2010 sugarcane harvest season. This information is used to identify commercial cultivars in Florida and identify clones with useful characteristics for the Canal Point sugarcane breeding and selection program. The information is also used by representatives of other sugarcane industries to request Canal Point clones. Throughout this report, the term clone or genotype refers to a genetically unique sugarcane entry in the Canal Point sugarcane breeding and selection program. The term sugarcane cultivar refers to any genotype that was released for commercial production.

The time of year and the duration that a clone yields its highest quantity of sugar per unit area are important because the Florida sugarcane harvest season extends from October to April. Because sugarcane is commercially grown in plant and ratoon crops, clones are evaluated accordingly. Adaptability to mechanical harvesters is an important trait in Florida. All sugarcane sent to Florida mills and much of the sugarcane used for planting is mechanically harvested. Before a new clone is released, Florida growers judge its acceptability for mechanical operations.

Genotypes with desired agronomic characteristics also must be productive in the presence of harmful diseases, insects, and weeds. Some pathogens rapidly develop new, virulent races or strains. Because of these changes in pathogen populations, clonal resistance is not considered permanent. The selection team at Canal Point uses some genotypes as parents that are superior for agronomic traits but too susceptible to pests to be grown commercially, but does not advance these genotypes in its selection program.

Two rust fungi in Florida have infected a large number of genotypes in the Canal Point program. From 2000 to 2005, this program discarded 15 clones that were within 1 year of commercial release because of new infections of brown rust, caused by *Puccinia melanocephala* Syd & P. Syd. During the summer of 2007, orange rust, caused by *Puccinia kuehnii* E.J. Butler, was detected, infecting commercial sugarcane fields in Florida (Comstock et al. 2008). Since 2007, the Canal Point program has been applying increasingly stricter selection criteria against both rust fungi. Therefore, fewer clones than previously advanced to stage 4 are susceptible to brown or orange rust. The percentage of clones susceptible to either of the rust fungi began declining with clones of the CP 03 and CPCL 00 series that advanced to stage 4 in 2009.

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The pathogen against which this program has had its most success in selecting resistant cultivars is sugarcane smut, caused by *Sporisorium scitaminea* (Syd.) M. Piepenbring, M. Stoll, & F. Oberwinkler. Other diseases the Canal Point program must contend with are leaf scald, caused by *Xanthomonas albilineans* (Ashby) Dow; sugarcane mosaic strain E.; and sugarcane yellow leaf virus, a disease caused by a luteovirus (Lockhart et al. 1996). Flynn et al. (2005) suggested that losses in sucrose yield due to sugarcane yellow leaf virus ranged from -3.4 (that is, a 3.4 percent increase) to 8.0 percent in Florida.

Ratoon stunting caused by *Leifsonia xyli* subsp. *xyli* Evtsuhenko et al. has probably been the most damaging, though the least visible, sugarcane disease in Florida. Dean and Davis (1990) reported that ratoon stunt caused sucrose yield losses of 5 percent in Florida. More recently, Comstock (2008) reported that ratoon stunt infections in the plant-cane and first-ratoon crops reduced stalk number, cane yield, and sucrose yield. Reductions were not always significant when compared with healthy plants, but trends were consistent. A program proposed by Comstock et al. (2001) is used at Canal Point to improve resistance of clones to ratoon stunting. In addition to improved resistance, growers can also minimize yield losses by planting stalks that do not contain the bacteria that cause ratoon stunting. This can be accomplished either by planting stalks that have been treated with hot-water therapy that kills the ratoon-stunting pathogen or by using disease-free stalks derived from meristem tissue culture.

In addition to brown rust, orange rust, and ratoon stunting, scientists at Canal Point screen clones in their selection program for resistance to smut, leaf scald, sugarcane yellow leaf virus, mosaic, and eye spot caused by *Bipolaris sacchari* (E.J. Butler) Shoemaker. Eye spot is not currently a commercial problem in Florida.

Recently, researchers in Florida have begun assessing fungicide control of sugarcane orange rust. Otherwise, sugarcane growers in Florida prefer to rely on genotype resistance to sugarcane diseases. However, it is increasingly difficult to develop high-yielding cultivars that are resistant to all diseases, so growers are also accepting some new cultivars with tolerance, rather than resistance, to some diseases. In the 2009 growing season, 7 cultivars made up 86.8 percent of Florida's sugarcane (Rice et al. 2010). All seven of these cultivars—CP 72-2086 (Miller et al. 1984), CP 78-1628 (Tai et al. 1991), CP 80-1743 (Deren et al. 1991), CP 84-1198 (Glaz et al. 1994), CP 88-1762 (Tai et al. 1997), CP 89-2143 (Glaz et al. 2000), and CP 96-1252 (Edmé et al. 2005)—were at least moderately susceptible to one or more of the following sugarcane diseases: brown rust, orange rust, mosaic, leaf scald, smut, and ratoon stunting. Glaz et al. (1986) presented a mathematical model and procedure to help growers distribute their available sugarcane cultivars while considering possible attacks of new pests.

Damaging insects in Florida are the sugarcane borer, *Diatraea saccharalis* (F.); the sugarcane lace bug, *Leptodictya tabida;* the sugarcane wireworm, *Melanotus communis;* the sugarcane grub, *Ligyrus subtropicus;* and the West Indian cane weevil, *Metamasius hemipterus* (L.).

Winter freezes are common in the region of Florida where much of the sugarcane is produced. The severity and duration of a freeze and the tolerance of specific sugarcane cultivars are the major factors that determine how much damage occurs. The damage caused by such freezes ranges from no damage to death of the mature sugarcane plant. The rate of deterioration of juice quality after a freeze depends on cultivar tolerance and the ambient air temperature: Warmer post-freeze temperatures result in more rapid deterioration of juice quality. Freezes also damage young sugarcane plants. Stalk populations may decline after severe freezes kill aboveground parts of recently emerged plants. The most severe damage occurs when the growing point is frozen, which is more likely if the plant has emerged from the soil. Tai and Miller (1996) reported that resistance to a light freeze (1.7 °C to -2.8 °C) was not significantly correlated to fiber content, but resistance to a moderate freeze (-5.0 °C) was.

The U.S. Sugarcane Corporation (USSC), based in Clewiston, Florida, discontinued its breeding program in 2004. Approximately the top 25 percent of clones in all selection stages from the USSC program were donated to the Canal Point program. Clones from the USSC program were designated with a CL (Clewiston) prefix. Each donated clone described in this report has a CPCL (Canal Point and Clewiston) designation.

Each year at Canal Point, 40,000 to 70,000 seedlings are evaluated from crosses derived from a diverse germplasm collection. However, based on a pedigree analysis, Deren (1995) suggested that the genetic base of U.S. sugarcane breeding programs was too narrow. About 80 percent of the genome in commercial sugarcane is *Saccharum officinarum.* This year, 67.1 percent of our parental clones adapted to Florida originated from the Canal Point breeding program, while the remainder were developed by USSC (25.2 percent were CPCL clones and 7.7 percent were CL clones). Additional parents not adapted to Florida originated from Louisiana or Texas breeding programs as well as from programs outside the United States.

The seedling stage planted in 2010 contained approximately 40,000 new clones that originated from true seeds first planted in the greenhouse and later transplanted to the field. Once selected as seedlings, clones are vegetatively propagated. Because of this vegetative propagation, from this stage (seedling stage) on in the selection program, each plant (clone) is genetically identical to its precursor, assuming no mutations. The stage 1 trial planted in January 2010 contained 12,044 new genotypes. The first stage 2 trial planted in November 2009, had 1,545 new clones planted on a muck soil and a second stage 2 trial had 491 new clones planted on a sand soil. There were 136 new clones in stage 3 (135 clones of the CP 09 series) that were tested in replicated experiments on 4 grower farms; plus an additional 134 clones of the CP 09 series that were planted at one location with a sand soil. Seedling, stage 1, and stage 2 tests were evaluated for 1 year in the plant-cane crop at Canal Point, and the additional stage 2 test was evaluated for 1 year on a sand soil at the USSC Townsite Farm (Townsite). Selection is visual in the seedling phase. In stage 1, the first selection process is visual; then the clones that are selected visually are analyzed with a hand-punch Brix, and heavy emphasis is placed on these Brix values. The primary selection criteria for stage 2 and all subsequent stages are sugar yield (in metric tons of sugar per hectare), theoretical recoverable sucrose, cane tonnage, and disease resistance.

The stage 3 genotypes are evaluated for 2 years, 1 year in the plant-cane crop followed by 1 year in the first-ratoon crop. For the group of stage 3 clones grown on three muck soils and one sand soil, independently for muck and sand soils, the 13 most promising clones receive continued testing for 4 more years in the stage 4 experiments in which they are planted in successive years and evaluated in the plant-cane, first-ratoon, and second-ratoon crops. Genotypes that successfully complete these experimental phases undergo 2 to 4 years of evaluation and expansion by the Florida Sugar Cane League, Inc., before commercial release. Some of the League's evaluation occurs concurrently with the stage 4 evaluations. The Canal Point selection program is summarized in appendix 1. The stage 2 and 3 tests at Townsite are not included in the appendix because the cycle of selection from these tests has not yet been completed.

Edmé et al. (2005) found that the CP program has been responsible for substantial sugarcane yield improvements in Florida. However, these yield improvements occurred on the muck soils on which sugarcane is grown in Florida (about 80 percent of Florida's sugarcane) and not on the 20 percent of Florida's sugarcane that is grown on sand soils. Based on this finding, scientists are conducting a comprehensive review of the CP program to identify changes that can improve results for sand soils without compromising successes on muck soils. Glynn et al. (2009)

reported that it would be unlikely to expect improvement in selecting genotypes for sand soils by adding a stage 2 on sand soils. Del Blanco et al. (2010) reported that adding more than six replications to the stage 4 tests on sand soils would not appreciably improve experimental precision, but that increasing the number of sand locations in stage 4 would be of most benefit in improving the ability of stage 4 to identify high-yielding cultivars for sand soils. Based on the recommendation of Glaz and Kang (2008), one location with a muck soil was dropped from stage 4 and one with a sand soil was added. Thus, this program now plants stage 4 at three, rather than at two locations on sand soils without increasing the total number of locations in stage 4.

Clones with characteristics that may be valuable for sugarcane breeding programs are identified throughout the selection process. Even though the Canal Point program breeds and selects sugarcane in Florida, some CP clones have been productive commercial cultivars in Texas and outside of the United States. An example of the potential adaptability of Canal Point genotypes is CP 88-1165 (Juárez et al. 2008). CP 88-1165 was not selected for commercial use in Florida, but scientists in Guatemala requested it from Canal Point and later selected it for commercial use in Guatemala. Sugarcane geneticists in other programs often request clones from Canal Point. From May 2009 to April 2010, clones or seeds from the Canal Point program were requested from and sent to Argentina, Australia, Bahamas, China, Costa Rica, Egypt, El Salvador, France, Guatemala, Honduras, Mexico, Nicaragua, Pakistan, Panama, Philippines, and Tanzania.

Test Procedures

In 30 experiments, 68 new CP and CPCL clones (27 CP clones and 41 CPCL clones) were evaluated. Three clones of the CP 05 series, six clones of the CPCL 02 series, and four clones of the CPCL 05 series were evaluated at five farms with muck soils in the plant-cane crop. Three clones of the CP 05 series, seven clones of the CPCL 02 series, and three clones of the CPCL 05 series were evaluated at three locations with sand soils in the plant-cane crop. Seven of these clones—CP 05-1526, CP 05-1740, CPCL 02-6848, CPCL 02-7610, CPCL 02-8001, CPCL 05-1201, and CPCL 05-1791—were evaluated at all eight locations (muck and sand soils). The clones evaluated only at locations with muck soils were CP 05-1466, CPCL 02-6225, CPCL 02-7190, CPCL 02-8071, CPCL 05-1102, and CPCL 05-1300. The clones evaluated only at locations with sand soils were CP 05-1679, CPCL 02-7080, CPCL 02-7386, CPCL 02-7500, CPCL 02-8072, and CPCL 05-1009.

Five clones of the CP 04 series, seven clones of the CPCL 02 series, and one clone of the CPCL 95 series were evaluated at two farms with muck soils in the plant-cane crop and at five farms with muck soils in the first-ratoon crop. Eight clones of the CP 04 series and five clones of the CPCL 02 series were evaluated at three farms with sand soils in the first-ratoon crop. Eight clones—CP 04-1252, CP 04-1321, CP 04-1619, CPCL 02-0843, CPCL 02-0908, CPCL 02-0926, CPCL 02-1295, and CPCL 02-2913—were evaluated at all ten locations (muck and sand soils). The five clones that were evaluated on muck soils only were CP 04-1367, CP 04-1426, CPCL 95-2287, CPCL 02-2273, and CPCL 02-2975; and the five clones that were evaluated on sand soils only were CP 04-1258, CP 04-1374, CP 04-1566, CP 04-1844, and CP 04-1935.

Three clones of the CP 03 series, eight clones of the CPCL 00 series, and two clones of the CPCL 01 series were evaluated at two farms with muck soils in the first-ratoon crop and at six farms with muck soils in the second-ratoon crop. Seven clones of the CP 03 series, three clones of the CPCL 00 series, and three clones of the CPCL 01 series were evaluated at two farms with sand soils in the second-ratoon crop. Eight clones—CP 03-1160, CP 03-1491, CP 03-2188, CPCL 00-1373, CPCL 00-4027, CPCL 00-6131, CPCL 01-0271, and CPCL 01-0571—were evaluated at all ten locations (muck and sand soils). The five clones that were evaluated on muck soils only were CPCL 00-0129, CPCL 00-0458, CPCL 00-4111, CPCL 00-4611, and CPCL 00-6756. The five clones that were evaluated on sand soils only were CP 03-1173, CP 03-1401, CP 03-1912, CP 03-1939, and CPCL 01-0877. Six clones of the CP 02 series and seven clones of the CPCL 99 series were evaluated at two farms with muck soils in the second-ratoon crop.

