SUGARCANE RESEARCH

ANNUAL PROGRESS REPORT

2000

This report is from 2000 only and should be regarded as preliminary. Complete research is reported in appropriate Louisiana Agricultural Experiment Station and Louisiana Cooperative Extension Service publications and/or other professional publications.

LOUISIANA STATE UNIVERSITY AGRICULTURAL CENTER
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FOREWORD

Research on sugarcane in the Louisiana Agricultural Experiment Station is an integral part of the LSU Agricultural Center's research-extension effort to provide the knowledge and technology base for efficient production and processing of sugarcane. Sugarcane research projects are led by scientists in the Sugar Research Station, Audubon Sugar Institute and the departments of Agricultural Economics and Agribusiness, Agronomy, Biological and Agricultural Engineering, Entomology, and Plant Pathology and Crop Physiology.

Members of the Louisiana Agricultural Experiment Station maintain close working relations with colleagues in respective departments of the College of Agriculture and other colleges of the LSU Baton Rouge campus, the Louisiana Cooperative Extension Service, the Agricultural Research Service and Natural Resources Conservation Service of the USDA, the American Sugar Cane League, and the Louisiana Department of Agriculture and Forestry.

A major portion of the resources for production research is linked to the St. Gabriel Research Station and the Sugar Research Station located at St. Gabriel, La. Processing research is linked to the Audubon Sugar Institute located on the LSU campus at Baton Rouge, La. The Iberia Research Station helped to accomplish specific sugarcane research objectives in 2000.

Important parts of the 2000 research effort were conducted on cooperating farms and in cooperating factories throughout the industry. These activities are very important and must be continued. **The cooperation of individual farms and sugarcane factories in conducting research projects and financial support from the American Sugar Cane League are gratefully acknowledged.**

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AN OVERVIEW OF 2000 ACTIVITIES IN THE LOUISIANA "L" SUGARCANE VARIETY DEVELOPMENT PROGRAM

K. A. Gravois
Sugar Research Station

The primary objective of the Louisiana Agricultural Experiment Station (LAES) Sugarcane Variety Development Program is to contribute to the profitability of the Louisiana sugarcane industry by developing improved sugarcane varieties.

Sugarcane variety development in the LAES is carried out by a team of scientists (Table 1). The LAES sugarcane breeding team and the United States Department of Agriculture (USDA) sugarcane breeding team work independently yet cooperatively to produce "L" and "HoCP or Ho" varieties, respectively. The best varieties from the two programs are brought together for evaluation at the outfield test locations. Outfield testing is conducted by personnel of the LAES, the USDA, and the American Sugar Cane League in accordance with the provisions of the "Three-way Agreement of 1978." After yield data for one crop cycle (plantcane, first stubble, and second stubble) are collected in the outfield, those varieties that show promise are released for commercial production.

Table 1. Members of the LAES Sugarcane Breeding and Variety Development Team in 2000.

Team Member	Budgetary Unit	Responsibility
Kenneth Gravois	Sugar Research Station	Program Leader
Keith Bischoff	Sugar Research Station	Selection
Gene Reagan	Entomology	Insect Resistance
Jeff Hoy	Plant Pathology & Crop Physiology	Disease Resistance
Jim Griffin	Plant Pathology & Crop Physiology	Herbicide Tolerance
Sonny Viator	Iberia Research Station	Variety Testing
Joel Hebert	Sugar Research Station	Variety Testing
Gert Hawkins	Sugar Research Station	Sucrose Laboratory
Chris LaBorde	Sugar Research Station	Photoperiod and Crossing
Daniel Guillot	Sugar Research Station	Outfield Variety Testing
Harold Schexnayder, Sr.	St. Gabriel Research Station	Farm Manager

A total of 93,927 seedlings from 236 crosses from the 1999 crossing series were planted in the field in the spring of 2000. A total of 74,263 seedlings survived transplanting. The 79% survival was due to extremely dry conditions after transplanting in mid-April (Table 3). The majority of the seedlings were from crosses of commercial varieties and elite experimental varieties. Selection will be carried out in 2001 when the seedlings are in the first stubble crop.

Photoperiod treatments to induce flowering began on May 31 and continued until September 10. Flowering in 2000 was excellent, with 461 crosses being made. Germination tests were conducted in December and indicated excellent germination for the 2000 crossing campaign. Seed production for 2000 was 713,474.

In the fall of 2000, individual selection was practiced on 45,356 first stubble seedlings that represented the 1998 crossing series. Family selection (top 83% in 2000) was utilized based on information from the cross appraisal study. Of the 45,356 clones, 3,014 were selected and planted to establish the first-line trials.

Established procedures were used to advance superior clones of the 1997 crossing series from first-line trials to second-line trials (735 clones) and of the 1996 crossing series from second-line trials to increase trials (206 clones). After preliminary ratings for cane yield and plant type in August, clones with acceptable ratings were further evaluated for lodging, borer damage, presence of disease, presence of pith/tube, and Brix/sugar per ton.

The best 33 experimental varieties from the 1995 crossing series were assigned permanent variety designations in the fall of 2000. Newly assigned varieties were entered in replicated nursery trials at three locations (St. Gabriel Research Station, USDA Ardoyne Farm, Iberia Research Station). "L" and "HoCP or Ho" varieties of the 2000 series were exchanged in the fall of 2000 to plant cooperative infield and nursery tests the following year.

Experimental varieties were replanted in infield and off-station nursery tests (16 varieties of the 1999 series), introduced to the outfield tests (two varieties of the 1998 series), and planted in outfield tests (one variety of the 1995 series and two varieties of the 1997 series). Breeding personnel assisted Dr. Jeff Hoy and Dr. Gene Reagan to enter experimental varieties in the sugarcane smut and sugarcane borer resistance trials, respectively.

The distribution of "L" experimental clones through stages of testing in 2000 is presented in Table 2. The practice of planting nursery trials at multiple locations allows efficient identification of superior varieties in each assignment series.

Table 2. Number of "L" varieties by assignment series at the most advanced stage of testing in 2000.

Series	Stage of Testing	Number of experimental varieties
L 1995	Outfield - Replanted and harvested as first stubble	1
L 1996	Outfield - Replanted and harvested as plantcane; Off-station nurseries - 2nd stubble harvested	0
L 1997	Outfield - Planted; On-station nurseries - 2nd stubble harvested; Off-station nurseries - 1st stubble harvested	2
L 1998	Outfield - Introduced; On-station Nurseries 1st stubble harvested; Off-station nurseries - plantcane harvested.	2
L 1999	On-station nurseries plantcane harvested; Off-station nurseries planted.	16
L 2000	Assignment - On-station nurseries planted	33

Progress in the LAES Sugarcane Variety Development Program would not be possible without the financial support of the director of the LAES and the Louisiana sugar industry through the American Sugar Cane League.

Rainfall for 2000 at the St. Gabriel Research Station is reported in Table 3. Total rainfall for the year was 40.48 inches, which was 71% of normal annual rainfall. Only 0.15 inch rain was recorded in May. A dry spring was followed by below-average rainfall until November. The mild winter of 1999-2000 contributed to higher than normal amounts of sugarcane smut and rust diseases.

Table 3. 2000 rainfall reported by date at the St. Gabriel Research Station, St. Gabriel, Louisiana.

January	Rainfall (in.)	Comments
3	1.10	
8	0.10	
9	0.75	
23	0.90	
27	0.15	
28	0.35	
	3.35	70% Normal
February		
26	1.00	20% Normal
March		
11	0.25	
15	0.85	
16	0.05	

	Rainfall (in.)	Comments
18	1.40	
19	0.15	
27	0.50	
	3.20	69% Normal
April		
3	0.35	
4	0.05	
24	0.55	
	0.95	23% Normal
May		
28	0.15	3% Normal

June	Rainfall (in.)	Comments
4	0.25	
5	0.60	
8	0.20	
9	0.40	
15	0.35	
16	0.20	
18	0.20	
19	0.05	
20	0.35	
26	0.25	
27	1.55	
	4.40	84% Normal
July		
1	1.40	
2	0.15	
23	1.40	
	2.95	50% Normal
August		
8	0.20	
9	0.15	
10	2.00	
22	0.15	
	2.50	44% Normal
September		
8	0.75	
9	1.45	
21	1.35	
	3.55	80% Normal

October	Rainfall (in.)	Comments
5	0.40	
6	0.80	
	1.20	38% Normal
November	Rainfall (in.)	Comments
3	0.07	
6	1.70	
9	2.12	
13	0.70	
16	1.60	

17	0.20	
18	0.70	
19	5.45	
24	1.00	
	13.54	335% Normal
27	0.13	
28	1.24	
	3.49	63% Normal
December		
2	0.05	
6	0.60	

14	0.76	
17	0.25	
19	0.25	
22	0.20	
24	0.01	
Total 2000	40.48	71% Normal
Third driest year in history		

Data provided by Dr. Richard Bengtson, Department of Biological and Agricultural Engineering.

2000 PHOTOPERIOD AND CROSSING IN THE LOUISIANA "L" SUGARCANE VARIETY DEVELOPMENT PROGRAM

C. M. LaBorde, K. A. Gravois, and K. P. Bischoff
Sugar Research Station

Photoperiod induction and crossing are the first stages in the Louisiana "L" Sugarcane Variety Development Program. For subsequent stages to be successful, success must first be achieved at crossing. The objective of crossing is to produce not only a large number of seed, but viable "true" seed from the most desirable crosses. Viable "true" seed is seed that has a sufficient germination count. This seed will then be advanced to the seedling stage of the Sugarcane Variety Development Program.

Cuttings of potential parent varieties used for the 2000 crossing season were planted in the fall of 1999. After establishing the plants from the cuttings, the plants were fertilized weekly with a 200 ppm solution of Peter's 20-20-20. In late January 2000, the cuttings were then transferred to can culture. In April, the cans were moved from the greenhouse to the photoperiod rail carts. Soluble fertilizer applications were applied weekly. Fertilization was discontinued in early May to condition the plants for floral induction. Three additional applications of dry granular fertilizer (8-24-24, one Tbs/can) were applied to the cans during July, August, and September. A reduced nitrogen ratio makes a higher C:N ratio, which is more desirable for the ease of flowering.

Natural lighting and six light-tight chambers (photoperiod bays) were used to impose photoperiod treatments. To prevent overwhelming the crossing facilities, two flowering peaks were planned for September 23 and October 8. Records of varietal flowering, past photoperiod response, and pollen production were used to determine the most appropriate photoperiod treatment for each variety. Poor flowering varieties or those varieties with no flowering history were generally scheduled within the late peak and the longest inductive treatments (bays 3, 4, and 6). Easy flowering varieties were generally placed in bays 1 and 2. The first photoperiod treatments were begun on May 30. All photoperiod treatments (time from artificial sunrise to natural sunset) were initiated with a minimum of 34 consecutive days of 12½ hours of constant day length. After the initial constant photoperiod days, day length was shortened by one minute per day. Treatments differed by the number of days with constant day length and the date on which the decline of photoperiod was initiated. All photoperiod treatments were discontinued on September 10, 2000, when natural day length was 12½ hours and decreasing.

Photoperiod treatments require pulling the carts out of the photoperiod bays at their appropriate time each morning to receive full sunlight. On certain days when the weather was severe, the carts were pushed back into the photoperiod chambers to protect the parental varieties from wind damage. While in the photoperiod chambers, artificial lighting was used. In addition to artificial lighting, the doors were partially opened to allow natural light to enter the chambers.

Flowering percentage of tassels was good on the photoperiod carts in 2000 (Tables 1-2). Total flowering percentage for the six bays was 38%. There were adequate tassels to accomplish good seed production. In 2000, there were high hopes of using our newest commercial variety, HOCP 91-555, as a potential parent in many biparental crosses. This goal was unsuccessful because of the long lag phase of flowering for this variety.

Crossing began on September 11 and ended on November 17, 2000. Six-hundred fifteen tassels of 119 varieties were used to produce 473 total crosses yielding 713,474 viable seed with598,459 seed produced from biparental crosses (Table 3). The germination of seed from biparental crosses was extremely high (average 192 viable seed per gram fuzz). Maintaining high relative humidity is an important factor in achieving high pollen viability. Close attention was made to maintaining high relative humidity. Seed production in 2000 comparable that of 1996, a year where the most viable seed was produced in the history of the Louisiana Sugarcane Variety Development Program. That number in 1996 was 758,905 viable seed produced.

The parents grown in the crossing greenhouse (carts 7 and 8) were used to make the first approximation of the flowering characteristics of new varieties by comparing the date of tasseling of new varieties to those of known varieties (Tables 4 and 6). Varietal flowering dates were recorded from November 27 through December 13, 2000. At that time, all varieties that had not tasseled were examined for signs of induction. Conditions for natural flowering were good. Data collected will be used to gage photoperiod response for the upcoming crossing years.

Table 1. Summary of 2000 photoperiod treatments†.

Bay	Cart	Treatment Start Date	Days of Constant Photoperiod	Date Photoperiod Decline Started	Days of Declining Photoperiod		Mean Flowering Date	Total Stalks	Percent Flowered
					Peak 1	Peak 2			
1	A	June 26	34	July 30	62	77	Oct 30±8	96	56
1	B	June 26	34	July 30	62	77	Oct 29±9	93	49
1	C	June 26	34	July 30	62	77	Oct 27±11	98	35
2	A	June 16	34	July 20	72	87	Oct 21±12	88	60
2	B	June 16	34	July 20	72	87	Oct 18±11	88	53
2	C	June 16	34	July 20	72	87	Oct 23±13	86	45
3	A	May 30	37	July 6	87	102	Sept 28±12	98	44
3	B	May 30	37	July 6	87	102	Oct 1±15	86	37
3	C	May 30	37	July 6	87	102	Oct 12±13	86	23
4	A	May 30	37	July 6	87	102	Oct 13±16	92	49
4	B	May 30	37	July 6	87	102	Oct 5±14	82	44
4	C	May 30	37	July 6	87	102	Oct 10±20	85	14
5	A	June 4	36	July 10	82	97	Oct 15±15	97	36
5	B	June 4	36	July 10	82	97	Oct 28±12	96	13
5	C	June 4	36	July 10	82	97	Oct 16±14	92	18
6	A	May 30	41	July 10	82	97	Oct 8±16	84	36
6	B	May 30	41	July 10	82	97	Oct 5±16	86	38
6	C	May 30	41	July 10	82	97	Oct 4±11	88	31

† Decline rate = 1 minute/day; all bays were heated.

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

Varieties used in crossing	Cans with stalks	Cans with tassels	Total stalks	Total tassels	Mean stalks per can	Mean tassels per can†	Mean pollen rating‡	Mean days to flower§
---------- number ----------								days
119	324	184	1621	615	5.31	3.34	5.1	92
					±1.62	±1.58	±1.6	±14

† Based upon cans with tassels.

‡ Rating of 1 to 4 being male and 5 to 9 being female.

§ Days from decline date to flowering.

Table 3. Summary of 2000 crossing and seed production.

Type of cross	Crosses	Sum of seed production	Mean seed production per cross	Mean seed production per female tassel	Mean germination per gram seed
	---------- number ----------				
Biparental	366	598,459	1635 ± 1654	1613 ±1640	192 ± 161
Polycross	19	54,697	2878 ±2688	2348 ± 1948	289 ± 197
Self	88	60,318	685 ± 942	638 ± 951	99 ± 121
Total	473	713,474	1508 ± 1664	1462 ± 1602	179 ± 161

Table 4. Summary of can, variety, and flowering information on bays 7 and 8 under natural photoperiod.

		Total Varieties		Varieties Flowering			
Total Cans	Cans used	Known flowering response	Unknown flowering response	Known flowering response	Unknown flowering response	Mean stalks per can	Mean tassels per can†
---------- number ----------							
108	108	3	55	1	20	5.2 ± 1.3	3.1 ± 1.6

† Based upon cans with tassels.

Table 5. Varietal flowering summary in 2000 in the photoperiod bays.

VARIETY	Days of Constant Photoperiod	Mean Days to Flower	Pollen Rating	Total Stalk Number	Percent Flowering Stalks
CP65-357	35	88±7	7	10	30
CP70-321	39±1	.	.	8	.
CP72-370	36±1	.	.	9	.
CP73-351	41	.	.	5	.
CP77-405	36	92±4	7	15	33
CP78-317	34	77±1	5	13	69
CP78-357	39±1	.	.	12	.
CP79-318	35	101±2	6	14	86
CP79-348	36	.	.	14	.
CP82-550	37±1	.	.	10	.
CP83-644	37	132	6	25	4
CP88-702	39±1	.	.	12	.
CP89-805	35	.	.	10	.
CP89-846	34	96±1	6	11	27
CP89-879	35	.	.	13	.
HO89-889	37	.	.	12	.
HO91-572	36±1	94±5	6±1	15	53
HO95-988	36	106±3	6	23	57
HOCP85-845	36	103±2	4	44	43
HOCP88-739	36	.	.	16	.
HOCP91-552	34	78±1	3	11	100
HOCP91-555	39	.	.	23	.
HOCP92-618	36	105±7	4±1	22	32
HOCP92-624	35	88±2	6	37	84
HOCP92-648	35	100±3	6	21	57
HOCP93-776	41	.	.	8	.
HOCP94-808	41	.	.	4	.
HOCP94-866	41	.	.	3	.
HOCP94-867	37	85	6	3	33
HOCP95-908	37	.	.	3	.
HOCP95-950	37	110±11	6±1	5	40
HOCP95-951	34	94±2	6±1	9	22
HOCP96-503	38±	.	.	16	.
HOCP96-509	36	.	.	24	.
HOCP96-522	35	86±2	5	15	73
HOCP96-540	37±1	91±3	5	23	78
HOCP96-561	39±1	108±3	4	13	69
HOCP97-601	34	93±2	4±1	10	30
HOCP97-606	35	115±8	6±1	11	18
HOCP97-609	36	85±3	4	21	62
HOCP97-621	35	86±4	5±1	12	67
HOCP97-628	41	.	.	2	.
HOCP97-629	41	.	.	3	.

Table 5. Continue.

VARIETY	Days of Constant Photoperiod	Mean Days to Flower	Pollen Rating	Total Stalk Number	Percent Flowering Stalks
HOCP97-641	37	.	.	11	.
HOCP97-645	39±1	94±3	6	16	19
HOCP97-646	36	.	.	14	.
HOCP97-665	37	.	.	11	.
HOCP98-717	35	100±4	6±1	12	25
HOCP98-741	41	95	3	3	33
HOCP98-743	34	91±3	6	6	100
HOCP98-752	34	.	.	5	.
HOCP98-770	34	.	.	3	.
HOCP98-771	34	.	.	2	.
HOCP98-776	35	85±2	5±1	12	83
HOCP98-781	34	80±6	5	3	67
L75-056	34	94	7	6	17
L89-113	38±1	108±5	5±1	17	35
L90-191	37	112±4	5±1	14	36
L90-207	35	76±2	7	16	88
L91-255	35	92±4	5	16	56
L91-281	34	87±1	6	16	100
L92-312	37	132	3	10	10
L93-363	34	93±3	6±1	7	71
L93-399	39±1	99±4	7	12	75
L94-426	35	96±3	5	34	35
L94-428	38	105±4	6	22	55
L94-431	37	.	.	10	.
L94-432	38	98±3	5±1	22	18
L94-433	38±1	119	4	9	22
L95-462	36±1	.	.	27	.
L95-485	39±1	.	.	12	.
L96-026	38±1	.	.	16	.
L96-030	39±1	.	.	12	.
L96-040	34	97±1	4	12	92
L96-092	38±1	.	.	21	.
L97-102	36±1	.	.	19	.
L97-128	34	90±1	7	29	90
L97-137	37	84	3	34	3
L97-154	34	.	.	6	.
L98-158	37	79±6	6	5	60
L98-168	36	.	.	4	.
L98-197	38±1	88±4	5±1	16	50
L98-198	39±1	79±2	7	11	82
L98-207	35	96±5	5±1	23	22
L98-209	36	105±2	4	15	73
L99-213	34	.	.	6	.
L99-220	34	.	.	4	.
L99-224	39±1	95±5	5	12	75

Table 5. Continue.

VARIETY	Days of Constant Photoperiod	Mean Days to Flower	Pollen Rating	Total Stalk Number	Percent Flowering Stalks
L99-226	38±1	90±3	5	16	81
L99-229	34	77±2	5	9	78
L99-231	37	.	.	6	.
L99-233	36	79±3	3	17	65
L99-234	34	106	3	7	29
L99-237	34	84±5	5±1	3	100
L99-240	34	.	.	3	.
L99-243	34	.	.	7	.
L99-245	34	116	7	4	25
LCP81-010	36	87±3	5	31	90
LCP81-030	36	116	3	11	9
LCP82-089	37±1	126	4	22	5
LCP83-137	39±1	.	.	9	.
LCP85-384	37	93±2	3	115	59
LCP86-408	37	.	.	9	.
LCP86-454	37±1	81±7	4±1	22	36
LCP87-492	35	83±2	6	16	88
LHO83-153	39±1	.	.	14	.
TucCP77-042	36	92±1	6	12	92
US79-010	36	94±4	6	15	73
US80-004	38±1	92±5	4±1	9	56
US90-018	36	.	.	16	.
US90-021	37	.	.	9	.
US92-010	39±1	107	3	10	10
US93-016	36	.	.	12	.
US96-001	39±1	100±5	4	10	90
US96-002	37±1	93±7	7	8	50
US99-001	41	.	.	4	.
US99-002	41	67±1	4	5	80
US99-003	41	78±4	6±1	4	100
US99-004	41	98±28	4±1	3	67

Table 6. Summary of varietal flowering response to natural photoperiod in 2000.

VARIETY	First Flower Date	Mean Flower Date	Stalks	Flowers	Percent Flowered
HO98-783	boot stage		11		
HO98-784	emerging		12		
HOCP85-845	induced		11		
HOCP98-702	346	346	11	3	27
HOCP98-703	induced		5		
HOCP98-712	343	346±2	20	11	55
HOCP98-716	induced		10		
HOCP98-718	341	344±3	9	9	100
HOCP98-728	boot stage		6		
HOCP98-734	boot stage		12		
HOCP98-735	induced	.	11	.	.
HOCP98-742	induced	.	6	.	.
HOCP98-746	348	348	4	1	25
HOCP98-749	emerging	.	5	.	.
HOCP98-751	emerging	.	10	.	.
HOCP98-752	boot stage	.	5	.	.
HOCP98-762	341	341	4	2	50
HOCP98-765	348	348	6	5	83
HOCP98-769	boot stage	.	6	.	.
HOCP98-770	boot stage	.	5	.	.
HOCP98-775	boot stage	.	12	.	.
HOCP98-778	boot stage	.	11	.	.
HOCP98-779	boot stage	.	15	.	.
HOCP98-781	343	343	5	2	40
L99-212	boot stage	.	16	.	.
L99-213	boot stage	.	9	.	.
L99-214	343	346±2	24	11	46
L99-215	boot stage	.	11	.	.
L99-216	346	346	11	2	18
L99-217	boot stage	.	13	.	.
L99-218	341	343±2	10	9	90
L99-219	348	348	15	3	20
L99-221	boot stage	.	17	.	.
L99-222	induced	.	11	.	.
L99-223	boot stage	.	16	.	.
L99-225	341	342±3	13	4	31
L99-227	336	339±3	7	5	71
L99-228	346	347±1	9	3	33
L99-230	339	339	7	1	14
L99-231	boot stage	.	7	.	.
L99-232	boot stage	.	6	.	.
L99-234	348	348	2	1	50
L99-235	emerging	.	10	.	.
L99-236	induced	.	11	.	.
L99-237	343	345±3	11	7	64
L99-238	induced	.	6	.	.
L99-239	induced	.	9	.	.

Table 6. Continue.

VARIETY	First Flower Date	Mean Flower Date	Stalks	Flowers	Percent Flowered
L99-241	348	348	9	3	33
L99-242	induced	.	10	.	.
L99-244	emerging	.	10	.	.
L99-245	emerging	.	6	.	.
L99-326	induced	.	4	.	.
LCP85-384	348	348	12	1	8
LCP86-454	induced	.	6	.	.
US99-001	boot stage	.	5	.	.
US99-002	332	337±3	11	11	100
US99-003	346	346	5	1	20
US99-004	emerging	.	2	.	.

Table 7. Crosses and seed made in 2000 sorted by cross number.

Cross	Female	Male	Seed
XL00-001	L90-207	US99-002	0
XL00-002	US99-002	US99-002	84
XL00-003	L99-233	US99-002	595
XL00-004	L90-207	L99-233	0
XL00-005	L99-233	L99-233	105
XL00-006	HOCP92-624	L99-233	55
XL00-007	HOCP92-624	US99-003	0
XL00-008	L98-158	US99-003	0
XL00-009	US99-003	US99-003	0
XL00-010	HOCP92-624	LCP85-384	105
XL00-011	L90-207	LCP85-384	0
XL00-012	LCP85-384	LCP85-384	48
XL00-013	HOCP92-624	LCP86-454	30
XL00-014	L90-207	LCP86-454	0
XL00-015	LCP86-454	LCP86-454	0
XL00-016	LCP81-010	LCP85-384	729
XL00-017	US99-004	LCP85-384	0
XL00-018	LCP85-384	LCP85-384	9
XL00-018	LCP85-384	LCP85-384	27
XL00-019	LCP86-454	LCP85-384	0
XL00-020	LCP85-384	LCP85-384	0
XL00-020	LCP85-384	LCP85-384	0
XL00-020	LCP85-384	LCP85-384	20
XL00-021	L98-198	LCP81-010	41
XL00-022	LCP81-010	LCP81-010	43
XL00-023	HOCP92-624	HOCP97-609	533
XL00-024	HOCP97-609	HOCP97-609	39
XL00-025	LCP81-010	US99-002	1019
XL00-026	L98-198	US99-002	25
XL00-027	L98-197	US99-002	882
Cross	Female	Male	Seed
XL00-028	LCP87-492	LCP85-384	313
XL00-029	LCP85-384	LCP85-384	118
XL00-029	LCP85-384	LCP85-384	0
XL00-030	LCP87-492	HOCP97-609	56
XL00-031	LCP81-010	HOCP97-609	611
XL00-032	LCP87-492	HOCP97-621	20
XL00-033	LCP81-010	HOCP97-621	3419
XL00-034	HOCP97-621	HOCP97-621	1719
XL00-035	L99-233	LCP85-384	2116
XL00-036	LCP81-010	LCP85-384	2362
XL00-037	LCP85-384	LCP85-384	268
XL00-037	LCP85-384	LCP85-384	407
XL00-037	LCP85-384	LCP85-384	145
XL00-038	HOCP92-624	HOCP97-621	1262
XL00-039	L98-198	HOCP97-621	450
XL00-040	HOCP98-776	HOCP97-621	1173
XL00-041	HOCP97-609	HOCP97-621	1257
XL00-042	HOCP98-741	HOCP97-609	1414
XL00-043	L98-198	HOCP97-609	303
XL00-044	LCP87-492	HOCP97-609	507
XL00-045	CP65-357	LCP85-384	775
XL00-046	HOCP97-621	LCP85-384	1818
XL00-047	HO91-572	LCP85-384	0
XL00-048	LCP85-384	LCP85-384	500
XL00-048	LCP85-384	LCP85-384	102
XL00-049	HOCP92-624	HOCP96-540	2890

Table 7. Crosses and seed made in 2000 sorted by cross number.

XL00-050	HOCP96-540	HOCP96-540	4873
XL00-051	HOCP96-540	00P1	10256
XL00-052	LCP81-010	00P1	5029
XL00-053	US99-002	00P1	475
Cross	Female	Male	Seed
XL00-054	US99-003	00P1	0
XL00-055	CP65-357	L91-255	566
XL00-056	HOCP92-624	L91-255	1441
XL00-057	HOCP97-609	L91-255	850
XL00-058	L91-255	L91-255	515
XL00-059	L94-426	L99-233	1740
XL00-060	L98-158	L99-233	1048
XL00-061	LCP87-492	L99-233	813
XL00-062	L98-197	LCP81-010	61
XL00-063	L98-198	LCP81-010	229
XL00-064	LCP86-454	LCP85-384	2264
XL00-065	US96-002	LCP85-384	1014
XL00-066	HOCP85-845	LCP85-384	2026
XL00-067	HOCP96-522	LCP85-384	1349
XL00-068	LCP85-384	LCP85-384	321
XL00-069	HO91-572	LCP81-010	257
XL00-070	L90-207	LCP81-010	11
XL00-071	HOCP98-776	LCP81-010	977
XL00-072	L98-197	00P2	824
XL00-073	L98-198	00P2	732
XL00-074	HOCP85-845	HOCP96-540	2006
XL00-075	US79-010	HOCP96-540	1822
XL00-076	LCP85-384	HOCP96-540	669
XL00-077	HOCP94-867	L99-226	546
XL00-078	L99-224	L99-226	2161
XL00-079	LCP86-454	L99-226	2508
XL00-080	US96-001	L99-226	2963
XL00-081	LCP85-384	L99-226	1202
XL00-082	L99-226	L99-226	946
XL00-083	HOCP92-624	LCP85-384	1707
XL00-084	HOCP92-618	LCP85-384	219
XL00-085	TUCCP77-042	LCP85-384	12
XL00-086	US79-010	LCP85-384	2516
XL00-087	US96-001	LCP85-384	1946
XL00-088	LCP85-384	LCP85-384	312
XL00-088	LCP85-384	LCP85-384	154
XL00-089	US99-050	LCP85-384	154
XL00-090	US99-043	LCP85-384	315
XL00-090.5	LCP85-384	LCP85-384	138
XL00-091	US80-004	LCP85-384	1694
XL00-092	HOCP98-781	LCP85-384	337
XL00-093	L99-226	LCP85-384	1592
XL00-094	LCP85-384	LCP85-384	320
XL00-094	LCP85-384	LCP85-384	143
XL00-095	HOCP92-618	HOCP96-540	806
XL00-096	L90-207	HOCP96-540	51
XL00-097	L99-226	HOCP96-540	1478
XL00-098	L98-158	US79-010	1094
Cross	Female	Male	Seed
XL00-099	L98-197	US79-010	1794
XL00-100	L98-198	US79-010	686
XL00-101	L99-224	US79-010	1423
XL00-102	TUCCP77-042	US79-010	20
XL00-103	US79-010	US79-010	506
XL00-104	HOCP92-618	L94-426	195
XL00-105	L90-207	L94-426	92
XL00-106	L98-198	L94-426	325
XL00-107	TUCCP77-042	L94-426	0
XL00-108	US99-003	L94-426	11
XL00-109	L94-426	L94-426	488
XL00-110	CP78-317	L94-428	244
XL00-111	L99-224	L94-428	309
XL00-112	L94-428	L94-428	0
XL00-113	HOCP96-522	CP78-317	631
XL00-114	LCP81-010	CP78-317	4054
XL00-115	CP78-317	CP78-317	247
XL00-116	LCP81-010	US96-001	3462
XL00-117	L97-137	US96-001	223
XL00-118	US96-001	US96-001	396
XL00-119	US80-004	LCP85-384	22
XL00-120	LCP85-384	LCP85-384	31
XL00-121	TUCCP77-042	HOCP96-540	25
XL00-122	HO91-572	HOCP96-540	137
XL00-123	LCP87-492	HOCP96-540	7
XL00-124	TUCCP77-042	HOCP98-776	13
XL00-125	HOCP98-776	HOCP98-776	53
XL00-126	L97-128	L99-233	501
XL00-127	L98-207	L99-233	1512
XL00-128	L99-224	L99-233	1882
XL00-129	L99-233	L99-233	0
XL00-130	HO95-988	HOCP85-845	49
XL00-131	L93-399	HOCP85-845	36
XL00-132	L99-226	HOCP85-845	74
XL00-133	LCP81-010	HOCP85-845	1331
XL00-134	HOCP85-845	HOCP85-845	241
XL00-135	HOCP91-552	L91-255	6452
XL00-136	HOCP97-645	L91-255	110
XL00-138	L93-399	L99-233	352
XL00-139	L98-209	L99-233	2190
XL00-140	L99-226	L99-233	1191
XL00-141	LCP81-010	L99-233	4896

Table 7. Crosses and seed made in 2000 sorted by cross number.