Cultivar CP 89-2143 was the primary reference clone on muck soils, and cultivar CP 78-1628 was the primary reference clone on sand soils. In 2009, CP 89-2143 was the most widely grown cultivar in Florida, and CP 78-1628 the most widely grown cultivar on sand soils in Florida (Rice et al. 2010). CP 72-2086 was sometimes used as a reference clone for KS/T. CP 72-2086 was the sixth most widely grown cultivar in Florida in 2009 (Rice et al. 2010).

Agronomic practices, such as fertilization, pest and water control, and cultivation were conducted by the farmer or farm manager responsible for the field in which each experiment was planted.

The plant-cane and second-ratoon experiments at A. Duda and Sons, Inc. (Duda), southeast of Belle Glade; four experiments (plant cane and first ratoon not planted in the successive rotation and the two ratoon experiments in the successive rotation) planted at Okeelanta Corporation (Okeelanta), south of South Bay; and the first-ratoon experiment at Sugar Farms Cooperative North—SFI Region S05 (SFI) near 20-Mile Bend in Palm Beach County—were conducted on Dania muck soil. As described by Rice et al. (2002), Dania muck is the shallowest of the histosols (organic soils) comprised primarily of decomposed sawgrass (*Cladium jamaicense* Crantz) in the Everglades Agricultural Area. The maximum depth to the bedrock of Dania muck is 51 cm. The other organic soils similar to Dania muck are Lauderhill muck (51 to 91 cm depth to bedrock), Pahokee muck (91 to 130 cm to bedrock), and Terra Ceia muck (more than 130 cm to bedrock).

All experiments at Knight Management, Inc. (Knight), southwest of 20-Mile Bend; the plant-cane and second-ratoon experiments at SFI; the two ratoon experiments at Wedgworth Farms, Inc. (Wedgworth), east of Belle Glade; the plant-cane experiment in the successive rotation and the second-ratoon experiment that was not planted in the successive rotation at Okeelanta; the first-ratoon experiment at Duda; and the second-ratoon experiment planted at Sugar Farms Cooperative North—Osceola Region S03 (Osceola) were conducted on Lauderhill muck.

The plant-cane experiment at Wedgworth was conducted on Pahokee muck. The three experiments at Eastgate Farms, Inc. (Eastgate), north of Belle Glade, were conducted on Torry muck. The three experiments at Hilliard Brothers of Florida, Ltd. (Hilliard), west of Clewiston, were on Malabar sand. All three experiments at Lykes Brothers, Inc. (Lykes), near Moore Haven in Glades County, were on Pompano fine sand, and the plant-cane and first-ratoon experiments at United States Sugar Corporation—Townsite (Townsite) were on Margate sand.

At Okeelanta, clones of the CP 04 and CPCL 02 series in the plant-cane crop; CP 03, CPCL 00, and CPCL 01 series experiment in the first-ratoon crop; and the CP 02 and CPCL 99 series in the second-ratoon experiment were planted on fields in successive sugarcane rotations. In this rotation in Florida, a new crop of sugarcane is planted within about 2 months of the previous sugarcane harvest, a practice that increases the number of harvests per year but decreases yields per hectare (Glaz and Ulloa 1995). All other experiments were planted in fields that had not been cropped to sugarcane for approximately 1 year. In all experiments, plots were arranged in randomized-complete-block designs with six replications.

In all experiments of CP and CPCL clones, all plots had three rows: a border row and two inside rows used for yield determination. These two rows were 10.7 m long and 3.0 m wide (0.0032 ha). The distance between rows was l.5 m, and 1.5-m alleys separated the front and back ends of the plots; except that at Hilliard, Lykes, and Townsite, alleys were 1.8 m wide. The outside row of each plot was a border row, and it was usually planted with the same genotype as the two adjacent rows. All inside rows of each plot in all replications and the border row of each plot in three replications were planted with two lines of stalks. The border row of each plot in the remaining three replications was planted with one line of stalks. Experiments were two clones (6 rows) wide, and each replication was 16 plots long. An extra 1.5 m of sugarcane protected each row at the front and back of each test.

Samples of 10 stalks were cut from unburned cane from a middle row of each plot in each experiment between October 16, 2009, and February 10, 2010. In addition, preharvest samples of 10 stalks were cut from 2 replications of all plant-cane experiments between October 8 and October 15, 2009. Once a stool of sugarcane was chosen for cutting, the next 10 stalks in the row were cut as the 10-stalk sample. The range of sample dates for each crop was as follows:

Plant-cane crop	December 9, 2009, to February 10, 2010
First-ratoon crop	October 30, 2009, to February 8, 2010
Second-ratoon crop	October 15, 2009, to February 2, 2010

After each stalk sample was transported to the USDA-Agricultural Research Service (ARS) Sugarcane Field Station at Canal Point, FL, for weighing and milling, crusher juice from the milled stalks was analyzed for commercial recoverable yield of 96° sucrose, in kilograms per metric ton of cane (kilograms sucrose per ton of cane: KS/T), which was determined as a measure of sugar content. The KS/T of juice extracted from milled sugarcane is calculated with a formula that uses measurements of the juice Brix (soluble solids) and optical rotation (Arceneaux 1935). Brix is read by a hydrometer and is measured as grams per kilogram, and the optical rotation is read on a polarimeter and is measured as °Z (International Sugar Scale). The fiber percentage of each clone was used to calculate commercial recoverable yield (Legendre 1992). The values of theoretical recoverable yield determined by the Legendre (1992) method were multiplied by 0.86 to estimate the commercial recoverable yield in a Florida sugarcane mill. Brix and optical rotation were usually estimated by near-infrared reflectance spectroscopy (NIRS); for samples with unacceptable NIRS calibrations, Brix and optical rotation were measured by refractometer and polarimeter, respectively.

Using 3-stalk samples collected from border rows, an average of 11, 17, 14, 16, 12, 16, 14, 14, and 16 fiber samples were calculated for the clones of the CP 02, CP 03, CP 04, CP 05, CPCL 95, CPCL 00, CPCL 01, CPCL 02, and CPCL 05 series, respectively. Leaves were stripped from these stalks, which were then processed through a Jeffco1 cutter-grinder (Jeffries Brothers, Ltd., Brisbane, Queensland, Australia). About 400 g of material (bagasse) processed through the cutter-grinder was collected and weighed. Juice was extracted from the bagasse by pressing it at 69 MPa for 30 seconds. Brix of the juice was measured by refractometer. The pressed bagasse was then weighed, crumbled, placed in paper bags, and dried at 60° C until it reached a constant weight. Fiber percentage was then measured as described by Tanimoto (1964). All fiber percentages calculated on a given day were corrected to the historical fiber percentage of the reference clone.

Total millable stalks per plot were counted between June 11 and September 4, 2009. Cane yields, in metric tons per hectare (tons cane per hectare: TC/H), were calculated by multiplying stalk weights by number of stalks. Theoretical yields of sugar (in metric tons per hectare: TS/H) were calculated by multiplying TC/H by KS/T and dividing by 1,000.

To assess freeze tolerance, stage 4 clones were subjected to freezing temperatures in three field experiments established at the Hague Farm of the Florida Institute of Food and Agricultural Sciences, University of Florida, in Hague, near Gainesville, FL. Air temperatures usually go down to -8 °C at the testing site during winter months, which guarantees exposure of the clones to harsher freeze temperatures than normally found in south Florida. Clones of the CP 02 and CPCL 99 series were planted on March 16, 2006, as randomized-complete-block experiments with four replications in single-row plots 2.4 m long and 3.0 m apart. Plots had 2.4 m breaks between replications and clones were compared with three reference cultivars—CP 72-2086, CP 78-1628, and CP 89-2143. Five stalks were sampled from each plot on January 13, February 6, and March 5, 2007. Clones of the CP 03, CP 04, CPCL 00, and CPCL 01, CPCL 02, and CPCL 95 series were planted similarly to the previous series on February 25, 2009. Five-stalk samples were collected from the first-ratoon crop on December 10 and 17, 2010, and on January 10 and 27, 2011. Freeze-tolerance rankings for all three experiments were based on KS/T values of clones on each sampling date. For example, if a clone had the highest KS/T on each sampling date, it would be ranked 1 (best) for freeze tolerance. In addition, rate of KS/T decline per day was determined. Hypothetically, a clone could have the highest rate of decline (an indication of poor freeze tolerance) and still have a good ranking for freeze tolerance if its KS/T started high and remained high.

Prior to their advancement to stage 4, CP clones were evaluated in separate tests, by artificial inoculation, for susceptibility to sugarcane smut, sugarcane mosaic virus, leaf scald, and ratoon stunting. CP clones were inoculated in stage 2 plots to determine eye spot susceptibility. After being advanced to stage 4, separate artificial-inoculation tests were repeated on clones for smut, ratoon stunting, mosaic, and leaf scald. Each clone was also field rated for its emergence, early plant height, tillering, and shading, as well as for its reactions to natural infection by sugarcane smut, sugarcane brown rust, sugarcane orange rust, sugarcane mosaic virus, and leaf scald in stage 4.

Statistical analyses of the stage 4 experiments were based on a mixed model using SAS software (SAS version 9.2, 2008; SAS Institute, Inc., Cary, NC) with clones as fixed effects and locations and replications as random effects. Least squares means were calculated for clones. Means of locations were estimated by empirical best linear unbiased predictors. Significant differences were sought at the 10-percent probability level. Differences among clones were tested by the least significant difference *(LSD),* which was used regardless of significance of F-ratios to protect against high type-II error rates (Glaz and Dean 1988). The SAS estimation of the mean square error used for separating clone means was the error term used to calculate this *LSD.* Clones that had significantly higher yields than the reference clone were also identified by individual t tests calculated by SAS. Values of *LSD* were also calculated to approximate significant differences among locations using the mean square error of replications within locations as the error term.

Results and Discussion

Table 1 lists the parentage, increase status, percentage of fiber, and reactions to smut, brown rust, orange rust, leaf scald, mosaic, and ratoon stunting for each clone included in these experiments. Tables 2-5 contain the results of clones from the CP 05, CPCL 02, and CPCL 05 series in plant-cane experiments at locations with muck soils, and tables 6-7 contain the results of plant-cane experiments of clones from these series planted at locations with sand soils. Tables 8-9 contain the results of plant-cane experiments of clones from the CP 04, CPCL 95, and CPCL 02 series, and tables 10-12 and tables 13-14 contain results for clones from these three series in first-ratoon experiments on muck and sand soils, respectively. Table 15 contains the results of the CP 03, CPCL 00, and CPCL 01 first-ratoon experiments; tables 16-18 contain the results for clones from these three series in second-ratoon experiments on muck soils; and table 19 contains results for clones from these three series in second-ratoon experiments on sand soils. Table 20 contains the results of the CP 02 and CPCL 99 second-ratoon experiments. Table 21 gives the dates that stalks were counted in each experiment. Table 22 gives freeze-tolerance ratings for clones of the CP 02, CP 03, CP 04, CPCL 95, CPCL 99, CPCL 00, CPCL 01, and CPCL 02 series.

Plant-Cane Crop, CP 05, CPCL 02, and CPCL 05 Series on Muck Soils

When averaged across all five locations, CPCL 05-1102 was the only clone that yielded significantly more TC/H (metric tons of cane per hectare), KS/T (theoretical recoverable yield of 96° sugar in kg per metric ton of cane), and TS/H (metric tons of sugar per hectare) than CP 89-2143 (tables 2, 4 and 5). The preharvest KS/T values of CPCL 05-1102 and CP 89-2143 were similar (table 3). CL 88-4730, a high yielding proprietary genotype of USSC, was the male parent of CPCL 05-1102 (table 1).

Three new clones—CP 05-1526, CPCL 02-6848, and CPCL 05-1791—had significantly higher mean yields of TC/H and TS/H than CP 89-2143, but significantly lower yields of KS/T than CP 89-2143 (table 4). The preharvest KS/T yields of all three of these clones and CP 89-2143 did not differ significantly (table 3). Cultivar CP 98-1029 (Edmé et al. 2006) was the female parent of CP 05-1526, and cultivar CP 96-1252 was the female parent of CPCL 05-1791 (table 1). The male parent of CPCL 05-1791 was CL 90-4725, a high yielding proprietary genotype of USSC. CP 05-1466 also had significantly higher yields of TC/H and TS/H than CP 89-2143 (tables 2 and 5), and its preharvest and harvest KS/T values were similar to those of CP 89-2143 ((tables 3 and 4).

CPCL 05-1201 had higher TC/H than CP 89-2143 (table 2). However, the KS/T of CPCL 05-1201 was significantly lower than that of CP 89-2143 (table 4). CPCL 05-1201 still had a high yield of TS/H (not significantly lower than any new clone except CP 05-1526 and CPCL 02-6848), but due to its low KS/T value, the TS/H of CPCL 05-1201 was not significantly higher than that of CP 89-2143. CPCL 02-7610 had a moderate yield of TC/H (table 2) and a high KS/T value (table 4), which resulted in a TS/H yield similar to that of CPCL 05-1201. Proprietary genotype CL 88-4730 was the male parent of CPCL 02-7610. CP 05-1740 also had moderate yields of TC/H and TS/H (tables 2 and 5). The preharvest KS/T of CP 05-1740 was significantly lower than that of CP 89-2143 (table 3), but its KS/T during the normal harvest season did not differ significantly from that of CP 89-2143 (table 4). Both parents of CP 05-1740 were US genotypes (table 1).

Sugarcane in Florida is propagated by planting stem sections (referred to as seed cane) from which axillary buds emerge. The Florida Sugar Cane League, Inc., has begun increasing seed cane of CP 05-1526, CPCL 02-6848, CPCL 02-7610, and CPCL 05-1791 at all stage 4 locations and has begun increasing seed cane of CP 05-1466, CP 05-1740, CPCL 05-1102, and CPCL 05-1201 at all stage 4 locations with muck soils (table 1). As seed cane of these clones is increased, more disease testing will be conducted. CP 05-1740 is susceptible to smut. Otherwise, none of these clones has been rated as susceptible to any of the major diseases. The fiber contents of CP 05-1466, CP 05-1526, CP 05-1740, CPCL 02-6848, CPCL 02-7610, CPCL 05-1102, CPCL 05-1201, and CPCL 05-1791, were 8.69, 11.31, 11.93, 12.36, 11.31, 9.85, 10.47, and 12.28 percent, respectively. These are within acceptable ranges for Florida except that the fiber percentages of CPCL 02-6848 and CPCL 05-1791 are moderately high.

Plant-Cane Crop, CP 05, CPCL 02, and CPCL 05 Series on Sand Soils

When averaged across all three locations with sand soils, no new clone yielded significantly more TC/H, preharvest KS/T, or TS/H than CP 78-1628 (tables 6 and 7). However, two clones that did well on muck soils—CPCL 02-7610 and CPCL 05-1791—had significantly higher harvest KS/T than CP 78-1628 in these tests on sand soils (table 6). Both of these new clones were among the highest ranking new clones in TC/H and TS/H (table 7). Also, similar to their yields on muck soils, CP 05-1526 and CPCL 02-6848 had high yields of TC/H on the sand soils. The harvest KS/T of CP 05-1526 was similar to that of CP 78-1628 but significantly lower than the harvest KS/T values of CP 72-2086 and CP 89-2143 (table 6). The harvest KS/T of CPCL 02-6848 did not differ significantly from the KS/T values of CP 05-1526, CP 78-1628, CP 72-2086 or CP 89-2143.

As noted previously, the Florida Sugar Cane League, Inc., has begun increasing seed cane of CP 05-1526, CPCL 02-6848, CPCL 02-7610, and CPCL 05-1791 at stage 4 locations with muck and sand soils (table 1). There was no clone from this group that was increased on sand soils only.

Plant-Cane Crop, CP 04, CPCL 02, and CPCL 95 Series on Muck Soils

Last year's report contained the results from five locations with muck soils of the CP 04, CPCL 02, and CPCL 95 series plant-cane crop (Glaz et al. 2010). This year, plant-cane results for these clones are available from Eastgate and the successively planted test at Okeelanta (tables 8-9). Averaged across these two locations, no new genotype had significantly higher mean yields of TS/H than CP 89-2143 (table 9). CP 04-1321 had significantly higher mean preharvest and harvest KS/T values than CP 89-2143 (table 8), but its mean TC/H yield was not high (table 9). The TC/H yield of CP 04-1367 was significantly higher than that of CP 89-2143, but its harvest KS/T value was significantly lower than that of CP 89-2143. Neither of these new clones is being propagated by the Florida Sugar Cane League, Inc., for potential release in Florida.

First-Ratoon Crop, CP 04, CPCL 02, and CPCL 95 Series on Muck Soils

When averaged across all five farms with muck soils in the first-ratoon crop, no new clone yielded significantly more TS/H than CP 89-2143 (table 12). Last year, Glaz et al. (2010) reported that seed cane of CPCL 95-2287, CPCL 02-0926, CPCL 02-1295, and CPCL 02-2273 was being increased for potential release. This year, the Florida Sugar Cane League, Inc., is still increasing seed cane of CPCL 02-0926 and CPCL 02-1295 at stage 4 locations with muck and sand soils and CPCL 95-2287 and CPCL 02-2273 at locations with muck soils (table 1). Each of these new clones had similarly high TC/H yields (table 10). The KS/T yields of CPCL 95-2287, CPCL 02-2273, and CPCL 02-0926 were not significantly lower than the KS/T yields of CP 89-2143 or CP 72-2086 (table 11). However, the KS/T yields were moderately low for these three new clones. The KS/T yield of CPCL 02-1295 was significantly lower than the KS/T yields of each of the three new clones and CP 89-2143. Last year in the plant-cane crop, CPCL 02-0926 and CP 89-2143 had similar KS/T yields (Glaz et al. 2010). Otherwise, KS/T yields of the other three new clones were similarly low last year.

CPCL 95-2287 and CPCL 02-2273 have no major disease concerns. The only major disease concerns of CPCL 02-0926 and CPCL 02-1295 are susceptibility to mosaic and leaf scald, respectively. The fiber content of CPCL 95-2287 (12.35 percent) was moderately high for commercial sugarcane in Florida. Otherwise, with fiber percentages for CPCL 02-0926, CPCL 02-1295, and CPCL 02-2273 of 10.36, 10.97, and 11.60, respectively, these clones were within acceptable ranges. CPCL 95-2287 and CPCL 02-2273 were ranked 3rd and 11th best in freeze tolerance, respectively, among the 21 clones in this group (table 22).

First-Ratoon Crop, CP 04, CPCL 02, and CPCL 95 Series on Sand Soils

CP 04-1935 was the only clone in this group that had significantly higher mean yields of TC/H, KS/T, and TS/H than CP 78-1628 (tables 13 and 14). Last year, CP 04-1935 also had high yields of KS/T, TC/H, and TS/H, but these yields were not significantly higher than those of CP 78-1628 (Glaz et al. 2010). CP 04-1566 and CP 04-1844 had significantly higher mean TC/H and TS/H yields than CP 78-1628 (table 14). However, the high mean TC/H yield of CP 04-1566 was due mostly to high yields at Townsite combined with mediocre TC/H yields at Hilliard and Lykes. The KS/T yields of CP 04-1566 and CP 04-1844 did not differ significantly from the KS/T yield of CP 78-1628 (table 13). However, the KS/T yield of

CP 04-1844 was significantly lower than that of CP 04-1935. Yields of CP 04-1566 and CP 04-1844 were similar in the plant-cane crop (Glaz et al. 2010). The male parent of CP 04-1844 was CP 84-1198, and the female parent was CP 97-1989 (table 1 and Glaz et al. 2005). CP 84-1198 was the fifth most widely planted sugarcane cultivar on all soils in Florida in 2009 and the fourth most widely planted on sand soils (Rice et al. 2010), and CP 97-1989 is a minor cultivar that was released for sand soils in Florida. The female parent of CP 04-1566 was CP 89-2377 (Miller et al. 2000), which is a minor cultivar in Florida. The male parent was CP 96-1252. CP 96-1252 was the sixth most widely planted cultivar on sand soils in Florida in 2009 (Rice et al. 2010).

The Florida Sugar Cane League, Inc., is increasing seed cane of CP 04-1566, CP 04-1844, and CP 04-1935 at all stage 4 locations with sand soils (table 1). There are no major disease concerns for CP 04-1566 and CP 04-1935. However, CP 04-1844 is susceptible to leaf scald. The fiber contents of CP 04-1566, CP 04-1844, and CP 05-1935 were 9.73, 9.95, and 10.57 percent, respectively. CP 04-1935 had a high KS/T on all sampling dates following freezes in Gainesville, so it ranked sixth for cold tolerance among the 21 clones in this group (table 22). However, its decline in KS/T following the freeze was among the highest in this group. CP 04-1566 and CP 04-1844 ranked 9th and 10th in freeze tolerance, respectively.

First-Ratoon Crop, CP 03, CPCL 00, and CPCL 01 Series on Muck Soils

Last year's report contained information for the CP 03, CPCL 00, and CPCL 01 series in the first-ratoon crop at eight locations and in the plant-cane crop at Eastgate and Okeelanta (Glaz et al. 2010). In addition, Glaz et al. (2009) reported on results of these clones from eight locations in the plant-cane crop 2 years ago. This year, in the combined yields of the first-ratoon crop at Okeelanta and Eastgate, two new clones—CPCL 00-6131 and CP 03-1160—yielded significantly more TC/H and TS/H than CP 89-2143 (table 15). Each of these new clones had a KS/T yield that was lower, but not significantly different than that of CP 89-2143. CPCL 00-6131 (orange rust) and CP 03-1160 (brown rust and ratoon stunting) are not candidates for release due to disease susceptibilities (table 1). CPCL 00-4111, which has been commercially released, had TC/H, KS/T, and TS/H yields similar to those of CPCL 00-6131 and CP 03-1160, although none of these yields were significantly different from those of CP 89-2143.

Second-Ratoon Crop, CP 03, CPCL 00, and CPCL 01 Series on Muck Soils

When averaged across all six locations, CPCL 00-6131, CP 03-1160, and CPCL 00-4027 yielded significantly more TC/H and TS/H than CP 89-2143 (tables 16 and 18). No clone yielded significantly more KS/T than CP 89-2143 (table 17). However, of the three new clones with high TC/H and TS/H yields, the mean KS/T value of CPCL 00-4027 was also significantly higher than that of CP 72-2086. Conversely, the mean KS/T of CPCL 00-6131 was significantly lower than that of CP 89-2143. The KS/T of CP 03-1160 did not differ significantly from the KS/T values of CP 89-2143 or CP 72-2086, although it was significantly lower than the KS/T of CPCL 00-4027. CP 03-1160, CPCL 00-4027, and CPCL 00-6131 ranked 5th, 23rd, and 19th in freeze tolerance among 24 clones tested (table 22). Due to susceptibilities to brown or orange rust, CPCL 00-6131, CP 03-1160, and CPCL 00-4027 are not being considered for commercial release.

CPCL 00-4111 was released for commercial production on muck soils in Florida in February 2011. This year as second ratoon, CPCL 00-4111 had a significantly higher KS/T value than CP 72-2086 (table 17). It also had high yields of TC/H and TS/H, but these yields were not significantly higher than those of CP 89-2143 (table 16 and 18). As plant cane in the 2007-2008 harvest season, and as first ratoon the following year, the TC/H and TS/H yields of CPCL 00-4111 were significantly higher than those of CP 89-2143, but the KS/T values of the two clones did not differ significantly (Glaz et al. 2009 and Glaz et al. 2010). CPCL 00-4111 was susceptible to ratoon stunt, otherwise it had no problems with the major diseases prevalent in Florida and had a fiber content of 11.23 percent (table 1). CPCL 00-4111 had the 13th best tolerance to freezing temperatures among 24 clones tested in Gainesville, FL (table 22).

Second-Ratoon Crop, CP 03, CPCL 00, and CPCL 01 Series on Sand Soils

Four new clones—CPCL 00-4027, CP 03-1912, CP 03-1401, and CP 03-1160—yielded significantly more TC/H and TS/H than CP 78-1628 (table 19). Of these four new clones, only CPCL 00-4027 had a higher KS/T value than that of CP 78-1628. As mentioned in the previous section, CPCL 00-4027 and CP 03-1160 were susceptible to brown or orange rust (table 1). Similarly, CP 03-1401 is not being considered for commercial release because it is susceptible to brown rust.

CP 03-1912 was released for commercial production on sand soils in Florida in February 2011. Similar to its yields this year, CP 03-1912 had significantly higher yields of TC/H and TS/H than CP 78-1628 in the plant-cane and first-ratoon crops (Glaz et al. 2009, 2010). Also, in both previous crop cycles, the KS/T values of CP 03-1912 and CP 78-1628 were similar. CP 03-1912 is not susceptible to any of the major diseases in Florida. The fiber content of CP 03-1912 was 9.96 percent (table 1), and it had the 15th best tolerance to freeze in a group of 24 clones (table 22). CP 03-1912 was not advanced to the stage 4 tests on muck soils because it had a high percentage of broken tops due to its vigorous growth in the stage 3 plots on these soils.

Second-Ratoon Crop, CP 02 and CPCL 99 Series on Muck Soils

When combined across Okeelanta and Eastgate in the second-ratoon crop, three new clones—CP 02-1564, CPCL 99-1401, and CPCL 99-2206—had significantly higher TC/H and TS/H yields than CP 89-2143 (table 20). However, CP 02-1564 (brown rust and leaf scald), CPCL 99-1401 (brown rust, orange rust, and leaf scald), and CPCL 99-2206 (brown rust, orange rust, leaf scald, and ratoon stunting) are not being considered for commercial production due to susceptibilities to multiple major diseases (table 1).

In December 2009, CPCL 99-4455 (Davidson et al. 2011) was released for commercial production in Florida (table 1). Based on yields of the previous 3 years, CPCL 99-4455 was recommended for all soil types (Glaz et al. 2008, 2009, 2010). This year as second ratoon, CPCL 99-4455 had low yields of TC/H and TS/H, but these yields did not differ significantly from those of CP 89-2143 (table 20). Except for CP 89-2143 and CPCL 99-2574, the KS/T value of CPCL 99-4455 was significantly higher than that of any other clone in these tests. The only disease concerns regarding CPCL 99-4455 were its susceptibilities to smut and ratoon stunting (table 1). The fiber content of CPCL 99-4455 was 10.19 percent. CPCL 99-4455 ranked 9th for freeze tolerance in a group of 24 clones tested at Gainesville (table 22).