XL00-142	HOCP91-552	L99-233	4624
XL00-143	L93-399	LCP85-384	301
XL00-144	HOCP96-522	LCP85-384	726
XL00-144.5	HOCP91-552	LCP85-384	2832
XL00-145	L97-128	US80-004	437
XL00-146	HOCP91-522	US80-004	3960

Cross	Female	Male	Seed
XL00-147	US80-004	US80-004	32
XL00-148	L98-197	HOCP96-522	1798
XL00-149	L99-226	HOCP96-522	2408
XL00-150	HOCP96-522	HOCP96-522	55
XL00-151	LCP87-492	L99-226	0
XL00-152	TUCCP77-042	L99-226	38
XL00-153	US96-002	L99-226	1332
XL00-154	HOCP92-624	LCP86-454	2493
XL00-155	LCP85-384	LCP86-454	1083
XL00-156	L94-426	LCP86-454	931
XL00-157	LCP86-454	LCP86-454	185
XL00-158	CP79-318	LCP85-384	3323
XL00-159	US96-001	LCP85-384	2006
XL00-160	LCP85-384	LCP85-384	916
XL00-160	LCP85-384	LCP85-384	1570
XL00-161	L94-426	L94-432	163
XL00-162	LCP87-492	L94-432	1530
XL00-163	US96-002	L94-432	1122
XL00-164	L94-432	L94-432	210
XL00-165	HOCP85-845	LCP85-384	3480
XL00-166	L91-281	LCP85-384	873
XL00-167	L89-113	LCP85-384	659
XL00-168	CP78-317	LCP85-384	110
XL00-169	US79-010	LCP85-384	2995
XL00-170	L94-428	LCP85-384	1344
XL00-171	LCP85-384	LCP85-384	403
XL00-171	LCP85-384	LCP85-384	237
XL00-172	HOCP92-624	L99-226	5062
XL00-173	HOCP96-522	L99-226	3558
XL00-174	HOCP97-645	L99-226	595
XL00-175	HOCP98-743	L99-226	3778
XL00-176	L93-399	L99-226	1332
XL00-177	L94-428	L99-226	2212
XL00-178	L99-229	LCP81-010	1866
XL00-179	L99-224	LCP81-010	2977
XL00-180	L97-128	LCP81-010	1420
XL00-181	L94-428	LCP81-010	1020
XL00-182	LCP81-010	LCP81-010	3914
XL00-183	HO95-988	HOCP96-561	1154
XL00-184	L94-428	HOCP96-561	119
XL00-185	HOCP96-561	HOCP96-561	17

XL00-186	CP78-317	L91-255	152
XL00-187	HOCP85-845	L91-255	1910
XL00-188	HOCP96-522	L91-255	987
XL00-189	L91-255	L91-255	562
XL00-190	HOCP91-552	L94-432	2027
XL00-191	HOCP96-522	L94-432	1543
XL00-192	L89-113	L94-432	32

Cross	Female	Male	Seed
XL00-193	L97-128	LCP87-492	759
XL00-194	US79-010	LCP87-492	1913
XL00-195	HO91-572	LCP87-492	1791
XL00-196	LCP87-492	LCP87-492	1880
XL00-197	CP77-405	LCP85-384	2390
XL00-198	HO95-988	LCP85-384	662
XL00-199	HOCP92-648	LCP85-384	4565
XL00-200	US80-004	LCP85-384	1881
XL00-201	L91-281	LCP85-384	943
XL00-202	HO91-572	LCP85-384	839
XL00-203	LCP85-384	LCP85-384	249
XL00-203	LCP85-384	LCP85-384	757
XL00-203	LCP85-384	LCP85-384	121
XL00-204	HOCP96-540	HOCP85-845	8090
XL00-205	HOCP97-609	HOCP85-845	3981
XL00-206	L94-432	HOCP85-845	2671
XL00-208	HOCP98-741	HOCP85-845	2570
XL00-209	HO95-988	L90-191	1261
XL00-210	L99-229	L90-191	2730
XL00-211	HOCP91-552	L90-191	4009
XL00-212	L90-191	L90-191	205
XL00-213	HOCP92-624	HOCP96-561	1517
XL00-214	HOCP96-522	HOCP96-561	745
XL00-215	HOCP98-781	HOCP96-561	298
XL00-216	L91-281	L98-197	3068
XL00-217	L99-229	L98-197	1195
XL00-219	L98-197	L98-197	1981
XL00-220	CP78-317	L99-237	122
XL00-221	HOCP95-950	L99-237	1920
XL00-222	L91-281	L99-237	1213
XL00-223	L99-237	L99-237	571
XL00-224	LCP87-492	L98-209	4325
XL00-225	US79-010	L98-209	4286
XL00-226	L91-281	L98-209	3745
XL00-227	L98-209	L98-209	1372
XL00-228	CP78-317	LCP85-384	515
XL00-229	HOCP92-624	LCP85-384	3720
XL00-230	L91-255	LCP85-384	1672
XL00-231	CP77-405	LCP85-384	3231
XL00-232	L94-426	LCP85-384	1093

Table 7. Crosses and seed made in 2000 sorted by cross number.

XL00-233	LCP85-384	LCP85-384	431
XL00-234	HOCP92-624	L98-197	3817
XL00-235	HOCP97-645	L98-197	446
XL00-236	CP77-405	L98-197	3025
XL00-237	CP77-405	L98-209	2586
XL00-238	CP78-317	L98-209	1049
XL00-239	HOCP98-743	L98-209	2348
XL00-240	CP78-317	L99-229	582
Cross	Female	Male	Seed
XL00-241	HOCP92-624	L99-229	4672
XL00-242	HOCP96-540	L99-229	4435
XL00-243	HOCP96-561	L99-229	484
XL00-244	L90-207	L99-229	174
XL00-245	L97-128	L99-229	774
XL00-246	L99-229	L99-229	162
XL00-247	HOCP96-540	HOCP91-552	7793
XL00-248	L93-399	HOCP91-552	1654
XL00-249	HOCP91-552	HOCP91-552	3821
XL00-250	L90-207	HOCP98-776	4
XL00-251	L93-399	HOCP98-776	49
XL00-252	L96-040	HOCP98-776	588
XL00-253	L97-128	US96-001	1158
XL00-254	HOCP96-540	US96-001	2797
XL00-255	HOCP98-743	US96-001	2524
XL00-256	TucCP77-042	LCP85-384	245
XL00-257	L91-255	LCP85-384	802
XL00-258	L99-229	LCP85-384	643
XL00-259	US79-010	LCP85-384	3919
XL00-260	L94-426	LCP85-384	457
XL00-261	LCP85-384	LCP85-384	356
XL00-261	LCP85-384	LCP85-384	531
XL00-262	HOCP92-624	HOCP96-522	1108
XL00-263	L90-207	HOCP96-522	28
XL00-264	HOCP96-522	HOCP96-522	10
XL00-265	L90-207	HOCP96-561	84
XL00-266	L97-128	HOCP96-561	212
XL00-267	LCP81-010	HOCP96-561	964
XL00-268	L90-207	L97-128	0
XL00-269	L90-207	CP78-317	36
XL00-270	L97-128	CP78-317	49
XL00-271	CP78-317	CP78-317	106
XL00-272	LCP85-384	CP79-318	4664
XL00-273	HOCP98-743	CP79-318	2194
XL00-274	L98-207	CP79-318	3082
XL00-275	CP79-318	CP79-318	1676
XL00-276	HOCP92-648	L93-363	2795
XL00-277	L97-128	L93-363	836
XL00-278	LCP85-384	L93-363	1080
XL00-279	L93-363	L93-363	1120
XL00-280	HOCP98-743	L98-209	4649
XL00-281	TUCCP77-042	L98-209	114
XL00-282	CP89-846	LCP85-384	5835
XL00-283	HOCP92-648	LCP85-384	5082
XL00-284	L90-191	LCP85-384	5049
XL00-285	TucCP77-042	LCP85-384	757
XL00-286	HO95-988	HOCP85-845	1746
XL00-287	HOCP92-648	HOCP85-845	3675
Cross	Female	Male	Seed
XL00-288	HOCP96-561	HOCP85-845	938
XL00-289	L91-255	HOCP85-845	1108
XL00-290	L99-237	HOCP85-845	1571
XL00-291	L97-128	HOCP85-845	536
XL00-292	HOCP85-845	HOCP85-845	731
XL00-293	L93-399	L99-224	2122
XL00-294	L94-426	L99-224	1874
XL00-295	L94-432	L99-224	1313
XL00-296	L99-224	L99-224	511
XL00-297	HOCP97-609	LCP81-010	987
XL00-298	L96-040	LCP81-010	2380
XL00-299	HOCP98-776	LCP81-010	4038
XL00-300	TUCCP77-042	L96-040	222
XL00-301	L94-426	L96-040	430
XL00-302	L91-281	L96-040	2291
XL00-303	HOCP98-776	L96-040	2637
XL00-304	CP77-405	L96-040	3480
XL00-305	L96-040	L96-040	285
XL00-306	CP79-318	HOCP85-845	2066
XL00-307	HOCP98-776	HOCP85-845	2426
XL00-308	HOCP97-606	L89-113	1260
XL00-309	LCP87-492	L89-113	558
XL00-310	HOCP98-776	L89-113	2385
XL00-311	L89-113	L89-113	237
XL00-312	HOCP98-776	L91-281	2449
XL00-313	L91-281	L91-281	2115
XL00-314	US92-010	L91-281	742
XL00-315	LCP87-492	L91-281	785
XL00-316	L90-207	LCP85-384	174
XL00-317	L93-363	LCP85-384	3911
XL00-318	L96-040	LCP85-384	1715
XL00-319	LCP85-384	LCP85-384	281
XL00-320	HOCP92-624	HOCP85-845	895
XL00-321	L93-399	HOCP85-845	691
XL00-322	L97-128	HOCP85-845	119
XL00-323	HOCP92-648	L91-281	2770
XL00-324	L97-128	L91-281	685
XL00-325	HOCP92-624	L91-281	2044

Table 7. Crosses and seed made in 2000 sorted by cross number.

XL00-326	HOCP92-624	US80-004	1040
XL00-327	L97-128	US80-004	902
XL00-328	HO91-572	US80-004	297
XL00-329	US80-004	US80-004	288
XL00-330	HOCP92-624	HOCP92-618	2658
XL00-331	L97-128	HOCP92-618	1370
XL00-332	TucCP77-042	HOCP92-618	714
XL00-333	HOCP92-618	HOCP92-618	674
XL00-334	L97-128	L94-428	70
XL00-335	LCP81-010	L94-428	4198
Cross	Female	Male	Seed
XL00-336	US79-010	L94-428	1080
XL00-337	L94-428	L94-428	670
XL00-338	HOCP96-522	00P3	2702
XL00-339	HOCP96-561	00P3	1882
XL00-340	HOCP97-601	00P3	3670
XL00-341	L97-128	00P3	327
XL00-342	CP65-357	LCP85-384	4065
XL00-343	HO95-988	LCP85-384	1726
XL00-344	HOCP95-951	LCP85-384	1200
XL00-345	HOCP98-717	LCP85-384	2171
XL00-346	L97-128	LCP85-384	475
XL00-347	HOCP97-609	LCP85-384	2714
XL00-348	LCP85-384	LCP85-384	568
XL00-349	HO95-988	L98-207	5358
XL00-350	CP79-318	L98-207	11360
XL00-351	LCP81-010	L98-207	2434
XL00-352	L98-207	L98-207	2016
XL00-353	HOCP92-648	L98-209	3455
XL00-354	HOCP92-624	L98-209	2129
XL00-355	L94-426	L98-209	1130
XL00-356	L98-209	L98-209	1850
XL00-357	HOCP96-561	L99-233	2834
XL00-358	CP79-318	L99-233	4344
XL00-359	HOCP92-618	L99-233	750
XL00-360	L99-233	L99-233	592
XL00-361	HOCP92-648	HOCP98-648	1696
XL00-362	HOCP96-561	HOCP98-648	1839
XL00-363	L99-237	HOCP98-648	1413
XL00-364	HOCP98-743	HOCP98-743	2201
XL00-365	HOCP92-624	L91-255	2784
XL00-366	HOCP96-522	L91-255	4203
XL00-367	LCP87-492	L91-255	983
XL00-368	L91-281	L91-255	681
XL00-369	L91-255	L91-255	1770
XL00-370	HOCP92-624	00P4	6136
XL00-371	L90-191	00P4	6937
XL00-372	L91-281	00P4	1614
XL00-373	US96-001	00P4	3037
XL00-374	US96-002	00P4	1696
XL00-375	CP79-318	LCP85-384	6639
XL00-376	L75-056	LCP85-384	67
XL00-377	CP79-318	L98-209	6978
XL00-378	HO95-988	L98-209	1563
XL00-379	HOCP85-845	L98-209	864
XL00-381	HOCP92-624	HOCP97-601	1013
XL00-382	L94-428	HOCP97-601	837
XL00-383	HOCP97-601	HOCP97-601	2004
XL00-384	HOCP96-540	L91-281	5788
Cross	Female	Male	Seed
XL00-385	L94-428	L91-281	1220
XL00-386	L97-128	L91-281	494
XL00-387	L90-191	US96-001	556
XL00-388	L97-128	US96-001	2239
XL00-389	US96-001	US96-001	1013
XL00-390	HOCP95-950	LCP85-384	2986
XL00-391	HOCP97-621	LCP85-384	5380
XL00-392	CP79-318	L89-113	2122
XL00-393	HOCP85-845	L89-113	1178
XL00-394	HOCP92-624	L89-113	871
XL00-395	HOCP92-624	HOCP96-540	1946
XL00-396	HOCP95-951	HOCP96-540	1133
XL00-397	HOCP97-621	HOCP96-540	2962
XL00-398	HOCP96-540	HOCP96-540	3063
XL00-399	L97-128	L96-040	73
XL00-400	L91-255	L96-040	529
XL00-401	CP79-318	L96-040	2017
XL00-402	CP79-318	HOCP92-618	3421
XL00-403	HOCP97-601	HOCP92-618	2432
XL00-404	L93-363	HOCP92-618	970
XL00-405	L97-128	L99-224	264
XL00-406	L90-191	L99-224	89
XL00-407	HO95-988	HOCP92-624	38
XL00-408	HOCP85-845	HOCP92-624	1691
XL00-409	HOCP92-648	HOCP92-624	3984
XL00-410	HOCP96-540	HOCP92-624	4506
XL00-411	HOCP96-561	HOCP92-624	1017
XL00-412	HOCP97-609	HOCP92-624	721
XL00-413	L89-113	HOCP92-624	201
XL00-414	LCP85-384	HOCP92-624	1277
XL00-415	HOCP92-624	HOCP92-624	301
XL00-416	CP89-846	L96-040	168
XL00-417	HO95-988	L96-040	896
XL00-418	HOCP92-648	L96-040	1232
XL00-419	L89-113	L96-040	730
XL00-420	L93-363	L96-040	683

Table 7. Crosses and seed made in 2000 sorted by cross number.

XL00-421	LCP81-010	L96-040	1621
XL00-422	US79-010	L96-040	2827
XL00-423	HOCP96-540	L94-433	2720
XL00-424	HO95-988	L94-433	512
XL00-425	LCP85-384	L94-433	1214
XL00-426	LCP87-492	L94-433	232
XL00-427	L94-428	L94-433	439
XL00-428	L93-399	HOCP97-621	313
XL00-429	HOCP97-621	HOCP97-621	1615
XL00-430	HOCP92-624	L91-255	816
XL00-431	HOCP98-717	L91-255	1054
XL00-432	L99-224	L91-255	1687
Cross	Female	Male	Seed
XL00-433	HOCP97-606	LCP85-384	856
XL00-434	L99-226	LCP85-384	2015
XL00-435	US96-001	LCP85-384	2756
XL00-436	L99-245	HOCP85-845	8688
XL00-437	HOCP92-618	HOCP85-845	155
XL00-438	LCP81-030	HOCP85-845	948
XL00-439	LCP81-010	L99-234	1303
XL00-440	LCP86-454	L99-234	603
XL00-441	US79-010	L99-234	720
XL00-442	LCP82-089	LCP85-384	6574
XL00-443	HOCP92-648	LCP85-384	1181
XL00-444	L96-040	LCP85-384	723
XL00-445	L98-209	LCP85-384	1037
XL00-446	CP79-318	LCP85-384	7703
XL00-447	HOCP96-540	00P5	1572
XL00-448	L98-207	00P5	4689
XL00-449	US99-004	00P5	2379
XL00-450	HOCP98-717	00P5	738
XL00-451	CP83-644	HOCP97-609	1210
XL00-452	HOCP92-648	HOCP97-609	1872
XL00-453	L94-426	HOCP97-609	0
XL00-454	HOCP97-609	HOCP97-609	133
XL00-455	HOCP96-540	L92-312	3328
XL00-456	L98-207	L92-312	1684
XL00-457	LCP81-010	L92-312	1693
XL00-458	L92-312	L92-312	633
XL00-459	L98-209	L94-428	2457
XL00-460	HO91-572	L94-428	1531
XL00-461	L75-056	L94-433	0
Total			**713,474**

SELECTIONS, ADVANCEMENTS, AND ASSIGNMENTS OF THE LOUISIANA "L"SUGARCANE VARIETY DEVELOPMENT PROGRAM FOR THE YEAR 2000

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SUMMARY

In the selection phase of the Louisiana "L" Program, superior clones are advanced through the single stool, first line, second line, and increase stages of the breeding program. In the first stubble crop of the second-line trials, those clones with acceptable breeding or commercial value are assigned a permanent variety number. A total of 74,263 seedlings from 312 crosses were planted in the field in the spring of 2000. The majority of these seedlings are progeny of crosses among commercial and elite experimental varieties. In the fall of 2000, family selection was practiced on the 54,794 stubble seedlings surviving the winter. A total of 45,356 seedlings were used for individual selection. This selection resulted in the planting of 3,012 first-line trial plots. At the same time, superior clones were also selected and advanced through subsequent stages (735 to second line, 206 to increase). Assignment of permanent "L00" numbers were given to the 33 best clones of the 1995 crossing series.

PROCEDURES

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

RESULTS AND DISCUSSION

A total of 74,263 seedlings from 312 crosses of the 1999 crossing series were planted to the field in the spring of 2000 (Table 1). Many of these seedlings were progeny of crosses among commercial and superior experimental varieties. In the fall of 2000, individual selection was practiced on the 54,794 stubble single stools of the 1998 crossing series that survived the winter. Family selection was practiced on the top 83% of the crosses in 2000 based on results obtained in the cross appraisal study. The 3,012 clones selected and advanced from the single stools were planted in 6-foot first-line trial plots. Dates of planting and harvesting of all plots in the selection phase of the program can be found in Table 2.

Over 3,900 first-line trial plots of the 1997 crossing series were rated for cane yield and pest resistance in August of 2000 (Table 3). After screening for cane yield rating, acceptable clones were further evaluated for pest resistance (diseases and borer injury), stalk quality, and Brix (Table 3). This second stage of advancement was concluded with the planting of 735 clones in 16-foot second- line trial plots.

Stalk counts were made on the 705 plantcane second-line trial plots of the 1996 crossing series in August 2000. Based on these counts and the previously described criteria, 206 clones were planted in two 16-foot increase plots (Table 4). One replication is planted in light soil, and the other replication is planted in heavy soil. These clones will be candidates for assignment in 2001. Of the 191 candidates from the first stubble crop of the second-line trials, the best 33 clones from the 1995 crossing series were assigned permanent "L00" numbers (Table 5). These newly assigned "L00" varieties were then planted in replicated nursery trials at three locations (St. Gabriel Research Station, Iberia Research Station, and USDA Ardoyne Farm).

The advancement summary of clones from crosses made in 1995 through 1998 is shown in Table 6. Crosses are sorted by female parent in ascending order, with the percentile ranking given for each cross in each stage of the program. Results of the 1999 crossing series plantcane cross appraisal in 2000 are presented in Table 7.

Table 1. Summary of selections, advancements and assignments made during 2000 by the Louisiana, "L", Sugarcane Variety Development Program's personnel.

Crossing series	Crosses		Plants surviving transplanting	Over-wintered plants	Advanced to			
	Progeny test	Selection program			1st line	2nd line	Increase	Nursery (Assigned)
			------------------------------ number of clones --------------------------------					
X95	154	201	46401	32402	2675	459	191	33
X96	239	252	63468	49213	3392	705	206	
X97	75	174	71416	48322	3901	735		
X98	125	193	64467	54794	3012			
X99		312	74263					

Table 2. Dates of seedling and line trials planted or harvested in 2000.

Crossing Series	Test	Crop	Date Planted	Date Harvested
X99	Seedlings	Planted	4/7 - 24/00	
X98	Seedlings	First Stubble	4/9 - 14/99	
X98	Cross Appraisal	First Stubble	4/14/99	12/8/00
X98	First Line Trial	Planted	9/7 - 14/00	
X97	First Line Trial	Plantcane	9/13- 17/00	
X96	First Line Trial	First Stubble	9/24 - 10/2/99	10/23/00
X97	Second Line Trial	Planted	9/20/00	
X96	Second Line Trial	Plantcane	9/23/99	11/27/00
X95	Second Line Trial	First Stubble	10/19/98	10/8/00
X94	Second Line Trial	Second Stubble	10/2/97	10/10/00
X96	Light Soil Increase	Planted	9/26/00	
X95	Light Soil Increase	Plantcane	10/5/99	11/20/00
X94	Light Soil Increase	First Stubble	10/27/98	11/20/00
X93	Light Soil Increase	Second Stubble	10/29/97	10/8/00
X96	Heavy Soil Increase	Planted	9/26/00	
X95	Heavy Soil Increase	Plantcane	10/5/99	11/15/00
X94	Heavy Soil Increase	First Stubble	10/27/98	10/16/00
X93	Heavy Soil Increase	Second Stubble	10/21/97	10/8/00

Table 3. Numbers of experimental clones dropped for identified faults in the 1997 crossing series first-line trials after the initial selection stage.

Trait	Fault	
	Frequency	Percent
-- 2046 enter 2nd round of evaluation ---		
Borers	34	12.4
Leaf Scald	55	0.3
Lodged	139	17.2
Pith / Tube	577	53.3
Rust	19	1.4
Short	33	1.0
Small	28	0.7
Smut	47	6.5
Aphids	4	0.3
--- 936 clones dropped --		
-- 863 clones enter 3rd round of evaluation --		
Brix	375	18.3
Clones advanced to second clonal trial	735	81.7

Table 4. Number of experimental clones dropped for identified faults in the 1996 crossing series second-line trial prior to advancement to the increase stage.

Trait	Fault	
	Frequency	Percent
--- First evaluation - 705 clones --		
Stalk count <85 per plot	210	37.9
Gap	15	0.4
Rust	8	1.5
Leaf Scald	1	1.5
Lodged	70	8.5
Pith / Tube	128	6.3
Short	33	0.2
Small	5	0.7
Smut	26	0.9
Other	3	0.4

-- 499 clones dropped -- --------		
Advanced to Increase stage	206	79.5

Table 5. Mean yield data of 2000 “L” assignments from first stubble line trial plots.

Variety	Female	Male	Sugar per acre	Cane Yield	Sugar per ton	Stalk Weight	Stalk Number
			lbs/A	tons/A	lbs/ton	lbs	stalks/A
CP70-321	CP61-039	CP57-614	8531	42.1	200	2.2	36754
LCP85-384	CP77-310	CP77-407	8327	46.6	178	1.6	57929
HOCP85-845	CP72-370	CP77-403	6783	36.8	174	1.7	43409
L2000-246	HOCP88-739	LCP85-384	7878	38.8	203	1.6	47644
L2000-247	L91-281	LHO92-314	10336	51.6	200	1.7	60349
L2000-248	LCP83-137	HOCP92-624	10010	54.1	185	1.9	55811
L2000-249	L91-281	LHO92-314	9689	43.8	221	1.4	63525
L2000-250	L91-281	LHO92-314	12714	65.1	195	2.4	53543
L2000-251	HOCP85-845	L93-391	8638	40.6	213	1.6	49459
L2000-252	HOCP89-846	L93-386	7519	42.3	178	1.7	49459
L2000-253	L89-113	CP83-644	8351	41.7	200	2.0	41291
L2000-254	HOCP85-845	CP83-644	8781	42.5	207	1.8	47190
L2000-255	L91-281	LCP82-089	10512	51.9	202	2.2	47644
L2000-256	L89-113	CP83-644	10461	47.7	220	1.8	53543
L2000-257	LCP85-313	CP76-331	10237	45.8	224	1.7	53543
L2000-258	LCP85-384	95P3	9396	42.2	222	1.8	47190
L2000-259	HOCP89-846	L92-321	7617	37.4	204	1.3	55811
L2000-260	LCP85-384	95P3	11768	45.8	257	2.1	44468
L2000-261	L91-281	L92-312	10659	41.1	259	1.8	46736
L2000-262	US78-020	LCP85-384	8759	39.2	223	1.3	59441
L2000-263	LCP83-137	CP83-644	5964	31.0	193	1.3	47644
L2000-264	HOCP89-846	US77-010	11589	66.9	173	2.3	57173
L2000-265	LCP85-313	L92-355	7685	39.8	193	1.2	68063
L2000-266	HOCP89-846	L93-386	8108	45.9	177	1.5	60349
L2000-267	LCP83-137	L92-321	9121	47.9	190	2.0	47190
L2000-268	LCP83-137	CP83-644	12887	62.2	207	1.9	64433
L2000-269	LCP85-313	L93-365	12715	74.0	172	2.2	66701
L2000-270	CP70-330	L92-312	9656	48.5	199	1.9	51274
L2000-271	CP65-357	LCP82-089	14501	59.8	242	2.1	58080
L2000-272	L91-281	LCP86-454	10765	51.0	211	1.9	53996
L2000-273	L91-281	L93-365	12965	57.1	227	2.2	52635
L2000-274	L91-281	L93-365	9723	44.7	218	2.0	45829
L2000-275	LCP83-137	CP83-644	9369	44.1	212	1.8	49005
L2000-276	HOCP90-941	LCP82-089	8051	37.6	214	1.7	44468
L2000-277	L91-281	HOCP92-624	9144	47.6	192	2.1	44468
L2000-278	HOCP90-941	LCP82-089	8737	48.8	179	2.5	38569

Table 6. Advancement summary of crosses in the 1995 through 1998 crossing series.

			1st Line		2nd Line		Increase		Assignment	
Female	Male	Survive	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l
1995 Crossing Series										
CP65-357	HOCP90-955	79	14	92	2	85	0	25	0	42
CP65-357	L93-391	417	19	37	3	49	1	57	0	42
CP65-357	LCP82-089	194	42	96	4	79	2	83	1	94
CP70-321	HO93-769	204	0	12	0	18	0	25	0	42
CP70-330	HOCP92-624	203	0	12	0	18	0	25	0	42
CP70-330	L92-312	733	45	47	3	41	1	54	1	85
CP70-330	L93-380	407	10	28	2	44	0	25	0	42
CP70-330	LCP82-089	84	11	81	0	18	0	25	0	42
CP72-370	94P9	81	8	74	2	84	1	88	0	42
CP78-317	LCP81-030	241	18	57	6	85	2	75	0	42
CP79-318	HOCP90-955	74	7	71	0	18	0	25	0	42
CP79-318	US77-010	221	11	40	2	50	1	62	0	42
CP80-323	LCP83-137	142	0	12	0	18	0	25	0	42
CP87-625	HOCP91-552	105	12	78	3	88	2	93	0	42
CP87-625	L92-312	185	11	46	4	81	3	91	0	42
CP89-879	LCP82-089	367	22	47	4	58	3	73	0	42
HO89-889	HOCP92-624	387	39	75	6	70	1	59	0	42
HO89-889	L92-312	426	41	72	4	52	3	70	0	42
HOCP85-845	95P2	185	12	50	0	18	0	25	0	42
HOCP85-845	CP78-317	214	0	12	0	18	0	25	0	42
HOCP85-845	CP79-318	875	50	45	4	43	1	52	0	42
HOCP85-845	CP79-318	220	18	63	1	42	0	25	0	42
HOCP85-845	CP83-644	1058	93	69	14	65	6	67	1	84
HOCP85-845	HOCP91-527	305	21	53	1	39	0	25	0	42
HOCP85-845	HOCP91-552	899	63	54	17	76	4	61	0	42
HOCP85-845	HOCP92-624	784	35	36	4	45	2	58	0	42
HOCP85-845	HOCP92-674	249	13	42	0	18	0	25	0	42
HOCP85-845	L92-312	103	12	79	1	53	0	25	0	42
HOCP85-845	L92-321	101	9	70	1	54	0	25	0	42
HOCP85-845	L92-321	455	29	49	1	38	0	25	0	42
HOCP85-845	L93-391	437	54	80	7	71	2	63	1	87
HOCP85-845	LCP81-030	752	42	45	9	62	1	53	0	42
HOCP85-845	LCP85-371	326	0	12	0	18	0	25	0	42
HOCP85-845	US77-010	457	21	37	3	47	1	55	0	42
HOCP85-845	US78-020	92	7	58	0	18	0	25	0	42

HOCP88-739	L84-290	86	26	98	0	18	0	25	0	42

Table 6. Continue.

			1st Line		2nd Line		Increase		Assignment	
Female	Male	Survive	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l
HOCP88-739	LCP85-384	207	18	68	5	83	2	80	1	92
HOCP89-846	CP78-317	105	9	66	3	88	3	96	0	42
HOCP89-846	HO93-769	235	0	12	0	18	0	25	0	42
HOCP89-846	HOCP91-559	232	0	12	0	18	0	25	0	42
HOCP89-846	HOCP92-674	110	0	12	0	18	0	25	0	42
HOCP89-846	HOCP92-675	453	11	28	5	59	1	56	0	42
HOCP89-846	L92-321	130	14	76	4	90	2	91	1	95
HOCP89-846	L93-363	63	14	97	3	98	2	97	0	42
HOCP89-846	L93-386	134	18	83	5	93	3	94	2	98
HOCP89-846	L93-391	105	17	91	0	18	0	25	0	42
HOCP89-846	LCP81-030	466	30	49	7	68	4	77	0	42
HOCP89-846	LCP82-089	204	27	82	4	77	3	90	0	42
HOCP89-846	LCP86-454	197	0	12	0	18	0	25	0	42
HOCP89-846	LHO92-314	218	11	40	2	51	0	25	0	42
HOCP89-846	US77-010	410	12	29	4	54	3	71	1	87
HOCP89-846	US90-018	114	8	54	3	86	1	77	0	42
HOCP90-923	HO93-769	425	16	33	1	38	1	56	0	42
HOCP90-941	CP91-552	53	10	94	0	18	0	25	0	42
HOCP90-941	HOCP92-674	229	9	34	2	50	0	25	0	42
HOCP90-941	L92-312	244	21	66	4	72	2	74	0	42
HOCP90-941	L92-312	400	0	12	0	18	0	25	0	42
HOCP90-941	L93-363	171	0	12	0	18	0	25	0	42
HOCP90-941	L93-391	223	35	90	6	87	1	61	0	42
HOCP90-941	LCP82-089	96	24	98	7	99	5	99	2	99
HOCP90-957	HOCP92-674	211	0	12	0	18	0	25	0	42
HOCP90-957	L92-310	168	13	59	2	61	1	68	0	42
HOCP90-957	L93-391	86	0	12	0	18	0	25	0	42
HOCP90-957	LCP81-010	449	33	56	5	59	0	25	0	42
HOCP90-957	LCP81-030	208	0	12	0	18	0	25	0	42
HOCP90-957	LCP82-089	99	5	42	0	18	0	25	0	42
HOCP90-963	LCP82-089	250	0	12	0	18	0	25	0	42
HOCP90-963	LCP85-336	148	14	71	1	48	0	25	0	42
HOCP90-963	US77-017	247	20	61	1	40	0	25	0	42
HOCP91-552	95P2	195	9	37	2	57	0	25	0	42

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP91-559	L93-365	90	0	12	0	18	0	25	0	42
HOCP91-559	LCP81-030	163	6	32	0	18	0	25	0	42
HOCP92-624	LCP82-089	451	0	12	0	18	0	25	0	42
HOCP92-624	LCP82-089	185	27	87	6	91	2	85	0	42
HOCP92-654	CP76-331	242	0	12	0	18	0	25	0	42
HOCP92-654	HOCP92-654	225	0	12	0	18	0	25	0	42
L75-056	LCP82-089	390	38	73	4	57	2	65	0	42
L89-113	CP83-644	916	64	54	15	72	7	72	2	86
L89-113	HOCP90-957	61	3	39	0	18	0	25	0	42
L90-191	CP89-855	281	41	87	6	80	3	84	0	42
L91-255	US90-018	319	27	65	5	71	0	25	0	42
L91-281	CP78-317	195	0	12	0	18	0	25	0	42
L91-281	CP79-318	227	20	69	0	18	0	25	0	42
L91-281	CP79-318	191	0	12	0	18	0	25	0	42
L91-281	HOCP85-845	236	18	58	4	74	2	76	0	42
L91-281	HOCP90-941	89	14	90	1	60	1	86	0	42
L91-281	HOCP91-552	165	22	82	4	83	2	87	0	42
L91-281	HOCP91-552	70	8	78	3	96	3	98	0	42
L91-281	HOCP92-624	247	9	31	3	63	1	60	1	89
L91-281	HOCP92-674	339	0	12	0	18	0	25	0	42
L91-281	L91-255	492	48	73	7	66	5	82	0	42
L91-281	L92-312	213	24	77	4	75	2	78	1	92
L91-281	L92-312	421	22	42	3	49	3	70	0	42
L91-281	L92-312	219	18	63	3	66	2	78	0	42
L91-281	L92-321	229	0	12	0	18	0	25	0	42
L91-281	L92-321	222	9	35	1	42	0	25	0	42
L91-281	L93-365	426	35	63	13	89	8	92	2	92
L91-281	LCP81-010	152	13	66	1	47	0	25	0	42
L91-281	LCP81-030	174	0	12	0	18	0	25	0	42
L91-281	LCP82-089	408	28	53	5	64	1	57	0	42
L91-281	LCP82-089	388	50	80	6	70	3	73	1	88
L91-281	LCP85-336	331	45	84	11	92	4	87	0	42
L91-281	LCP85-371	169	0	12	0	18	0	25	0	42
L91-281	LCP86-454	228	19	64	11	98	4	92	1	91
L91-281	LHO92-314	215	29	84	10	97	7	98	3	98

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
L91-281	US77-010	223	3	26	0	18	0	25	0	42
L91-281	US78-020	243	8	29	1	41	0	25	0	42
L92-312	95P2	146	10	51	3	78	0	25	0	42
L92-313	LCP81-030	209	8	33	2	52	1	63	0	42
L92-313	LCP86-450	95	13	85	3	91	1	84	0	42
L93-366	L93-365	195	0	12	0	18	0	25	0	42
L93-399	CP78-317	101	0	12	0	18	0	25	0	42
L93-399	HOCP85-845	165	11	50	0	18	0	25	0	42
L93-399	HOCP91-552	340	0	12	0	18	0	25	0	42
L93-399	L92-312	788	64	61	15	77	4	64	0	42
L93-399	LCP81-030	539	19	31	1	37	0	25	0	42
L93-399	LCP82-089	304	0	12	0	18	0	25	0	42
L93-399	LCP85-336	766	15	27	1	36	0	25	0	42
L93-399	US78-020	234	1	26	0	18	0	25	0	42
LCP81-010	CP76-331	82	14	91	1	63	0	25	0	42
LCP81-010	LCP81-030	1024	35	30	5	44	1	52	0	42
LCP82-089	94P5	88	6	51	0	18	0	25	0	42
LCP82-089	LCP81-010	117	22	93	2	75	0	25	0	42
LCP83-137	CP76-331	198	39	94	3	69	1	64	0	42
LCP83-137	CP83-644	906	67	56	20	82	10	85	3	89
LCP83-137	HOCP91-552	354	17	38	2	46	1	59	0	42
LCP83-137	HOCP92-624	199	29	87	2	56	2	81	1	93
LCP83-137	L92-321	796	61	59	16	78	6	71	1	85
LCP85-313	CP76-331	180	19	75	4	82	1	66	1	94
LCP85-313	CP79-318	196	16	63	6	89	2	82	0	42
LCP85-313	CP83-644	189	0	12	0	18	0	25	0	42
LCP85-313	L92-321	204	0	12	0	18	0	25	0	42
LCP85-313	L92-355	238	12	40	4	73	2	75	1	90
LCP85-313	L93-365	100	15	89	1	55	1	80	1	96
LCP85-313	L93-365	458	25	44	2	42	1	54	0	42
LCP85-313	L93-380	75	6	60	0	18	0	25	0	42
LCP85-313	L93-391	99	0	12	0	18	0	25	0	42
LCP85-313	LCP81-030	243	0	12	0	18	0	25	0	42
LCP85-313	LCP85-384	97	20	95	2	79	0	25	0	42
LCP85-313	LCP86-454	209	11	43	3	67	2	79	0	42

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
LCP85-341	L93-380	160	0	12	0	18	0	25	0	42
LCP85-341	LCP82-089	192	0	12	0	18	0	25	0	42
LCP85-384	95P3	242	43	92	11	96	6	94	2	96
LCP85-384	LCP82-089	77	7	70	3	94	2	95	0	42
LCP86-429	CP76-331	541	0	12	0	18	0	25	0	42
LCP86-429	CP79-318	202	0	12	0	18	0	25	0	42
LCP86-429	CP83-644	206	43	96	3	68	0	25	0	42
LCP86-429	HOCP92-618	472	0	12	0	18	0	25	0	42
LCP86-429	L92-312	383	15	34	4	57	2	66	0	42
LCP86-429	L92-312	334	21	48	4	62	2	69	0	42
LHO83-153	HO89-889	160	0	12	0	18	0	25	0	42
LHO92-314	CP76-331	351	51	86	12	92	2	68	0	42
UNKNOWN	UNKNOWN	3578	12	25	3	36	1	51	0	42
US78-020	LCP82-089	77	9	79	1	64	1	89	0	42
US78-020	LCP85-384	78	11	85	3	94	1	89	1	97
<u>1996 Crossing Series</u>										
CP65-357	CP77-407	72	9	81	4	95	0	35	.	.
CP65-357	HOCP85-845	209	26	80	0	25	0	35	.	.
CP65-357	HOCP91-573	245	26	74	3	64	0	35	.	.
CP65-357	HOCP93-749	98	0	23	0	25	0	35	.	.
CP65-357	L91-255	157	0	23	0	25	0	35	.	.
CP65-357	L92-319	89	10	78	3	86	1	89	.	.
CP65-357	L94-431	75	32	99	3	90	0	35	.	.
CP65-357	LCP82-089	84	5	59	1	62	0	35	.	.
CP65-357	LCP85-384	750	91	80	35	92	15	96	.	.
CP72-370	CP79-348	248	0	23	0	25	0	35	.	.
CP72-370	HOCP85-845	497	0	23	0	25	0	35	.	.
CP72-370	HOCP91-552	435	0	23	0	25	0	35	.	.
CP72-370	L92-312	150	18	79	7	92	2	93	.	.
CP72-370	LHO92-307	200	0	23	0	25	0	35	.	.
CP77-310	CP72-370	243	0	23	0	25	0	35	.	.
CP77-310	CP77-407	97	14	84	5	94	1	88	.	.
CP77-310	HOCP91-573	200	0	23	0	25	0	35	.	.
CP77-310	HOCP92-618	157	20	81	1	56	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
CP78-357	HOCP93-750	98	15	88	3	84	1	87	.	.
CP78-357	HOCP93-754	112	9	65	4	87	0	35	.	.
CP79-318	HO89-889	103	10	70	5	94	0	35	.	.
CP79-318	HOCP85-845	1143	65	57	14	64	5	76	.	.
CP79-318	HOCP91-573	248	0	23	0	25	0	35	.	.
CP79-318	HOCP92-618	247	0	23	0	25	0	35	.	.
CP79-318	L92-312	245	7	49	1	53	0	35	.	.
CP79-318	L94-431	72	0	23	0	25	0	35	.	.
CP79-318	L94-436	112	0	23	0	25	0	35	.	.
CP79-318	LCP85-384	1281	126	71	20	69	8	83	.	.
CP79-318	LCP85-384	178	0	23	0	25	0	35	.	.
CP79-318	LCP85-384	356	0	23	0	25	0	35	.	.
CP79-318	LHO92-314	725	0	23	0	25	0	35	.	.
CP79-318	US90-018	81	0	23	0	25	0	35	.	.
CP79-318	US92-010	177	0	23	0	25	0	35	.	.
CP79-348	HOCP93-746	68	0	23	0	25	0	35	.	.
CP79-348	HOCP93-765	226	0	23	0	25	0	35	.	.
CP79-348	L92-312	40	8	94	4	99	0	35	.	.
CP82-550	CP79-348	108	12	77	3	81	0	35	.	.
CP82-550	HOCP92-624	118	9	64	5	91	0	35	.	.
CP82-550	L91-255	92	0	23	0	25	0	35	.	.
CP82-550	LCP82-089	322	33	72	3	60	0	35	.	.
CP83-644	CP84-730	104	7	61	2	75	0	35	.	.
CP83-644	HOCP85-845	179	16	67	5	81	3	94	.	.
CP83-644	HOCP91-527	197	0	23	0	25	0	35	.	.
CP83-644	HOCP93-749	347	0	23	0	25	0	35	.	.
CP83-644	L91-255	462	51	77	4	59	0	35	.	.
CP83-644	L92-312	284	17	59	2	57	0	35	.	.
CP83-644	L94-431	43	5	78	3	97	1	98	.	.
CP83-644	L94-438	428	0	23	0	25	0	35	.	.
CP83-644	LCP82-089	237	0	23	0	25	0	35	.	.
CP83-644	LCP85-313	240	41	90	4	71	1	75	.	.
CP83-644	LCP85-384	367	0	23	0	25	0	35	.	.
CP83-644	LCP86-454	277	0	23	0	25	0	35	.	.
CP84-730	HOCP85-845	383	0	23	0	25	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
CP84-730	L92-312	300	32	75	5	71	2	83	.	.
CP84-730	LCP85-384	231	22	70	3	66	0	35	.	.
CP88-702	L91-255	104	0	23	0	25	0	35	.	.
CP88-702	LCP85-384	438	38	66	3	56	2	79	.	.
CP89-805	LCP85-384	235	0	23	0	25	0	35	.	.
CP89-805	LCP85-384	247	0	23	0	25	0	35	.	.
CP89-831	HOCP85-845	282	0	23	0	25	0	35	.	.
CP89-831	HOCP91-527	103	18	91	8	98	2	95	.	.
CP89-831	LCP82-089	85	0	23	0	25	0	35	.	.
CP89-831	LCP85-384	214	31	85	6	82	3	93	.	.
CP89-831	US90-018	109	25	97	8	98	2	94	.	.
HO89-889	LCP82-089	620	0	23	0	25	0	35	.	.
HOCP85-845	HOCP93-765	482	0	23	0	25	0	35	.	.
HOCP85-845	L89-136	201	9	53	3	69	1	80	.	.
HOCP85-845	L94-432	482	10	47	4	58	2	74	.	.
HOCP88-739	CP72-370	180	0	23	0	25	0	35	.	.
HOCP88-739	CP77-310	104	21	94	4	89	0	35	.	.
HOCP88-739	CP77-407	100	0	23	0	25	0	35	.	.
HOCP88-739	HO89-889	106	0	23	0	25	0	35	.	.
HOCP88-739	HOCP85-845	367	0	23	0	25	0	35	.	.
HOCP88-739	L91-255	218	8	50	3	67	0	35	.	.
HOCP88-739	L94-431	96	0	23	0	25	0	35	.	.
HOCP88-739	LCP82-089	87	0	23	0	25	0	35	.	.
HOCP88-739	LCP85-384	248	16	60	11	91	3	90	.	.
HOCP88-739	LCP85-384	679	123	92	19	82	9	92	.	.
HOCP88-739	LCP86-454	133	0	23	0	25	0	35	.	.
HOCP88-739	LCP87-472	248	0	23	0	25	0	35	.	.
HOCP90-923	CP79-348	494	148	98	19	89	8	94	.	.
HOCP90-923	HOCP92-618	249	0	23	0	25	0	35	.	.
HOCP90-923	HOCP92-618	177	0	23	0	25	0	35	.	.
HOCP90-923	HOCP93-749	225	0	23	0	25	0	35	.	.
HOCP90-923	L91-255	179	0	23	0	25	0	35	.	.
HOCP90-923	L94-436	197	0	23	0	25	0	35	.	.
HOCP90-923	LHO92-314	96	0	23	0	25	0	35	.	.
HOCP91-527	L92-312	31	4	82	0	25	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP91-527	L92-319	162	0	23	0	25	0	35	.	.
HOCP91-575	CP70-321	227	16	62	2	59	1	77	.	.
HOCP91-575	HOCP93-750	92	7	64	0	25	0	35	.	.
HOCP91-575	L91-255	104	17	89	3	83	0	35	.	.
HOCP91-575	L93-365	448	25	57	7	69	2	78	.	.
HOCP91-575	LCP85-384	103	15	85	4	90	0	35	.	.
HOCP91-575	LCP86-454	461	0	23	0	25	0	35	.	.
HOCP92-618	CP79-348	235	0	23	0	25	0	35	.	.
HOCP92-618	US92-010	99	4	52	1	61	0	35	.	.
HOCP92-624	CP77-310	194	3	46	1	55	1	81	.	.
HOCP92-624	HOCP85-845	493	0	23	0	25	0	35	.	.
HOCP92-624	L91-255	95	0	23	0	25	0	35	.	.
HOCP92-624	LCP85-384	488	71	85	7	68	4	84	.	.
HOCP92-645	HOCP93-765	232	0	23	0	25	0	35	.	.
HOCP92-645	L91-255	101	0	23	0	25	0	35	.	.
HOCP92-645	LCP86-422	59	4	61	0	25	0	35	.	.
HOCP92-648	HO89-889	94	4	53	2	76	2	97	.	.
HOCP92-648	HOCP85-845	452	48	74	8	72	1	71	.	.
HOCP92-648	HOCP91-573	483	0	23	0	25	0	35	.	.
HOCP92-648	HOCP92-618	230	46	94	20	98	3	92	.	.
HOCP92-648	HOCP92-618	80	17	95	0	25	0	35	.	.
HOCP92-648	HOCP93-744	240	0	23	0	25	0	35	.	.
HOCP92-648	HOCP93-749	384	0	23	0	25	0	35	.	.
HOCP92-648	L92-312	241	4	47	3	65	0	35	.	.
HOCP92-648	L92-319	227	11	55	4	72	1	77	.	.
HOCP92-648	L94-431	79	12	87	3	89	0	35	.	.
HOCP92-648	LCP85-384	460	72	88	10	77	6	92	.	.
HOCP92-648	LHO92-314	228	0	23	0	25	0	35	.	.
HOCP92-648	LHO92-314	148	0	23	0	25	0	35	.	.
HOCP92-648	LHO92-314	214	0	23	0	25	0	35	.	.
HOCP92-648	US80-004	245	19	64	4	70	1	74	.	.
HOCP92-654	CP70-321	91	0	23	0	25	0	35	.	.
HOCP92-654	HOCP85-845	228	0	23	0	25	0	35	.	.
HOCP92-654	L92-312	187	0	23	0	25	0	35	.	.
HOCP92-654	L92-319	97	0	23	0	25	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP92-654	L92-319	102	0	23	0	25	0	35	.	.
HOCP92-654	LCP82-089	457	0	23	0	25	0	35	.	.
HOCP92-654	LCP86-454	47	0	23	0	25	0	35	.	.
HOCP92-664	HOCP92-624	252	23	68	1	53	0	35	.	.
HOCP92-664	HOCP93-749	225	0	23	0	25	0	35	.	.
HOCP92-664	L92-319	91	17	93	2	77	0	35	.	.
HOCP92-664	L93-365	246	0	23	0	25	0	35	.	.
HOCP92-664	L94-438	102	6	58	0	25	0	35	.	.
HOCP92-664	LCP86-454	101	4	52	1	60	0	35	.	.
HOCP93-744	CP77-407	175	0	23	0	25	0	35	.	.
HOCP93-744	CP77-407	190	6	50	1	55	0	35	.	.
HOCP93-744	HOCP85-845	263	0	23	0	25	0	35	.	.
HOCP93-744	LCP85-384	395	0	23	0	25	0	35	.	.
HOCP93-744	LCP87-472	188	0	23	0	25	0	35	.	.
HOCP93-744	LHO92-307	155	0	23	0	25	0	35	.	.
HOCP93-744	LHO92-307	181	0	23	0	25	0	35	.	.
HOCP93-746	HOCP85-845	416	0	23	0	25	0	35	.	.
HOCP93-746	HOCP93-750	101	0	23	0	25	0	35	.	.
HOCP93-746	L88-063	104	17	89	3	83	2	95	.	.
HOCP93-746	L93-363	100	14	83	0	25	0	35	.	.
HOCP93-746	LCP85-384	340	58	90	16	93	12	98	.	.
HOCP93-749	CP77-310	97	7	62	2	76	2	96	.	.
HOCP93-749	HOCP85-845	148	0	23	0	25	0	35	.	.
HOCP93-749	HOCP92-618	86	13	86	3	87	2	98	.	.
HOCP93-749	HOCP92-624	111	25	97	3	80	0	35	.	.
HOCP93-749	L88-063	96	0	23	0	25	0	35	.	.
HOCP93-749	L92-312	35	20	99	6	99	2	99	.	.
HOCP93-749	LCP82-089	251	13	56	2	57	1	72	.	.
HOCP93-749	LCP85-384	95	0	23	0	25	0	35	.	.
HOCP93-749	LCP85-384	424	49	78	14	86	8	95	.	.
HOCP93-749	LCP86-454	109	9	66	1	59	1	85	.	.
HOCP93-749	US92-010	100	0	23	0	25	0	35	.	.
HOCP93-750	US90-018	100	0	23	0	25	0	35	.	.
HOCP93-767	CP89-805	100	0	23	0	25	0	35	.	.
HOCP93-767	HOCP92-618	90	0	23	0	25	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP93-767	L93-365	459	26	57	7	69	2	76	.	.
HOCP93-767	L94-431	179	9	56	2	61	2	89	.	.
HOCP93-767	LCP86-422	103	0	23	0	25	0	35	.	.
L78-063	HOCP85-845	370	18	55	1	52	1	71	.	.
L88-063	L91-255	81	11	83	3	88	1	91	.	.
L90-181	HOCP91-552	34	5	86	0	25	0	35	.	.
L90-181	HOCP92-618	234	0	23	0	25	0	35	.	.
L90-181	HOCP93-750	192	11	57	1	55	0	35	.	.
L90-181	LCP86-454	633	51	66	1	51	0	35	.	.
L90-191	CP72-370	98	9	69	2	75	0	35	.	.
L90-191	HOCP92-618	196	0	23	0	25	0	35	.	.
L91-255	HOCP91-573	222	7	50	4	73	1	78	.	.
L92-312	L91-255	220	0	23	0	25	0	35	.	.
L92-319	HOCP92-664	112	10	67	2	73	0	35	.	.
L93-363	CP70-321	95	0	23	0	25	0	35	.	.
L93-363	HOCP92-618	79	12	87	0	25	0	35	.	.
L93-363	L92-312	88	9	72	2	78	1	90	.	.
L93-363	LCP85-384	344	37	76	20	96	8	98	.	.
L93-363	US90-018	186	22	79	6	85	2	88	.	.
L93-365	HOCP92-624	255	12	54	1	52	0	35	.	.
L93-365	L92-312	214	16	63	8	88	1	80	.	.
L93-365	LCP85-384	680	90	83	21	85	9	92	.	.
L93-378	HOCP93-765	242	19	64	3	65	0	35	.	.
L93-378	LHO92-314	194	19	71	0	25	0	35	.	.
L93-397	US90-018	82	0	23	0	25	0	35	.	.
L94-407	LCP85-384	229	0	23	0	25	0	35	.	.
L94-407	LCP85-384	252	17	61	3	62	0	35	.	.
L94-422	L92-319	167	11	60	3	73	1	82	.	.
L94-422	L94-431	175	0	23	0	25	0	35	.	.
L94-424	LCP85-384	672	34	56	15	78	1	70	.	.
L94-428	L93-365	232	9	51	1	54	0	35	.	.
L94-428	LCP86-454	232	17	63	1	54	0	35	.	.
L94-431	L92-312	79	10	81	2	80	0	35	.	.
L94-431	LCP85-313	87	0	23	0	25	0	35	.	.
L94-433	HOCP93-754	225	18	65	3	67	1	77	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
L94-433	L92-319	213	0	23	0	25	0	35	.	.
LCP81-010	CP70-321	248	12	55	3	64	1	73	.	.
LCP81-010	CP72-370	439	29	60	8	74	2	78	.	.
LCP81-010	HOCP85-845	712	12	47	2	52	0	35	.	.
LCP81-010	HOCP93-765	232	0	23	0	25	0	35	.	.
LCP81-010	L89-136	238	0	23	0	25	0	35	.	.
LCP81-010	L94-432	233	0	23	0	25	0	35	.	.
LCP81-010	LCP85-384	2368	67	49	18	57	7	72	.	.
LCP81-010	LHO92-307	138	0	23	0	25	0	35	.	.
LCP82-089	HOCP91-552	220	2	46	0	25	0	35	.	.
LCP83-137	HO89-889	54	12	96	1	74	0	35	.	.
LCP83-137	HOCP93-750	106	19	92	3	83	1	86	.	.
LCP83-137	LCP85-384	170	28	89	5	84	0	35	.	.
LCP83-137	LCP86-422	233	52	96	12	94	2	85	.	.
LCP85-313	CP70-321	46	13	98	1	77	0	35	.	.
LCP85-313	CP77-407	248	3	46	0	25	0	35	.	.
LCP85-313	CP79-348	501	13	48	7	67	3	82	.	.
LCP85-313	CP79-348	230	24	74	3	66	1	76	.	.
LCP85-313	HOCP85-845	251	32	81	6	79	1	72	.	.
LCP85-313	HOCP92-618	753	70	69	18	79	6	84	.	.
LCP85-313	HOCP93-750	79	0	23	0	25	0	35	.	.
LCP85-313	L91-255	99	6	59	3	84	1	87	.	.
LCP85-313	L94-431	256	12	54	1	52	0	35	.	.
LCP85-313	LCP82-089	165	7	53	1	56	0	35	.	.
LCP85-313	LHO92-314	252	0	23	0	25	0	35	.	.
LCP85-384	HOCP93-754	41	4	71	3	97	3	99	.	.
LCP86-422	HOCP93-749	91	0	23	0	25	0	35	.	.
LCP86-422	HOCP93-750	205	8	51	0	25	0	35	.	.
LCP86-422	L92-312	62	0	23	0	25	0	35	.	.
LCP86-422	LCP85-384	207	37	92	11	95	2	86	.	.
LCP86-429	CP70-321	223	0	23	0	25	0	35	.	.
LCP86-429	CP72-370	251	0	23	0	25	0	35	.	.
LCP86-429	CP72-370	36	0	23	0	25	0	35	.	.
LCP86-429	CP77-310	232	23	71	2	58	0	35	.	.
LCP86-429	CP77-407	218	19	66	4	74	1	79	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
LCP86-429	HOCP92-618	167	0	23	0	25	0	35	.	.
LCP86-429	HOCP92-618	81	18	96	5	96	0	35	.	.
LCP86-429	HOCP93-744	79	0	23	0	25	0	35	.	.
LCP86-429	HOCP93-750	85	9	74	4	93	1	90	.	.
LCP86-429	HOCP93-765	211	0	23	0	25	0	35	.	.
LCP86-429	HOCP93-765	242	0	23	0	25	0	35	.	.
LCP86-429	L91-255	103	11	75	1	60	1	87	.	.
LCP86-429	L94-432	241	0	23	0	25	0	35	.	.
LCP86-429	LCP85-384	167	17	72	2	63	1	82	.	.
LCP86-429	LCP85-384	597	0	23	0	25	0	35	.	.
LCP86-454	HOCP93-750	243	25	73	3	65	2	84	.	.
LCP86-454	HOCP93-765	242	0	23	0	25	0	35	.	.
LCP86-454	L92-312	237	34	84	5	76	1	75	.	.
LCP86-454	L93-363	99	12	80	7	97	0	35	.	.
LCP87-023	CP78-2114	46	8	91	0	25	0	35	.	.
LCP87-023	HOCP91-576	108	12	77	4	88	0	35	.	.
LCP87-023	HOCP92-618	220	0	23	0	25	0	35	.	.
LCP87-023	HOCP92-678	108	0	23	0	25	0	35	.	.
LCP87-023	HOCP93-746	53	0	23	0	25	0	35	.	.
LCP87-023	L94-432	236	0	23	0	25	0	35	.	.
LCP87-023	LHO92-307	106	0	23	0	25	0	35	.	.
LCP87-472	HOCP93-765	245	0	23	0	25	0	35	.	.
LCP87-472	L94-432	250	7	48	3	63	0	35	.	.
LHO92-307	CP72-370	237	0	23	0	25	0	35	.	.
LHO83-153	L91-255	90	8	67	4	91	0	35	.	.
LHO92-307	CP70-321	212	8	51	3	68	1	80	.	.
LHO92-307	HOCP85-845	461	86	93	21	92	1	71	.	.
LHO92-307	HOCP92-678	398	41	73	7	72	3	83	.	.
LHO92-307	LCP85-384	1107	0	23	0	25	0	35	.	.
LHO92-314	CP84-730	77	19	98	2	80	1	91	.	.
LHO92-314	L92-312	93	13	83	1	61	1	88	.	.
US78-020	L91-255	104	0	23	0	25	0	35	.	.
US78-020	LCP82-089	183	6	50	3	70	1	81	.	.
US79-010	CP72-370	93	18	93	5	95	2	97	.	.
US79-010	HOCP85-845	86	13	86	1	62	0	35	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
US79-010	L92-319	102	0	23	0	25	0	35	.	.
US79-010	LCP82-089	81	14	90	0	25	0	35	.	.
US90-021	CP72-370	106	10	69	4	88	0	35	.	.
US90-021	HOCP91-552	222	46	95	7	85	2	85	.	.
US90-021	HOCP93-765	250	27	76	7	81	1	73	.	.
US90-021	L89-136	240	54	97	6	79	1	75	.	.
US90-027	HOCP92-664	117	0	23	0	25	0	35	.	.
1997 Crossing Series										
CP77-310	HOCP85-845	237	0	14	0	20	.	.	.	.
CP77-310	HOCP92-618	333	26	62	4	64	.	.	.	.
CP77-310	HOCP92-618	246	20	65	3	65	.	.	.	.
CP77-310	US78-020	81	0	14	0	20	.	.	.	.
CP77-407	CP88-769	220	0	14	0	20	.	.	.	.
CP77-407	LCP82-089	105	23	96	6	97	.	.	.	.
CP79-318	CP87-609	243	0	14	0	20	.	.	.	.
CP79-318	CP94-856	241	19	64	0	20	.	.	.	.
CP79-318	HO94-850	335	15	41	3	59	.	.	.	.
CP79-318	HO95-988	341	0	14	0	20	.	.	.	.
CP79-318	HOCP85-845	247	15	48	0	20	.	.	.	.
CP79-318	HOCP92-618	247	19	62	2	49	.	.	.	.
CP79-318	L88-072	238	22	73	2	53	.	.	.	.
CP79-318	US78-020	109	7	52	1	59	.	.	.	.
CP79-348	L91-255	484	21	40	8	70	.	.	.	.
CP80-356	LCP82-089	246	17	55	0	20	.	.	.	.
CP82-550	L91-255	243	19	62	0	20	.	.	.	.
CP83-644	LCP85-384	722	57	64	21	86	.	.	.	.
CP84-1198	TCP87-3388	344	6	32	0	20	.	.	.	.
CP84-722	LCP82-089	240	9	38	0	20	.	.	.	.
CP85-830	US78-020	229	17	58	5	79	.	.	.	.
CP87-626	HOCP95-950	112	0	14	0	20	.	.	.	.
CP88-769	HOCP85-845	111	14	87	0	20	.	.	.	.
CP89-805	LCP85-336	108	0	14	0	20	.	.	.	.
CP89-831	HOCP94-806	243	30	86	4	70	.	.	.	.
CP89-843	LCP86-454	480	11	33	2	45	.	.	.	.

Table 6. Continue.