Summary

This is the third report in this long series in which clones in the plant-cane tests were advanced from stage 3 to stage 4 muck and sand locations independently. There were seven genotypes common to all tests of the CP 05, CPCL 02, and CPCL 05 series reported on for the first time this year in stage 4. These tests had six additional genotypes on muck soils and six other genotypes on sand soils. For genotypes in this report for the second year from the CP 04, CPCL 02, and CPCL 95 series, and from the CP 03 and CPCL 00 series for the third time in this series, there were eight genotypes common to all tests, five genotypes only at locations with muck soils, and five genotypes only at locations with sand soils.

Clones from the CP 05, CPCL 02, and CPCL 05 series were tested in the plant-cane crop at five locations with muck soil and at three locations with sand soil this year. Plantings of seed cane of CP 05-1526, CPCL 02-6848, CPCL 02-7610, and CPCL 05-1791 are being expanded on both muck and sand soils by the Florida Sugar Cane League, Inc., for potential commercial release in Florida. In addition, plantings for seed cane of CP 05-1466, CP 05-1740, CPCL 05-1102, and CPCL 05-1201 are being expanded on muck soils only. No genotypes from this group are being expanded for potential release on sand soils only. Except for CP 05-1740, which is susceptible to smut, none of these clones has been rated as susceptible to any of the major sugarcane diseases prevalent in Florida.

Summaries of clone performance from the CP 04, CPCL 02, and CPCL 95 series were reported from plant-cane tests at two locations with muck soils and from first-ratoon tests at five locations with muck soil and three locations with sand soils. CPCL 02-0926, CPCL 02-1295, CPCL 02-2273, and CPCL 95-2287 had high yields of TC/H and TS/H on muck soils. These four new clones had moderate yields of KS/T, except for CPCL 02-1295, which had low KS/T yields. The Florida Sugar Cane League, Inc., is increasing seed cane of CPCL 02-0926 and CPCL 02-1295 on muck and sand soils, although both clones currently have relatively higher yields on the muck rather than sand soils. Seed cane plantings of CPCL 02-2273 and CPCL 95-2287 are being increased on muck soils only. All four of these new clones are resistant to all major diseases, except that CPCL 02-0926 is susceptible to mosaic and CPCL 02-1295 is susceptible to leaf scald. The Florida Sugar Cane League, Inc., is also increasing seed cane of CP 04-1566, CP 04-1844, and CP 04-1935 on sand soils. All three new clones for sand soils had high TC/H and TS/H yields. CP 04-1935 also had high yields of KS/T. CP 04-1844 is susceptible to leaf scald; otherwise there are no major disease concerns for these three new clones.

Clones from the CP 03, CPCL 00, and CPCL 01 series were tested in the plant-cane crop at two locations with muck soils last year and at six locations with muck soils and two locations with sand soils 2 years ago. These clones were also tested in the first-ratoon crop at two locations with muck soils this year and at eight locations (six with muck soils and two with sand soils) last year; and in the second-ratoon crop at six locations with muck soils and two locations with sand soils this year. In March 2011, USDA-ARS, the University of Florida, and the Florida Sugar Cane League, Inc., jointly released CPCL 00-4111 for commercial production on muck soils in Florida and CP 03-1912 for commercial production on sand soils in Florida. CPCL 00-4111 had consistently high KS/T yields across years and locations; its yields of TC/H and TS/H were high in the plant-cane and first-ratoon crop cycles, but were mediocre in the second-ratoon crop. The only disease concern of CPCL 00-4111 is its susceptibility to ratoon stunting. CP 03-1912 had consistently high yields of TC/H and TS/H with acceptable yields of KS/T at the two sand locations on which it was tested from the plant-cane through the second-ratoon crop cycle. There are no major disease concerns with CP 03-1912. This clone was not tested on muck soils in stage 4 due to concerns with broken tops related to its vigorous growth on those soils.

Stage 4 testing of the CP 02 and CPCL 99 series was completed this year with two second-ratoon experiments on muck soil. Previous testing of these clones included 2 years and 10 locations as plant cane, 2 years and 10 locations as first ratoon, and 7 locations as second ratoon last year. Combined across all locations in the plant-cane through the second-ratoon crop cycles, five new clones—CP 02-1143, CP 02-1458, CP 02-1564, CPCL 99-1401, and CPCL 99-2206—had significantly higher yields of TC/H and TS/H than CP 89-2143. However, each of these new clones—CP 02-1458 (brown rust and orange rust), CP 02-1564 (brown rust, leaf scald, and ratoon stunting), CPCL 99-1401 (brown rust, orange rust, and leaf scald), and CPCL 99-2206 (brown rust, orange rust, leaf scald, and ratoon stunting)—was susceptible to more than one major disease. The harvest KS/T yield throughout the three-crop cycle of CPCL 99-4455 (127.86 kg ton^{-1}) was significantly greater ($p < 0.001$) than that of CP 89-2143 (122.43 kg ton^{-1}). The 3-year yields of TC/H and TS/H of CPCL 99-4455 and CP 89-2143 did not differ significantly. CPCL 99-4455 was jointly released by USDA-ARS, the University of Florida, and the Florida Sugar Cane League, Inc., for commercial production on muck and sand soils in Florida in December 2009. The only major disease concern regarding CPCL 99-4455 is its susceptibility to smut.

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Tables

Notes (tables 2–20):

1. Clonal yields approximated by least squares ($p = 0.10$) within and across locations.

2. Location yields approximated by empirical linear unbiased predictors.

3. *LSD* = least significant difference.

4. *CV* = coefficient of variation.

Table 1. Parentage, fiber content, increase status, and ratings of susceptibility to smut, brown rust, orange rust, leaf scald, mosaic, and ratoon stunting for CP 72-2086, CP 78-1628, CP 89-2143, 36 new CP sugarcane clones, and 26 new CPCL sugarcane clones

	Parentage†				Rating*					
						Rust				
Clone	Female	Male	Increase status‡	Percent fiber	Smut	Brown	Orange	Leaf scald	Mosaic	Ratoon stunting**
CP 72-2086	CP 62-374	CP 63-588	Commercial	8.97	R	L	S	R	S	R
CP 78-1628	CP 65-0357	CP 68-1026	Commercial	10.39	S	S	L	L	R	R
CP 89-2143	CP 81-1254	CP 72-2086	Commercial	9.85	R	R	R	L	L	L
CP 02-1143	CP 93-1382	CP 92-1666	None	10.80	R	L	S	L	S	R
CP 02-1458	CP 85-1382	CP 80-1743	None	11.90	R	S	S	L	R	R
CP 02-1554	CP 92-1561	CP 94-2059	None	12.13	R	L	S	L	L	R
CP 02-1564	CP 94-1528	CP 72-2086	None	9.70	R	S	L	S	L	S
CP 02-2015	CP 85-1491	CP 80-1743	None	11.84	R	L	L	L	L	S
CP 02-2281	CP 94-1200	CP 92-1167	None	11.93	L	L	R	L	S	R
CP 03-1160	CP 92-1435	CP 92-1435	None	10.73	L	S	R	R	R	S
CP 03-1173	HoCP 85-845	HoCP 85-845	None	9.62	R	L	R	L	L	S
CP 03-1401	CP 90-1424	CP 92-1167	None	12.05	L	S	R	R	R	L
CP 03-1491	CP 92-1561	CP 92-1167	None	10.48	R	S	S	R	R	R
CP 03-1912	CP 92-1167	CP 95-1039	Sand	9.96	L	R	R	L	R	L
CP 03-1939	CP 82-1172	CP 95-1039	None	9.71	S	R	R	S	R	R
CP 03-2188	CP 95-1569	CP 97-1362	None	10.29	R	L	R	S	R	L
CP 04-1252	CP 97-2068	CP 97-1362	None	12.43	L	R	R	S	R	L
CP 04-1258	CP 96-1252	01 P04	None	10.94	R	L	L	R	R	L
CP 04-1321	CP 96-1252	01 P04	Muck	9.31	L	L	L	S	R	L
CP 04-1367	CP 97-2068	CP 94-1607	None	13.24	R	L	L	L	R	R
CP 04-1374	CP 97-2068	CP 94-1607	None	11.82	L	L	L	R	R	R
CP 04-1426	CP 95-1712	CP 84-1198	None	12.75	L	R	S	L	L	R
CP 04-1566	CP 89-2377	CP 96-1252	Sand	9.73	L	R	R	R	L	R
CP 04-1619	CP 95-1569	CP 84-1198	None	10.45	R	R	L	R	R	R
CP 04-1844	CP 97-1989	CP 84-1198	Sand	9.95	R	R	R	S	L	L
CP 04-1935	CP 94-2059	CP 84-1322	Sand	10.57	R	R	R	L	L	L
CP 05-1466	CP 98-1497	02 P08	Muck	8.69	R	R	U	U	U	R
CP 05-1526	CP 98-1029	CP 88-1162	All	11.31	R	R	R	R	R	R
CP 05-1679	US 99-1055	US 02-1339	None	10.82	L	R	R	R	R	L
CP 05-1740	US 99-1055	US 02-1027	Muck	11.93	S	R	R	R	R	R
CPCL 95-2287	CL 78-1120	CL 78-1600	Muck	12.35	R	L	L	L	R	R
CPCL 99-1225	CL 87-2608	CP 80-1743	None	11.52	S	S	S	R	R	L
CPCL 99-1401	CL 74-0259	CP 81-1238	None	10.67	L	S	S	S	R	R
CPCL 99-1777	CL 83-3586	CL 84-4234	None	11.05	R	S	S	R	R	R
CPCL 99-2103	CL 86-4047	CL 84-3152	None	11.99	S	S	S	R	R	S
CPCL 99-2206	CL 87-1630	CP 80-1743	None	9.66	R	S	S	S	L	S
CPCL 99-2574	CL 83-3431	MIX 98C	None	11.89	L	L	L	L	R	R
CPCL 99-4455	CL 90-4643	CP 84-1198	Commercial	10.19	S	R	R	L	R	S
CPCL 00-0129	CL 84-3878	Mix 91V	None	10.23	R	L	L	R	R	R

Table 1. Parentage, fiber content, increase status, and ratings of susceptibility to smut, rust, leaf scald, mosaic, and ratoon stunting for CL 77-0797, CP 72-2086, CP 78-1628, CP 89-2143, and 80 new sugarcane clones--*Continued*

	Parentage†				Rating*					
			Increase	Percent		Rust		Leaf		Ratoon
Clone	Female	Male	status‡	fiber	Smut	Brown	Orange	scald	Mosaic	stunting**
CPCL 00-0458	CL 87-2882	CL 89-5189	None	10.44	R	S	S	R	R	S
CPCL 00-1373	CL 83-1900	CL 88-4730	None	12.27	R	S	L	R	R	L
CPCL 00-4027	CL 83-1364	CL 86-4590	None	11.59	R	S	S	R	R	L
CPCL 00-4111	CL 83-3431	CL 89-5189	All	11.23	R	R	R	L	R	S
CPCL 00-4611	CL 80-1575	CP 85-1491	None	11.75	L	S	S	R	R	R
CPCL 00-6131	CL 87-1630	CP 84-1198	None	11.24	L	L	S	L	L	R
CPCL 00-6756	CL 83-1364	CL 92-5431	None	12.19	R	S	S	R	R	R
CPCL 01-0271	CL 86-4340	Poly 00-3	None	10.88	R	L	S	R	L	S
CPCL 01-0571	CL 87-2944	CL 86-4590	None	11.09	S	L	S	L	L	R
CPCL 01-0877	CL 90-4725	CL 88-4730	None	10.70	L	L	L	R	R	R
CPCL 02-0843	CL 89-5189	CP 80-1743	None	10.55	L	R	S	L	R	L
CPCL 02-0908	CL 92-0775	LCP 85-0384	None	9.83	R	S	S	S	R	L
CPCL 02-0926	CP 80-1743	CL 92-0046	All	10.36	R	R	R	L	S	L
CPCL 02-1295	CP 88-1762	CL 91-1637	All	10.97	R	R	L	S	R	R
CPCL 02-2273	CP 89-2143	CL 88-4730	Muck	11.60	R	L	L	L	R	R
CPCL 02-2913	CL 88-4730	CP 80-17434	None	10.32	R	S	S	L	S	L
CPCL 02-2975	CL 94-4155	CL 84-4302	None	10.36	L	S	S	R	S	L
CPCL 02-6225	CL 88-4730	Poly 01-6	None	10.13	R	U	R	U	R	R
CPCL 02-6848	CL 92-2533	Poly 01-9	All	12.36	R	R	R	R	R	R
CPCL 02-7080	CP 94-1528	CL 98-5189	None	10.86	S	R	R	U	R	R
CPCL 02-7190	CP 89-2143	CL 88-4730	None	10.64	R	R	R	R	U	R
CPCL 02-7386	CL 88-4730	CL 89-2189	None	11.43	U	R	R	R	R	R
CPCL 02-7500	LCP 85-0384	CL 77-0797	None	12.19	U	R	R	R	R	R
CPCL 02-7610	CL 90-4500	CL 88-4730	All	11.31	L	R	U	U	R	L
CPCL 02-8001	Unknown	Unknown	None	10.13	U	U	R	R	R	L
CPCL 02-8071	CL 92-5431	LCP 85-0384	None	13.20	R	R	R	R	R	R
CPCL 02-8072	CL 92-5431	LCP 85-0384	None	13.10	S	R	R	R	U	R
CPCL 05-1009	CL 89-5189	CL 90-4727	None	11.96	S	R	R	R	R	R
CPCL 05-1102	CL 89-5189	CL 88-4730	Muck	9.85	R	R	R	R	R	L
CPCL 05-1201	CL 87-2882	CL 93-2679	Muck	10.47	R	R	R	R	R	R
CPCL 05-1300	CL 87-2882	CL 85-3715	None	14.10	R	R	R	R	R	R
CPCL 05-1791	CP 96-1252	CL 90-4725	All	12.28	R	U	R	U	R	R

* R = resistant enough for commercial production; L = low levels of disease susceptibility; S =too susceptible for production; U = undetermined susceptibility (available data not sufficient to determine the level of susceptibility).

‡ None = Not considered as potential release candidate; otherwise, increasing acreage of seed cane at all locations, locations with sand soils only, or locations with muck soils only.

** Ratoon stunting can be controlled by using heat treated or tissue cultured vegetative planting material.

† 01 P04, Mix 98c, and Poly 00-3 refer to polycrosses. In 01 P04, female parent (CP 96-1252) exposed to pollen from many clones in 2001 crossing season; in Mix 98c, CL 83-3431 exposed to pollen from many clones in 1998 crossing season at United States Sugar Corp., and in Poly 00-3, female parent (CL 86-4340) exposed to pollen from many clones in 2000 crossing season at United States Sugar Corp.; and therefore, male parents of CP 04-1258, CPCL 99-2574, and CPCL 01-0271 unknown. Similar explanations for CP 04-1321, CP 05-1466, CPCL 00-0129, CPCL 01-0271, CPCL 01-0271, CPCL 02-6225, CPCL 02-6848.

Table 2. Yields of cane in metric tons per hectare (TC/H) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck		Pahokee muck	
Clone	Duda 1/11/2010	Okeelanta 1/20/2010	SFI 1/5/2010	Knight 1/19/2010	Wedgworth 1/7/2010	Mean yield, all farms
CP 05-1526	211.78 *	188.69 *	218.93 *	195.26 *	139.16	190.76 *
CPCL 02-6848	202.89 *	148.47	195.85 *	162.18 *	211.62 *	184.23 *
CPCL 05-1791	184.66 *	168.53 *	172.79	156.37 *	213.03 *	179.08 *
CP 78-1628	176.11	159.55	177.03	165.06 *	188.49 *	173.25 *
CPCL 05-1201	199.73 *	151.02	180.37	111.52	186.38 *	165.80 *
CP 05-1466	185.66 *	167.64 *	164.48	144.62 *	155.21	163.23 *
CPCL 05-1102	184.37 *	139.10	180.76	130.16 *	177.51	162.38 *
CPCL 02-7610	171.10	153.31	167.26	110.87	185.36 *	157.58
CP 05-1740	188.35 *	149.98	152.26	106.76	181.14	156.81
CPCL 02-6225	173.81	141.97	159.75	108.91	187.90 *	154.23
CPCL 02-8001	163.15	142.11	153.83	127.83 *	161.74	149.29
CPCL 02-8071	186.40 *	144.57	150.43	80.03	170.11	146.31
CP 72-2086	175.21	142.26	141.47	90.69	169.21	143.77
CP 89-2143	150.01	142.45	163.21	97.03	162.66	143.07
CPCL 05-1300	161.48	120.58	149.43	114.44	156.71	140.53
CPCL 02-7190	181.78 *	127.33	144.56	98.00	132.68	136.87
Mean	181.03 *	149.22	167.03	124.98 *	173.68	159.20
LSD (p = 0.1)†	26.41	22.07	21.37	22.23	20.50	17.87
CV (%)	11.43	10.97	12.21	25.40	12.94	10.16

*Significantly greater than CP 89-2143 at p = 0.10 based on t test.
†*LSD* for location means of cane yield = 7.77 TC/H at p = 0.10.

Table 3. Preharvest yields of theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck		Pahokee muck	
Clone	Duda 1/11/2010	Okeelanta 1/20/2010	Knight 1/19/2010	SFI 1/5/2010	Wedgworth 1/7/2010	Mean yield, all farms
CPCL 02-7610	103.4	118.8	128.2	111.4	124.1	117.2
CP 05-1526	100.1	122.1	124.4	110.6	125.1	116.5
CPCL 02-7190	100.1	118.0	122.7	117.1 *	122.2	116.0
CPCL 05-1201	104.3	108.5	130.0 *	106.9	129.2 *	115.8
CPCL 05-1791	111.9	115.2	125.4	111.3	114.3	115.6
CP 89-2143	107.1	130.0	112.4	105.2	122.2	115.4
CPCL 05-1102	104.5	118.5	119.2	106.4	125.6	114.8
CPCL 02-8001	99.4	122.9	124.2	112.0	114.4	114.6
CP 05-1466	109.8	106.5	120.4	104.0	128.4 *	113.8
CP 72-2086	109.7	107.9	119.7	104.5	124.8	113.3
CPCL 02-6848	114.2	117.4	114.9	103.2	115.1	113.0
CPCL 05-1300	104.5	111.4	109.8	107.1	112.8	109.1
CPCL 02-8071	99.3	109.7	112.1	101.8	121.6	108.9
CPCL 02-6225	97.3	111.5	116.7	99.6	117.9	108.6
CP 78-1628	99.8	109.9	115.8	93.0	114.9	106.7
CP 05-1740	98.3	111.0	105.9	97.1	113.5	105.2
Mean	104.0	114.9	118.9	105.7	120.4	112.8
LSD (p = 0.1) †	14.0	13.1	17.2	9.2	5.6	5.6
CV (%)	5.0	5.7	5.7	5.8	4.7	3.4

* Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
†*LSD* for location means of sugar yield = 2.3 KS/T at p = 0.10.

Table 4. Yields of theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck		Pahokee muck	
Clone	Duda 1/11/2010	Okeelanta 1/20/2010	Knight 1/19/2010	SFI 1/5/2010	Wedgworth 1/7/2010	Mean yield, all farms
CPCL 02-8001	139.8*	141.8	133.0*	152.5*	132.9	140.0*
CPCL 05-1102	137.6	146.1	130.2	146.7*	137.4	139.6*
CPCL 02-7610	128.8	145.2	134.7*	149.9*	138.1	139.3
CP 72-2086	142.6*	143.9	125.6	144.8	138.7	139.1
CP 05-1466	132.4	139.6	129.4	145.8*	134.5	136.3
CP 89-2143	133.5	144.0	125.0	141.8	137.2	136.3
CPCL 02-6225	130.9	140.7	129.3	143.0	132.9	135.3
CPCL 02-8071	135.2	134.7	124.6	138.0	136.3	133.8
CP 05-1740	132.1	139.5	127.8	137.7	129.8	133.2
CPCL 02-6848	131.8	137.3	124.4	138.6	129.6	132.3
CP 78-1628	129.2	136.7	126.7	137.6	129.0	131.8
CP 05-1526	130.1	131.7	124.7	140.6	128.7	131.2
CPCL 05-1201	131.6	130.7	121.3	138.3	129.2	130.2
CPCL 05-1791	124.4	131.9	125.1	135.8	118.7	127.2
CPCL 02-7190	126.8	131.9	118.8	134.2	121.7	126.7
CPCL 05-1300	121.4	121.5	112.8	122.0	118.0	119.1
Mean	131.8	137.3	125.8	140.4	130.8	133.2
LSD (p = 0.1)†	5.2	4.3	5.5	3.9	4.6	3.3
CV (%)	4.1	4.8	4.2	5.1	5.1	4.2

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
†*LSD* for location means of sugar yield = 2.2 KS/T at p = 0.10.

Table 5. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from plant cane on Dania muck, Lauderhill muck, and Pahokee muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck		Pahokee muck	
Clone	Duda 1/11/2010	Okeelanta 1/20/2010	SFI 1/19/2010	Knight 1/19/2010	Wedgworth 1/7/2010	Mean yield, all farms
CP 05-1526	23.818 *	21.458 *	26.560 *	20.983 *	15.505	21.665 *
CPCL 02-6848	23.117 *	17.587	23.417 *	17.397 *	23.688 *	21.042 *
CP 78-1628	19.662	18.880	20.965	18.050 *	20.962	19.704 *
CPCL 05-1791	19.935	19.190	20.267	16.863 *	21.915 *	19.634 *
CPCL 05-1102	21.885 *	17.523	22.828 *	14.662 *	21.038	19.587 *
CP 05-1466	21.250 *	20.150	20.728	16.143 *	18.012	19.229 *
CPCL 02-7610	19.005	19.363	21.615	12.938	22.047 *	18.994
CPCL 05-1201	22.527 *	17.045	21.540	11.602	20.720	18.687
CPCL 02-8001	19.690	17.402	20.248	14.806 *	18.555	18.094
CP 05-1740	21.510 *	18.108	18.118	11.832	20.313	18.086
CPCL 02-6225	19.708	17.213	19.737	12.233	21.469	18.052
CP 72-2086	21.573 *	17.683	17.662	9.863	20.280	17.412
CPCL 02-8071	21.767 *	16.828	17.953	8.727	20.050	17.065
CP 89-2143	17.335	17.713	19.992	10.465	19.247	16.950
CPCL 02-7190	20.037	14.507	16.797	10.053	13.960	15.071
CPCL 05-1300	16.818	12.673	15.718	11.167	15.950	14.465
Mean	20.602 *	17.708	20.259	13.611 *	19.607	18.359
LSD (p = 0.1) †	3.165	2.738	2.619	2.509	2.365	2.130
CV (%)	9.411	11.637	13.371	25.724	13.400	10.441

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
†*LSD* for location means of sugar yield = 1.050 TS/H at p = 0.10.

Table 6. Yields of preharvest and harvest theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from plant cane on Malabar sand, Pompano fine sand, and Margate sand by soil type, farm, and sampling date

	Preharvest yield				Harvest yield			
	Malabar sand	Pompano fine sand	Margate sand		Malabar sand	Pompano fine sand	Margate sand	
Clone	Hilliard 12/9/2009	Lykes 12/17/2009	Townsite 2/11/2010	Mean yield, all farms	Hilliard 12/9/2009	Lykes 12/17/2009	Townsite 2/11/2010	Mean yield, all farms
CPCL 02-8001	144.9 *	127.2	118.7	130.3	157.7 *	150.8*	151.1 *	153.2 *
CP 05-1679	134.4 *	137.3	143.7 *	138.4	156.0 *	149.2*	146.6	150.6 *
CPCL 02-7610	142.9 *	133.3	119.7	132.0	155.3 *	144.8*	145.4	148.5 *
CPCL 05-1791	147.7 *	132.2	124.7	134.8	149.6 *	144.6*	146.9	147.0 *
CP 89-2143	143.8 *	130.3	124.5	132.9	151.5 *	141.2*	143.2	145.3 *
CPCL 02-7080	132.1 *	133.4	131.2	132.2	148.2 *	136.4	150.2 *	145.0 *
CP 72-2086	132.5 *	131.4	117.2	127.0	148.6 *	143.9*	139.9	144.2 *
CPCL 02-6848	138.3 *	136.7	119.2	131.4	148.9 *	137.9	138.5	141.7
CPCL 02-7500	111.9	127.4	118.1	119.1	141.3 *	135.9	144.3	140.4
CPCL 02-8072	128.3 *	131.5	113.3	124.3	146.2 *	140.7*	134.3	140.4
CP 05-1740	135.5 *	114.9	128.5	126.3	145.9 *	136.8	138.5	140.4
CPCL 02-7386	131.3 *	100.3	109.4	113.7	138.3	131.8	146.2	138.7
CP 78-1628	118.8	132.0	127.8	126.2	135.0	134.0	144.3	137.8
CP 05-1526	129.4 *	111.3	124.8	121.8	140.2 *	130.5	141.1	137.3
CPCL 05-1201	98.2	117.3	115.6	110.4	130.5	135.9	142.3	136.2
CPCL 05-1009	110.5	105.1	97.8	104.5	138.7	129.3	138.3	135.4
Mean	130.0 *	125.1	120.9	125.3	145.7 *	139.0	143.2	142.6
LSD (p = 0.1)[†]	7.8	15.3	15.3	12.5	4.1	5.1	5.2	6.1
CV (%)	10.6	9.2	8.4	7.5	5.4	4.6	3.2	3.7

* Significantly greater than CP 78-1628 at p = 0.10 based on *t* test.