			1st Line		2nd Line		Increase		Assignment	
				Rank		Rank		Rank		Rank
Female	Male	Survive	No.	pcnt'l	No.	pcnt'l	No.	pcnt'l	No.	pcnt'l
CP89-845	CP91-534	234	20	69	7	86	.	.	.	.
CP94-1996	LHO83-153	244	11	41	2	51	.	.	.	.
HO95-985	L96-044	425	0	14	0	20	.	.	.	.
HO93-771	HOCP92-678	236	15	52	5	78	.	.	.	.
HO93-771	HOCP93-775	235	23	76	10	94	.	.	.	.
HO93-771	LHO83-153	345	38	82	4	64	.	.	.	.
HO94-850	L95-482	939	39	40	8	55	.	.	.	.
HO95-985	CP88-769	244	20	66	2	51	.	.	.	.
HO95-985	L88-063	111	0	14	0	20	.	.	.	.
HO95-985	L95-461	343	33	75	8	81	.	.	.	.
HO95-988	LCP82-089	244	0	14	0	20	.	.	.	.
HOCP85-845	SELF	221	0	14	0	20	.	.	.	.
HOCP85-845	US78-020	250	10	39	0	20	.	.	.	.
HOCP88-739	HO94-850	97	24	98	4	94	.	.	.	.
HOCP88-739	L94-428	108	0	14	0	20	.	.	.	.
HOCP88-739	LCP81-010	194	20	78	3	67	.	.	.	.
HOCP88-739	LCP85-384	105	18	94	5	96	.	.	.	.
HOCP89-846	L96-044	106	0	14	0	20	.	.	.	.
HOCP90-923	LHO83-153	465	15	36	5	63	.	.	.	.
HOCP90-941	HOCP92-618	239	0	14	0	20	.	.	.	.
HOCP90-941	HOCP93-750	938	80	69	29	87	.	.	.	.
HOCP90-941	SELF	421	51	84	4	61	.	.	.	.
HOCP91-542	CP91-559	483	40	67	15	88	.	.	.	.
HOCP92-618	HOCP93-775	485	36	58	4	51	.	.	.	.
HOCP92-618	US95-1001	240	0	14	0	20	.	.	.	.
HOCP92-624	CP79-318	110	17	91	0	20	.	.	.	.
HOCP92-624	CP84-772	1348	11	29	3	42	.	.	.	.
HOCP92-624	HOCP85-845	361	39	80	7	76	.	.	.	.
HOCP92-624	HOCP92-618	250	27	80	4	68	.	.	.	.
HOCP92-624	L94-428	808	115	90	7	58	.	.	.	.
HOCP92-624	LCP81-010	493	34	55	6	65	.	.	.	.
HOCP92-624	LCP85-384	245	25	77	2	51	.	.	.	.
HOCP92-624	LCP85-384	1944	238	85	54	85	.	.	.	.
HOCP92-624	LCP85-384	256	33	87	5	77	.	.	.	.
HOCP92-624	US95-1001	341	0	14	0	20	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP92-631	LHO83-153	503	0	14	0	20	.	.	.	.
HOCP92-648	L90-191	106	14	88	2	74	.	.	.	.
HOCP92-648	L91-255	706	53	60	1	40	.	.	.	.
HOCP92-648	L94-428	230	14	48	2	58	.	.	.	.
HOCP92-648	LCP81-010	232	47	95	9	93	.	.	.	.
HOCP92-648	LCP87-472	493	28	46	4	49	.	.	.	.
HOCP92-648	US90-018	106	0	14	0	20	.	.	.	.
HOCP92-654	HOCP93-752	453	0	14	0	20	.	.	.	.
HOCP93-744	CP77-407	221	0	14	0	20	.	.	.	.
HOCP93-744	HOCP85-845	869	0	14	0	20	.	.	.	.
HOCP93-746	HOCP85-845	1206	111	73	27	80	.	.	.	.
HOCP93-746	L94-426	240	13	44	2	52	.	.	.	.
HOCP93-746	LCP82-089	228	15	53	6	83	.	.	.	.
HOCP93-746	LHO83-153	243	0	14	0	20	.	.	.	.
HOCP93-746	US95-1014	234	23	76	4	71	.	.	.	.
HOCP93-750	HOCP90-941	249	0	14	0	20	.	.	.	.
HOCP93-775	SELF	250	24	74	10	93	.	.	.	.
HOCP93-775	US93-016	245	0	14	0	20	.	.	.	.
HOCP94-806	L91-255	684	0	14	0	20	.	.	.	.
HOCP94-806	L94-428	393	0	14	0	20	.	.	.	.
HOCP95-950	LCP82-089	461	0	14	0	20	.	.	.	.
HOCP96-569	HOCP93-775	487	30	50	6	66	.	.	.	.
L88-063	HOCP92-618	223	0	14	0	20	.	.	.	.
L88-063	L91-255	472	45	74	17	90	.	.	.	.
L88-072	HOCP85-845	1655	75	41	13	48	.	.	.	.
L88-072	L96-044	240	0	14	0	20	.	.	.	.
L89-113	LHO83-153	236	17	56	2	55	.	.	.	.
L89-136	HOCP85-845	237	29	85	2	53	.	.	.	.
L90-191	LCP82-089	476	27	46	5	62	.	.	.	.
L91-255	HOCP85-845	103	17	93	2	76	.	.	.	.
L91-281	CP87-626	251	22	71	5	77	.	.	.	.
L91-281	LCP81-010	96	26	98	9	99	.	.	.	.
L91-281	LCP84-222	107	15	90	4	91	.	.	.	.
L91-288	HOCP92-618	247	0	14	0	20	.	.	.	.
L92-321	HOCP85-845	234	0	14	0	20	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
L93-363	HOCP85-845	243	20	66	5	78	.	.	.	.
L94-424	LCP85-384	1473	96	52	28	75	.	.	.	.
L94-426	CP84-772	400	97	97	14	90	.	.	.	.
L94-426	L95-477	106	9	69	5	95	.	.	.	.
L94-428	L93-365	109	8	57	3	84	.	.	.	.
L94-428	LCP87-472	108	2	33	1	60	.	.	.	.
L94-432	L91-255	211	19	72	7	89	.	.	.	.
L94-432	LCP81-010	481	19	39	3	47	.	.	.	.
L94-432	LCP86-454	105	23	96	7	98	.	.	.	.
L95-495	CP79-318	232	0	14	0	20	.	.	.	.
L95-495	CP85-830	90	0	14	0	20	.	.	.	.
L95-495	HO95-988	232	20	70	2	56	.	.	.	.
L95-495	HOCP85-845	216	0	14	0	20	.	.	.	.
L96-013	HOCP85-845	243	26	79	4	70	.	.	.	.
L96-024	LCP82-089	465	24	43	10	79	.	.	.	.
L96-044	LCP81-010	104	10	75	0	20	.	.	.	.
L96-048	LCP87-472	242	15	50	1	44	.	.	.	.
L96-051	CP85-830	212	35	93	12	97	.	.	.	.
L96-060	L95-477	611	0	14	0	20	.	.	.	.
L96-060	L96-044	703	0	14	0	20	.	.	.	.
L96-060	LCP82-089	712	0	14	0	20	.	.	.	.
L96-071	LCP82-089	685	51	58	13	75	.	.	.	.
LCP81-010	HOCP85-845	1691	47	35	0	20	.	.	.	.
LCP81-010	HOCP85-845	1405	0	14	0	20	.	.	.	.
LCP81-010	L88-072	456	27	47	2	47	.	.	.	.
LCP81-010	L89-136	110	12	81	2	72	.	.	.	.
LCP81-010	L91-281	1403	51	37	12	56	.	.	.	.
LCP81-010	L94-432	1431	51	37	2	40	.	.	.	.
LCP81-010	L95-477	1064	132	86	25	82	.	.	.	.
LCP81-010	L96-044	105	104	99	8	98	.	.	.	.
LCP81-010	LCP82-089	734	42	46	3	44	.	.	.	.
LCP81-010	LCP85-384	106	9	69	0	20	.	.	.	.
LCP81-010	LCP85-384	1057	57	44	24	81	.	.	.	.
LCP81-010	LCP87-472	893	11	31	0	20	.	.	.	.
LCP81-010	US78-020	914	9	30	2	42	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
LCP82-089	HOCP94-806	679	0	14	0	20	.	.	.	.
LCP82-089	LCP87-472	321	6	33	1	43	.	.	.	.
LCP85-313	HOCP85-845	237	9	38	0	20	.	.	.	.
LCP85-313	HOCP85-845	387	35	72	11	85	.	.	.	.
LCP85-313	HOCP85-845	234	45	95	9	92	.	.	.	.
LCP85-313	L88-072	112	7	51	2	72	.	.	.	.
LCP85-313	LCP82-089	728	39	44	5	48	.	.	.	.
LCP85-313	LCP85-336	105	20	94	1	61	.	.	.	.
LCP85-336	L96-024	109	0	14	0	20	.	.	.	.
LCP85-336	LCP85-384	842	97	82	27	89	.	.	.	.
LCP85-384	HOCP85-845	349	42	83	15	95	.	.	.	.
LCP85-384	US95-1075	461	28	48	4	58	.	.	.	.
LCP86-429	HOCP92-618	109	9	67	2	73	.	.	.	.
LCP86-429	L88-072	436	0	14	0	20	.	.	.	.
LCP86-429	L91-255	940	71	61	13	67	.	.	.	.
LCP86-429	L94-428	484	0	14	0	20	.	.	.	.
LCP86-429	L95-477	227	37	92	7	87	.	.	.	.
LCP86-429	LCP85-336	1167	56	43	2	41	.	.	.	.
LCP86-429	LCP85-384	446	59	88	12	83	.	.	.	.
LCP86-429	LCP87-472	236	16	54	2	55	.	.	.	.
RSB90-22	US95-1014	453	11	34	0	20	.	.	.	.
US78-020	HOCP85-845	240	18	60	1	45	.	.	.	.
US79-010	HOCP94-806	234	32	89	4	71	.	.	.	.
US80-004	LCP84-222	94	7	58	0	20	.	.	.	.
US80-004	LCP87-472	95	15	91	1	62	.	.	.	.
US80-004	US78-020	196	0	14	0	20	.	.	.	.
US90-021	HO94-850	239	19	64	1	45	.	.	.	.
US90-025	US90-020	103	7	54	1	62	.	.	.	.
US90-027	97P2	187	19	77	7	91	.	.	.	.
US90-027	L95-477	230	0	14	0	20	.	.	.	.
US90-20	HOCP92-678	236	0	14	0	20	.	.	.	.
US90-25	US92-11	241	2	29	0	20	.	.	.	.
US92-11	CP88-757	232	0	14	0	20	.	.	.	.
US93-16	HOCP93-750	464	49	79	11	82	.	.	.	.
US95-1036	RSB90-24	248	0	14	0	20	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
US96-1	HO93-769	245	29	83	4	68	.	.	.	.
US96-1	SELF	242	0	14	0	20	.	.	.	.
US96-2	HOCP93-775	484	14	35	0	20	.	.	.	.
US96-2	LCP86-454	360	25	55	1	43	.	.	.	.
US96-2	LHO83-153	250	4	31	0	20	.	.	.	.
US96-6	HO94-851	219	0	14	0	20	.	.	.	.
US96-6	SELF	246	0	14	0	20	.	.	.	.
1998 Crossing Series										
CP65-357	98P1	234	20	76	.	.	.	.	.	.
CP78-357	HOCP92-624	448	43	84	.	.	.	.	.	.
CP78-357	HOCP96-561	351	24	64	.	.	.	.	.	.
CP79-318	98P3	85	9	86	.	.	.	.	.	.
CP79-318	HOCP85-845	461	7	25	.	.	.	.	.	.
CP79-318	HOCP89-846	207	14	64	.	.	.	.	.	.
CP79-318	HOCP94-836	351	5	24	.	.	.	.	.	.
CP79-318	HOCP95-947	79	0	11	.	.	.	.	.	.
CP79-318	L95-495	593	44	68	.	.	.	.	.	.
CP79-318	LCP82-089	187	16	77	.	.	.	.	.	.
CP79-318	LCP82-089	242	36	96	.	.	.	.	.	.
CP79-318	LCP85-384	251	34	95	.	.	.	.	.	.
CP79-348	US96-006	657	25	41	.	.	.	.	.	.
CP82-550	L96-045	62	0	11	.	.	.	.	.	.
CP83-644	CP79-318	211	9	44	.	.	.	.	.	.
CP83-644	HO94-856	231	0	11	.	.	.	.	.	.
CP83-644	HOCP85-845	964	27	32	.	.	.	.	.	.
CP83-644	HOCP92-624	245	29	90	.	.	.	.	.	.
CP83-644	HOCP95-947	237	0	11	.	.	.	.	.	.
CP83-644	HOCP96-538	246	29	90	.	.	.	.	.	.
CP83-644	L89-113	93	0	11	.	.	.	.	.	.
CP83-644	L95-477	1616	107	62	.	.	.	.	.	.
CP83-644	L95-495	540	0	11	.	.	.	.	.	.
CP83-644	L96-044	225	0	11	.	.	.	.	.	.
CP83-644	LCP81-010	1306	51	42	.	.	.	.	.	.
CP83-644	LCP81-010	232	7	34	.	.	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
CP83-644	LCP82-089	1328	80	56	.	.	.	.	.	.
CP83-644	US80-004	101	8	72	.	.	.	.	.	.
CP85-803	L89-113	221	21	83	.	.	.	.	.	.
HO95-985	HOCP85-845	250	28	88	.	.	.	.	.	.
HO95-985	HOCP85-845	397	7	26	.	.	.	.	.	.
HO95-985	L96-040	227	37	98	.	.	.	.	.	.
HO95-985	LCP81-010	452	9	28	.	.	.	.	.	.
HO95-985	LCP81-010	340	21	57	.	.	.	.	.	.
HO95-985	LCP82-089	238	12	48	.	.	.	.	.	.
HO95-985	LCP85-384	106	12	88	.	.	.	.	.	.
HO95-988	HOCP85-845	250	6	30	.	.	.	.	.	.
HO95-988	L89-113	230	17	68	.	.	.	.	.	.
HO95-988	L94-426	105	14	94	.	.	.	.	.	.
HO95-988	L95-495	109	7	59	.	.	.	.	.	.
HO96-566	HOCP92-624	240	22	82	.	.	.	.	.	.
HO96-566	HOCP96-538	394	48	92	.	.	.	.	.	.
HOCP92-618	LCP81-010	689	0	11	.	.	.	.	.	.
HOCP92-624	HO96-565	91	3	36	.	.	.	.	.	.
HOCP92-624	HOCP85-845	249	20	73	.	.	.	.	.	.
HOCP92-624	HOCP85-845	944	71	69	.	.	.	.	.	.
HOCP92-624	HOCP96-509	103	10	85	.	.	.	.	.	.
HOCP92-624	L89-113	427	32	69	.	.	.	.	.	.
HOCP92-624	L96-040	241	35	96	.	.	.	.	.	.
HOCP92-624	L96-045	643	22	38	.	.	.	.	.	.
HOCP92-624	L96-045	240	19	72	.	.	.	.	.	.
HOCP92-624	L97-121	220	17	71	.	.	.	.	.	.
HOCP92-624	LCP85-384	344	24	65	.	.	.	.	.	.
HOCP92-624	LCP85-384	1146	69	56	.	.	.	.	.	.
HOCP92-648	L96-040	234	15	59	.	.	.	.	.	.
HOCP92-648	L97-121	1179	16	24	.	.	.	.	.	.
HOCP92-648	L97-133	242	16	62	.	.	.	.	.	.
HOCP92-648	LCP81-010	564	29	49	.	.	.	.	.	.
HOCP92-648	LCP82-089	92	7	70	.	.	.	.	.	.
HOCP92-654	98P3	621	0	11	.	.	.	.	.	.
HOCP92-654	HOCP85-845	473	0	11	.	.	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
HOCP92-654	L94-426	1215	0	11	.	.	.	.	.	.
HOCP92-654	L96-083	480	0	11	.	.	.	.	.	.
HOCP94-836	HOCP95-998	1135	0	11	.	.	.	.	.	.
HOCP96-500	L89-113	543	20	39	.	.	.	.	.	.
HOCP96-500	LCP81-010	497	17	38	.	.	.	.	.	.
HOCP96-500	LCP81-010	470	30	59	.	.	.	.	.	.
HOCP96-500	LCP85-384	901	47	50	.	.	.	.	.	.
HOCP96-515	HO96-565	227	14	57	.	.	.	.	.	.
HOCP96-519	HOCP95-998	591	42	66	.	.	.	.	.	.
HOCP96-519	HOCP96-538	333	9	31	.	.	.	.	.	.
HOCP96-522	HOCP95-947	236	9	41	.	.	.	.	.	.
HOCP96-522	LCP82-089	508	24	46	.	.	.	.	.	.
HOCP96-538	CP78-317	226	0	11	.	.	.	.	.	.
HOCP96-538	HOCP85-845	455	0	11	.	.	.	.	.	.
HOCP96-538	HOCP92-624	233	0	11	.	.	.	.	.	.
HOCP96-538	LCP82-089	1074	45	44	.	.	.	.	.	.
HOCP96-546	HOCP85-845	395	19	47	.	.	.	.	.	.
HOCP96-546	L96-044	665	0	11	.	.	.	.	.	.
HOCP96-561	L96-045	85	0	11	.	.	.	.	.	.
L89-113	LCP82-089	713	27	41	.	.	.	.	.	.
L89-163	HOCP94-836	111	6	51	.	.	.	.	.	.
L89-163	HOCP95-947	430	60	95	.	.	.	.	.	.
L89-163	LCP81-010	1296	14	23	.	.	.	.	.	.
L91-255	HOCP96-561	650	0	11	.	.	.	.	.	.
L91-255	L89-113	384	0	11	.	.	.	.	.	.
L91-255	LCP85-384	533	35	62	.	.	.	.	.	.
L94-428	LCP86-454	234	0	11	.	.	.	.	.	.
L95-461	HO94-856	500	52	85	.	.	.	.	.	.
L95-461	HOCP92-624	244	8	36	.	.	.	.	.	.
L95-461	HOCP94-836	247	7	32	.	.	.	.	.	.
L95-495	CP78-2114	93	5	51	.	.	.	.	.	.
L95-495	HO96-565	220	13	55	.	.	.	.	.	.
L95-495	HOCP85-845	374	0	11	.	.	.	.	.	.
L95-495	HOCP96-500	224	0	11	.	.	.	.	.	.
L95-495	L89-113	414	45	87	.	.	.	.	.	.

Table 6. Continue.

Female	Male	Survive	1st Line No.	1st Line Rank pcnt'l	2nd Line No.	2nd Line Rank pcnt'l	Increase No.	Increase Rank pcnt'l	Assignment No.	Assignment Rank pcnt'l
L95-495	L96-045	196	0	11	.	.	.	.	.	.
L95-495	L96-083	77	10	93	.	.	.	.	.	.
L96-040	L96-044	694	58	75	.	.	.	.	.	.
L96-040	L97-149	229	0	11	.	.	.	.	.	.
L96-040	LCP82-089	567	67	90	.	.	.	.	.	.
L96-040	US96-006	245	22	81	.	.	.	.	.	.
L96-045	HOCP85-845	108	8	68	.	.	.	.	.	.
L96-060	HOCP95-998	227	0	11	.	.	.	.	.	.
L96-060	L95-495	349	6	26	.	.	.	.	.	.
L96-060	LCP82-089	344	14	43	.	.	.	.	.	.
L96-072	HOCP85-845	234	12	49	.	.	.	.	.	.
L96-072	HOCP89-846	100	0	11	.	.	.	.	.	.
L96-072	LCP82-089	392	32	74	.	.	.	.	.	.
L96-078	HOCP95-947	107	9	75	.	.	.	.	.	.
L97-104	L97-146	444	29	60	.	.	.	.	.	.
L97-104	LCP82-089	241	21	79	.	.	.	.	.	.
L97-113	L96-044	97	3	34	.	.	.	.	.	.
L97-113	LCP81-010	244	1	23	.	.	.	.	.	.
L97-121	HOCP92-624	101	17	98	.	.	.	.	.	.
L97-121	HOCP96-561	882	40	45	.	.	.	.	.	.
L97-121	LCP81-010	237	26	87	.	.	.	.	.	.
L97-128	HOCP95-998	235	8	38	.	.	.	.	.	.
L97-128	LCP81-010	899	17	27	.	.	.	.	.	.
L97-146	LCP85-384	219	18	74	.	.	.	.	.	.
L97-149	LCP81-010	225	0	11	.	.	.	.	.	.
LCP81-010	HOCP96-550	235	8	38	.	.	.	.	.	.
LCP81-010	L95-495	225	5	29	.	.	.	.	.	.
LCP81-010	L97-149	343	24	65	.	.	.	.	.	.
LCP81-010	LCP82-089	1194	4	22	.	.	.	.	.	.
LCP82-089	HOCP96-527	427	0	11	.	.	.	.	.	.
LCP82-089	L89-113	746	0	11	.	.	.	.	.	.
LCP82-089	LCP86-454	166	0	11	.	.	.	.	.	.
LCP85-384	CP78-2114	314	23	66	.	.	.	.	.	.
LCP85-384	L96-045	221	28	92	.	.	.	.	.	.
LCP85-384	LCP82-089	1223	192	97	.	.	.	.	.	.

Table 6. Continue.

			1st Line		2nd Line		Increase		Assignment	
Female	Male	Survive	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l	No.	Rank pcnt'l
LCP85-384	LCP82-089	237	40	99	.	.	.	.	.	.
LCP85-384	LCP86-454	211	7	36	.	.	.	.	.	.
LCP86-429	L94-428	753	16	28	.	.	.	.	.	.
LCP87-492	CP78-2114	203	26	93	.	.	.	.	.	.
MISC	98P2	231	13	52	.	.	.	.	.	.
MISC	CP78-317	245	21	77	.	.	.	.	.	.
MISC	HOCP85-845	600	35	54	.	.	.	.	.	.
MISC	HOCP92-624	404	35	79	.	.	.	.	.	.
MISC	HOCP96-500	219	19	79	.	.	.	.	.	.
MISC	L89-113	486	25	49	.	.	.	.	.	.
MISC	L89-163	251	23	82	.	.	.	.	.	.
MISC	L94-426	243	23	83	.	.	.	.	.	.
MISC	L95-495	198	8	42	.	.	.	.	.	.
MISC	L96-044	229	13	53	.	.	.	.	.	.
MISC	L96-045	243	29	91	.	.	.	.	.	.
MISC	L97-146	241	14	54	.	.	.	.	.	.
MISC	LCP81-010	101	9	80	.	.	.	.	.	.
MISC	LCP85-384	243	16	62	.	.	.	.	.	.
MISC	LCP86-454	214	5	30	.	.	.	.	.	.
US77-017	HOCP85-845	235	7	34	.	.	.	.	.	.
US77-017	HOCP92-624	247	20	73	.	.	.	.	.	.
US93-015	CP78-2114	228	0	11	.	.	.	.	.	.
US93-015	L96-044	252	0	11	.	.	.	.	.	.
US93-016	CP78-2114	203	12	55	.	.	.	.	.	.
US93-016	L95-495	583	28	47	.	.	.	.	.	.
US93-016	L96-045	247	11	45	.	.	.	.	.	.
US93-016	LCP86-454	38	1	31	.	.	.	.	.	.
US96-006	CP78-2114	234	0	11	.	.	.	.	.	.
US96-006	L97-121	241	0	11	.	.	.	.	.	.
US96-006	L97-155	102	0	11	.	.	.	.	.	.
US96-006	US96-006	206	18	79	.	.	.	.	.	.

Table 7. Plant weight and rank summary statistics from the 1999 crossing series first stubble cross appraisal test at the St. Gabriel Research Station in 2000.

FEMALE	MALE	Plant Weight kg	pcnt'l
HOCP96-546	HOCP85-845	25.1	99
HOCP92-618	LCP81-010	17.9	98
L97-146	LCP85-384	17.0	97
L91-255	L89-113	15.9	96
US96-006	CP78-2114	15.8	95
HO95-985	HOCP94-806	15.9	95
L97-128	LCP81-010	15.4	94
LCP81-010	LCP82-089	15.1	93
HOCP92-654	HOCP85-845	14.9	92
HOCP92-624	HOCP85-845	14.8	90
L96-040	L94-426	14.5	90
LCP85-384	LCP82-089	14.5	89
L97-104	L97-146	14.5	88
LCP85-384	CP78-2114	14.4	87
US77-017	HOCP92-624	14.3	86
HOCP92-648	L97-121	14.0	85
HOCP96-522	HOCP95-947	14.3	85
CP83-644	L89-113	14.0	84
CP83-644	HOCP95-947	13.7	81
L95-495	HOCP85-845	13.6	80
CP83-644	L95-495	13.6	80
HOCP92-624	HOCP85-845	13.5	79

FEMALE	MALE	Plant Weight kg	pcnt'l
L96-040	L96-044	13.4	78
HOCP96-500	L89-113	13.4	77
L97-149	LCP81-010	13.1	76
HOCP96-561	L96-045	13.2	76
HO95-985	LCP81-010	13.1	75
LCP81-010	L97-149	13.1	74
HOCP92-624	L96-045	13.0	73
L97-104	L96-045	13.0	72
L96-040	L96-044	12.9	71
HO95-985	LCP85-384	12.9	71
L96-060	L95-495	12.8	70
US93-016	L95-495	12.8	69
CP83-644	L95-477	12.8	68
CP83-644	HO94-856	12.6	67
L89-163	LCP81-010	12.5	66
CP83-644	HOCP85-845	12.5	66
HOCP96-538	LCP82-089	12.4	65
HOCP92-648	LCP81-010	12.4	64
HO95-988	HOCP85-845	12.3	63
HOCP96-522	LCP82-089	12.3	62
CP83-644	HOCP96-538	12.2	61
HOCP95-931	HOCP92-618	12.3	61

Table 7. Continue

FEMALE	MALE	Plant Weight kg	pcnt'l
L95-495	L96-083	12.2	60
CP79-318	LCP81-010	12.1	59
LCP82-089	L89-113	12.1	58
CP78-357	HOCP92-624	12.0	57
HOCP96-515	HO96-565	12.0	57
CP83-644	LCP81-010	11.9	56
HOCP94-836	HOCP95-998	11.9	55
CP83-644	LCP82-089	11.9	54
HO95-985	LCP81-010	11.8	53
US93-016	L96-045	11.7	52
L96-040	LCP82-089	11.8	52
L89-113	HOCP94-836	11.6	51
L95-495	HO96-565	11.6	50
HO95-985	LCP82-089	11.5	49
HOCP96-546	L96-044	11.4	48
HOCP92-624	LCP85-384	11.4	47
CP79-318	HOCP94-836	11.4	47
CP79-318	L96-040	11.4	46
HOCP92-624	L89-113	11.3	45
L95-495	L89-113	11.2	44
L95-461	HO94-856	11.2	43
HO96-566	HOCP96-538	11.2	42
CP78-357	HOCP96-561	11.2	42
L89-113	LCP82-089	11.2	41
HO95-985	HOCP85-845	11.1	40
L97-128	HOCP95-998	11.1	39
L96-040	US96-006	11.1	38
HOCP96-538	CP78-317	11.1	38
HOCP92-624	LCP85-384	11.1	37
CP79-318	LCP82-089	11.1	36
L95-461	HOCP92-624	11.1	35

CP82-550	L96-045	11.1	34
HO95-985	L96-040	11.0	33
HOCP96-500	LCP85-384	11.0	33
HOCP92-648	L97-133	11.0	32
L96-072	LCP82-089	11.0	31
HOCP96-500	LCP81-010	10.9	30
HOCP96-500	LCP81-010	10.9	29
L97-113	US96-006	10.8	28

FEMALE	MALE	Plant Weight	
		kg	pcnt'l
CP79-318	98P3	10.8	28
L95-461	US80-004	10.6	27
L96-060	HOCP95-998	10.4	26
L97-113	LCP81-010	10.3	25
CP79-318	L95-495	10.3	24
HOCP96-519	HOCP95-998	10.3	23
US96-006	L97-121	10.3	23
LCP81-010	L95-495	10.2	22
US93-015	CP78-2114	10.2	21
L97-121	LCP82-089	10.2	20
HOCP92-624	L96-040	10.2	19
LCP85-384	LCP82-089	10.0	19
L91-255	LCP85-384	10.0	18
L97-121	LCP81-010	10.0	17
HOCP96-519	HOCP96-538	9.9	16
HOCP96-538	HOCP92-624	9.8	15
US93-015	L96-044	9.5	14
L96-078	HOCP95-947	9.7	14
HO96-566	HOCP92-624	9.5	13
L95-461	HOCP94-836	9.5	12
L97-121	L97-146	9.4	11
L95-495	HOCP96-500	9.4	10
L96-040	L97-149	9.3	9
US93-016	LCP86-454	9.3	9
L97-113	LCP85-384	9.0	8
L95-483	LCP82-089	9.0	7
L97-121	HOCP96-561	8.8	6
HOCP96-538	HOCP85-845	8.7	5
L96-072	HOCP85-845	8.4	4
HOCP92-654	L94-426	7.7	4
LCP82-089	HOCP96-527	6.9	3
HOCP92-654	98P3	6.7	2
L91-255	HOCP96-561	6.4	1
HOCP92-654	L96-083	6.4	0
Commercial Varieties			
CP70-321		14.8	91
LCP85-384		14.0	83
HOCP85-845		13.9	82

2000 LOUISIANA NURSERY VARIETY TRIALS

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Five years after the initial hybridization of parents, clones that have met or exceeded criteria for important characteristics at previous selection stages are assigned permanent numbers by the Louisiana "L" Sugarcane Variety Development Program. These varieties are planted in replicated nursery tests at different locations.

One objective of the nursery stage is to identify and select varieties that will perform well across the range of environments that a commercial variety will encounter in Louisiana. The nursery tests are normally planted at three locations (Ardoyne, Iberia, and St. Gabriel) during the year of assignment, and three additional and different locations are planted the year after assignment. A test at Newton Farms in Bunkie, a new location planted in 1999, was harvested for the first time in 2000. It should be noted that a light frost occurred before the Bunkie location could be harvested. In 2000 both LSU AgCenter and USDA varieties were planted together in the nursery trials, as in 1999, except at the Stoute location, where only the LSU AgCenter varieties were planted. The locations, soil types, dates of planting, and dates of harvest are listed in Table 1.

The "on station" nursery trials (Ardoyne, Iberia, and St. Gabriel) were planted in single row (6-foot centers), 16-foot-long plots. The "off-station" nurseries (Blake Newton Farm, Danny Stoute, and Westfield) were planted in 20-foot-long plots. The experimental design used was a randomized complete block with two replications per location. Three commercial check varieties, CP70-321, HOCP 85-845, and LCP 85-384, were planted in tests for comparison.

Millable stalk counts were made in August. During the harvest season, 10-stalk samples were harvested by hand and stripped of leaves. Most samples were weighed and milled at the Sucrose Lab in St. Gabriel to obtain a juice sample for analysis. The only exceptions were the samples taken at the Newton location, which were run at the USDA Ardoyne Farm in Chacahoula, La. Brix and pol readings were used to estimate theoretical recoverable sugar per ton as estimated by the Winter-Carp formula as reported by Gravois and Milligan (1992). Cane yield was estimated as the product of stalk weight and stalk number. Sugar per acre was calculated as the product of sugar per ton and cane yield.

LCP85-384 has been the leading variety in Louisiana since 1998 with about 71% of the sugarcane acreage in 2000. For comparison, LCP85-384 is highlighted in the tables. In contrast to past years, a new statistical method has been adopted for data analysis. To adjust for missing data, the analysis used SAS 8.01 Proc Mixed. Mean separation used least square means probability differences (P=0.05) to calculate significant differences. Varieties that are significantly higher or lower than LCP85-384 are denoted by a plus(+) or minus(-), respectively, next to the value for each trait.

Results from nursery variety trials harvested in 2000 are presented in Tables 2-16 and summary results are presented in Tables 17-22. The 1997 Series at the Iberia Station was plowed out and not harvested in 2000. Results from the 1995 Series, third stubble tests are presented only in the summary tables.

References

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

Table 1. 2000 Planting and harvest dates of nursery tests.

				Harvest Dates			Varieties	
		Soil	Planting	1998	1999	2000	No.	No.
1995	Stoute	Cosl	9/26/96	11/6	10/1	9/28	14	1
1995	Westfield	Csl	10/21/96	10/29	10/2	9/28	14	1
1997	Ardoyne	Csl	11/4/97	12/7	11/2	10/1	56	2
1997	Iberia	Bsc	10/30/97	11/16	11/1	-----	56	2
1997	St Gabriel	Csl	10/30/97	11/23	11/1	10/8	56	2
1997	Gonsoulin	Cosl	8/26/98		11/8	9/28	26	2
1997	Stoute	Bsc	8/28/98		11/8	10/2	26	2
1997	Westfield	Sc	8/26/98		11/1	10/2	26	2
1998	Ardoyne	Csl	10/15/98		12/7	11/1	53	2
1998	Iberia	Bsc	10/14/98		12/6	11/1	53	2
1998	St. Gabriel	Sc	10/16/98		11/1	11/1	53	2
1998	Gonsoulin	Cos1	8/13/99			11/3	44	10
1998	Newton	Mosl	8/25/99		11/2		44	10
1998	Stoute	Bsc	8/20/99			11/1	13	2
1998	Westfield	Csl	8/17/99			12/1	44	10
1999	Ardoyne	Csl	10/20/99			11/2	34	16
1999	Iberia	Bsc	10/19/99			11/3	34	16
1999	St. Gabriel	Sc	10/18/99			11/1	34	16
1999	Newton	Mosl	8/24/00				39	
1999	Stoute	Bsc	8/18/00				16	
1999	Westfield	Csl	8/21/00				39	
2000	Ardoyne	Csl	10/12/00				33	
2000	Iberia	Bsc	10/13/00				33	
2000	Newton	Mosl	8/24/00				39	
2000	St. Gabriel	Sc	10/12/00				33	
2000	Stoute	Bsc	8/18/00				16	
2000	Westfield	Csl	8/21/00				39	

† Ardoyne-USDA Ardoyne Farm (Terrebonne), Gonsoulin-R. Gonsoulin Farm (Iberia), Iberia-Iberia Research Station (Iberia), Newton-Blake Newton Farm (Avoyelles), St. Gabriel-Saint Gabriel Research Station (Iberville), Stoute-D. Stoute Farm (St. Martin), Westfield-Westfield Plantation (Assumption)

‡ Bsc-Baldwin silty clay, Csl-Commerce silt loam, Cosl-Coteau silt loam, Csl-Jeanerette silt loam, Sc-Sharkey clay, Mosl-Moreland silt loam.

----- Plowed out

Table 2. 2000 Nursery second-stubble means of the 1997 "L" assignment series in light soil at Ardoyne Farm near Chacahoula, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	14210	57.4	247	2.3	49686
LCP85-384	13943	63.5	219	1.9	65340
HOCP85-845	11055	45.5	239	2.1	43333
L97-128	15301	56.2	272	2.1	52408
L97-137	10080	41.1	246	1.5	53996

Table 3. 2000 Nursery second-stubble means of the 1997 "L" assignment series in light soil at St. Gabriel Research Station near St. Gabriel, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	10371	45.5	227	2.3	39249 -
LCP85-384	13267	61.6	215	1.7	73961
HOCP85-845	10071	42.4	235	2.0	42653 -
L97-128	13114	58.8	221	2.1	56946 -
L97-137	16511	74.9	213	1.9	76457

Table 4. 2000 Nursery first-stubble means of the 1997 "L" assignment series in light soil at Ronnie Gonsoulin Farms near New Iberia, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	9216	48.1	192	2.6 +	36754 -
LCP85-384	8115	46.4	173	1.8	50820
HOCP85-845	8487	44.5	190	2.1	43106
L97-128	14471 +	66.3 +	218	2.6 +	51954
L97-137	12859 +	61.5	207	2.0	61937 +

Table 5. 2000 Nursery first-stubble means of the 1997 "L" assignment series in heavy soil at Danny Stoutes Farm near Cecilia, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	12184	44.5	274 +	2.3	38569 -

LCP85-384	15781		63.7		248		1.9		68743	
HOCP85-845	9537		38.8		246		1.6		48778	-
L97-128	12604		47.1		268	+	2.6		36527	-
L97-137	16971		72.7		235		1.9		75323	

Table 6. 2000 Nursery first-stubble means of the 1997 "L" assignment series in heavy soil at Westfield near Paincourtville, La.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	14901		50.4		295		2.3	+	44694	
LCP85-384	16009		55.5		288		1.8		62164	
HOCP85-845	14107		53.9		262		2.3	+	47871	
L97-128	20358	+	73.0		279		2.6	+	56492	
L97-137	19501	+	75.7	+	259		2.4	+	63979	

Table 7. 2000 Nursery first-stubble means of the 1998 "L" assignment series in light soil at Ardoyne Farm near Chacahoula, La..

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	10910	-	42.2	-	258		2.5		34031	-
LCP85-384	21199		80.0		265		2.1		75776	
HOCP85-845	18711		71.4		262		2.7		52181	-
L98-207	21205		81.9		259		2.3		70331	
L98-209	18605		72.7		256		2.7		53089	-

Table 8. 2000 Nursery first-stubble means of the 1998 "L" assignment series in heavy soil at Iberia Research Station near Jeanerette, La.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	13179		52.4		252		2.9		35619	-
LCP85-384	19026		76.6		248		2.5		61483	
HOCP85-845	13056		55.0		236		2.8		38569	-
L98-207	16165		66.4		244		2.2		60122	
L98-209	17024		72.9		233		2.6		55584	

Table 9. 2000 Nursery first-stubble means of the 1998 "L" assignment series in heavy soil at St. Gabriel Research Station near St. Gabriel, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number

	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	11318 -	48.4 -	234	2.4 +	41291 -
LCP85-384	16186	69.0	234	1.7	80541
HOCP85-845	9254 -	45.4 -	204 -	1.9	49005 -
L98-207	15020	64.1	234	1.9	68743 -
L98-209	16869	76.5	221	2.1 +	72600

Table 10. 2000 Nursery plantcane means of the 1998 "HOCP" and "L" assignment series in light soil at Ronnie Gonsoulin Farms near New Iberia, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	16158	56.6	286	3.1 +	36482
TUCCP77-042	7325	30.3	241	2.5	24321 -
LCP85-384	10412	39.4	264	2.0	40293
HOCP85-845	10601	42.1	254	2.5	33941
L98-207	14164	49.8	282	1.7	56628 +
L98-209	18783 +	67.0 +	280	2.4	56084 +
HOCP98-718	15719	64.5	246	2.5	51546
HOCP98-734	11176	42.6	260	2.1	40475
HOCP98-741	19206 +	79.7 +	242	3.5 +	45375
HOCP98-771	12338	48.0	255	2.7 +	35211
HOCP98-776	11689	41.9	279	2.2	39023
HOCP98-778	8962	33.7	267	2.5	28314
HOCP98-781	9211	37.7	244	2.7 +	28314

Table 11. 2000 Nursery plantcane means of the 1998 "HOCP" and "L" assignment series in light soil at Blake Newton Farms near Bunkie, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	10263	35.8	285	1.8	40656
TUCCP77-042	9690	35.9	270	2.0	35211
LCP85-384	8650	32.7	264	1.9	35211
HOCP85-845	8494	30.5	279	1.9	31763
L98-207	11454	40.9	280	1.8	45375 +
L98-209	9642	33.8	285	1.9	35937
HOCP98-718	7323	29.3	245	1.3 -	43560 +
HOCP98-734	7916	30.1	263	1.5 -	40656
HOCP98-741	10782	39.5	272	2.0	38841

HOCP98-771	5607 -	20.6 -	272	1.4 -	28859
HOCP98-776	4389 -	16.2 -	272	1.3 -	24140 -
HOCP98-778	9791	33.7	290	1.9	35756
HOCP98-781	9367	34.2	274	2.0	34667

Table 12. 2000 Nursery plantcane means of the 1998 "L" assignment series in heavy soil at Danny Stoutes Farm near Cecilia, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	9601	33.3 -	289	1.8	37208 -
LCP85-384	10997	41.6	265	1.4	57717
HOCP85-845	9186	34.4	266	2.2	31763 -
L98-207	11265	42.5	266	1.6	55176
L98-209	14557 +	53.7 +	271	2.0	54269

Table 13. 2000 Nursery plantcane means of the 1998 "HOCP" and "L" assignment series in light soil at Westfield near Paincourtville, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	11477	45.0	255	2.2	40656 -
TUCCP77-042	16546	89.6 +	185	3.7 +	49005
LCP85-384	12675	56.9	222	1.9	59532
HOCP85-845	10492	43.9	236	2.2	39749 -
L98-207	16256	70.3	230	1.8	79497 +
L98-209	16278	73.4	221	2.5 +	60077
HOCP98-718	18485	73.6	251	2.5 +	59532
HOCP98-734	15281	68.6	224	2.3	59714
HOCP98-741	18216	75.8	239	3.3 +	45920 -
HOCP98-771	16558	72.1	230	2.7 +	52998
HOCP98-776	17605	68.8	256	2.7 +	51909
HOCP98-778	14728	57.5	256	2.8 +	40656 -
HOCP98-781	15870	68.5	231	3.1 +	44286 -

Table 14. 2000 Nursery plantcane means of the 1999 "L" assignment series in light soil at Ardoyne Farm near Chacahoula, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight		Stalk Number	
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)		(stalks/A)	
CP70-321	15075	60.1	250	3.4	+	35166	-
LCP85-384	14999	63.6	236	2.5		51728	
HOCP85-845	9005	42.6	216	2.6		32897	-
L99-213	12784	49.0	261	2.2		44921	
L99-214	14190	55.1	259	2.9		38115	-
L99-215	14258	56.9	251	2.6		43560	
L99-221	10005	41.2	243	2.2		36754	-
L99-225	15490	59.7	259	2.3		51274	
L99-226	14400	62.1	233	3.8	+	32897	-
L99-227	12688	48.4	262	2.5		39023	-
L99-229	15117	61.6	246	3.2	+	38796	-
L99-230	12788	53.3	239	2.3		46963	
L99-231	13644	53.9	251	2.7		39703	-
L99-233	12739	49.2	261	2.5		39023	-
L99-234	10167	40.6	251	3.1	+	25864	-
L99-236	14527	59.3	245	2.7		44241	
L99-238	13981	57.1	246	2.6		44468	
L99-240	14174	56.0	254	2.7		41064	
L99-243	10996	41.4	266	2.6		31989	-

Table 15. 2000 Nursery plantcane means of the 1999 "L" assignment series in heavy soil at Iberia Research Station near Jeanerette, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)	(tons/A)	(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7109	29.1	243	-	2.0		29267	-
LCP85-384	9695	35.3	274		1.9		36981	
HOCP85-845	6606	27.4	241	-	2.3		24049	-
L99-213	10016	35.7	280		1.7		41064	
L99-214	9284	36.4	256		2.3		31082	
L99-215	7690	31.4	245	-	2.4		26091	-
L99-221	8277	35.6	233	-	1.7		43106	
L99-225	7317	28.4	258		1.7		33804	
L99-226	9323	36.9	253		2.6	+	27906	-
L99-227	8534	33.0	259		2.0		32670	
L99-229	6662	28.7	232	-	2.6	+	22461	-
L99-230	7414	32.3	230	-	2.0		32897	
L99-231	11039	41.1	269		2.6	+	31536	
L99-233	8020	31.4	256		2.1		30628	
L99-234	6703	26.5	256		2.5		21099	-
L99-236	9083	35.0	259		2.1		34485	
L99-238	8948	35.7	251	-	2.0		35619	
L99-240	8419	32.9	255		2.0		32443	
L99-243	7355	29.2	252	-	2.0		28586	-

Table 16. 2000 Nursery plantcane means of the 1999 "L" assignment series in heavy soil at St. Gabriel Research Station near St. Gabriel, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	6777	25.5	266	1.9	26771 -
LCP85-384	8580	33.1	262	1.7	38342
HOCP85-845	6339	26.2	242	1.9	28133
L99-213	7497	34.3	218 -	1.5	46056
L99-214	11685	46.8	250	2.3 +	40838
L99-215	9890	41.2	240 -	2.2 +	37661
L99-221	8889	37.0	241 -	1.6	45375
L99-225	7563	29.3	258	1.6	35619
L99-226	7551	31.0	243	1.8	35393
L99-227	6700	27.0	249	1.7	31536
L99-229	9892	40.1	247	2.6 +	31536
L99-230	7653	32.9	232 -	2.0	33578
L99-231	10646	38.8	275	2.2 +	34485
L99-233	10817	42.2	257	2.1	40157
L99-234	10934	42.9	256	2.5 +	34031
L99-236	9118	33.4	273	1.9	35393
L99-238	9641	37.2	260	2.2 +	34031
L99-240	7590	29.9	254	1.9	31082
L99-243	6897	26.9	257	1.9	28133 -

Table 17. 2000 Nursery third stubble means of the 1995 "L" assignment series across locations.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
LCP85-384	8747	45.5	191	1.6	56492
L95-462	11642	57.0	206	2.0	55769

Table 18. 2000 Nursery second stubble means of the 1997 "L" assignment series across locations.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	12291	51.4	237	2.3	44468
LCP85-384	13605	62.6	217	1.8	69651
HOCP85-845	10563	43.9	237	2.0	42993

L97-128	14207	57.5	247	2.1	54677
L97-137	13296	58.0	229	1.7	65227

Table 19. 2000 Nursery first stubble means of the 1997 "L" assignment series across locations.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	12100		47.7		254		2.4	+	40006	-
LCP85-384	13301		55.2		236		1.8		60576	
HOCP85-845	10710		45.7		233		2.0		46585	-
L97-128	15811		62.2		255		2.6	+	48324	
L97-137	16444		70.0		234		2.1		67079	

Table 20. 2000 Nursery first stubble means of the 1998 "L" assignment series across locations.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	11803	-	47.7	-	248		2.6	+	36981	-
LCP85-384	18804		75.2		249		2.1		72600	
HOCP85-845	13674	-	57.2	-	234		2.5	+	46585	-
L98-207	17463		70.8		246		2.1		66399	
L98-209	17499		74.0		236		2.5	+	60424	-

Table 21. 2000 Nursery plantcane means of the 1998 "HOCP" and "L" assignment series across locations.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	11875		42.7		279	+	2.2		38750	-
TUCCP77-042	10916		50.4		234		2.7	+	36414	-
LCP85-384	10684		42.7		254		1.8		48188	
HOCP85-845	9693		37.7		259		2.2		34303	-
L98-207	13285		50.9		264		1.7		59169	+
L98-209	14815		57.0		264		2.2		51591	
HOCP98-718	13571		54.3		249		2.0		51781	
HOCP98-734	11186		45.6		251		1.9		47183	
HOCP98-741	15796		63.5		254		2.9	+	43614	
HOCP98-771	11229		45.4		254		2.2		39258	
HOCP98-776	10956		40.8		271		2.0		38592	-
HOCP98-778	10889		40.1		273		2.3	+	35144	-
HOCP98-781	11211		45.3		252		2.5	+	35991	-

Table 22. 2000 Nursery plantcane means of the 1999 "L" assignment series across locations.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)	(tons/A)	(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	9653	38.2	253		2.4	+	30401	-
LCP85-384	11092	44.0	258		2.0		42350	
HOCP85-845	7317	32.1	233	-	2.3		28359	-
L99-213	10099	39.7	253		1.8		44014	
L99-214	11720	46.1	255		2.5	+	36678	
L99-215	10613	43.2	245		2.4		35771	
L99-221	9057	37.9	239		1.8		41745	
L99-225	10123	39.1	258		1.9		40233	
L99-226	10425	43.4	243		2.7	+	32065	-
L99-227	9307	36.1	256		2.1		34409	-
L99-229	10557	43.5	241		2.8	+	30931	-
L99-230	9285	39.5	233	-	2.1		37813	
L99-231	11776	44.6	265		2.5	+	35241	-
L99-233	10526	40.9	258		2.2		36603	
L99-234	9268	36.7	254		2.7	+	26998	-
L99-236	10909	42.5	259		2.2		38039	
L99-238	10857	43.3	252		2.3		38039	
L99-240	10061	39.6	254		2.2		34863	-
L99-243	8416	32.5	258		2.2		29569	-

2000 LOUISIANA "HoCP" NURSERY VARIETY TRIALS [1/]

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The Louisiana sugarcane breeding programs select varieties that give consistent yields across a range of environmental conditions. By planting varieties in several different regions of the sugarcane industry at an earlier stage of the breeding program, more information on genotype by environment interactions can be gained and superior genotypes (as well as inferior genotypes) can be identified earlier. Thus, decisions on advancement of varieties can be made with more confidence and precision.

USDA nursery tests are planted the year of assignment at Ardoyne Farm near Chacahoula, Iberia Research Station in Jeanerette, and St. Gabriel Research Station in St. Gabriel. Plots in these two-replication tests are single-rows, 16 feet long with a 4-foot alley between plots. At least three commercial varieties (including CP 70-321, LHo 83-153, HoCP 85-845, and/or LCP 85-384) are included in each replication as controls. Varieties from the USDA program advanced for further testing in the year following assignment were combined with varieties from the LSU program and replanted in two nurseries on commercial farms. Plot lengths in these two-replication tests were increased to 20 feet, with a 4-foot alley between plots.

Nursery plots are rated for stand (population) and vigor in both the spring (May) and summer (August). Stalk counts representing mature millable stalks are made in August. For USDA nursery trials, a 15-stalk sample is hand-cut from each plot during the harvest season and taken to the Juice and Milling Quality Laboratory at Ardoyne Farm, where they are weighed and processed for sucrose analysis. In the replant nurseries, a 10-stalk sample is hand-cut from each plot and sent to the Juice and Milling Quality Laboratory at Ardoyne Farm or the St. Gabriel Sucrose Laboratory. Brix, pol, and fiber content are then used to estimate the yield of theoretical recoverable sugar (TRS) per ton of cane. Results from these analyses, along with mature millable stalk counts, are used to calculate yield of sugar per acre, yield of cane per acre, mean stalk weight, and number of stalks per acre. Varieties with adequate yields (both tonnage and sugar per ton) and disease and insect resistance are advanced for further testing.

Varieties from the 1996 through the 1999 HoCP series were harvested from nursery trials in 2000. The replant of the 1998 HoCP series also included varieties from the 1998 LSU series. The 2000 HoCP assignment series was planted at three locations in 2000. Varieties from the 1999 HoCP series were combined with varieties from the 1999 LSU series and replanted on two commercial farms. Test locations, planting dates, and harvest dates can be found in Table 1. Results from trials harvested in 2000, along with combined analyses where applicable, can be found in Tables 2 to 24.

[1/] HoCP Varieties selected at Houma (Ho), La. from seed produced at Canal Point (CP), Fla., from

Louisiana parents.

Table 1. 2000 Planting and harvest dates of USDA nursery tests.

Series	Location[2/]	Soil Texture[3/]	Planting Date	Harvest Dates 1998	1999	2000	Varieties No. Planted	No. Harvested
1996	BSP	Csl	9/15/97	11/19	11/04	10/20	56	3
1996	GKF	Sc	9/22/97	11/20	11/03	10/05	56	3
1997	AFH	Sc	10/24/97	12/1	11/01	10/20	97	2
1997	AFL	Csl	10/23/97	12/1	11/10	10/20	97	2
1997	STG	Csl	11/06/97	12/2	11/05	10/30	97	2
1997	BSP	Csl	9/25/98		11/22	10/20	38	2
1997	GKF	Sc	10/15/98		11/19	10/05	34	2
1997	IRS	Bsc	10/14/98		11/16	10/31	36	2
1998	AFH	Sc	10/07/98		12/06	10/24	85	7
1998	AFL	Csl	10/07/98		12/07	11/15	85	7
1998	STG	Csl	10/23/98		11/23	10/30	71	7
1998	NEW	Mosl	8/25/99			11/21	44	10
1998	RGF	Cosl	8/13/99			11/29	44	10
1998	WES	Csl	8/17/99			12/06	44	10
1999	AFL	Csl	10/20/99			11/27	73	27
1999	STG	Csl	10/21/99			11/28	73	27
1999	IRS	Bsc	10/19/99			11/29	73	27
1999	NEW	Mosl	8/24/00				39	
1999	WES	Csl	8/21/00				39	
2000	AFL	Csl	10/27/00				61	
2000	STG	Csl	10/30/00				62	
2000	IRS	Bsc	10/31/00				62	

[2/] AFH = Ardoyne Farm Heavy soil in Chacahoula , AFL = Ardoyne Farm Light soil in Chacahoula, BSP = Bon Secour Plantation in St. James, GKF = Godfrey Knight Farm in Thibodaux,, IRS = Iberia Research Station in Jeanerette, NEW = Newton Farm in Bunkie, RGF = R. Gonsoulin in New Iberia, STG = St. Gabriel Research Station in St. Gabriel, WES = Westfield Plantation in Paincourtville.

[3/] Bsc = Baldwin silt clay, Cosl = Coteau silt loam, Csl = Commerce silt loam, Mosl = Moreland silty loam, Sc = Sharkey clay.

Table 2. Means of the 1996 HoCP and Ho series second stubble nursery variety trial on a Commerce silt loam soil at Bon Secour Plantation in St. James, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(Stalks/A)
CP 70-321	9977	44.0	228	2.0	44014
LCP 85-384	12878	58.4	220	1.7	67382
HoCP 85-845	10442	50.5	208	2.0	50366
HoCP 96-509	11378	51.5	223	1.9	52408
HoCP 96-540	12255	55.3	222	2.0	55584
HoCP 96-561	11257	47.9	234	1.7	56038
$MSD_{(.O5)}$	N.S.	N.S.	N.S.	N.S.	N.S.

Table 3. Means of the 1996 HoCP and Ho series second -stubble nursery variety trial on a Sharkey clay soil at Godfrey Knight Farms in Thibodaux, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	6685	35.1	192	1.7	41064
LCP 85-384	5822	33.1	176	1.1	62391
HoCP 85-845	3358	19.5	172	1.3	30401
HoCP 96-509	6096	41.5	145	1.2	67382
HoCP 96-540	8891	45.8	193	1.6	57626
HoCP 96-561	7345	33.4	219	1.4	46283
$MSD_{(.O5)}$	N.S.	N.S.	37	N.S.	17703

Table 4. Combined means of the 1996 HoCP and Ho series second stubble nursery variety trials in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	8331	39.5	210	1.8	42539
LCP 85-384	9350	45.7	198	1.4	64886
HoCP 85-845	6900	35.0	190	1.6	40384
HoCP 96-509	8737	46.5	184	1.6	59895
HoCP 96-540	10573	50.5	208	1.8	56605
HoCP 96-561	9301	40.6	227	1.6	51160
$MSD_{(.O5)}$	N.S.	N.S.	N.S.	N.S.	N.S.

Table 5. Means of the 1997 HoCP and Ho series second stubble nursery variety trial on a Commerce silt loam soil at Ardoyne Farm in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	10675	43.8	243	2.2	40157
LHo 83-153	12627	55.5	227	2.3	47871
LCP 85-384	13842	56.1	247	1.9	58534
HoCP 85-845	13196	51.5	256	2.1	49232
HoCP 97-606	12418	52.1	238	1.9	56038
HoCP 97-609	13287	51.9	255	2.2	47644
$MSD_{(.05)}$	N.S.	N.S.	N.S.	N.S.	N.S.

Table 6. Means of the 1997 HoCP and Ho series second stubble nursery variety trial on a Sharkey clay soil at Ardoyne Farm in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs)	(lbs)	(stalks/A)
CP 70-321	8264	31.7	262	1.7	35846
LHo 83-153	8031	32.1	249	1.9	34712
LCP 85-384	12329	44.3	279	1.5	58761
HoCP 85-845	10160	39.2	259	1.8	42879
HoCP 97-606	9884	38.7	256	1.5	51274
HoCP 97-609	10193	37.7	272	1.7	43106
$MSD_{(.05)}$	N.S.	N.S.	N.S.	N.S.	N.S.

Table 7. Means of the 1997 HoCP and Ho series second stubble nursery variety trial on a Commerce silt loam soil at St. Gabriel Research Station in St. Gabriel, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	7706	31.5	245	2.1	30174
LHo 83-153	10887	48.2	229	1.8	52408
LCP 85-384	8877	36.5	246	1.3	56492
HoCP 85-845	7841	32.7	241	1.7	38569
HoCP 97-606	11002	42.7	258	1.6	53996
HoCP 97-609	12519	43.8	286	1.7	50366

$MSD_{(.05)}$	N.S.	N.S.	33	0.3	16605

Table 8. Combined means of the 1997 HoCP and Ho series second stubble nursery variety trials in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	8882	35.7	250	2.0	35393
LHo 83-153	10515	45.3	235	2.0	44997
LCP 85-384	11683	45.6	257	1.6	57929
HoCP 85-845	10399	41.1	252	1.9	43560
HoCP 97-606	11101	44.5	250	1.7	53769
HoCP 97-609	12000	44.5	271	1.9	47039
$MSD_{(.05)}$	N.S.	N.S.	20	0.2	8703

Table 9. Means of the 1997 HoCP and Ho series first stubble nursery variety trial on a Commerce silt loam soil at Bon Secour Plantation in St. James, La., in 2000.

Variety	Sugar per acre	Cane Yield	Sugar per ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs.)	(lbs)	(stalks/A)
CP 70-321	10309	52.5	196	2.4	44241
LCP 85-384	13554	63.6	212	2.0	62618
HoCP 85-845	8949	44.1	203	2.2	41064
HoCP 97-606	11095	53.8	206	1.9	57853
HoCP 97-609	10138	45.2	224	2.0	45602
$MSD_{(.05)}$	N.S.	N.S.	N.S.	N.S.	14943

Table 10. Means of the 1997 HoCP and Ho series first stubble nursery variety trial on a Sharkey clay soil at Godfrey Knight Farms in Thibodaux, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	10434	50.5	207	2.5	40838
LCP 85-384	10436	52.7	192	1.8	59668
HoCP 85-845	7602	38.6	197	1.9	41064
HoCP 97-606	6840	35.1	195	1.5	47417

HoCP 97-609	9725	46.8	208	1.8	51501
$MSD_{(.05)}$	N.S.	N.S.	N.S.	0.6	N.S.

Table 11. Means of the 1997 HoCP and Ho series first stubble nursery variety trial on a Baldwin silty clay soil at the Iberia Research Station in Jeanerette, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	12622	46.6	270	2.6	36073
LCP 85-384	15825	57.1	277	2.0	56946
HoCP 85-845	13939	54.1	257	2.6	41745
HoCP 97-606	11181	43.7	256	2.0	44014
HoCP 97-609	15285	56.7	271	2.6	42879
$MSD_{(.05)}$	N.S.	N.S.	N.S.	N.S.	9719

Table 12. Combined means of the 1997 HoCP and Ho series first stubble nursery variety trials in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	11122	49.9	224	2.5	40384
LCP 85-384	13272	57.8	227	1.9	59744
HoCP 85-845	10163	45.6	219	2.2	41291
HoCP 97-606	9705	44.2	219	1.8	49761
HoCP 97-609	11716	49.6	234	2.1	46661
$MSD_{(.05)}$	N.S.	N.S.	N.S.	0.3	6599

Table 13. Means of the 1998 HoCP and Ho series first stubble nursery variety trial on a Commerce silt loam soil at Ardoyne Farm in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	16405	59.9	274	2.9	42199
LHo 83-153	16003	59.7	268	2.5	48324
LCP 85-384	18444	66.0	280	2.3	56492
HoCP 85-845	12603	47.5	265	2.3	41745
HoCP 98-718	16632	61.8	269	2.7	46056
HoCP 98-734	15423	62.7	246	2.4	51274

HoCP 98-741	18667	69.9	267	3.1	45148
HoCP 98-771	19775	73.0	271	3.2	46283
HoCP 98-776	15179	56.8	267	2.9	38796
HoCP 98-778	16563	60.5	274	2.7	45375
HoCP 98-781	15033	57.8	260	3.0	38115
$MSD_{(.05)}$	N.S.	N.S.	10	N.S.	10633

Table 14. Means of the 1998 HoCP and Ho series first stubble nursery variety trial on a Sharkey clay soil at Ardoyne Farm in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	18451	70.1	262	3.3	42879
LHo 83-153	17678	70.8	249	2.5	57173
LCP 85-384	20097	71.2	282	2.5	58534
HoCP 85-845	14691	57.7	254	2.4	47417
HoCP 98-718	12905	52.9	244	2.3	46509
HoCP 98-734	13899	62.0	224	2.5	49232
HoCP 98-741	19025	74.6	255	3.2	46283
HoCP 98-771	14898	59.7	249	2.5	48098
HoCP 98-776	16347	62.9	260	2.5	50593
HoCP 98-778	13877	52.8	263	2.4	44014
HoCP 98-781	13256	54.2	244	2.9	37208
$MSD_{(.05)}$	3758	10.1	26	0.2	8708

Table 15. Means of the 1998 HoCP and Ho series first stubble nursery variety trial on a Commerce silt loam soil at the St. Gabriel Research Station in St. Gabriel, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	10052	36.1	277	2.1	33124
LHo 83-153	12988	51.2	255	2.3	45148
LCP 85-384	14332	56.5	254	2.0	56492
HoCP 85-845	8083	31.8	251	1.8	33804
HoCP 98-718	12950	49.8	260	1.9	52181
HoCP 98-734	12116	50.8	238	1.9	53996
HoCP 98-741	15692	65.3	239	2.7	49232
HoCP 98-771	10926	48.6	223	2.0	49005
HoCP 98-776	10357	40.8	254	1.7	49232

HoCP 98-778	11661	43.0	271	2.2	39930
HoCP 98-781	11045	43.9	252	2.3	38569
$MSD_{(.O5)}$	N.S.	19.1	31	0.6	11624

Table 16. Combined means of the 1998 HoCP and Ho series first stubble nursery variety trial in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs.)	(lbs)	(stalks/A)
CP 70-321	14969	55.4	271	2.8	39401
LHo 83-153	15556	60.5	258	2.4	50215
LCP 85-384	17624	64.5	272	2.3	57173
HoCP 85-845	11793	45.7	257	2.2	40989
HoCP 98-718	14162	54.8	258	2.3	48249
HoCP 98-734	13813	58.5	236	2.3	51501
HoCP 98-741	17795	69.9	254	3.0	46888
HoCP 98-771	15200	60.4	248	2.5	47795
HoCP 98-776	13961	53.5	260	2.4	46207
HoCP 98-778	14034	52.1	269	2.4	43106
HoCP 98-781	13111	52.0	252	2.7	37964
$MSD_{(.O5)}$	2969	10.2	17	0.4	7024

Table 17. Means of the 1998 HoCP and L series plantcane nursery variety trial on a Moreland silt loam soil at Newton Farm in Bunkie, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A.)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	10263	35.8	285	1.8	40656
LCP 85-384	8650	32.7	264	1.9	35211
HoCP 85-845	8494	30.5	279	1.9	31763
L 98-207	11454	40.9	280	1.8	45375
L 98-209	9642	33.8	285	1.9	35937
HoCP 98-718	7323	29.3	245	1.3	43560
HoCP 98-734	7916	30.1	263	1.5	40656

HoCP 98-741	10782	39.5	272	2.0	38841
HoCP 98-771	5607	20.6	272	1.4	28859
HoCP 98-776	4389	16.2	272	1.3	24140
HoCP 98-778	9791	33.7	290	1.9	35756
HoCP 98-781	9367	34.2	274	2.0	34667
TucCP 77-042	9690	35.9	270	2.0	35211
$MSD_{(.05)}$	3229	8.6	N.S.	0.3	8106

Table 18. Means of the 1998 HoCP and L series plantcane nursery variety trial on a Coteau silt loam soil at Gonsoulin Farm in New Iberia, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	16158	56.6	286	3.1	36482
LCP 85-384	10412	39.4	264	2.0	40293
HoCP 85-845	10601	42.1	254	2.5	33941
L 98-207	14164	49.8	282	1.7	56628
L 98-209	18783	67.0	280	2.4	56084
HoCP 98-718	15719	64.5	246	2.5	51546
HoCP 98-734	11176	42.6	260	2.1	40475
HoCP 98-741	19206	79.7	242	3.5	45375
HoCP 98-771	12338	48.0	255	2.7	35211
HoCP 98-776	11689	41.9	279	2.2	39023
HoCP 98-778	8962	33.7	267	2.5	28314
HoCP 98-781	9211	37.7	244	2.7	28314
TUCCP 77-042	7325	30.3	241	2.5	24321
$MSD_{(.05)}$	N.S.	31.0	N.S.	0.7	15831

Table 19. Means of the 1998 HoCP and L series plantcane nursery variety trial on a Commerce silt loam soil at Westfield Plantation in Paincourtville, La., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	11477	45.0	255	2.2	40656
LCP 85-384	12675	56.9	222	1.9	59532
HoCP 85-845	10492	43.9	236	2.2	39749

L 98-207	16256	70.3	230	1.8	79497
L 98-209	16278	73.4	221	2.5	60077
HoCP 98-718	18485	73.6	251	2.5	59532
HoCP 98-734	15281	68.6	224	2.3	59714
HoCP 98-741	18216	75.8	239	3.3	45920
HoCP 98-771	16558	72.1	230	2.7	52998
HoCP 98-776	17605	68.8	256	2.7	51909
HoCP 98-778	14728	57.5	256	2.8	40656
HoCP 98-781	15870	68.5	231	3.1	44286
TUCCP 77-042	16546	89.6	185	3.7	49005
$MSD_{(.O5)}$	N.S.	23.1	N.S.	0.4	13914

Table 20. Combined means of the 1998 HoCP and L series plantcane nursery variety trials in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	12633	45.8	275	2.4	39265
LCP 85-384	10579	43.0	250	1.9	45012
HoCP 85-845	9862	38.8	256	2.2	35151
L 98-207	13958	53.7	264	1.8	60500
L 98-209	14901	58.1	262	2.2	50699
HoCP 98-718	13842	55.8	247	2.1	51546
HoCP 98-734	11457	47.1	249	2.0	46948
HoCP 98-741	16068	65.0	251	2.9	43379
HoCP 98-771	11501	46.9	252	2.3	39023
HoCP 98-776	11228	42.3	269	2.0	38357
HoCP 98-778	11160	41.6	271	2.4	34909
HoCP 98-781	11483	46.8	250	2.6	35756
TUCCP 77-042	11187	51.9	232	2.7	36179
$MSD_{(.O5)}$	N.S.	N.S.	28	0.7	11323

Table 21. Means of the 1999 HoCP series plantcane nursery variety trial on a Commerce silt loam soil at Ardoyne Farm in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	14666	53.5	274	3.3	32216
LCP 85-384	15658	58.4	267	2.7	42879
HoCP 85-845	11890	45.1	262	2.9	30855
HoCP 99-800	13678	58.7	233	3.2	36754
HoCP 99-804	15089	57.2	264	2.7	42199
HoCP 99-805	11761	51.6	228	2.8	36754
HoCP 99-806	14884	59.5	250	3.0	39930
HoCP 99-808	15153	55.1	276	2.5	44694
HoCP 99-809	16506	59.6	277	4.5	26544
HoCP 99-813	10680	38.6	277	2.5	31309
HoCP 99-814	10250	38.3	267	2.4	31763
HoCP 99-815	14697	54.0	272	2.7	40384
HoCP 99-817	13504	50.8	266	2.4	43106
HoCP 99-821	10116	43.4	233	2.3	37208
HoCP 99-822	10298	45.1	229	2.5	35846
HoCP 99-825	13584	50.5	269	3.2	31536
HoCP 99-829	13584	51.6	264	3.0	34939
HoCP 99-832	12464	49.0	254	2.3	43106
HoCP 99-833	14381	50.3	286	2.6	39249
HoCP 99-837	10174	40.7	250	2.7	30401
HoCP 99-838	13590	50.5	269	2.9	35166
HoCP 99-839	14094	54.9	257	4.0	27452
HoCP 99-854	7770	33.7	231	1.9	36073
HoCP 99-855	10703	47.4	224	2.3	41064
HoCP 99-857	12688	56.3	225	3.0	37434
HoCP 99-859	18205	70.5	258	3.1	45602
HoCP 99-861	14859	55.7	266	2.8	40157
HoCP 99-862	12034	45.2	266	1.8	49232
HoCP 99-866	18589	74.0	251	4.3	34485
HoCP 99-870	13829	56.6	244	2.4	46056
$MSD_{(.05)}$	4720	16.9	18	0.4	9022

Table 22. Means of the 1999 HoCP series plantcane nursery variety trial on a Baldwin silty clay soil at Iberia Research Station in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	8693	35.9	242	2.5	28813
LCP 85-384	7920	28.0	282	1.8	31536
HoCP 85-845	6728	28.9	233	2.2	26544
HoCP 99-800	9929	45.9	217	2.6	35393
HoCP 99-804	8837	37.4	237	2.1	36073
HoCP 99-805	9337	42.8	218	2.6	33578
HoCP 99-806	8386	35.8	234	2.7	26544
HoCP 99-808	7919	30.2	262	1.7	35166
HoCP 99-809	10274	37.3	275	3.6	21099
HoCP 99-813	5511	21.1	260	1.8	24049
HoCP 99-814	7794	29.5	264	2.1	27906
HoCP 99-815	9253	35.9	258	2.3	30628
HoCP 99-817	7413	29.8	249	1.8	33124
HoCP 99-821	6454	25.3	256	2.4	21099
HoCP 99-822	4705	21.3	224	2.0	21326
HoCP 99-825	7600	28.0	271	2.4	23595
HoCP 99-829	7450	28.7	260	2.7	21553
HoCP 99-832	5996	22.8	263	1.8	25183
HoCP 99-833	10457	39.2	267	2.2	35619
HoCP 99-837	7496	28.2	266	2.3	24276
HoCP 99-838	7357	29.1	252	2.2	26544
HoCP 99-839	10496	41.2	255	3.6	23141
HoCP 99-854	7688	28.4	269	1.9	29948
HoCP 99-855	7886	34.8	227	2.2	31763
HoCP 99-857	7858	35.7	220	2.8	25637
HoCP 99-859	8795	32.5	270	2.0	33351
HoCP 99-861	9517	37.4	256	2.4	31082
HoCP 99-862	8912	34.2	259	2.2	31536
HoCP 99-866	9338	38.5	243	3.1	24956
HoCP 99-870	7237	29.3	247	2.0	29494
$MSD_{(.05)}$	3098	11.9	18	0.5	9764

Table 23. Means of the 1999 HoCP series plantcane nursery variety trial on a Sharkey clay soil at St. Gabriel Research Station in St. Gabriel, La.., in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP 70-321	13732	54.2	253	3.2	34258
LCP 85-384	15767	58.5	270	2.3	50366
HoCP 85-845	7995	35.8	223	2.4	29948
HoCP 99-800	9391	44.2	213	2.6	34485
HoCP 99-804	13506	53.5	252	2.5	42653
HoCP 99-805	12022	52.8	228	2.7	39476
HoCP 99-806	11682	50.5	231	2.9	34485
HoCP 99-808	15465	57.6	269	2.3	50366
HoCP 99-809	17459	64.3	271	3.8	33578
HoCP 99-813	11554	46.1	251	2.4	38569
HoCP 99-814	9895	39.1	253	2.3	34712
HoCP 99-815	9933	39.5	251	2.3	34712
HoCP 99-817	10776	44.0	245	2.1	41972
HoCP 99-821	11431	46.8	244	2.6	35846
HoCP 99-822	10045	45.2	222	2.4	37661
HoCP 99-825	12206	48.4	252	2.6	37208
HoCP 99-829	12282	49.3	250	3.0	32443
HoCP 99-832	7091	29.9	238	1.8	32897
HoCP 99-833	10175	40.8	250	2.4	33351
HoCP 99-837	8633	32.7	264	2.0	32670
HoCP 99-838	14134	54.6	258	2.8	38796
HoCP 99-839	13229	58.8	225	4.1	28359
HoCP 99-854	8569	36.4	235	2.2	33351
HoCP 99-855	11389	49.8	229	2.8	35166
HoCP 99-857	11897	55.1	215	2.8	39249
HoCP 99-859	10747	41.8	257	2.2	37888
HoCP 99-861	9932	42.0	236	2.5	34031
HoCP 99-862	11985	46.3	258	1.8	52635
HoCP 99-866	12182	49.2	248	3.5	27906
HoCP 99-870	12692	52.2	243	2.3	45375
$MSD_{(.05)}$	3902	15.5	30	0.4	7217

Table 24. Combined means of the 1999 HoCP series plantcane nursery variety trials in 2000.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs.)	(lbs)	(stalks/A)
CP 70-321	12364	47.9	256	3.0	31763
LCP 85-384	13115	48.3	273	2.3	41594
HoCP 85-845	8871	36.6	239	2.5	29116
HoCP 99-800	10999	49.6	221	2.8	35544
HoCP 99-804	12477	49.4	251	2.4	40308
HoCP 99-805	11040	49.1	224	2.7	36603
HoCP 99-806	11651	48.6	238	2.9	33653
HoCP 99-808	12846	47.6	269	2.2	43409
HoCP 99-809	14746	53.8	274	4.0	27074
HoCP 99-813	9248	35.3	263	2.2	31309
HoCP 99-814	9313	35.6	261	2.3	31460
HoCP 99-815	11294	43.1	261	2.4	35241
HoCP 99-817	10565	41.5	253	2.1	39401
HoCP 99-821	9334	38.5	244	2.4	31384
HoCP 99-822	8349	37.2	225	2.3	31611
HoCP 99-825	11130	42.3	264	2.7	30779
HoCP 99-829	11105	43.2	258	2.9	29645
HoCP 99-832	8517	33.9	251	2.0	33729
HoCP 99-833	11671	43.4	268	2.4	36073
HoCP 99-837	8768	33.9	260	2.3	29116
HoCP 99-838	11694	44.7	260	2.6	33502
HoCP 99-839	12606	51.6	246	3.9	26318
HoCP 99-854	8009	32.8	245	2.0	33124
HoCP 99-855	9992	44.0	226	2.4	35998
HoCP 99-857	10814	49.0	220	2.9	34107
HoCP 99-859	12582	48.3	262	2.4	38947
HoCP 99-861	11436	45.0	252	2.5	35090
HoCP 99-862	10977	41.9	261	1.9	44468
HoCP 99-866	13370	53.9	247	3.6	29116
HoCP 99-870	11253	46.0	245	2.2	40308
$MSD_{(.05)}$	2876	10.6	15	0.3	5915

2000 INFIELD VARIETY TRIALS

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The infield variety trials of the Louisiana Sugarcane Variety Development Program have traditionally been planted from the year after permanent variety assignment through the year of introduction to outfield test locations. The Louisiana (L) program plants infield tests only the year after assignment. The Louisiana (HOCP and HO) program plants the year after assignment and the following year. These trials are the first machine-harvested tests in each program. The purpose of these trials is to estimate yields on larger plot sizes than used by earlier stages in the selection program. The infield variety trials are also important for screening experimental clones for suitability to mechanical harvesting.