† *LSD* for location means of preharvest sugar yield = 2.2 KS/T and of harvest sugar yield = 4.8 KS/T at p = 0.10

Table 7. Yields of cane and theoretical recoverable 96° sugar in metric tons per hectare (TC/H and TS/H) from plant cane on Malabar sand, Pompano fine sand, and Margate sand by soil type, farm, and sampling date

	Cane yield				Sugar yield			
	Malabar sand	Pompano fine sand	Margate sand	Mean yield, all farms	Malabar sand	Pompano fine sand	Margate sand	Mean yield, all farms
Clone	Hilliard 12/9/2009	Lykes 12/17/2009	Townsite 2/11/2010		Hilliard 12/9/2009	Lykes 12/17/2009	Townsite 2/11/2010	
CPCL 05-1791	139.24*	174.07 *	67.76	127.02	18.027*	21.718*	8.420	16.055
CP 05-1526	164.40*	169.64	66.30	133.45	19.975*	19.143	8.127	15.748
CP 89-2143	150.50*	152.24	51.89	118.21	19.693*	18.603	6.520	14.939
CPCL 02-6848	154.83*	158.99	42.00	118.60	19.888*	18.943	4.967	14.599
CPCL 02-7080	133.73*	133.88	63.00	110.20	17.105*	15.788	8.177	13.690
CPCL 05-1009	139.00*	158.53	46.22	114.59	16.642*	17.733	5.562	13.312
CPCL 02-8001	128.18*	134.32	37.27	99.92	17.445*	17.553	4.828	13.276
CPCL 02-7610	141.20*	136.92	22.36	100.16	18.955*	17.148	2.808	12.971
CP 05-1679	119.92*	125.78	32.51	92.74	16.142*	16.245	4.113	12.167
CP 78-1628	93.48	153.49	62.36	103.11	10.887	17.808	7.803	12.166
CPCL 02-8072	140.35*	138.63	15.86	98.28	17.760*	16.818	1.815	12.131
CP 72-2086	126.39*	131.69	24.81	94.30	16.250*	16.332	2.990	11.857
CPCL 02-7500	124.57*	140.74	24.46	96.59	15.208*	16.515	3.391	11.699
CPCL 02-7386	80.11	154.50	52.57	95.73	9.593	17.540	6.802	11.312
CP 05-1740	120.17*	135.08	23.48	92.91	15.140*	15.985	2.732	11.286
CPCL 05-1201	27.89	180.85 *	61.42	90.05	3.177	21.227*	7.487	10.630
Mean	124.00*	148.71	43.39	105.37	15.743*	17.819	5.409	12.990
LSD (p = 0.1)†	16.65	16.90	19.98	33.47	2.267	2.333	2.535	4.365
CV (%)	26.79	11.14	41.27	12.64	28.229	9.821	41.709	12.634

* Significantly greater than CP 78-1628 at p = 0.10 based on t test.
† *LSD* for location means of cane yield = 9.64 TC/H and of sugar yield =1.256 TS/H at p = 0.10.

Table 8. Yields of preharvest and harvest theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from plant cane on Lauderhill muck and Torry muck by soil type, farm, and sampling date

	Preharvest yield			Harvest yield		
	Lauderhill muck	Torry muck		Lauderhill muck	Torry muck	
Clone	Okeelanta 2/16/2010	Eastgate 2/9/2010	Mean yield, both farms	Okeelanta 2/16/2010	Eastgate 2/9/2010	Mean yield, both farms
CP 04-1321	135.9 *	138.9 *	137.3 *	155.1 *	151.8*	153.5*
CPCL 02-2975	124.3	117.0	120.6	149.0	147.1*	148.1
CP 72-2086	112.7	123.2	117.9	146.3	147.3*	146.8
CPCL 02-2913	123.0	122.2	122.6	149.4	144.1	146.8
CP 78-1628	115.6	109.1	112.4	146.9	141.3	144.1
CP 89-2143	117.1	124.1	120.6	146.6	141.5	144.1
CPCL 02-0843	122.1	98.1	110.1	144.0	143.0	143.5
CP 04-1619	105.6	119.8	112.7	146.1	139.8	142.9
CPCL 02-0908	116.3	118.5	117.4	149.3	135.0	142.2
CPCL 02-2273	121.7	104.8	113.2	139.7	143.5	141.6
CPCL 02-0926	125.1	111.4	119.2	138.4	141.4	139.9
CPCL 95-2287	110.8	119.0	115.5	136.9	139.6	138.3
CPCL 02-1295	110.9	100.0	105.4	139.1	135.7	137.4
CP 04-1426	110.8	98.2	104.5	127.3	137.9	132.6
CP 04-1367	115.5	111.4	113.5	129.1	134.7	131.9
CP 04-1252	101.6	109.5	105.6	125.7	132.0	128.9
Mean	116.8	114.1	115.5	141.8	141.0	141.4
LSD (p = 0.1)[†]	13.2	10.5	13.6	4.7	4.5	7.4
CV (%)	7.2	9.6	7.0	6.1	3.7	4.6

* Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.

[†]*LSD* for location means of preharvest sugar yield = 2.52 KS/T and of harvest yield = 1.97 KS/T at p = 0.10.

Table 9. Yields of cane and of theoretical recoverable 96° sugar in metric tons per hectare (TC/H and TS/H) from plant cane on Dania muck and Torry muck by soil type, farm, and sampling date

	Cane yield			Sugar yield		
	Lauderhill muck	Torry muck		Lauderhill muck	Torry muck	
Clone	Okeelanta 2/16/2010	Eastgate 2/9/2010	Mean yield, both farms	Okeelanta 2/16/2010	Eastgate 2/9/2010	Mean yield, both farms
CPCL 02-0843	130.11	304.64 *	217.38	16.158	37.462 *	26.810
CP 04-1367	134.64	322.45 *	228.55 *	15.000	37.403 *	26.202
CP 78-1628	114.53	294.36 *	204.44	14.548	35.952	25.250
CPCL 02-2273	142.45	268.30	205.37	17.163	33.267	25.215
CPCL 02-0926	121.98	293.04 *	207.51	14.507	35.858	25.183
CPCL 02-1295	127.35	287.34	207.34	15.323	33.697	24.510
CP 72-2086	121.98	262.55	192.27	15.425	33.330	24.378
CPCL 95-2287	127.18	268.91	198.04	15.100	32.342	23.721
CPCL 02-0908	103.28	279.25	191.26	13.370	32.540	22.955
CP 04-1426	112.79	279.46	196.13	12.512	33.295	22.903
CP 89-2143	120.33	248.13	184.23	15.228	30.472	22.850
CP 04-1321	116.75	225.80	171.28	15.685	29.663	22.674
CPCL 02-2913	103.67	254.89	179.28	13.415	31.832	22.623
CP 04-1252	124.30	270.09	197.19	13.503	31.020	22.262
CPCL 02-2975	108.10	238.75	173.42	13.988	30.212	22.100
CP 04-1619	146.01 *	204.90	175.46	18.400 *	24.610	21.505
Mean	122.22	268.93	195.57	14.958	32.685	23.821
LSD (p = 0.1)†	24.81	44.05	40.29	3.144	5.558	4.872
CV (%)	10.20	11.14	8.28	9.982	9.897	6.618

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.

†*LSD* for location means of cane yield = 34.46 TC/H and of sugar yield = 4.286 TS/H at p = 0.10.

Table 10. Yields of cane in metric tons per hectare (TC/H) from first-ratoon cane on Dania muck and Lauderhill muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck			
Clone	**SFI 12/2/2009**	**Okeelanta 12/28/2009**	**Wedgworth 12/29/2009**	**Knight 10/30/2009**	**Duda 1/4/2010**	**Mean yield, all farms**
CP 78-1628	191.02	176.53 *	155.38	-----	183.41 *	161.44 *
CPCL 02-0843	161.91	165.16	175.97 *	114.73 *	173.72	158.30 *
CPCL 02-0926	172.81	166.68	166.66	94.83	166.65	153.53
CPCL 02-2273	177.94	148.38	169.63	73.77	156.18	145.18
CPCL 95-2287	158.48	150.51	163.98	83.62	167.68	144.85
CPCL 02-1295	188.96	138.58	158.79	95.84	140.85	144.60
CP 04-1367	174.98	155.79	152.37	92.91	145.46	144.30
CP 89-2143	177.96	149.55	151.14	79.16	161.15	143.79
CP 04-1426	153.06	131.65	178.14*	87.16	155.93	141.19
CP 04-1619	165.34	144.35	154.79	76.59	137.65	135.75
CPCL 02-2975	166.89	127.55	150.52	76.74	147.82	133.90
CPCL 02-2913	166.41	135.96	146.55	74.99	139.48	132.68
CP 04-1252	173.95	124.39	156.11	51.72	121.54	125.54
CPCL 02-0908	133.40	111.36	186.01	63.73	121.95	123.29
CP 72-2086	145.71	123.99	160.02	26.26	97.80	110.76
CP 04-1321	114.86	96.53	113.78	15.52	97.89	87.72
Mean	163.98	140.44	158.74	73.84	144.70	136.68
LSD (p = 0.1)†	17.91	18.62	19.87	22.76	19.53	14.39
CV (%)	12.09	15.01	10.28	35.35	17.32	13.48

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
† *LSD* for location means of cane yield = 11.58 TC/H at p = 0.10.

Table 11. Yields of theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from first-ratoon cane on Dania muck and Lauderhill muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck			
Clone	SFI 12/2/2009	Okeelanta 12/28/2009	Wedgworth 12/29/2009	Knight 10/30/2009	Duda 1/4/2010	Mean yield, all farms
CP 04-1321	145.1*	153.8	142.3*	123.9*	149.0*	142.8*
CPCL 02-0908	143.3*	155.5 *	142.6*	125.8*	142.1	141.9*
CPCL 02-2913	138.5	150.2	139.3*	119.9	145.2	138.6
CPCL 02-2975	141.8	151.5	134.2	118.4	145.3	138.3
CP 89-2143	138.4	150.8	134.2	116.9	142.9	136.7
CP 72-2086	135.2	150.1	140.5*	108.7	141.7	135.2
CP 04-1619	134.5	143.5	136.3	111.5	143.0	133.7
CPCL 95-2287	133.7	150.0	132.0	109.8	140.4	133.2
CPCL 02-2273	135.8	149.9	136.3	103.7	139.8	133.1
CPCL 02-0926	135.0	147.9	132.9	106.6	139.3	132.3
CPCL 02-0843	133.5	144.9	134.3	104.9	142.7	132.1
CP 78-1628	128.2	146.0	132.4		141.0	131.4
CPCL 02-1295	127.7	145.9	130.9	90.9	138.4	126.8
CP 04-1367	122.4	134.7	126.9	102.7	131.4	123.6
CP 04-1426	124.9	135.9	115.3	107.6	125.8	121.9
CP 04-1252	113.9	124.4	114.4	101.3	121.5	115.1
Mean	133.2	145.9	132.8	110.2	139.4	132.3
LSD (p = 0.1)†	4.6	3.1	5.1	6.3	3.8	4.2
CV (%)	6.1	5.5	6.2	8.5	5.2	5.6

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
† *LSD* for location means of sugar yield = 1.9 KS/T at p = 0.10.

Table 12. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from first-ratoon cane on Dania muck and Lauderhill muck by soil type, farm, and sampling date

	Mean yield					
	Dania muck		Lauderhill muck			
Clone	SFI 12/2/2009	Okeelanta 12/28/2009	Wedgworth 12/29/2009	Knight 10/30/2009	Duda 1/4/2010	Mean yield, all farms
CP 78-1628	21.162	22.267 *	17.778	….	22.263 *	18.709
CPCL 02-0843	18.623	20.618	20.398 *	10.502 *	21.405	18.309
CPCL 02-0926	20.143	21.275	19.123	8.898	20.037	17.895
CP 89-2143	21.318	19.505	17.518	7.960	19.893	17.239
CPCL 02-2273	20.898	19.207	19.927 *	6.492	18.888	17.082
CPCL 95-2287	18.273	19.505	18.610	7.938	20.327	16.931
CPCL 02-2975	20.440	16.682	17.437	7.835	18.572	16.193
CPCL 02-2913	19.915	17.613	17.607	7.835	17.532	16.100
CPCL 02-1295	20.785	17.420	17.865	7.412	16.858	16.068
CP 04-1619	19.298	17.905	18.210	7.327	16.974	15.943
CP 04-1367	18.440	18.075	16.655	8.173	16.500	15.569
CPCL 02-0908	16.460	14.958	22.852 *	6.918	14.947	15.227
CP 04-1426	16.473	15.455	17.727	8.100	16.902	14.931
CP 72-2086	17.017	16.108	19.428	2.513	11.912	13.396
CP 04-1252	17.063	13.360	15.407	4.615	12.793	12.407
CP 04-1321	14.365	12.800	13.987	1.650	12.568	11.074
Mean	18.792	17.672	18.158	6.945	18.792	15.817
LSD (p = 0.1)†	2.369	2.424	2.232	2.207	2.388	1.706
CV (%)	13.112	14.246	13.290	33.051	14.278	15.406

* Significantly greater than CP 89-2143 at p = 0.10 based on t test.
†*LSD* for location means of sugar yield = 1.213 TS/H at p = 0.10.

Table 13. Yields of harvest theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from first-ratoon cane on Malabar sand, Pompano fine sand, and Margate sand by soil type, farm, and sampling date

	Sugar yield			
	Malabar sand	Pompano fine sand	Margate sand	
Clone	Hilliard 12/8/2009	Lykes 12/16/2009	Townsite 1/28/2010	Mean yield, all farms
CPCL 02-0908	151.5 *	151.6 *	159.5 *	154.2 *
CP 04-1321	149.2 *	149.2 *	159.3 *	152.6 *
CP 04-1935	149.3 *	144.8 *	152.7 *	148.9 *
CPCL 02-2913	148.0 *	147.2 *	151.0	148.8 *
CP 04-1619	151.2 *	136.8	157.3 *	148.4 *
CP 04-1566	151.5 *	138.5	149.1	146.4
CP 04-1258	150.2 *	138.1	149.3	145.9
CP 89-2143	140.6	144.8 *	149.1	144.8
CPCL 02-0926	142.9	139.7	148.2	143.6
CP 72-2086	138.0	145.7 *	144.9	142.8
CP 78-1628	141.6	136.9	147.4	142.0
CP 04-1844	142.2	139.0	144.1	141.8
CPCL 02-0843	139.0	138.0	147.6	141.5
CP 04-1374	142.4	131.0	147.4	140.3
CPCL 02-1295	135.1	135.9	143.9	138.3
CP 04-1252	129.6	123.6	140.2	131.1
Mean	143.9	140.0	149.4	144.5
LSD (p = 0.1)†	3.9	5.8	4.1	5.1
CV (%)	4.6	5.0	3.7	3.9

* Significantly greater than CP 78-1628 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield = and of sugar yield = 2.1 at p = 0.10.