A combine harvester/weigh wagon system was used to cut and weigh harvested plots in the Louisiana (L) infield variety trials. All but two infield tests at USDA's Ardoyne Farm were also harvested with a combine harvester. The 1994 and 1995 second stubble infield tests at Ardoyne Farms were harvested with a single-row soldier-type harvester and plots were weighed with a tractor-mounted hydraulic weigh rig. The combine harvester/weigh wagon system worked extremely well, with the immediate benefit of the amount of labor required for the collection of the data being reduced. Only two people were needed during the harvesting operation, compared to the old system that required a minimum of four people. Also, the accuracy of data collection was improved because of the absence of internal sugarcane jams in the combine harvester (soldier harvesters frequently jam), the absence of errors in topper height adjustment between plots, and the minimization of errors in terms of sugarcane missed and not weighed.

The 2000 sugarcane crop at St. Gabriel experienced a season-long drought throughout the spring. Lack of rainfall and warm weather throughout the summer growing season contributed to slow growth of the crop. Rainfall returned in the late summer/early fall in adequate quantities to initiate a burst of growth prior to maturity. Cool and dry conditions persisted during most of the fall harvest season and all locations were harvested before the first freeze. Rainfall was minimal during the harvest, with the exception of November.

Recommended cultural practices were used at St. Gabriel in 2000. Sencor 4L (2 lb/A) and Atrazine (2 lb/A) were applied to the tests after planting. In early March, 2-4,D (1 qt/A) and Atrazine (2 lb/A) were applied to all plantcane and stubble trials. In mid May, Sencor 4L (2 lb/A) and 2-4,D (1qt/A) were applied as layby applications. Broadcast treatments of Asulox (2 qts/A) were applied once in late April and again in May to control rhizome johnsongrass. Fields were fertilized with 120-0-60 lbs per acre in April.

At St. Gabriel, sugarcane borer (*Diatrea saccharalis* F.) populations were monitored weekly during June, July, and August and were found to exceed economic thresholds the last week in June of 2000. A helicopter was contracted to apply Karate insecticide at the recommended rate to all sugarcane areas on the station on July 2, 2000. A second treatment with Confirm insecticide was applied with an airplane on August 19, 2000.

At the USDA Ardoyne Farm, recommended culture practices were used in 2000. On February 24, Atrazine 4F (3 lb. a.i./A) and Weedmaster 4EC (1 lb. a.i./A) were applied to stubble infield tests. On March 3, Prowl 3.3EC (2.25 lb. a.i./A) and Direx 80WG (2.64lb. a.i./A) were applied to all infield tests. On April 6, test fields were fertilized at a rate of 100-30-60 lbs per acre. A layby treatment consisting of Atrazine (3 lbs. A.i./A) and Weedmaster (1 qt./A) was applied on June 13. Confirm insecticide was applied by airplane on July 22 for control of sugarcane borers.

Changes made in 2000 include planting a new infield test at Sugarland Acres in Youngsville. Varieties from both the LSU AgCenter and USDA program were combined in infield trials at all locations. During 2000, the 1999 L and HOCP assignment series were planted. An additional infield variety trial (1998 L and HoCP series) was planted on a Sharkey clay at the USDA-ARS Ardoyne Farm near Chacahoula, La. For each assignment series, infield tests are harvested for the three-year crop cycle.

Planting and harvest dates are summarized in Table 1. The experimental design used in the infield trials is a randomized complete block (two replications). Traditional plots are 16 feet long by three rows wide on 6-foot centers. For the trials planted at Blackberry Farms and Sugarland Acres, a plot size of 24 feet long by two rows wide was used. Because these trials are on commercial farms, this cuts down on the number of times the harvester has to stop between plots. Commercial check varieties, CP70-321, HOCP 85-845, and LCP85-384, were included in the tests. The number of varieties planted and harvested as listed in Table 1 excludes these commercial check varieties.

The plot weights for all locations were multiplied by 0.86 to adjust for trash. At the St. Gabriel Research Station, 10-stalk samples, stripped of leaves, were used to estimate stalk weight and obtain a juice sample for analysis. Brix and pol were used to estimate theoretical recoverable sugar (reported as sugar per ton) as calculated by the Winter Carp formula as reported by Gravois and Milligan(1992). Fiber content was assumed to be 12.5%. Sugar per acre was estimated as the product of cane yield and sugar per ton. At the USDA's Ardoyne Farm, 15-stalk samples were used to estimate stalk weight and for juice analysis. A five-stalk sub-sample was also obtained from each plot for fiber analysis.

LCP85-384 has been the leading variety in Louisiana since 1998, with about 71% of the sugarcane acreage in 2000. For comparison, LC85-384 is highlighted in the tables. In contrast to past years, a new statical method has been adopted for data analysis. To adjust for missing data, the analysis calculated least square means (SAS 8.01 Proc Mixed). Mean separation used least square means probability differences where P=0.05. Varieties that are significantly higher or lower than LCP85-384 are denoted by a plus (+) or minus (-), respectively, next to the value for each trait.

Results from the 2000 infield trials are presented in Tables 2 through 9.

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

Table 1. 2000 Planting and harvest dates of infield tests.

				Harvest Dates			Varieties	
Series	Location†	Soil Texture‡	Planting Date	1998	1999	2000	No. Planted	No. Harvested*
1997	St. Gabriel	Sc	8/25/98		11/15	10/16	43	2
1994	Ardoyne	Sc	9/4/97	11/23	11/1	10/17	12	1
1995	Ardoyne	Csl	9/3/97	12/7	11/9	10/17	27	2
1996	Ardoyne	Csl	8/28/97	11/27	11/15	10/23	56	3
1995	Ardoyne	Sc	8/31/98		11/18	**	8	0
1996	Ardoyne	Csl	8/27/98		11/29	11/14	38	4
1997	Ardoyne	Csl	10/3/98		11/30	11/22	39	2
1997	Ardoyne	Csl	8/20/99			11/22	12	4
1998***	Ardoyne	Sc	10/2/00				10	
1998	Blackberry	Csl	8/24/99			11/30	65	19
1999	Blackberry	Csl	8/17/00				39	
1999	Sugarland	Cosl	8/23/00				39	

† Ardoyne-Ardoyne Farm (Terrebonne), Blackberry- Blackberry Farms (St. James), St. Gabriel-St. Gabriel Research Station (Iberville), Sugarland - Sugarland Acres (Lafayette).
‡ Csl-Commerce silt loam, Cosl-Coteau silt loam, Sc-Sharkey clay
* Number harvested does not include varieties used for “check” plots.
** Plots were unharvestable because of physical damage by wildlife.
*** 1998 Series at Ardoyne Farms includes carryover varieties from previous years.

Table 2. 2000 Infield second stubble means of the 1994 "HOCP" and "L" assignment series in heavy soil at Ardoyne Farm near Chacahoula, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	6314	30.5	207	2.4 +	25341	11.7
LCP85-384	9772	37.9	258	1.9	41391	12.9
HOCP85-845	9747	42.7	228	2.1	41412	12.6
L94-428	5188	22.2	230	2.4 +	17910 -	12.6

Table 3. 2000 Infield second stubble means of the 1995 "HOCP" and "L" assignment series in light soil at Ardoyne Farm near Chacahoula, La..

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	11196	43.5	257	2.6	33937	14.3
LCP85-384	11038	42.9	257	2.3	37655	11.9
HOCP85-845	11356	46.4	245	2.1	43383 +	14.3
L95-462	11725	44.4	264	2.4	37175	14.0
HO95-988	10668	43.8	244	2.4	37130	13.2

Table 4. 2000 Infield second stubble means of the 1996 "HOCP" assignment series in light soil at Ardoyne Farm near Chacahoula, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	10681	42.4 +	252	2.3	37502	12.1
LCP85-384	8166	33.7	243	2.0	33251	13.3
HOCP85-845	12353	46.5 +	265	1.9	50453	13.6
HOCP96-509	9992	36.9	271	2.2	34081	13.5
HOCP96-540	11573	46.1 +	251	2.1	44642	12.9
HOCP96-561	10027	36.3	275	1.9	37959	12.7

Table 5. 2000 Infield first stubble means of the 1996 "HOCP" and "L" assignment series in light soil at Ardoyne Farm near Chacahoula, La.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	7721	28.0	276	2.7	20617	14.3
LCP85-384	10546	37.9	278	2.0	38594	14.5
HOCP85-845	8891	33.0	269	2.2	30578	16.0
L96-092	8135	32.8	248 -	2.3	28436	16.9
HOCP96-509	8458	30.9	274	2.6	23336	15.0
HOCP96-540	12504	46.6	269	2.4	38711	14.5
HOCP96-561	9007	32.6	278	2.4	27718	14.2

Table 6. 2000 Infield first stubble means of the 1997 "HOCP" assignment series in light soil at Ardoyne Farm near Chacahoula LA.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	8729	33.6	259	2.8 +	24222	11.7
LCP85-384	10432	39.3	266	2.2	35233	11.8
HOCP85-845	8355	33.0	253	2.2	30376	12.9
HOCP97-606	9731	38.9	250	2.1	38223	12.5
HOCP97-609	6944	26.7	263	1.9	28175	12.1

Table 7. 2000 Infield first stubble means of the 1997 "L" assignment series in heavy soil at St. Gabriel Research Station near St. Gabriel LA.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	4613 -	24.6 -	187	2.1 +	23722 -	-----
LCP85-384	8276	41.6	198	1.6	50843	-----
HOCP85-845	5402 -	31.1 -	174	1.8	33766 -	-----
L97-128	7897	35.6	221	2.2 +	31770 -	-----
L97-137	6219 -	33.8 -	185	1.7	39891 -	-----

Table 8. 2000 Infield plantcane means of the 1997 "HOCP" and "L" assignment series in light soil at Ardoyne Farm near Chacahoula LA.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number	Fiber
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)	%
CP70-321	12259	44.0	279	3.4	25761	11.1
LCP85-384	9052	33.3	272	2.3	29562	10.9
HOCP85-845	10403	38.7	269	2.5	31404	12.4
L97-128	12240	43.4	282	2.7	32284	11.3
L97-137	10848	40.2	270	2.6	31729	11.6
HOCP97-606	11677	45.4	257	2.5	36262	11.3
HOCP97-609	11243	40.0	281	2.5	31661	12.4

Table 9. 2000 Infield plantcane means of the 1995-1998 "HOCP" and "L" assignment series in light soil at Blackberry Farms near Vacherie, La.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number		Fiber	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)		%	
CP70-321	8307	-	33.6	-	247		2.0		34757	-	10.4	
TUCCP77-042	10349		46.1		225	-	2.6	+	35833	-	11.0	
LCP85-384	11359		43.1		264		1.7		49914		10.1	
HOCP85-845	10136		39.5		257		2.7	+	29432	-	11.9	+
L95-462	9638		37.2		259		2.5	+	30331	-	11.2	+
L96-092	9707		39.0		249		2.8	+	28311	-	12.3	+
HOCP96-509	9799		40.8		240	-	2.8	+	29384	-	11.0	
HOCP96-540	11016		42.3		260		2.7	+	30928	-	10.7	
HOCP96-561	11663		40.6		287	+	2.2	+	36706	-	11.7	+
L97-128	13057		51.8	+	253		2.9	+	35476	-	11.7	+
L97-137	9326	-	37.9		246		1.7		44524		9.9	
HOCP97-606	10957		42.3		260		2.0		41926		10.5	
HOCP97-609	12012		46.9		256		2.3	+	41122		10.4	
L98-207	11503		44.8		257		1.4		62585	+	11.8	+
L98-209	10698		43.5		246		2.1		41354		11.1	+
HOCP98-718	11590		47.0		246		2.1		46039		10.1	
HOCP98-734	9260	-	37.2		249		2.0		37394	-	10.6	
HOCP98-741	12792		50.4		254		3.0	+	33285	-	11.0	
HOCP98-771	11102		45.4		245	-	2.5	+	36245	-	10.4	
HOCP98-776	10453		40.1		261		2.4	+	33834	-	11.6	+
HOCP98-778	9806		36.5		269		2.7	+	27375	-	11.3	+
HOCP98-781	11014		44.6		247		3.1	+	29202	-	12.8	+

2000 OUTFIELD VARIETY TRIALS[1]

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The outfield variety trials are the final stage of testing experimental varieties for their potential commercial production in Louisiana. Results from these trials are used in both variety advancement and crossing decisions. The outfield variety trials are cooperatively conducted at up to 11 commercial locations throughout the Louisiana sugarcane belt by the Louisiana Agricultural Experiment Station, The United States Department of Agriculture - Agricultural Research Service, and the American Sugar Cane League.

To be considered for release, an experimental variety must equal or exceed the performance of commercial varieties with regard to yield and harvestability across locations, crops, and years. Accurate varietal evaluation requires overall yield performance information in addition to performance under adverse harvest conditions. The objective of this report is to provide overall and specific location yield data by crop for the 2000 outfield tests. Also included are multi-year yield analyses for appropriate test varieties.

The experimental design used at each outfield location was a randomized complete block design with three replications per location. To keep up to date with industry practices, most locations were harvested with a combine harvester. The use of the combine or whole stalk soldier harvester was decided upon in cooperation with the participating farmer. Plots harvested were three rows wide (six foot rows) and 32 feet long with a 5-foot alley between plots. Two tests that were harvested with a combine in 2000 were two-row plots 50 feet long with 5-foot alleys which were planted to aid with a combine harvesting system. Test plots harvested by combine were weighed with an electronic weigh wagon with load cells mounted in the axle and hitch. Test plots harvested by whole stalk soldier harvester were separated by hand and weighed with a tractor-mounted hydraulic weigh rig. A 15-stalk, whole stalk sample, not stripped of leaves, was taken from each plot and sent to the USDA sucrose lab. Samples were hand cut for combine-harvested tests, whereas samples were pulled from the heap row for the whole stalk harvested tests. The samples were weighed, milled, and the juice analyzed for Brix and pol. Theoretical recoverable sugar per ton of cane is reported.

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[1]The data for this report were obtained through a cooperative effort of personnel from the Louisiana Agricultural Experiment Station - LSU AgCenter, USDA - Agricultural Research Service, Sugarcane Research Unit, and the American Sugar Cane League in accordance to the provisions of the "Three-way Agreement of 1978." The testing program would not be possible without the full cooperation of the growers at each outfield location.

Cane yield for each plot was estimated by plot weight, less 14% to adjust for leaf-trash weight and 10% for harvest efficiency. Stalk number was calculated by dividing adjusted cane yield by stalk weight. Adjustments made to cane yield resulted in lower estimated stalk numbers than those commonly achieved by growers. No adjustment is made to stalk weight to account for leaf trash.

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

LCP85-384 has been the leading variety in Louisiana since 1998 with about 71% of the sugarcane acreage in 2000. For comparison, LCP85-384 is highlighted in the tables. In contrast to past years a new statistical method has been adopted for data analysis. To adjust for missing data, the analysis calculated least square means (SAS 8.01 Proc Mixed). Mean separation used least square means probability differences where P=0.05. Varieties that are significantly higher or lower than LCP85-384 are denoted by a plus(+) or minus(-), respectively, next to the value for each trait.

Ten experimental varieties were introduced to the outfield locations for seed increase in 2000 (Table 1). Seven experimental and four commercial varieties were planted at nine outfield locations. Twenty-nine tests were harvested in 2000 including nine plantcane, eight first stubble, seven second stubble, four third stubble, and one fourth-stubble (Table 2). In 2000, Northside West was converted from an outfield location to an observation nursery.

Varietal yields are reported by crop and trait with overall means and individual location data in the same table (Tables 3-22) and in summary tables by crop (Tables 23-26). One fourth stubble test was harvested in 2000 at Bon Secour plantation (Table 27). Combined analysis of 1999 through 2000 plantcane crops (Table 28) is included to aid in the evaluation of experimental varieties L94-462 and HO95-988. Combined analysis of 1996 through 2000 plantcane crops (Table 29), 1997 through 2000 first stubble crops (Tables 30), 1998 through 2000 second stubble crops (Tables 31), and 1997 through 2000 third stubble crops (Tables 32) are included to aid in the evaluation of the commercial varieties.

Varieties HO95-988, L96-92, and HOCP96-561 were dropped in 2000, and variety L94-428 was dropped in 1999. These varieties were harvested in 2000 to collect data for breeding purposes. The most advanced experimental variety, L95-462, was in plantcane and first stubble tests in 2000. Based on current data and observations, L95-462 is classified as resistant to smut and mosaic and moderately resistant to leaf scald and the sugarcane borer and has harvested well in outfield tests.

Table 1. 2000 Commercial and experimental varieties planted in the outfield.

Commercial Varieties	Experimental Varieties			Experimental Varieties Introduced to the Outfield		
CP70-321	L95-462	L97-128	HOCP97-606	L98-207	HOCP98-741	HOCP98-778
LCP85-384	HOCP96-509	L97-137	HOCP97-609	L98-209	HOCP98-771	HOCP98-781
HOCP85-845	HOCP96-540			HOCP98-718	HOCP98-776	TUC CP77-42
HOCP91-555				HOCP98-734		

Table 2. Harvest and planting dates for all outfield locations harvested in 2000.

Location	Parish	2000 Plant Date	Plantcane 2000 Harvest Date	Plantcane 1999 Plant Date	First stubble 2000 Harvest Date	First stubble 1998 Plant Date	Second 2000 Harvest Date	Second 1997 Plant Date	Third stubble 2000 Harvest Date	Third stubble 1996 Plant Date
Allain	St. Mary	09/27	12/27	09/14	10/30	10/01	10/31	09/12	**	**
Alma	Pointe Coupee	08/30	**	**	**	**	**	**	**	**
Bon Secour†	St. James	08/24	12/13	09/13	**	09/25	10/20	09/15	**	**
Georgia	Lafourche	09/19	12/22	08/24	12/22	10/21	11/02	09/25	11/02	10/24
Glenwood	Assumption	08/23	12/01	08/26	11/03	09/22	10/25	09/09	10/25	09/18
Lanaux	St. John	09/06	12/09	09/15	12/08	10/06	10/26	09/18	10/26	10/01
Levert-St.John	St. Martin	09/01	12/05	08/18	10/30	09/29	10/30	09/05	**	**
Magnolia	Terrebonne	10/04	10/24	08/23	10/23	10/02	**	09/23	10/23	10/16
R.Hebert	Iberia	09/05	11/29	08/25	11/29	09/24	10/18	09/16	**	09/20
Northside West	Jefferson Davis	08/22‡	12/21	08/27	12/20	09/01	**	**	**	**

† Bon Secour 4th stubble test harvested on 10/20.

‡ Observation nursery planted at Northside West in 2000.

** No test harvested at this location.

Table3. Plantcane sugar per acre for four commercial and six experimental varieties at nine outfield locations in 2000.

	Heavy		Light							
Variety	Allains	Magnolia	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs/A)					
CP70-321	3110 -	7897	9762	9837	7716 -	8724	9531	3588	4301	7163
LCP85-384	7675	7114	8657	8751	10499	9063	8477	4651	4062	7661
HOCP85-845	4311 -	7467	7900	8771	9705	6756 -	8536	4020	3359	6766 -
HOCP91-555	6776 -	8448	7793	9797	10860	7898	10627 +	4682	3974	7873
L95-462	6907	7701	6972 -	9752	10822	7862	9657	4279	3939	7543
HO95-988	5647 -	7273	8658	10472 +	13518 +	9673	8846	5625	4065	8197
L96-092	5747 -	8041	9247	9819	10428	9702	9279	5134	3802	7911
HOCP96-509	4694 -	7585	7099 -	9506	11006	7712	10308 +	4076	3462	7272
HOCP96-540	5938 -	9587	8978	11548 +	13140 +	10592	11756 +	5397	4350	9032 +
HOCP96-561	5705 -	6527	7796	8410	9049	8922	9277	4986	4106	7198

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.
†† Varieties HO95-988, L96-92 and HOCP 96-561 were dropped but were harvested to collect data for breeding purposes.

Table 4. Plantcane cane yield for four commercial and six experimental varieties at nine outfield locations in 2000.

	Heavy		Light							
Variety	Allains	Magnolia	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(tons/A)					
CP70-321	14.7 -	28.6	36.0	36.5 +	31.6 -	36.0	38.7 +	13.9	15.0	27.9
LCP85-384	30.1	29.4	31.4	31.6	37.4	35.1	30.5	17.0	13.9	28.5
HOCP85-845	19.8 -	28.6	34.9	34.2	38.6	33.3	37.1 +	17.1	13.4	28.6
HOCP91-555	29.0	34.3 +	32.5	36.0 +	40.3	31.7	40.3 +	18.4	14.2	30.7
L95-462	28.9	30.6	29.4	35.9 +	40.3	34.3	38.0 +	17.9	14.8	30.0
HO95-988	23.1 -	28.4	35.1	36.6 +	48.7 +	37.7	35.7 +	21.0	14.7	31.2
L96-092	28.4	32.4	39.3 +	37.5 +	43.9 +	45.6 +	41.5 +	22.7 +	15.1	34.0 +
HOCP96-509	21.1 -	28.2	29.9	36.4 +	42.8	34.3	40.4 +	17.2	12.5	29.2

HOCP96-540	25.7 -	34.3 +	36.5 +	41.1 +	48.6 +	44.2 +	45.9 +	20.6	15.1	34.7 +
HOCP96-561	24.7 -	25.9	28.5	30.5	35.1	34.3	33.1	18.1	13.7	27.1

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties HO95-988, L96-92 and HOCP 96-561 were dropped but were harvested to collect data for breeding purposes.

Table 5. Plantcane sugar per ton for four commercial and six experimental varieties at nine outfield locations in 2000.

	Heavy		Light							
Variety	Allains	Magnolia	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs/ton)					
CP70-321	212 -	276	271	268	244 -	240 -	246 -	258	286	256 -
LCP85-384	255	241	275	277	280	259	277	273	291	270
HOCP85-845	221 -	261	226 -	257	252 -	203 -	230 -	236 -	249 -	237 -
HOCP91-555	233	245	243 -	272	270	249	264	255 -	278 -	256 -
L95-462	240	252	238 -	271	268	229 -	254	237 -	266 -	251 -
HO95-988	244	255	246 -	286	278	257	248 -	266	278 -	262
L96-092	202 -	248	235 -	262	238 -	213 -	224 -	226 -	251 -	233 -
HOCP96-509	223 -	269	236 -	261	257	225 -	255	237 -	276 -	249 -
HOCP96-540	233	278	247 -	281	271	240 -	256	262	289	262
HOCP96-561	231	251	274	276	259	260	281	276	299	267

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties HO95-988, L96-92, and HOCP 96-561 were dropped but were harvested to collect data for breeding purposes.

Table 6. Plantcane stalk weight for four commercial and six experimental varieties at nine outfield locations in 2000.

	Heavy		Light							
Variety	Allains	Magnolia	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs)					
CP70-321	1.6	2.8 +	2.9	3.1 +	2.7	3.1	3.2 +	1.5	1.6	2.5 +
LCP85-384	2.0	1.9	2.3	2.0	2.4	2.4	1.8	1.4	1.3	1.9
HOCP85-845	2.3	2.5 +	2.6	2.6 +	3.0 +	2.8	3.2 +	1.6	1.8	2.5 +
HOCP91-555	2.2	2.0	2.2	2.0	2.5	2.6	2.5 +	1.4	1.3	2.1
L95-462	2.9 +	2.4	2.6	2.5 +	3.0 +	2.9	2.7 +	1.6	1.9	2.5 +
HO95-988	2.1	2.1	2.6	2.6 +	2.9 +	2.7	2.8 +	1.7	1.6	2.3 +
L96-092	2.5 +	2.2	2.9	2.7 +	3.2 +	3.1	3.5 +	1.8	1.8	2.6 +
HOCP96-509	2.7 +	2.3	2.6	2.8 +	3.3 +	2.9	3.2 +	1.7	1.6	2.6 +

HOCP96-540	2.9 +	2.1	2.6	2.8 +	3.3 +	3.0	2.8 +	1.7	1.6	2.5 +
HOCP96-561	2.1	1.7	2.3	2.2	2.4	2.6	2.4	1.3	1.5	2.0

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties HO95-988, L96-92, and HOCP 96-561 were dropped but were harvested to collect data for breeding purposes.

Table 7. Plantcane stalk number for four commercial and six experimental varieties at nine outfield locations in 2000.

	Heavy		Light							
Variety	Allains	Magnolia	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(stalks/A)					
CP70-321	18030 -	20863 -	25111	23806 -	23480	23608	23961 -	17867 -	19067	21755 -
LCP85-384	30879	31047	28101	31552	31256	29226	34311	25950	22616	29438
HOCP85-845	17769 -	22674 -	27649	26693 -	25897	24003	23778 -	20874	15208	22764 -
HOCP91-555	26267 -	33922	29901	35796	32262	24512	33118	25439	21816	29226
L95-462	20160 -	26422	22322	28186	27521	24100	28225 -	22369	16426	23970 -
HO95-988	22310 -	26686	27140	28167	33302	28455	25851 -	25445	19088	26272 -
L96-092	22748 -	30021	27108	28016	27384	29389	23712 -	26097	16759	25693 -
HOCP96-509	15858 -	24145	22876	26117 -	25860	23659	25344 -	20659 -	15391	22212 -
HOCP96-540	17688 -	33179	28181	29956	29889	30283	32267	23754	19188	27154 -
HOCP96-561	23699 -	30992	24853	27442	30167	26538	28707 -	27702	18572	26519 -

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties HO95-988, L96-92, and HOCP 96-561 were dropped but were harvested to collect data for breeding purposes.

Table 8. First stubble sugar per acre for four commercial and three experimental varieties at eight outfield locations in 2000.

	Heavy		Light						
Variety	Allains	Magnolia	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs/A)				
CP70-321	6031 -	6251 -	8505 -	9839	9279	9522	5635	3687 -	7343
LCP85-384	7792	7825	9725	9483	10476	9719	6221	4581	8228
HOCP85-845	5425 -	8705	8608	10274	9188	7213 -	4919 -	3572 -	7238 -

HOCP91-555	6365 -	9016	8533 -	7875 -	8229 -	7370	5805	4962	7269 -
L94-428	7466	7490	9071	10860	13080 +	11310	8491 +	5232 +	9125
L95-462	7164	------	9661	9930	9122	10323	5094 -	3931 -	7860
HO95-988	7905	7578	10322	10356	11845	10974	7553 +	4824	8920

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties L94-428 and HO95-988 were dropped but were harvested to collect data for breeding purposes.

Table 9. First stubble cane yield for four commercial and three experimental varieties at eight outfield locations in 2000.

Variety	Heavy		Light						
	Allains	Magnolia	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(tons/A)				
CP70-321	25.3 -	21.4 -	31.8	36.1	40.9	36.7	21.4 -	12.8 -	28.3
LCP85-384	31.6	26.3	35.4	35.4	40.7	36.8	26.3	15.6	31.0
HOCP85-845	24.1 -	29.2	33.6	37.7	38.7	28.4 -	21.6 -	13.1 -	28.3
HOCP91-555	25.4 -	29.0	31.3	28.8 -	32.8 -	27.2 -	23.7	17.1	26.9 -
L94-428	28.6	25.5	35.6	41.3 +	49.6 +	39.5	32.0 +	17.8 +	33.7
L95-462	29.9	-----	35.2	37.5	40.0	39.1	22.5 -	14.8	30.8
HO95-988	32.3	26.7	35.5	38.6	45.2	38.6	28.2	16.2	32.7

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.
†† Varieties L94-428 and HO95-988 were dropped but were harvested to collect data for breeding purposes.

Table 10. First stubble sugar per ton for four commercial and three experimental varieties at eight outfield locations in 2000.

Variety	Heavy		Light						
	Allains	Magnolia	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs/ton)				
CP70-321	239	292	268	273	227 -	259	264	289	264
LCP85-384	247	297	274	268	257	264	236	294	267
HOCP85-845	224	298	256	272	238	254	228	272 -	255 -
HOCP91-555	251	311	273	273	251	270	245	290	271
L94-428	260	294	255	262	264	286	266	294	273
L95-462	239	-----	275	264	228 -	263	226	265 -	255 -
HO95-988	245	284	291	269	262	284	268 +	298	275

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.
†† Varieties L94-428 and HO95-988 were dropped but were harvested to collect data for breeding purposes.

Table 11. First stubble stalk weight for four commercial and three experimental varieties at eight outfield locations in 2000.

	Heavy		Light						
Variety	Allains	Magnolia	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(lbs)				
CP70-321	2.1	2.5 +	2.8 +	2.6	3.1 +	2.5	1.7	1.7 +	2.4 +
LCP85-384	2.1	1.8	2.1	2.1	2.0	1.9	1.5	1.2	1.8
HOCP85-845	2.1	2.1	2.4	2.0	2.6 +	2.4	1.7	1.6 +	2.1 +
HOCP91-555	1.6	1.9	2.0	2.0	2.1	1.7	1.4	1.5	1.8
L94-428	2.1	2.4 +	2.8 +	2.3	3.2 +	2.8 +	2.2 +	2.1 +	2.5 +
L95-462	2.0	----	2.6 +	2.3	2.9 +	2.5 +	1.7	1.7 +	2.2 +
HO95-988	1.9	2.1	2.7 +	2.1	2.5	2.3	1.7	1.5	2.1 +

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

†† Varieties L94-428 and HO95-988 were dropped but were harvested to collect data for breeding purposes.

Table 12. First stubble stalk number for four commercial and three experimental varieties at eight outfield locations in 2000.

	Heavy		Light						
Variety	Allains	Magnolia	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Northside	Mean
					(stalks/A)				
CP70-321	23901	17509 -	22484 -	27526	26067 -	30945	25527 -	14825 -	23598 -
LCP85-384	30556	29984	33371	34514	40732	38107	36040	25275	33572
HOCP85-845	23540	28434	28173 -	38843	29633 -	24102	25718 -	16827 -	26909 -
HOCP91-555	33136	30207	31408	29982	32120 -	32039	35274	22354	30815
L94-428	26702	21492 -	25796 -	38181	31772 -	28335	29837 -	17617 -	27466 -
L95-462	30530	--------	26834 -	33041	27684 -	31510	26844 -	17561 -	27271 -
HO95-988	34365	25814	25936 -	37004	37016	33899	33880	21080	31124

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.
†† Varieties L94-428 and HO95-988 were dropped but were harvested to collect data for breeding purposes.