Table 14. Yields of cane and theoretical recoverable 96° sugar in metric tons per hectare (TC/H and TS/H) from first-ratoon cane on Malabar sand, Pompano fine sand, and Margate sand by soil type, farm, and sampling date

	Cane yield				Sugar yield			
	Malabar sand	Pompano fine sand	Margate sand		Malabar sand	Pompano fine sand	Margate sand	
Clone	Hilliard 12/8/2009	Lykes 12/16/2009	Townsite 1/28/2010	Mean yield, all farms	Hilliard 12/8/2009	Lykes 12/16/2009	Townsite 1/28/2010	Mean yield, all farms
CP 04-1844	83.47 *	162.32 *	66.88 *	104.22 *	10.208 *	19.443*	8.225 *	12.626 *
CP 04-1935	97.11 *	130.00	57.91 *	95.01 *	12.458 *	16.283	7.690 *	12.144 *
CP 04-1566	74.24	138.92	73.04 *	95.40 *	9.727	16.575	9.437 *	11.913 *
CP 04-1258	85.76 *	134.52	62.26 *	94.18	11.122 *	16.078	8.025 *	11.742 *
CP 04-1374	78.88	143.20	64.71 *	95.59 *	9.685	16.202	8.238 *	11.375
CPCL 02-2913	61.65	127.09	58.09 *	82.28	7.888	16.162	7.577 *	10.542
CPCL 02-0843	83.76 *	122.51	51.75 *	86.01	10.065	14.632	6.610 *	10.436
CPCL 02-0926	79.69	131.65	39.91	83.75	9.858	15.943	5.108	10.303
CP 89-2143	57.75	135.03	52.56 *	81.78	6.993	16.898	6.750 *	10.214
CPCL 02-0908	48.99	121.28	58.91	76.40	6.443	15.907	8.115 *	10.155
CP 04-1619	66.08	143.55	33.22	80.95	8.612	16.967	4.510	10.029
CP 78-1628	66.20	137.19	33.32	78.90	8.095	16.227	4.250	9.524
CPCL 02-1295	69.70	133.34	34.18	79.07	8.132	15.648	4.242	9.341
CP 72-2086	50.46	129.56	43.45	74.49	6.053	16.368	5.457	9.293
CP 04-1252	43.44	112.27	38.93	64.88	4.863	12.008	4.673	7.182
CP 04-1321	32.91	75.79	26.99	45.23	4.243	9.772	3.712	5.909
Mean	67.50	129.89	49.76 *	82.38	8.403	15.695	6.414 *	10.170
LSD (p = 0.1)[†]	15.94	17.62	13.86	15.51	1.979	2.382	1.783	1.937
CV (%)	25.94	14.04	28.45	17.01	26.968	13.716	28.565	17.237

* Significantly greater than CP 78-1628 at p = 0.10 based on t test.

† *LSD* for location means of cane yield =12.25 TC/H and of sugar yield = 1.546 TS/H at p = 0.10.

Table 15. Yields of cane in metric tons per hectare (TC/H) and theoretical recoverable 96° sugar in kg per metric ton (KS/T) and in metric tons per hectare (TS/H) from first-ratoon on Dania Muck and Torry Muck by soil type, farm, and sampling date

	Cane yield (TC/H)			Sugar yield (KS/T)			Sugar yield (TS/H)		
	Torry muck	Dania muck		Torry muck	Dania muck		Torry muck	Dania muck	
Clone	**Eastgate 2/8/2010**	**Okeelanta 12/22/2009**	**Mean yield, both farms**	**Eastgate 2/8/2010**	**Okeelanta 12/22/2009**	**Mean yield, both farms**	**Eastgate 2/8/2010**	**Okeelanta 12/22/2009**	**Mean yield, both farms**
CPCL 00-6131	233.09 *	107.36 *	170.23 *	139.4	142.1	140.7	28.242 *	13.127	20.684 *
CP 03-1160	203.80 *	125.22 *	164.51 *	145.1	139.0	142.0	25.552 *	14.962 *	20.257 *
CPCL 00-4111	197.55 *	101.35	149.45 *	145.8	139.2	142.5	24.873	12.207	18.540
CPCL 00-1373	206.89 *	108.09 *	157.49 *	135.8	131.3	133.6	24.240	12.338	18.289
CP 78-1628	184.82	107.85 *	146.34	144.7	140.9	142.8	23.067	13.230	18.148
CPCL 00-4027	183.22	99.68	141.45	144.9	149.0	146.9	23.063	12.862	17.963
CPCL 00-0129	181.15	83.29	132.22	152.9	149.1	151.0	23.928	10.740	17.334
CPCL 01-0271	160.35	104.61	132.48	144.8	149.9	147.4	20.063	13.543	16.803
CPCL 01-0571	176.38	84.30	130.34	153.0	136.0	144.5	23.205	9.885	16.545
CP 89-2143	167.18	78.35	122.76	150.5	148.9	149.7	21.712	10.115	15.913
CPCL 00-4611	186.63	78.71	132.67	139.7	135.7	137.7	22.482	9.198	15.840
CPCL 00-0458	180.02	67.99	124.01	149.8	138.4	144.1	23.295	8.202	15.748
CPCL 00-6756	169.78	86.09	127.94	141.1	140.3	140.7	20.560	10.797	15.678
CP 03-2188	148.46	71.44	109.95	147.6	123.2	135.4	18.940	7.618	13.279
CP 72-2086	164.24	37.21	100.72	146.2	144.4	145.3	20.702	4.657	12.679
CP 03-1491	112.69	58.01	85.35	149.2	149.5	149.3	14.505	7.520	11.013
Mean	178.52	87.47	132.99	145.7	141.1	143.4	22.402	10.688	16.545
LSD (p = 0.1)†	27.37	27.62	25.99	4.6	6.1	9.5	3.502	3.544	3.361
CV (%)	15.10	25.59	16.88	3.4	5.3	3.5	13.867	25.773	15.738

* Significantly greater than CP 89 2143 at p = 0.10 based on t test.

†*LSD* for location means of cane yield = 12.72 TC/H of sugar yield = 2.0 KS/T, and of sugar yield = 1.734 TS/H at p = 0.10.

Table 16. Yields of cane in metric tons per hectare (TC/H) from second-ratoon cane on Lauderhill muck and Dania muck by soil type, farm, and sampling date

	Mean yield						
	Lauderhill muck					Dania Muck	
Clone	Okeelanta 10/27/2009	Knight 10/19/2009	Wedgworth 10/29/2009	SFI 10/16/2009	Osceola 10/21/2009	Duda 10/23/2009	Estimated yield, all farms
CPCL 00-6131	125.49 *	26.36	174.66 *	170.96 *	147.74 *	145.10 *	131.72 *
CP 78-1628	84.37	-----	159.47 *	-----	121.37	150.63 *	119.93 *
CP 03-1160	117.77 *	132.76	179.29 *	84.70	117.39	80.89	118.80 *
CPCL 00-4027	122.85 *	65.81	146.23 *	128.13	106.26	124.97 *	115.73 *
CPCL 00-6756	109.94 *	22.26	137.05	130.60 *	107.21	142.05 *	108.18
CPCL 00-1373	97.75 *	50.76	140.03	122.74	73.14	119.18 *	100.60
CPCL 00-4111	88.62	43.38	130.00	131.44 *	94.18	113.52	100.19
CPCL 00-0129	91.18	25.79	-----	120.14	86.71	120.89 *	96.93
CP 89-2143	72.12	-----	126.96	111.56	111.29	93.87	92.66
CPCL 01-0271	96.40 *	25.78	137.36	94.76	52.85	133.57 *	90.12
CPCL 00-0458	85.16	37.16	115.97	110.75	61.95	105.45	86.07
CPCL 01-0571	50.17	41.38	127.04	83.66	86.48	108.99	82.95
CPCL 00-4611	65.47	18.47	111.56	93.51	50.54	89.04	71.47
CP 72-2086	51.49	19.16	121.59	89.67	66.46	78.58	71.16
CP 03-2188	39.69	13.36	119.63	95.20	63.56	91.13	70.43
CP 03-1491	56.08	20.68	67.81	75.96	53.19	56.87	54.95
Mean	84.66	38.79	132.98	109.59	87.52	109.67	94.49
LSD (p = 0.1)†	20.12	22.13	17.56	17.33	20.78	22.28	19.06
CV (%)	31.82	79.21	20.33	22.91	33.17	24.28	22.50

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield =13.16 TC/H at p = 0.10.

Table 17. Yields of theoretical recoverable 96° sugar in kg per metric ton of cane (KS/T) from second-ratoon on Lauderhill muck and Dania muck by soil type, farm, and sampling date

	Mean yield						
	Lauderhill muck					Dania Muck	
Clone	Okeelanta 10/27/2009	Knight 10/19/2009	Wedgworth 10/29/2009	SFI 10/16/2009	Osceola 10/21/2009	Duda 10/23/2009	Estimated yield, all farms
CPCL 00-4111	128.8 *	113.3	124.4	142.4	136.5	117.6 *	127.2
CPCL 00-0129	119.6	116.2	-----	132.1	139.1	121.1 *	125.9
CPCL 00-4027	117.7	120.3	130.4	129.3	139.3	118.7 *	125.8
CPCL 01-0271	125.1 *	113.3	121.8	137.8	132.3	116.8 *	124.5
CP 03-1491	127.5 *	101.5	126.3	137.0	137.7	110.9	123.7
CPCL 01-0571	107.6	114.1	123.9	141.0	133.4	115.4	122.6
CP 89-2143	115.5	-----	129.3	135.9	134.5	108.5	122.5
CPCL 00-0458	113.8	112.6	119.6	139.6	128.1	110.6	120.7
CP 03-2188	95.2	116.3	128.4	130.0	134.7	119.4	120.7
CP 03-1160	111.1	114.4	122.9	136.9	114.7	111.2	118.5
CP 72-2086	111.6	101.5	129.2	127.3	125.8	114.2	118.3
CPCL 00-4611	115.2	97.1	127.5	132.0	124.9	108.9	117.6
CPCL 00-6756	122.5 *	101.2	118.3	119.0	133.7	105.4	116.7
CP 78-1628	109.5	-----	118.7	-----	124.6	110.8	116.0
CPCL 00-1373	116.3	102.2	114.0	127.1	130.7	105.4	116.0
CPCL 00-6131	112.9	107.5	108.4	127.7	125.6	104.5	114.4
Mean	115.6	109.4	122.9	133.0	131.0	112.5	120.7
LSD (p = 0.1)†	6.9	10.0	7.9	10.1	5.6	6.7	5.9
CV (%)	7.2	6.7	5.1	4.8	5.1	4.7	3.3

***** Significantly greater than CP 89-2143 at p = 0.10 based on t test.
† *LSD* for location means of cane yield =4.5 KS/T at p = 0.10.

Table 18. Yields of theoretical recoverable 96° sugar in metric tons per hectare (TS/H) from second-ratoon on Dania muck and Lauderhill muck by soil type, farm, and sampling date

	Mean yield						
	Lauderhill muck					Dania Muck	
Clone	Okeelanta 10/27/2009	Knight 10/19/2009	Wedgworth 10/29/2009	SFI 10/16/2009	Osceola 10/21/2009	Duda 10/23/2009	Estimated yield, all farms
CPCL 00-6131	12.138 *	2.518	16.340 *	18.772 *	16.025 *	13.233	13.171 *
CPCL 00-4027	12.457 *	6.907	16.445 *	14.273	12.850	12.807	12.628 *
CP 03-1160	11.350 *	13.038	19.062 *	10.010	11.892	7.823	12.196 *
CP 78-1628	7.955	-----	16.233 *	-----	13.323	14.337	12.156 *
CPCL 00-4111	9.802 *	4.313	13.917	16.143 *	11.113	11.578	11.144
CPCL 00-6756	11.598 *	2.028	14.075	13.558	12.392	12.860	11.085
CPCL 00-0129	9.365 *	2.328	-----	13.662	10.500	12.777	10.595
CPCL 00-1373	9.853 *	4.845	13.805	13.530	8.245	10.808	10.181
CP 89-2143	7.195	-----	14.072	13.148	13.003	8.903	10.090
CPCL 01-0271	10.328 *	2.678	14.437	11.262	6.100	13.493	9.716
CPCL 00-0458	8.512	3.740	12.002	13.227	6.852	10.025	9.059
CPCL 01-0571	4.650	3.945	13.573	10.240	9.915	10.947	8.878
CP 03-2188	3.192	1.295	13.272	10.695	7.633	9.402	7.581
CP 72-2086	4.878	1.740	13.557	9.917	7.297	7.780	7.528
CPCL 00-4611	6.597	1.533	12.220	10.590	5.462	8.365	7.467
CP 03-1491	6.133	1.786	7.328	8.905	6.378	5.510	5.990
Mean	8.500	3.764	14.022	12.529	9.936	10.666	9.967
LSD (p = 0.1)†	2.059	2.313	1.994	2.220	2.473	2.360	2.044
CV (%)	33.492	82.145	18.565	21.285	31.830	23.750	21.042

***** Significantly greater than CP 89-2143 at p = 0.10 based on *t* test.
† *LSD* for location means of cane yield =1.464 TS/Hat p = 0.10.

Table 19. Yields of cane in metric tons per hectare (TC/H) and theoretical recoverable 96° sugar in kg per metric ton (KS/T) and in metric tons per hectare (TS/H) from second-ratoon on Malabar sand and Pompano fine sand by soil type, farm, and sampling date

	Cane yield (TC/H)			Sugar yield (KS/T)			Sugar yield (TS/H)		
	Malabar sand	Pompano fine sand		Malabar sand	Pompano fine sand		Malabar sand	Pompano fine sand	
Clone	Hilliard 10/28/2009	Lykes 10/22/2009	Mean yield, both farms	Hilliard 10/28/2009	Lykes 10/22/2009	Mean yield, both farms	Hilliard 10/28/2009	Lykes 10/22/2009	Mean yield, both farms
CPCL 00-4027	89.43 *	82.68 *	86.05 *	129.3 *	130.4 *	129.8 *	10.010 *	9.340 *	9.675 *
CP 03-1912	86.81 *	64.46 *	75.64 *	116.1	115.0	115.6	8.833 *	6.375 *	7.604 *
CP 03-1401	64.40	58.45 *	61.43	128.6 *	127.2	127.9 *	7.172	6.762 *	6.967 *
CP 03-1160	66.85	62.84 *	64.85 *	122.6 *	123.1	122.8	7.227	6.583 *	6.905 *
CPCL 00-6131	78.11	52.13	65.12 *	105.6	120.2	112.9	7.282	5.580	6.431
CP 03-1939	67.75	44.75	56.25	126.9 *	116.6	121.8	7.470	4.887	6.178
CP 03-1173	66.38	53.17	60.10	114.3	121.7	118.0	6.688	5.277	6.010
CPCL 01-0877	65.74	42.44	54.09	131.9 *	111.4	121.6	7.572	4.145	5.858
CPCL 01-0571	55.79	48.97	52.38	122.1 *	133.1 *	127.6 *	5.867	5.812	5.839
CP 89-2143	67.58	39.16	53.37	120.5 *	132.4 *	126.5	7.093	4.562	5.828
CP 72-2086	60.02	37.81	48.34	124.1 *	126.0	125.0	6.479	4.157	5.243
CP 03-1491	49.56	39.96	44.76	133.5 *	131.1 *	132.3 *	5.757	4.557	5.157
CP 78-1628	68.76	33.35	50.23	109.5	120.0	114.8	6.510	3.490	4.942
CPCL 00-1373	60.71	32.67	46.69	110.7	111.9	111.3	6.028	3.240	4.634
CPCL 01-0271	57.82	28.79	44.43	123.0 *	107.0	115.5	6.292	2.559	4.627
CP 03-2188	50.89	26.89	38.89	112.9	127.7	120.3	5.118	3.078	4.098
Mean	66.04	46.78	56.41	120.7*	122.2	121.5	6.962	5.025	6.000
LSD (p = 0.1)†	15.16	24.26	14.05	9.6	9.2	12.7	1.840	2.683	1.593
CV (%)	16.95	32.07	21.71	7.0	6.6	5.3	17.212	34.186	22.730

* Significantly greater than CP 89 2143 at p = 0.10 based on *t* test.

†*LSD* for location means of cane yield = 23.09 TC/H of sugar yield = 4.7 KS/T, and of sugar yield = 2.654 TS/H at p = 0.10.

Table 20. Yields of cane in metric tons per hectare (TC/H) and theoretical recoverable 96° sugar in kg per metric ton (KS/T) and in metric tons per hectare (TS/H) from second-ratoon on Dania Muck and Torry Muck by soil type, farm, and sampling date

	Cane yield (TC/H)			Sugar yield (KS/T)			Sugar yield (TS/H)		
	Torry muck	Dania muck		Torry muck	Dania muck		Torry muck	Dania muck	
Clone	Eastgate 2/2/2010	Okeelanta 10/26/2009	Mean yield, both farms	Eastgate 2/2/2010	Okeelanta 10/26/2009	Mean yield, both farms	Eastgate 2/2/2010	Okeelanta 10/26/2009	Mean yield, both farms
CP 02-1564	228.43 *	113.75 *	171.09 *	139.7	135.2	137.5	27.534 *	13.074 *	20.304 *
CPCL 99-1401	179.22 *	132.59 *	155.90 *	148.7	135.3	142.0	22.987 *	15.462 *	19.224 *
CPCL 99-2206	208.00 *	111.05 *	159.53 *	141.0	134.6	137.8	25.317 *	12.824	19.070 *
CP 02-1143	195.29 *	83.49	139.39 *	139.2	139.3	139.2	23.483 *	9.999	16.741
CP 02-1554	186.07 *	97.45	141.76	134.0	133.1	133.5	21.588	11.093	16.340
CP 02-2281	167.32	105.21 *	136.26	131.2	140.1	135.7	18.935	12.737	15.836
CP 02-2015	164.83	92.26	128.55	137.4	145.0	141.2	19.628	11.559	15.594
CPCL 99-1777	183.06 *	81.44	132.25	133.0	133.1	133.1	21.040	9.041	15.040
CPCL 99-1225	156.72	95.04	125.88	135.3	139.1	137.2	18.294	11.377	14.836
CPCL 99-2574	147.22	79.70	113.46	144.9	145.5	145.2	18.481	10.050	14.266
CPCL 99-2103	149.14	72.02	110.58	143.1	139.4	141.2	18.458	8.684	13.571
CP 89-2143	147.25	62.01	104.63	149.0	149.8	149.4	18.994	7.820	13.407
CP 78-1628	145.03	74.00	109.51	139.3	141.9	140.6	17.480	8.848	13.164
CPCL 99-4455	122.01	65.13	93.57	146.8	158.5 *	152.6	15.487	8.904	12.195
CP 72-2086	122.33	66.15	94.24	143.5	145.2	144.3	15.217	8.228	11.723
CP 02-1458	116.07	52.35	84.21	134.9	144.0	139.4	13.509	6.397	9.953
Mean	163.62	86.48	125.05	140.1	141.2	140.6	19.777	10.381	15.079
LSD (p = 0.1)†	25.07	24.81	25.56	4.9	7.5	7.8	3.252	2.841	3.285
CV (%)	19.42	25.21	20.17	4.0	4.8	3.8	18.942	22.796	18.830

* Significantly greater than CP 89 2143 at p = 0.10 based on t test.

†*LSD* for location means of cane yield = 15.31 TC/H of sugar yield = 2.8 KS/T, and of sugar yield = 1.801 TS/H at p = 0.10.

Table 21. Dates of stalk counts of 10 plant-cane, first-ratoon, and second-ratoon experiments

	Crop		
Location	**Plant cane**	**First ratoon**	**Second ratoon**
Duda	07/09/09	07/28/09	08/28/09
Eastgate	06/11/09	08/04/09	08/18/09
Hilliard	07/17/09	08/11/09	08/14/09
Knight	07/14/09	08/06/09	08/24/09
Lykes	07/16/09	08/12/09	08/19/09
Okeelanta	07/10/09	07/30/09	09/01/09
Okeelanta (successive)	07/22/09	08/07/09	09/03/09
Osceola	---	---	08/13/09
SFI	07/13/09	08/05/09	08/31/09
Townsite	08/03/09	09/04/09	---
Wedgworth	07/20/09	07/31/09	08/17/09

Table 22. Rankings of clones for freeze tolerance and rate of decrease in kilograms sucrose per metric ton of cane per day following exposure to freezing temperatures*

CP 04, CPCL 95, and CPCL 02 Series			CP 03, CPCL 00, and CPCL 01 Series			CP 02 and CPCL 99 Series		
Clone	**Rank**	**Decline in KS/T per day**	**Clone**	**Rank**	**Decline in KS/T per day**	**Clone**	**Rank**	**Decline in KS/T per day**
CP 72-2086	17	1.86	CP72-2086	12	1.86	CP 72-2086	14	1.56
CP 78-1628	12	2.13	CP78-1628	11	2.13	CP 78-1628	1	1.65
CP 89-2143	13	1.87	CP89-2143	6	1.87	CP 89-2143	5	1.66
CP 04-1252	21	2.70	CP03-1160	5	1.53	CP 02-1143	13	1.55
CP 04-1258	1	1.91	CP03-1173	7	2.04	CP 02-1458	7	0.97
CP 04-1321	19	2.16	CP03-1401	24	2.26	CP 02-1554	4	0.89
CP 04-1367	14	1.88	CP03-1491	10	1.08	CP 02-1564	6	1.63
CP 04-1374	16	1.76	CP03-1912	15	1.50	CP 02-1582	15	1.64
CP 04-1426	18	2.32	CP03-1939	17	1.89	CP 02-1736	9	1.62
CP 04-1566	9	1.89	CP03-2188	20	2.29	CP 02-2015	12	1.59
CP 04-1619	15	1.46	CPCL 00-0458	22	1.93	CP 02-2281	17	1.57
CP 04-1844	10	1.39	CPCL 00-1373	18	1.98	CPCL 99-1225	10	0.84
CP 04-1935	6	2.59	CPCL 00-4027	23	2.38	CPCL 99-1401	8	1.63
CPCL 95-2287	3	1.63	CPCL 00-4111	13	1.85	CPCL 99-1777	16	1.46
CPCL 02-0843	8	1.69	CPCL 00-4611	16	1.80	CPCL 99-2103	2	1.62
CPCL 02-0908	2	1.87	CPCL 00-6131	19	1.70	CPCL 99-2206	11	1.61
CPCL 02-0926	4	1.37	CPCL 00-6756	14	1.62	CPCL 99-2574	3	1.65
CPCL 02-1295	20	1.77	CPCL 01-0271	8	2.04			
CPCL 02-2273	11	1.68	CPCL 01-0571	1	1.41			
CPCL 02-2913	7	2.19	CPCL 01-0877	4	2.03			
CPCL 02-2975	5	2.48	CPCL 01-1029	2	1.48			
			CPCL 97-2730	3	2.08			
			CPCL 99-4455	9	2.29			

*The lower the ranking, the better the freeze tolerance.

Appendix. Sugarcane Field Station Cultivar Development Program for Muck and Sand Soils

Timeline	Stage	Population	Field layout	Crop age at selection	Yield and quality selection criteria	Disease and other selection criteria	Seedcane increase scheme
Year 1	Crossing	400-600 crosses producing about 500,000 true seeds	—	—	Germination tests of seed (bulk of seed stored in freezers)	Field progeny tests planted by family	—
Year 2	Seedlings (single stool stage) Seedlings start in the greenhouse from true seed of the previous year	40,000-70,000 individual plants	Transplants spaced 12 in apart in paired rows on 5-ft centers	8-10 months	Visual selection for plant type, vigor, stalk diameter, height, density, and population; freedom from diseases	Family evaluation for general agronomic type and disease resistance against rust, leaf scald (LS)*, smut, etc.	One stalk cut for seed from each selected seedling
Year 3	Stage I (First clonal trial)	10,000-15,000 clonal plots	Unreplicated plots, 5 ft long on 5-ft row spacing	9-10 months	Essentially the same selection criteria as for seedlings	Permanent CP-series number assignment made	Eight stalks planted for agronomic evaluation. One stalk planted for RSD screening (by inoculation)
Year 4	Stage II (Second clonal trial)	1,000-1,500 clones including five checks	Unreplicated 2-row plots, 15 ft long on 5-ft row spacing	12 months	Yield estimates based on stalk number, average stalk weight, and sucrose analysis; freedom from diseases	Family evaluation for disease resistance against RSD* and eye spot (by inoculation) and LS*, yellow leaf syndrome (YLS), and dry top rot (by natural infection)	Eight 8-stalk bundles cut for seed; two stalks used for RSD screening
Year 5-6	Stage III (Replicated test; first stage planted in commercial fields)	135 clones including 2 checks[†] per location	Four 2-replicate tests (3 organic and 1 sand site) on growers' farms; Two-row plots, 15 ft long	10-11 months Evaluated in plant cane and first-ratoon crops	Yield estimates based on stalk number, average stalk weight, and sucrose analysis; clonal performance assessed across locations	Disease screening (inoculation) for LS*, smut, mosaic virus, and RSD; also rated for other diseases (rust, etc.)	Two 8-stalk bundles cut for seed at each location
Year 7-9	Stage IV (Final replicated test; planted in commercial fields)	16 clones including 2 checks[†] per location	Eleven 6-replicate tests (8 organic and 3 sand sites) on growers' farms; Three-row plots, 35 ft long on 5-ft row spacing	10-15 months Tests are analyzed in plant-cane and first- and second-ratoon crops	Cane tonnage, sucrose and fiber analyses; yield estimates based on stalk number and average stalk weight	Disease screening for LS*, smut, mosaic, and RSD; also rated for lodging and suitability for mechanical harvest	Initial seed increase for potential commercial release planted from first-ratoon seed following evaluation in the plant cane
Year 8-11	Seedcane increase and distribution	Usually 6 or fewer clones	Plots range from 0.1 to 2.0 ha	—	Seedcane purity; freedom from diseases and insects	Plots checked and certified for clonal purity and seedcane quality	Seedcane is increased at 9 Stage IV locations (7 muck and 2 sand)

* LS: leaf scald; RSD: ratoon stunting disease; YLS: yellow leaf syndrome

[†] Checks in stages III and IV: CP 72-2086 (all locations), CP 78-1628 (sand soils), and CP 89-2143 (organic soils).