Table 13. Second stubble sugar per acre for four commercial and one experimental varieties at seven outfield locations in 2000.

	Heavy	Light						
Variety	Allains	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Mean
	(lbs/A)	(lbs/A)	(lbs/A)	(lbs/A)	(lbs/A)	(lbs/A)	(lbs/A)	(lbs/A)
CP70-321	4794 -	6680	8773	7314	7897	6835	6742	7005
LCP85-384	6560	8383	8565	7573	7960	7396	7578	7716
HOCP85-845	4702 -	7875	8905	7546	8387	6026	4724 -	6881
HOCP91-555	5221 -	------	8395	7010	7450	8319	7236	7319
L94-428	6096	8223	7460	8589 +	10265 +	8819	8154	8229

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 14. Second stubble cane yield for four commercial and one experimental varieties at seven outfield locations in 2000.

	Heavy	Light						
Variety	Allains	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Mean
				(tons/A)				
CP70-321	22.0 -	28.6	31.0	30.3	31.3	30.1	23.5	28.1
LCP85-384	28.3	34.9	30.7	29.9	30.5	34.1	26.2	30.7
HOCP85-845	21.5 -	33.3	33.4	30.9	34.5 +	28.2	20.4 -	28.9
HOCP91-555	21.9 -	-----	28.4	27.1	28.6	32.3	26.5	28.0
L94-428	24.8 -	36.6	29.1	33.5	36.7 +	33.5	28.1	31.7

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 15. Second stubble sugar per ton for four commercial and one experimental varieties at seven outfield locations in 2000.

	Heavy	Light						
Variety	Allains	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Mean
				(lbs/ton)				
CP70-321	218	233	283	242	253	224	285	248
LCP85-384	232	240	279	253	262	217	290	253
HOCP85-845	217	237	267	245	243 -	214	231 -	236 -
HOCP91-555	239	-----	295	259	260	257 +	273	262

L94-428	246	225	256	257	280 +	265 +	290	260

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 16. Second stubble stalk weight for four commercial and one experimental varieties at seven outfield locations in 2000.

	Heavy	Light						
Variety	Allains	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Mean
				(lbs)				
CP70-321	1.9	2.2 +	2.5	2.4 +	2.6 +	2.5 +	1.9 +	2.3 +
LCP85-384	1.6	1.4	1.9	1.8	1.7	2.1	1.2	1.7
HOCP85-845	1.6	2.3 +	2.3	2.0	2.0 +	2.1	1.6 +	2.0 +
HOCP91-555	1.4	----	2.0	1.7	1.7	1.8 -	1.4	1.7
L94-428	2.2 +	2.2 +	2.4	2.3 +	2.4 +	2.9 +	2.0 +	2.3 +

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 17. Second stubble stalk number for four commercial and one experimental varieties at seven outfield locations in 2000.

	Heavy	Light						
Variety	Allains	Bon Secour	Georgia	Glenwood	Lanaux	R. Hebert	St. John	Mean
				(stalks/A)				
CP70-321	23185 -	25363 -	25011	25041 -	24345 -	24176 -	25293 -	24631 -
LCP85-384	35916	49059	33323	33859	36659	32211	42603	37661
HOCP85-845	26610 -	29015 -	29087	30764	34283	26357 -	26000 -	28874 -
HOCP91-555	31671	--------	28587	32423	33565	36341	37907	33878
L94-428	22830 -	33431 -	23911	29742	30697 -	23406 -	28300 -	27474 -

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 18. Third stubble sugar per acre for eight commercial varieties at four outfield locations in 2000.

	Heavy		Light							
Variety	Magnolia		Georgia		Glenwood		Lanaux		Mean	
					(lbs/A)					
CP70-321	4823	-	6841		7365		7994	-	6756	
CP72-370	5182	-	7694		6303	-	6676	-	6464	-
CP79-318	6206		8079		6812		7525	-	7156	
LCP82-089	5803		8042		7054		7170	-	7017	
LHO83-153	3637	-	5589	-	6286	-	7317	-	5707	-
LCP85-384	6557		7306		7805		9351		7755	
HOCP85-845	6100		9116	+	8847		9524		8397	
HOCP91-555	5018	-	9277	+	8773		8759		7957	

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 19. Third stubble cane yield for eight commercial varieties at four outfield locations in 2000.

	Heavy		Light							
Variety	Magnolia		Georgia		Glenwood		Lanaux		Mean	
					(tons/A)					
CP70-321	18.8	-	25.3		28.9	-	32.0	-	26.3	-
CP72-370	20.3	-	29.3		26.0	-	26.9	-	25.6	-
CP79-318	23.7		29.0		32.9		34.2		30.0	
LCP82-089	21.7		28.0		31.7		29.6	-	27.8	
LHO83-153	14.9	-	21.6	-	28.1	-	31.2	-	24.0	-
LCP85-384	23.8		26.2		33.0		37.5		30.1	
HOCP85-845	25.6		34.9	+	36.1		38.8		33.9	+
HOCP91-555	18.8	-	32.1	+	32.4		33.3	-	29.2	

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 20. Third stubble sugar per ton for eight commercial varieties at four outfield locations in 2000.

	Heavy		Light							
Variety	Magnolia		Georgia		Glenwood		Lanaux		Mean	
					(lbs/ton)					
CP70-321	254	-	270		254		250		257	
CP72-370	255		264		243		248		252	
CP79-318	262		278		207		219	-	242	-
LCP82-089	267		287		222		242		254	
LHO83-153	243	-	258	-	224		234		240	-
LCP85-384	276		279		235		249		260	
HOCP85-845	238	-	262		245		246		248	
HOCP91-555	267		289		271	+	264		272	

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 21. Third stubble stalk weight ton for eight commercial varieties at four outfield locations in 2000.

	Heavy		Light							
Variety	Magnolia		Georgia		Glenwood		Lanaux		Mean	
					(lbs)					
CP70-321	2.2	+	2.5	+	2.5	+	2.4	+	2.4	+
CP72-370	1.8		2.3	+	2.3	+	2.3	+	2.2	+
CP79-318	2.0	+	2.5	+	2.3	+	2.4	+	2.3	+
LCP82-089	1.7		2.2		2.0		1.9	+	2.0	+
LHO83-153	1.3	-	2.0		1.8		2.0	+	1.8	
LCP85-384	1.6		1.7		1.8		1.6		1.7	
HOCP85-845	2.0	+	2.2	+	2.1		2.4	+	2.2	+
HOCP91-555	1.5		2.1		1.6		1.8		1.8	

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 22. Third stubble stalk number for eight commercial varieties at four outfield locations in 2000.

	Heavy		Light							
Variety	Magnolia		Georgia		Glenwood		Lanaux		Mean	
					(stalks/A)					
CP70-321	17136	-	20044	-	23424	-	26636	-	21810	-
CP72-370	22503	-	25928		22385	-	23232	-	23512	-
CP79-318	23859		23523	-	28628	-	28664	-	26169	-
LCP82-089	25374		26523		32026		30685	-	28652	-
LHO83-153	22862	-	21482	-	31771		31516	-	26908	-
LCP85-384	29308		30578		37752		47230		36217	
HOCP85-845	25432		31248		34217		32022	-	30730	-
HOCP91-555	24759		31660		40404		37377	-	33550	

† Significant differences, higher or lower, from LCP85-384 are indicated next to the value by a plus(+) or minus(-), respectively.

Table 23. 2000 plantcane means from nine outfield locations: Allains, Bon Secour, Georgia, Glenwood, Lanaux, Magnolia, R. Hebert, St. John, and Northside farms.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7163		27.9		256	-	2.5	+	21755	-
LCP85-384	7661		28.5		270		1.9		29438	
HOCP85-845	6766	-	28.6		237	-	2.5	+	22764	-
HOCP91-555	7873		30.7		256	-	2.1		29226	
L95-462	7543		30.0		251	-	2.5	+	23970	-
HO95-988	8197		31.2		262		2.3	+	26272	-
L96-092	7911		34.0	+	233	-	2.6	+	25693	-
HOCP96-509	7272		29.2		249	-	2.6	+	22212	-

HOCP96-540	9032 +	34.7 +	262	2.5 +	27154 -
HOCP96-561	7198	27.1	267	2.0	26519 -

Table 24. 2000 first stubble means from eight outfield locations: Allains, Georgia, Glenwood, Lanaux, Magnolia, R. Hebert, St. John, and Northside farms.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	7343	28.3	264	2.4 +	23598 -
LCP85-384	8228	31.0	267	1.8	33572
HOCP85-845	7238 -	28.3	255 -	2.1 +	26909 -
HOCP91-555	7269 -	26.9 -	271	1.8	30815
L94-428	9125	33.7	273	2.5 +	27466 -
L95-462	7860	30.8	255 -	2.2 +	27271 -
HO95-988	8920	32.7	275	2.1 +	31124

Table 25. 2000 second stubble means from seven outfield locations: Allains, Bon Secour, Georgia, Glenwood, Lanaux, R. Hebert, and St. John farms.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	7005	28.1	248	2.3 +	24631 -
LCP85-384	7716	30.7	253	1.7	37661
HOCP85-845	6881	28.9	236 -	2.0 +	28874 -
HOCP91-555	7319	28.0	262	1.7	33878
L94-428	8229	31.7	260	2.3 +	27474 -

Table 26. 2000 third stubble means from four outfield locations: Georgia, Glenwood, Lanaux, and Magnolia farms.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP70-321	6756	26.3 -	257	2.4 +	21810 -
CP72-370	6464 -	25.6 -	252	2.2 +	23512 -
CP79-318	7156	30.0	242 -	2.3 +	26169 -
LCP82-089	7017	27.8	254	2.0 +	28652 -
LHO83-153	5707 -	24.0 -	240 -	1.8	26908 -
LCP85-384	7755	30.1	260	1.7	36217
HOCP85-845	8397	33.9 +	248	2.2 +	30730 -
HOCP91-555	7957	29.2	272	1.8	33550

Table 27. 2000 fourth stubble means from Bon Secour.

Variety	Sugar per Acre	Cane Yield	Sugar per Ton	Stalk Weight	Stalk Number
	(lbs/A)	(tons/A)	(lbs/ton)	(lbs)	(stalks/A)
CP65-357	6128 -	26.9	227	1.9 +	28090 -
CP70-321	4712 -	19.6 -	240	2.2 +	17594 -
CP72-370	4126 -	18.0 -	230	1.7 +	21187 -

LCP82-089	6073	-	25.8	-	235		1.9	+	26839	-
LHO83-153	5000	-	21.7	-	229		1.4	-	31244	-
LCP85-384	7643		31.6		241		1.6		40200	
HOCP85-845	7488		33.3		224		2.0	+	33890	-

Table 28. Combined plantcane means across outfield locations from 1999 to 2000.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7800	-	29.2		266	-	2.7	+	21854	-
LCP85-384	8501		30.9		275		2.1		29174	
HOCP85-845	7590	-	30.7		246	-	2.6	+	23633	-
HOCP91-555	8077		30.4		265	-	2.2		27721	
L95-462	8549		32.7		260	-	2.6	+	25207	-
HO95-988	8879		32.6		271		2.5	+	26063	-

Table 29. Combined plantcane means across outfield locations from 1996 to 2000.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7907	-	30.0	-	264	-	2.8	+	21768	-
LCP85-384	8929		33.1		270		2.3		28953	
HOCP85-845	7877	-	32.2		244	-	2.6	+	24569	-
HOCP91-555	8443	-	31.8		265	-	2.3		27565	-

Table 30. Combined first stubble means across outfield locations from 1997 to 2000.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7919	-	29.3	-	272		2.5	+	23366	-
LCP85-384	9250		33.8		274		2.0		34123	
HOCP85-845	8213	-	31.7	-	258	-	2.3	+	27629	-
HOCP91-555	8644	-	31.3	-	276		2.0		31711	-

Table 31. Combined second stubble means across outfield locations from 1998 to 2000.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	7195	-	27.8	-	259	-	2.3	+	24064	-
LCP85-384	8564		32.1		267		1.7		38126	
HOCP85-845	7990	-	31.2		254	-	2.1	+	30151	-
HOCP91-555	7761	-	28.3	-	273	+	1.7		34654	-

Table 32. Combined third stubble means across outfield locations from 1999 to 2000.

Variety	Sugar per Acre		Cane Yield		Sugar per Ton		Stalk Weight		Stalk Number	
	(lbs/A)		(tons/A)		(lbs/ton)		(lbs)		(stalks/A)	
CP70-321	6625	-	25.3	-	262		2.4	+	21426	-
LCP85-384	7878		29.7		267		1.7		35795	

HOCP85-845	8548	33.3	+	256	2.2	+	29983	-
HOCP91-555	8040	29.2		275	1.8		33391	

THE 2000 LOUISIANA SUGARCANE VARIETY SURVEY

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During June and July of 2000 a sugarcane variety survey was conducted by county agents in the 24 parishes currently producing sugarcane in Louisiana to determine the varietal makeup and distribution across the sugarcane belt in the state. The information presented in this report was summarized from those individual parish surveys.

Extension agents in each sugarcane-producing parish collected acreage figures by variety and crop year from growers in their parishes. Some information was also collected from the local Farm Service Agency office when the agents had difficulty in obtaining all the needed information from the growers. Since this information was collected during the growing season and included input from many persons, acreages may differ from the final total crop acreage figures collected at harvest.

Acreages for each parish, regional totals, and the statewide total are shown in Table 1. Figure 1 shows the parishes in which sugarcane is grown in the state. The statewide total of acreage reported in the survey is 489,306 acres although the certified acreage reported by Farm Service Agency was 495,737 acres. It is important to note that the total acreage of 489,306 is not the "official" total sugarcane acreage in Louisiana; however, it does represent approximately 98.7% of the total certified acreage. Regional totals were 215,650 acres for the Teche Region, 169,124 acres for the River-Bayou Lafourche Region, and 104,532 acres for the Northern Region in 2000.

The portion of the total statewide acreage made up by each variety and the portion of the total for each crop year contributed by each variety are shown in Table 2. The leading variety for 2000 was LCP 85-384, with 71% of the total acreage. The second leading variety was CP 70-321, with 13% of the acreage. LCP 85-384 has been the leading variety since 1998 when it occupied 43% of the state's acreage (Table 7). Other varieties making important acreage contributions included: HoCP 85-845 at 8%, and CP 72-370, LCP 82-89, and LHo 83-153 at 2% each (Table 2). All other varieties in the survey occupied less than 1% of the total acreage. There was an increase in the acreage of only one variety, LCP 85-384, during 2000 (Table 7). LCP 85-384 is the first variety to reach more than 70% of the total acreage since CP 65-357, released in 1973, did it in the early 1980s. LCP 85-384 is a high yielding, excellent stubbling variety. The variety produces a large number of small stalks and exceeds most other varieties in the yield of sugar per acre.

In recent years there has been a tendency to keep older stubble because of better stubbling varieties and relatively milder winters in both 1998 and 1999. Whereas a normal crop cycle extended for only three years, a plant-cane and two stubble crops, many growers are now keeping third and older stubble, extending their crop cycle to four or five years. In 2000, 17.5% or more than 85,000 acres was third or older stubble (Table 2). Table 3 shows the distribution of plant and stubble crops by region. The percentage of the crop made up by plantcane, first stubble, second stubble and third and older stubble was about the same across the regions with the exception of the Northern Region, where there was more third and older stubble than second stubble cane.

Varietal makeup by crop year for the Teche, River-Bayou Lafourche, and Northern regions is shown in Tables 4, 5, and 6, respectively. LCP 85-384 is the major variety for all three regions with 73, 66 and 76% of the total acreage found in the Teche, River-Bayou Lafourche, and Northern regions, respectively. CP 70-321 is the second leading variety in the Teche and Northern regions while HoCP 85-845 is the second leading variety in the River-Bayou Lafourche Region. No other variety is found on more than 3% of the total area in any of the regions.

Sugarcane variety trends over the last five years are shown in Table 7. Only one variety, LCP 85-384, increased in 2000 from the previous year. All other varieties either decreased or remained the same as reported from the previous year. CP 70-321 declined the most at 7 percentage points while LCP 82-89 declined 3%. HoCP 85-845 remained the same from the previous year. All other varieties are grown on only limited acreages. It is anticipated that LCP 85-384 will continue to gain in popularity for the near future while the remaining varieties will continue to decrease in total acreage with the possible exception of HoCP 91-555. HoCP 91-555 was only released for commercial planting in 1999. At present, there are only approximately 1,400 acres of this variety grown in the state. Many growers have planted only a small seed plot since its release and will decide on possible expansion in the summer of 2001. HoCP 91-555 is a high yielding, good stubbling variety. It is mostly erect in growth habit and suited to both soldier and combine harvesting. On the other hand, LCP 85-384 frequently lodges and is brittle and difficult to harvest when lodged, being better suited for combine harvesting.

ACKNOWLEDGMENTS

We acknowledge the assistance of the county agents for soliciting the sugarcane variety information published in this survey. We also want to thank the sugarcane producers who took the time to respond to the survey from their agents.

Table 1. Estimated total sugarcane acres by parish and region, 2000[1].

Teche Region		River-Bayou Lafourche Region		Northern Region	
Parish	Acres	Parish	Acres	Parish	Acres
Acadia	3,322	Ascension	15,301	Avoyelles	22,408
Calcasieu	6,132	Assumption	42,004	East Baton Rouge	556
Iberia	65,002	Iberville	35,580	Evangeline	2,078
Jeff Davis	8,025	Lafourche	32,684	Pointe Coupee	25,479
Lafayette	15,870	St. Charles	2,210	Rapides	13,558
St. Martin	36,929	St. James	25,289	St. Landry	24,319
St. Mary	45,871	St. John	5,580	West Baton Rouge	16,134
Vermilion	34,499	Terrebonne	10,476		
TOTAL	215,650	TOTAL	169,124	TOTAL	104,532
Total-All Regions: 489,306 acres					

[1]Based on 2000 variety survey information from county agents.

Figure 1. Louisiana sugarcane growing parishes

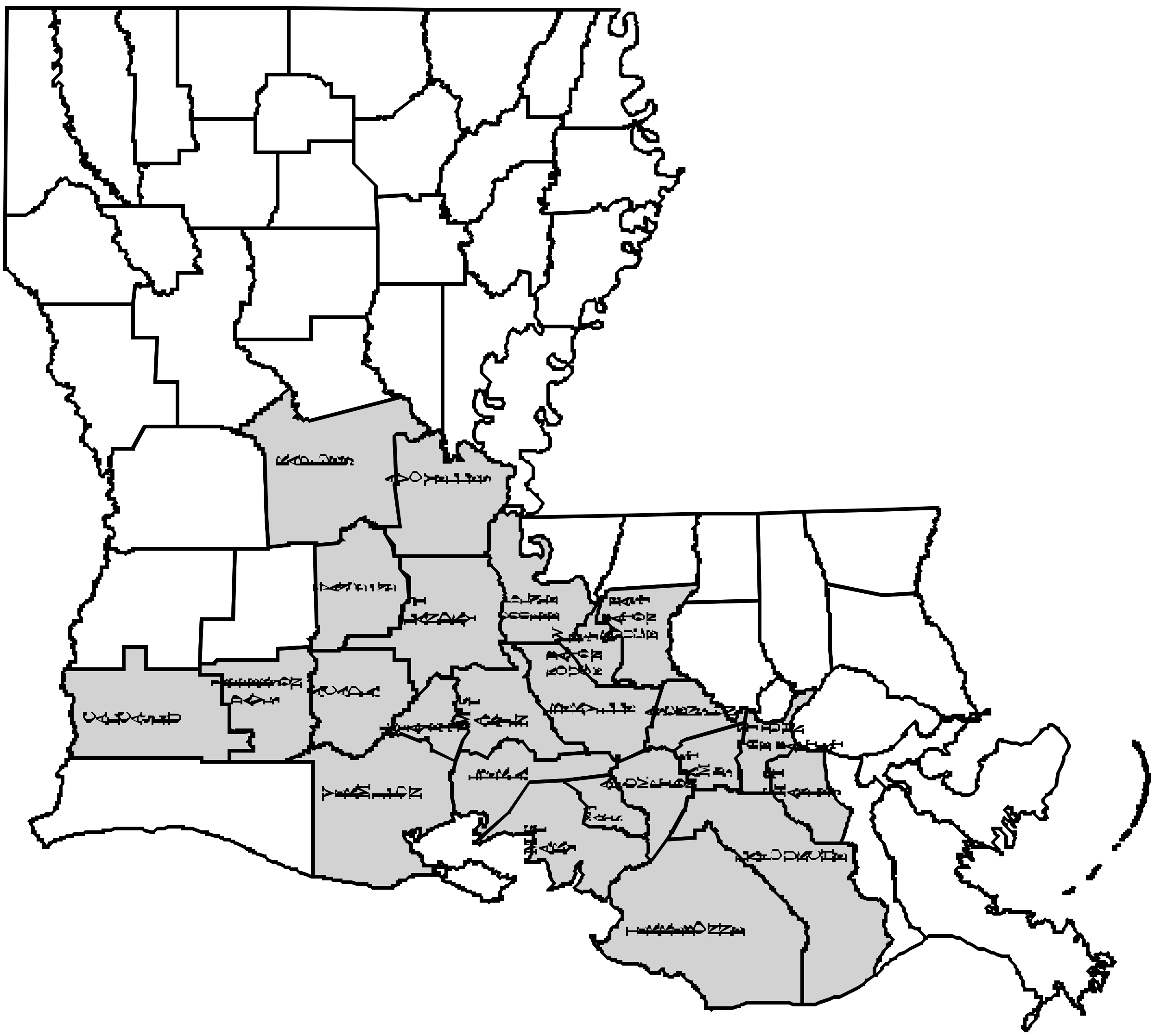

Table 2. Estimated statewide sugarcane acreage percentage by variety and crop year, 2000[1].

Variety	Plant Cane	1st Stubble	2nd Stubble	3rd Stubble And Older	Total
			%		
CP 65-357	<1	<1	1	2	1
CP 70-321	6	10	19	27	13
CP 72-370	1	2	2	2	2
CP 74-383	<1	<1	<1	1	<1
CP 79-318	<1	<1	<1	<1	<1
LCP 82-89	<1	1	4	3	2
LHo 83-153	1	1	2	2	2
LCP 85-384	82	76	63	56	71
HoCP 85-845	7	8	9	6	8
LCP 86-454	<1	<1	<1	<1	<1
HoCP 91-555	<1	<1	<1	<1	<1
Others	<1	<1	<1	<1	<1
Total Acres	136,027	144,345	123,305	85,629	489,306
Percent Total Crop (%)	27.8	29.5	25.2	17.5	

[1]Based on 2000 variety survey information from county agents.

Table 3. Estimated sugarcane distribution by region and crop year, 2000[1].

Crop Year	Teche	River Bayou Lafourche	Northern	State Total
Plantcane				
Acres	57,363	49,046	29,687	136,027
%	26.6	29.0	28.4	27.8
1st Stubble				
Acres	64,695	50,568	28,746	144,345
%	30.0	29.9	27.5	29.5
2nd Stubble				
Acres	57,579	44,987	19,861	123,305
%	26.7	26.6	19.0	25.2
3rd Stubble and Older				
Acres	36,013	24,523	26,238	85,629
%	16.7	14.5	25.1	17.5
Total Acres	215,650	169,124	104,532	489,306

[1]Based on 2000 variety survey information from county agents.

Table 4. Estimated Teche region acreage percentage by variety and crop year, 2000[1].

Variety	Plant Cane	1st Stubble	2nd Stubble	3rd Stubble And Older	Total
CP 65-357	<1	<1	<1	<1	<1
CP 70-321	9	15	26	27	17
CP 72-370	1	1	2	1	1
CP 74-383	0	0	0	<1	<1
CP 79-318	<1	<1	1	<1	<1
LCP 82-89	1	1	2	2	2
LHo 83-153	<1	1	1	1	1
LCP 85-384	84	76	62	65	73
HoCP 85-845	4	5	5	3	4
LCP 86-454	<1	<1	<1	<1	<1
HoCP 91-555	1	<1	<1	0	<1
Others	<1	<1	<1	<1	<1

[1]Based on 2000 variety survey information from county agents.

Table 5. Estimated River-Bayou Lafourche region sugarcane acreage percentage by variety and crop year, 2000[1].

Variety	Plant Cane	1st Stubble	2nd Stubble	3rd Stubble And Older	Total
CP 65-357	1	1	2	2	1
CP 70-321	3	6	9	17	8
CP 72-370	2	3	3	2	3
CP 74-383	<1	<1	<1	1	<1
CP 79-318	<1	<1	<1	1	<1
LCP 82-89	1	2	6	6	3
LHo 83-153	2	3	4	4	3
LCP 85-384	74	69	60	55	66
HoCP 85-845	14	15	15	11	14
LCP 86-454	1	1	1	1	1
HoCP 91-555	1	<1	<1	<1	<1
Others	<1	<1	<1	<1	<1

[1]Based on 2000 variety survey information from county agents.

Table 6. Estimated Northern region sugarcane acreage percentage by variety and crop year, 2000[1].

Variety	Plant Cane	1st Stubble	2nd Stubble	3rd Stubble And Older	Total
CP 65-357	<1	<1	1	5	2
CP 70-321	3	4	19	38	15
CP 72-370	<1	1	1	3	1
CP 74-383	0	<1	1	2	1
CP 79-318	<1	<1	0	2	<1
LCP 82-89	<1	1	2	1	1
LHo 83-153	<1	<1	<1	<1	<1
LCP 85-384	94	91	72	43	76
HoCP 85-845	1	3	5	6	3
LCP 86-454	0	<1	<1	0	<1
HoCP 91-555	<1	0	0	0	<1
Others	<1	<1	0	<1	<1

[1]Based on 2000 variety survey information from county agents.

Table 7. Louisiana sugarcane variety trends 1996-2000[1].

	% of state total acreage by year					
Variety	1996	1997	1998	1999	2000	1 yr. Change
CP 65-357	10	6	3	1	1	0
CP 70-321	40	35	29	20	13	-7
CP 72-370	9	7	5	3	2	-1
CP 74-383	3	2	1	<1	<1	0
CP 79-318	3	3	2	1	<1	-1
LCP 82-89	16	10	7	5	2	-3
LHo 83-153	4	4	3	3	2	-1
LCP 85-384	13	29	43	58	71	+13
HoCP85-845	2	4	6	8	8	0
LCP 86-454	<1	<1	1	1	<1	0
HoCP 91-555	<1	<1	<1	<1	<1	0
Others	<1	<1	1	<1	<1	0

[1]Based on annual variety survey reports from county agents in sugarcane-producing parishes, 1996-2000.

SUCROSE LABORATORY AT ST. GABRIEL

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More than 2,600 samples were processed at the St. Gabriel Sucrose Laboratory during the 2000 harvest season (Table 1). Standard laboratory procedures, which include use of the ABC Clarifier, were used to measure the Brix and pol of the juice. Personnel in the lab tested a new clarifier, Octapol®, developed by Baddley Chemical, to measure the juice pol. Compared to the ABC Clarifier, the Octapol® was found to clarify fresh and stale sugarcane juice while using the same amount of product. The ABC Clarifier does not clarify stale sugarcane as easily. The ABC Clarifier active ingredients tend to break down quicker; therefore, it requires more product to clarify the same amount of raw juice. The juice was extracted via a three-roller mill for most of the samples (2592). Fiber analysis was done on 30 samples via chip/press extraction. The laboratory numbers were recorded on the sample tags and returned to the researchers, along with the computer file that contains Brix, pol, and theoretical recoverable sugar per ton of cane.

Table 1. Number of sugarcane samples processed at the St. Gabriel Sucrose Laboratory during the 2000 harvest season.

Project Area	Leader	Number of Samples
Agronomy	Allen Arceneaux	487
	Magdi Selim	18
Entomology	Eugene Reagan	20
Iberia Research Station	William Hallmark	863
	Howard Viator	24
Plant Pathology and Crop Physiology	Jeffrey Hoy	104
	James Griffin	94
Sugar Research Station	Line Trials	525
	Infield	10
	Increase	144
	Nursery	233
	Nursery (fiber)	30
	Tissue Culture	54
	Kenneth Gravois	16
TOTAL		2622

LAES SUGARCANE TISSUE CULTURE LABORATORY

Q. J. Xie, J. L. Flynn, and K. A. Gravois
Thermo Trilogy Corp. and Sugar Research Station

During the 2000-2001 production season, more than 30,000 plantlets were regenerated in the Louisiana Agricultural Experiment Station tissue culture laboratory. A total of 26,932 plantlets were turned over to Thermo Trilogy Corp., Kleentek Div., for transplanting into the greenhouse at Houma. The number of plantlets transplanted for each cultivar are listed at Table 1. To minimize somaclonal variation, plantlets from all cultivars were generated through meristem production method.

Table 1. The number of tissue-culture-derived plantlets of different cultivars transplanted in the greenhouse.

Cultivar	Meristem production
CP 70-321	2,592
LCP 85-384	15,012
HoCP 85-845	2,952
HoCP 91-555	6,322
LCP 95-462	414
TOTAL	26,932

TISSUE CULTURE METHOD EFFECTS ON SUGARCANE YIELD COMPONENTS

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Department of Plant Pathology and Sugar Research Station

The vegetative propagation of sugarcane is conducive to the spread of systemic diseases such as ratoon stunting disease (RSD). This important disease in Louisiana is now controlled largely by planting commercial seed-cane initially produced in a lab through tissue culture. To determine whether tissue culture affects yield or its components, three varieties, CP 70-321, LCP 85-384, and HoCP 85-845, were compared in three successive crops initially planted with stalks from three sources: Kleentek® plants derived from callus (undifferentiated cells) produced from the leaf roll above the apical meristem, Kleentek plants directly regenerated from an apical meristem, and original plants from conventional bud propagation. Stalks of plants derived from both tissue culture methods were typical of Kleentek seed-cane farmers would purchase for planting that had been rogued for phenotypic variants (off-types) and increased by bud propagation. Differences in yield components among the two tissue culture methods and bud propagated cane occurred only in CP 70-321 (Table 1). Stalk diameter and stalk weight were lower and stalk population was higher for plants derived from leaf roll callus compared to bud propagated cane. However, yield components were similar for plants derived from an apical meristem and bud propagation. Individual plant off-types were not observed in cane produced by either tissue culture method. In summary, variety and tissue culture method affected persistent, uniform variation in plant growth habit resulting from tissue culture that changed some yield components. However, apical meristem culture was suitable for production of seed-cane, because sugarcane derived by meristem culture of all three varieties did not differ significantly from the original germplasm for any measured trait (Table 1).

The experiment was conducted over three successive growing seasons at three locations, the Sugar Research Station, the Iberia Research Station, and the Ardoyne Farm of the USDA-ARS-SRRC Sugarcane Research Unit. Three replications of each variety and plant source were planted in single-row plots, 15 feet in length. Plots were visually surveyed for individual plant off-types each year during May, August, and at harvest. Yield components, including stalk population, weight, diameter and length, sucrose content, cane tonnage, and sugar per acre, were collected at the conclusion of each growing season.

In the past, farmers in Louisiana have sometimes noted that tissue-culture-derived plants had smaller stalk diameter and stalk weight and higher stalk population. One of the varieties this change was observed in was CP 70-321. These changes were confirmed in CP 70-321 derived from a leaf-roll explant source in this study. Previous experience and observations suggested that culture from the apical meristem would reduce the magnitude in difference in these traits compared to culture from leaf-roll callus. This study supports these observations. Smaller stalk diameter and stalk weight were observed for plants of CP 70-321 from a leaf-roll callus source but not for plants from an apical meristem. It also should be noted for the CP 70-321 leaf-roll callus culture source that final yield, as measured by cane and sucrose yield, was not affected by this tissue culture practice because stalk weight and population are compensatory yield components in sugarcane. Apical meristem culture-derived plants were not significantly different from never-cultured cane in stalk diameter and stalk weight for all three varieties.

The study results indicate that sugarcane varieties can be grown with seed-cane from apical meristem tissue culture (the method currently used to produce Kleentek seed-cane) without any change in growth and yield characteristics. The implication of this finding is that healthy seed-cane programs needed for disease management can be shifted from a traditional heat treatment program to one using tissue culture derived seed-cane without affecting the yield characteristics of varieties developed by the breeding program.

Table 1. Sugar yield and its components as affected by variety and plant source averaged across three crop-years, 1998 through 2000.

Variety	Plant source	Sugar yield[1]	Cane yield	Sucrose content	Stalk population	Stalk weight	Stalk diameter	Stalk length
		lbs./A	tons/A	lbs./ton	1000/A	lbs.	inches	feet
CP 70-321	Never cultured	14370 a	58.7 a	244.8 a	42.3 b	2.8 a	0.94 a	8.3 a
	Meristem	12941 a	53.3 a	242.8 a	43.3 ab	2.4 ab	0.91 a	8.2 a
	Leaf roll	12823 a	54.8 a	234.0 a	49.3 a	2.2 b	0.84 b	8.2 a
LCP 85-384	Never cultured	14351 a	59.3 a	242.0 a	54.6 a	2.2 a	0.85 a	8.4 a
	Meristem	15384 a	61.0 a	252.2 a	55.5 a	2.2 a	0.84 a	8.2 a
	Leaf roll	13847 a	57.6 a	240.4 a	57.9 a	2.1 a	0.82 a	8.3 a
HoCP 85-845	Never cultured	11751 a	49.5 a	237.4 a	42.7 a	2.3 a	0.89 a	8.2 a
	Meristem	11326 a	49.5 a	228.8 a	43.0 a	2.3 a	0.88 a	8.2 a
	Leaf roll	11498 a	51.1 a	225.0 a	44.5 a	2.2 a	0.88 a	8.1 a

[1] Yield component values within a column and variety followed by the same letter were not significantly different at $P = 0.05$.

SUGARCANE APHID CONTROL – SMALL PLOT INSECTICIDE TEST

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Nine insecticide treatments were evaluated for control of two aphid pest species in sugarcane, the sugarcane aphid (WSA), *Melanaphis sacchari*, and the yellow sugarcane aphid (YSA), *Sipha flava*. An RCB design with five replications of three-row plots (0.01 acre each) in a field of plant sugarcane (variety LCP 85-384) was set up at the Henry Corley farm near Cheneyville, La. Insecticide treatments were applied in water using a "solo" 3-gal. hand pump pressurized backpack sprayer with an 8004 T-Jet flat fan tip nozzle with 32 psi spraying both sides of the sugarcane row on July 7 or 8. Relatively uniform pre-treatment infestations averaged 75-80 WSA and 8-10 YSA sampled on the 3rd or 4th leaf below the whorl. Post treatment counts were made on the 3rd or 4th leaf below the whorl with random samples of 10 plants per plot. Results on the sugarcane aphid (Table 1) indicated that the higher trending treatments, Aphistar (.25 lb) and Furadan (.75 lb), were not significantly different from the other rates of Furadan (.5 and .25 lb), Karate (.03 or .05 lb), or Orthene 75S (0.5 lb). Except for Danitol (181.6 g) with YSA, all treatments for both species were significantly different from the untreated check.

Table 1. Sugarcane aphid response to small plot insecticide test at Cheneyville, La, 2000.

Treatment (ai/acre)	Number of Aphids Per Leaf	
	Sugarcane Aphid (WSA) *Melanaphis sacchari*	Yellow Sugarcane Aphid (YSA) *Sipha flava*
Aphistar (0.25lbs)	0.4d	0c
Orthene 75S (0.5lbs)	1.4cd	0c
Furadan 4F (0.25lbs)	2.0cd	0c
Furadan 4F (0.5lbs)	0.6cd	0c
Furadan 4F (0.75lbs)	0.4d	0c
Karate Z (0.015lbs)	6.2cd	2bc
Karate Z (0.03lbs)	5.6cd	2bc
Knack (50g)	35.2b	3abc
Danitol (181.6g)	21.8bc	5.8ab
Check-Untreated	65.6a	6a

Ten plants randomly sampled leaves per plot (50 per treatment) ($P \leq 0.05$, LSD).

ASSESSMENT OF INSECT PEST MANAGEMENT IN LOUISIANA SUGARCANE

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To determine an experimental assessment of insect pest management in Louisiana sugarcane, eight production regions were selected for comparison of sugarcane borer (SCB) *Diatraea saccharalis* spring deadhearts, SCB and other insect pest insecticidal control, end-of-season bored internodes (and adult emergence), and yield. In each area, two management units were selected to compare two-plantcane and two stubble fields in SCB susceptible varieties versus moderate or resistant varieties. A total of 117 fields were sampled across the primary Louisiana sugarcane production areas. The varieties sampled were LCP85-384 or HoCP91-555 (SCB susceptible) and HoCP85-845, CP70-321, LCP86-454, or LHo83-153 (SCB resistant). With cooperation from the respective growers and/or licensed consultants and county agents, spring deadheart sampling, stand counts, insecticide use, and end of season SCB bored internode frequency and adult emergence holes were compared to the yields of the sampled fields. During the deadheart survey, borer larvae were collected and reared out for parasite (parasitoid) determination.

Out of the 5,350 stalks (65,081 total internodes) evaluated for the eight areas, 1,331 of the internodes were bored, given a total average of 2.05%, and SCB spring deadhearts averaged 277 per acre for the 2000 growing season (Table 1 provides an analyzed mean of the summary for each area). Results indicated a year of very light insect pressure with most fields receiving only one or less application of insecticide because of the severity of the drought that farmers faced during this growing season. An exception to the drought occurred in the Central Louisiana area where early rains were received (Table 2 compares above normal rainfall versus drought conditions), and some fields required three applications for SCB control with infestations reaching as high as 20% live larvae in the leaf sheaths at times, and one field required four applications of insecticide. Some of these same farmers were also faced with an outbreak of the newly discovered white sugarcane aphid *Melanaphis sacchari* (Zehtner) and the yellow sugarcane aphid *Sipha flava* (Forbes) requiring additional insecticide treatments.

Table 1. Deadheart Assessment and SCB Injury in Louisiana Sugarcane Industry for 2000.

Selected Areas	SCB Deadhearts/ Acre	% SCB Bored Internodes
Central	675a	4.10a
Southwest	167b	2.91ab
Upper River	150b	2.77ab
Upper Lafourche	406ab	2.51abc
Lower Lafourche	113b	2.04bc
Vermilion	248b	1.33bc
Teche	219b	1.26bc
Lower River	238b	0.68c

Each value represents a mean of 16 fields ($P \leq 0.05$, LSD).

Table 2. Integrated Pest Management Comparison of Three Areas of the Louisiana Sugarcane Industry for 2000.

Area	Rainfall (Inches)			# of Insecticide Applications	% SCB Bored Internodes	# of Dead-hearts/ Acre
	Apr & May	Jun & Jul	Aug & Sep			
Central	11.70	6.26	0.84	2.5	4.10a	675a
(+/-) from normal	2.45	0.47	- 4.50			
Lower River	1.80	7.30	12.40	0.1	0.68c	238b
(+/-) from normal	- 3.93	- 2.80	- 2.17			
Vermilion	1.03	7.13	5.89	0.0	1.33b	248b
(+/-) from normal	- 7.57	- 3.79	- 6.50			

Weather data was gathered from Climatological Data Louisiana 2000 ($P \leq 0.05$, LSD).

Central = Rapides and Avoyelles parishes, Lower River = St. John and St. Charles parishes, and Vermilion = Abbeville and Youngsville areas including all of Vermilion parish.

SMALL PLOT ASSESSMENT OF INSECTICIDES AGAINST THE MEXICAN RICE BORER IN TEXAS SUGARCANE

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Three insecticides and an untreated check were evaluated in an experiment for Mexican rice borer, *Eoreuma loftini* (Dyar) control at Duda farms near Donna, Texas, in the Lower Rio Grande Valley. An RCB design with six replications was used in a field of first ratoon sugarcane (variety CP 72-1210). Insecticide treatments were applied to three-row plots (0.01 acre each) using a 3-liter CO_2 pressurized backpack sprayer with two hollow cone nozzles delivering 25 gpa at 30 psi. To obtain the maximum possible coverage, both sides of each row were sprayed with the two-nozzle wand held approximately 45 degrees to the horizontal. Seven applications were made to each side of the cane row at approximate three-week intervals. The initial treatment was made on 27 Apr when the MRB larval infestation was approximately 5% live larvae on the plant surface and in the leaf sheaths, and MRB adult pheromone trap catches adjacent to the test averaged greater than two moths per day. MRB damage was assessed by counting bored internodes and the total number of internodes per stalk from 120 randomly selected stalks of sugarcane (20 stalks/ plot) on the center row in each treatment (2 Nov). All insecticides were applied with Latron CS-7 at 0.125% v/v. Following ANOVA, separation of means was by LSD.

Based on percentage of MRB bored internodes, all three insecticide treatments significantly suppressed plant injury with the reduction in boring varying from 65-87%. Plant injury from the sugarcane borer, *Diatraea saccharalis,* which is distinctively different, was never more than a 5-8% proportion of that attributed to MRB.

Table 1. Effect of insecticides against the Mexican rice borer in sugarcane, Donna, Texas, 2000.

Treatment/ formulation	Rate per acre	Percent bored internodes
Fury 1.5 EC	3.83 oz	2.12b
Confirm 2F	16.00 oz	3.63b
Intrepid 2F	8.00 oz	5.93b
Untreated	–	16.53a

Means in a column followed by the same letter are not significantly different at 5% level (LSD).
Seven applications with a CO_2 backpack sprayer at approximate three-week intervals initiated 4-27-00.

SMALL PLOT ASSESSMENT OF INSECTICIDES AGAINST THE SUGARCANE BORER

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Eleven insecticide treatments were evaluated for control of sugarcane borer (SCB), *Diatraea saccharalis* (F.) in an RCB design with five replications in a field of plant sugarcane (variety) LCP 85-384, at St. Gabriel, La. Insecticide treatments were applied to three-row plots (0.01 acre each) using a CO_2 sprayer mounted on an all-terrain vehicle on 13 Jul and 4 Aug. Three 8005 flat fan spray tips per 6 feet width of row delivered 20 gpa at 35 psi. Initial treatment was made when the SCB infestation exceeded Louisiana's economic threshold level (5% of the stalks containing live larvae in the leaf sheaths); the succeeding application was made when re-infestation began to appear in the Confirm 2F treatment. Prior to test initiation, one application of Lorsban 15G was broadcast (15.0 lb/acre) to suppress red imported fire ant predation on SCB larvae (10 Jul). SCB damage was assessed by counting the bored internodes, moth emergence holes, and total number of internodes per stalk from 100 randomly selected stalks of sugarcane (20 stalks/plot) in each treatment (27 Oct). All of the Confirm 2F and Intrepid 2F treatments were applied with the surfactant Latron CS-7 at 0.25% vol/vol. Following ANOVA, means were separated with LSD.

Except for Intrepid 2F at the 4 oz per acre rate, all insecticide treatments resulted in less than 10% bored internodes (economic injury level) [Table 1]. All treatments were significantly different from the untreated check of 18.42% bored internodes. Because of unseasonable drought conditions, borer infestations were abnormally low during the summer of 2000. Experience shows that the most reliable untreated check approaches 25% bored internodes.

Table 1. Effect of small plot insecticidal test on (SCB) *Diatraea saccharalis* (F.), St. Gabriel Research Station, 2000.

Treatment/formulation	Rate (amt/acre)	% Bored internodes	No. of exit holes/acre[a]
Fury 1.5 EC	3.2 oz	2.50d	5,674c
Karate Z	1.92 oz	3.73cd	5,158c
Danitol 2.4 EC	21.3 oz	4.91cd	7,221c
Confirm 2F[b]	8.0 oz	5.31cd	8,252bc
Knack	16.0 oz	5.71bcd	8,768bc
Asana XL	5.8 oz	5.94bcd	10,315bc
Intrepid 2F[b]	6.0 oz	6.37bcd	14,957bc
Intrepid 2F[b]	2.0 oz	8.05bcd	17,536bc
Tracer	3.0 oz	8.70bc	18,567bc
Tracer	2.0 oz	8.70bc	19,083bc
Intrepid 2F[b]	4.0 oz	11.81b	25,272ab
Untreated Check	---	18.42a	40,229a

Means followed by same letter in a column are not significantly different ($P \leq 0.05$, LSD).

Insecticide plots were treated on 13 Jul and 4 Aug.
[a]Number of exit holes reflect moth emergence. [b]+ Latron CS-7 at 0.25% vol/vol.

ASSESSMENT OF VARIETAL RESISTANCE TO THE SUGARCANE BORER

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Sugarcane resistance to the sugarcane borer, *Diatraea saccharalis*, (SCB) is categorized as a combination of physical characteristics that hinder boring (i.e., rind hardness, leaf-sheath appression), cultivar specific tolerance to boring, and antibiosis mechanisms that contribute to differences in survival of bored in larvae. The extent of this resistance is also influenced by the severity of infestations. Heavy borer pressure results in more bored internodes even in cultivars considered highly resistant. Several factors contribute to seasonal areawide SCB infestation levels such as weather conditions, predator and parasite numbers, and indigenous borer populations. Expansive acreage of cultivars with elevated moth production increases endemic SCB populations and imposes additional pressure on the remaining resistant varieties. For this reason, we also report moth production for each cultivar in these tests.

Test plots for assessing SCB varietal resistance in the 1997 HoCP and 1998 L series cultivars and three commercial varieties were planted September 22, 1999, at Glendale Plantation, Killona, La. A randomized block design replicated four times was used with each block containing two plots of the commercial cultivars CP70-321, HoCP85-845, and LCP85-384 and one plot for each block of the HoCP-97 and L-98 cultivars. No chemical controls for SCB were applied in the test and natural control from fire ants was suppressed by applying granular Lorsban in late June. A 15-stalk sample was cut from each plot on October 12, 2000 (four replications = 60 stalks per each of HoCP-97 and L-97 cultivar and 120 stalks per commercial cultivar). Sample stalks were examined to determine the number of bored internodes, moth emergence holes, and the total number of internodes.

Cultivars HoCP97-609 and L98-209 had the most bored internodes (10.47% and 12.65%, respectively). LCP85-384 had the highest moth production with 23,426 moths per acre produced, and is seven to eight times higher than HoCP85-845 and L98-207 ($P \leq 0.05$, LSD). Commercial cultivar LCP85-384 also had a higher level of bored internodes at 9.69%. HoCP85-845 had the lowest bored internodes (3.59%), followed by CP70-321, and L98-207 at 4.18%, and 6.01%, respectively.

Host plant resistance to target pest insects remains an important component of the sugarcane IPM system, providing growers with a proven methodology for minimizing the economic impact of the sugarcane borer. Resistant varieties reduce pest damage at little or no cost to the grower. Our research now provides additional assessment criteria for selecting resistant cultivars. Incorporating the cultivar’s pest survival rating better allows us to flag varieties that will enhance SCB populations in an area. Quantifying the impact of adult SCB emergence involves little additional data collection and enhances the efficiency and value of the entomological component in sugarcane breeding and varietal development at the LSU Agricultural Center.

Table 1. Sugarcane borer damage and moth production on 1997 HoCP series, 1998 L series cultivars, and three commercial varieties during 2000, Glendale Plantation, Killona, La. Test was planted September 22, 1999, and samples cut October 12, 2000.

Variety	% Bored Internodes	Stalks/Acre*	Moths/Acre Production
HoCP85-845	3.59d	30,799	3,337b
CP70-321	4.18d	33,493	5,582ab
L98-207	6.01cd	57,934	3,862b
HoCP97-606	6.52bcd	42,754	11,401ab
LCP85-384	9.69abcd	46,851	23,426a
HoCP97-609	10.47abc	40,561	19,605ab
L98-209	12.65ab	49,163	10,652ab

Means followed by the same letter are not significantly different ($P \leq 0.05$, LSD).
* Based on stand counts provided by Dr. Kenneth Gravois, Sugar Research Station.

Acknowledgment: The sugarcane entomology program would like to express appreciation for help from other members of the sugarcane variety development and breeding program for their assistance in cutting the seed-cane, planting, and harvesting the plots.

EFFECTS ON NON-TARGET ARTHROPODS FOLLOWING INSECTICIDAL WIREWORM CONTROL IN SUGARCANE

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Granular insecticides were spread with a tractor-mounted Gandy applicator in open sugarcane (*Saccharum* spp. (Interspecific hybrid) 'LCP 85-384') furrow at planting of a 32-acre field of Vanderlick Farms near Lecompte, La., November 16, 1999, to evaluate effect of wireworm insecticides on non-target arthropods. Treatments assigned to 1.6 acre plots in an RCB design with five replications were Aztec 2.1G, Mocap 20G, Thimet 20G, and an untreated check. Particular attention was given to constructing drains and water furrows so that pesticide-treated soil would not drain into adjacent plots. Three pitfall traps (pint jars filled with 150 ml of 70% ethylene glycol in water) were embedded 10 m apart on the center of the middle three rows of each plot and covered by a 22 cm diam metal disc supported on a tripod 3 cm above the jar and soil surface. Non-target arthropods [Araneida (Spiders), Gryllidae (Crickets), Formicidae (Ants, *Solenopsis invicta* Buren)] were collected in pitfall traps during sampling periods for early (Mar 3-15), middle (Jun 23-Jul 5, and Jul 5-25) and late (Aug 8-30) season.

The ant collection early season showed a 25% suppression in Aztec plots ($P \leq 0.05$, LSD). Mid-season spiders were suppressed approximately 30%, and crickets 50-60% in all insecticide treatments ($P \leq 0.05$, LSD). *S. invicta* was significantly reduced 30-50% in Mocap and Aztec treatments, with a trend for a 30% reduction in Thimet plots mid-season [Table 1]. In this experiment differences were not detected with late season sampling of arthropods, among any other arthropods throughout this study, or in yield of sugarcane.

Table 1. Pitfall trap collection of non-target arthropods following insecticidal wireworm control in sugarcane, Lecompte, La., 2000.

	Non-Target Arthropods								
Treatment/	*Solenopsis invicta*			Spiders			Crickets		
Formulation	Early	Mid	Late	Early	Mid	Late	Early	Mid	Late
Thimet 20G	35.2a	67.1ab	94.2	10.4	20.0b	18.8	3.6ab	18.3b	65.6
Mocap 20G	24.8ab	62.1b	110.6	10.6	17.7b	15.6	2.0b	18.0b	75.0
Aztec 2.1G	22.8b	48.3b	94.6	11.2	17.3b	12.8	4.4a	13.8b	84.6
Untreated	30.2ab	92.7a	98.6	12.2	25.0a	15.4	3.2ab	34.8a	70.2

Mean number per three traps per two-week sampling period (comparatively adjusted for sampling interval).
Each insecticide applied at 9.0 lb formulated material per acre.
Means followed by same letter in a column are not significantly different ($P \leq 0.05$, LSD).

ASSESSING THE THREAT OF THE MEXICAN RICE BORER TO SUGARCANE AND RICE IN THE UPPER TEXAS RICE BELT AND WESTERN LOUISIANA

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As a followup to pheromone trap sampling for the Mexican Rice Borer (MRB), *Eoreuma loftini* (Dyar) (Lepidoptera: Crambidae), adjacent to sugarcane fields in Southeast Texas and Southwest Louisiana in 1999, cooperative studies between Texas A&M and the LSU AgCenter were undertaken in the summer and fall of 2000 to define the insect's present range. Using twice weekly monitoring of pheromone traps in 12 Texas counties and seven Louisiana parishes, newly discovered MRB locations were in Brazoria, Colorado, Fort Bend, Waller, and Wharton counties in Texas. (See Figure 1 for relative locations). The insect still is not known to occur in Louisiana, but now appears in relatively high populations within 50 - 60 miles of the new sugarcane production area near Beaumont, TX (See Table 1). In addition to pheromone trap assessment, larval infestations in rice and other grasses have been discovered in many of the newly invaded areas.

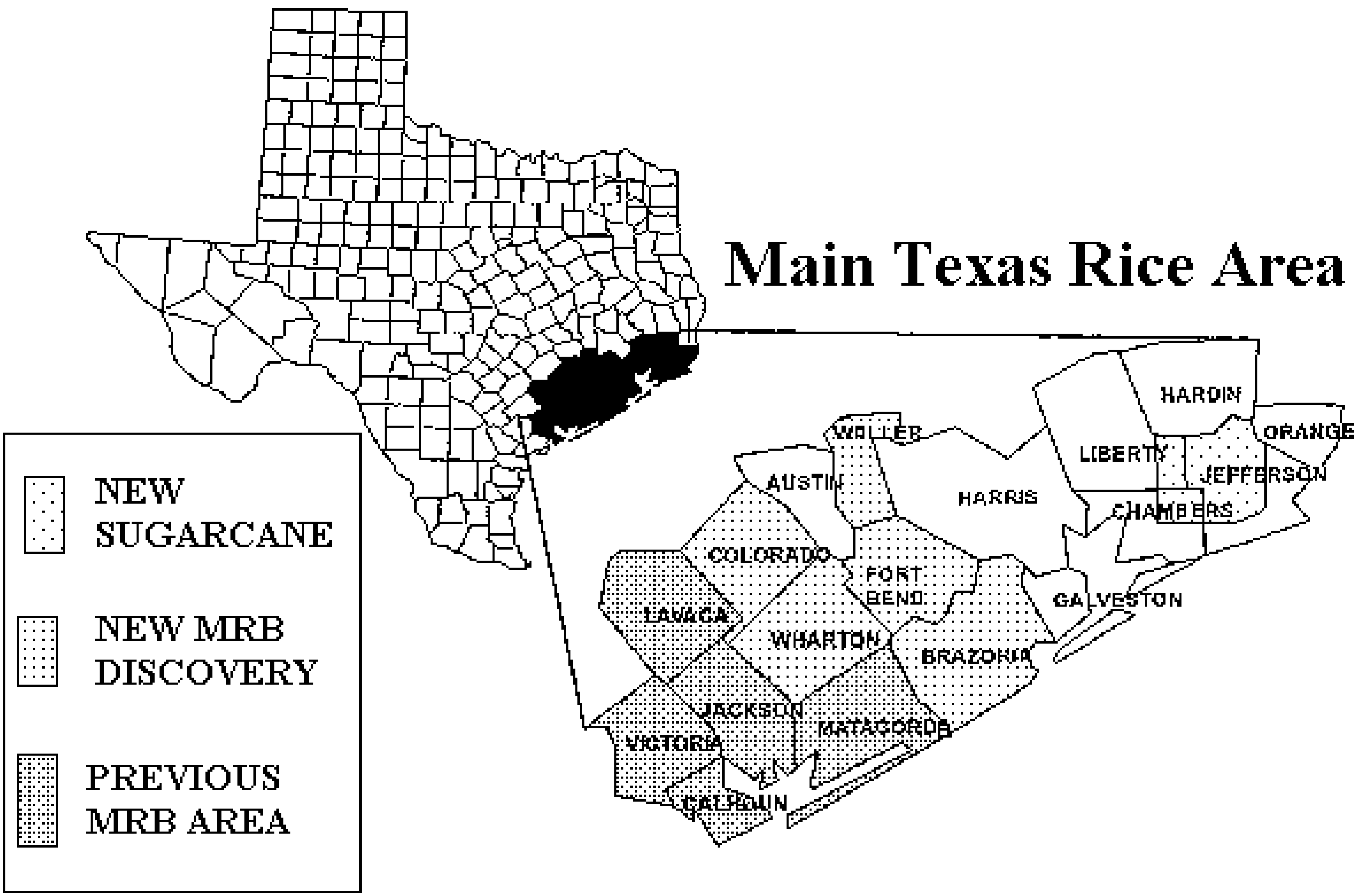
Management studies involving varietal resistance and insecticide control were also assessed with cooperators in the USDA, LSU AgCenter, and Texas A&M Systems, as well as with chemical industry colleagues, and the Rio Grande Valley Sugar Growers Association. The most promising MRB pesticidal controls in sugarcane, though inadequate compared to the sugarcane borer standards, were cyfluthrin (Baythroid$^{(R)}$) and the ecdysone agonist tebufenozide (Confirm$^{(R)}$). Replicated variety assessment to determine relative MRB resistance of rice and sugarcane has shown at least 4.5-fold differences in susceptibility among selected commercially available varieties. MRB has proved to be a very severe pest of sugarcane in South Texas and Mexico, and would be an especially serious problem to Louisiana growers under drought conditions similar to those experienced in recent years. Agricultural Extension agents together with the Texas and Louisiana departments of agriculture personnel have additionally assisted in these monitoring studies.

Table 1. Pheromone Trap Collections of Mexican Rice Borer (*Eoreuma loftini*) Moths in Southeast Texas, 2000[1]

Texas Counties	May	June	July	August	September	October	November
NEW DISCOVERY							
Brazoria	6	39	23	31	6	--	6
Colorado	75	192	203	305	432	712	113
Fort Bend	56	210	85	135	43	--	--
Waller	0	4	10	16	18	23	9
Wharton	109	228	232	325	393	638	132
PREVIOUSLY KNOWN COUNTIES							
Calhoun	--	--	110	307	385	560	107
Jackson	263	350	275	276	98	102	34
Matagorda	846	832	462	1175	1096	435	--
NO MRB COLLECTED							
Chambers	0	0	0	0	0	0	0
Jefferson	0	0	0	0	0	0	0
Liberty	0	0	0	0	0	0	0
Orange	0	0	0	0	0	0	0

[1]Number of moths per two traps per month. Moths were removed from traps twice weekly; pheromone lures and insecticide strips replaced monthly.

Figure 1. Map of Mexican Rice Borer Pheromone Trapping in the Main Texas Rice Area (Southeast Texas), 2000.



PATHOLOGY RESEARCH

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RATOON STUNTING DISEASE TESTING

A fourth year of testing for ratoon stunting disease (RSD) was conducted during 2000 as part of the Sugarcane Disease Detection Lab operations. RSD was monitored in commercial fields on farms, in the Sugarcane Variety Selection and Release Programs, at all levels of Kleentek® seedcane production, and in the local quarantine that provides healthy plant material for tissue culture of Kleentek seedcane (Table 1). A large-scale, statewide survey was conducted, and 535 commercial fields were sampled on 123 farms. The results indicate that RSD incidence and therefore impact was low in 2000 (Table 2). The results of the large-scale survey were similar to the results from the two previous years, so RSD stalk infection levels within fields have been 3% or less for three years of testing. From 1997 to 2000, RSD stalk infection levels within fields decreased from 12 to 2%, and the proportion of fields with RSD decreased from 52 to 14%. The reduction of RSD represents a major positive development for the Louisiana sugarcane industry. One survey statistic, percentage of farms with RSD in at least one tested field, indicated the need to continue efforts to reduce RSD in the industry. RSD was detected on 83% of farms tested during 1997. This decreased to 35% by 2000, indicating substantial progress, but this infection level indicates that RSD is still present in the industry.

Factors associated with decreased RSD infection levels are increased cultivation of LCP 85-384, a variety with some resistance to spread of RSD, and use of tissue cultured seedcane. The area under cultivation with LCP 85-384 increased from 29 to 68% between 1997 and 2000. Stalk infection and field infection levels in tested fields of LCP 85-384 were 0.4% and 7%, respectively, during 2000. Kleentek progeny was grown in 55% of tested fields during 2000. The RSD stalk infection level within Kleentek progeny fields was 1% or less, and the field infection level averaged 6% for the last three years (Table 3). One negative note detected by the survey was that, during 2000, one-third of the tested fields were not progeny of a healthy seedcane program.

Variability among varieties in the resistance to spread and increase of RSD was detected in previous field experiments. The survey results demonstrate that this type of resistance can affect the occurrence of RSD. For the varieties LCP 82-89, CP 70-321, and LCP 85-384, which have high, moderate, and low rates of RSD spread, respectively, the average stalk infection levels within fields were 20, 10, and 0.4%, and the average field infection levels were 75, 41, and 7%, respectively. Test results from 2000 suggest that HoCP 91-555, the most recently released variety, has a high rate of disease spread, as well as high potential for yield loss when infected, so this variety needs to be carefully monitored for RSD. Research will continue to evaluate resistance to RSD spread. Experiments were planted to compare rates of spread caused by combine and whole stalk harvesting in the new varieties.

The Kleentek seedcane production system was monitored for RSD at four stages: initial plant material to be used to start Foundation stock plants for tissue culture, established Foundation stock plants, primary increase farms, and secondary increase farms (Table 1). No RSD was detected at any stage of Kleentek seedcane production.

In Louisiana, on-farm healthy seedcane programs using Kleentek seedcane produced through tissue culture and the growth of a variety with resistance to RSD spread have brought about a high degree of control of what has long been the most damaging disease of sugarcane. This has been accomplished through a partnership of farmers, the LSU AgCenter, a state regulatory agency, and a private company. On-going research and farmer participation in healthy seedcane programs and RSD testing will be needed to prevent RSD from becoming re-established in the sugarcane industry.

PATHOGEN ASSAYS, LOCAL QUARANTINE, AND SUGARCANE YELLOW LEAF

The tissue-blot immunoassay was used for RSD testing during 2000. Tissue-blot immunoassays also were adapted for detection of leaf scald and a new virus disease, sugarcane yellow leaf. These methods were used to test promising experimental varieties from the Louisiana Cooperative Sugarcane Breeding Program for RSD, leaf scald, and yellow leaf, then stalks were heat-treated and plants were grown in a local quarantine greenhouse to provide plant material to initiate Foundation stock plants for tissue culture production of Kleentek seedcane. Plants growing in the local quarantine greenhouse were observed for disease symptoms, re-tested for RSD, leaf scald, and yellow leaf, and heat-treated again before release to Kleentek. Seven clones were delivered from quarantine, and eight clones were started in quarantine during 2000.

The tissue-blot assay using leaf mid-ribs for detection of sugarcane yellow leaf virus (SCYLV) was adapted for use in Louisiana. A total of 6,514 samples were run through the lab. The mid-rib blot was used to test Kleentek seedcane sources for the virus. Infection was detected in some Kleentek seedcane fields, and cane was not sold to growers from these fields. Stalks were collected from one field and used to plant a field experiment to determine the effect of SCYLV infection on yield of LCP 85-384.

SELECTION OF DISEASE-RESISTANT VARIETIES

Leaf scald symptoms resulting from inoculation by the decapitation method were mild during 2000. The highly susceptible former commercial variety, CP 74-383, was rated as moderately susceptible. Evaluation of the resistance levels in the experimental varieties rated four of 35 clones (11%) as moderately susceptible (Table 4). Natural mosaic infection levels in outfield yield trials were low during 2000. Only six of 10 experimental varieties exhibited any mosaic symptoms, and all had infection levels of 1% or less (Table 5). In the smut inoculated test, 21 (60%), 11 (31%), and three (9%) of 35 experimental varieties were found to be resistant, moderately susceptible, and highly susceptible, respectively, to smut (Table 6).

Table 1. RSD testing summary for 2000.

Source	Location	No. of fields	No. of varieties	No. of stalks
La Growers	Statewide	535	11	10,525
LSU AgCenter	St. Gabriel/Iberia		17	221
Variety Release Program	Primary and secondary stations		12	715
Kleentek	Foundation Stock		1	8
Kleentek	Primary increase	17	5	417
Kleentek	Secondary increase	14	5	408
Local Quarantine	LSU AgCenter		12	54
Research	LSU AgCenter		4	80
Totals		566		12,428

Table 2. RSD infection levels for fields and within fields by crop cycle year over four years of testing.

	Average percentage of infected stalks within fields				Average percentage of fields with RSD			
Crop year	1997	1998	1999	2000	1997	1998	1999	2000
Plantcane	9	2	0	2	42	12	0	8
1st stubble	10	3	0	2	50	19	0	14
2nd stubble	21	1	6	5	55	13	13	17
Older	13	18	0	3	73	33	0	22
Unknown	10	0.4	0	-	100	10	0	-
Total	12	3	2	2	52	15	3	14

Table 3. RSD infection levels for fields and within fields by healthy seedcane program over four years of testing.

	Average percentage of infected stalks within fields				Average percentage of fields with RSD			
Program	1997	1998	1999	2000	1997	1998	1999	2000
Heat treated	24	4	0	2	70	32	0	13
Kleentek®	12	1	0	1	52	10	0	10
Cleenseed®	-	0	0	2	-	0	0	6
Other	9	7	12	6	44	24	25	23
Total	12	3	2	2	51	15	3	14

Table 4. Experimental variety evaluation for leaf scald resistance in an inoculated test.

Variety	Rating[a]	Variety	Rating[a]	Variety	Rating[a]
CP 65-357	4.5	HoCP 96-503	3.9	HoCP 97-665	3.2
CP 70-321	4.7	HoCP 96-509	4.2	L 98-158	2.9
CP 73-351	3.8	HoCP 96-540	3.1	L 98-165	3.0
CP 74-383	5.0	HoCP 96-561	3.1	L 98-168	2.8
TucCP 77-42	2.2	L 97-102	3.5	L 98-173	3.0
CP 81-335	2.4	L 97-128	3.0	L 98-174	2.8
LCP 85-384	3.7	L 97-137	3.8	L 98-181	4.1
HoCP 85-845	2.5	HoCP 97-606	3.4	L 98-183	3.0
HoCP 91-555	2.8	HoCP 97-609	2.8	L 98-186	2.8
L 95-462	3.3	HoCP 97-621	2.8	L 98-192	2.7
L 95-485	3.3	HoCP 97-628	4.0	L 98-197	2.9
Ho 95-988	2.0	HoCP 97-629	3.4	L 98-198	2.8
L 96-26	5.3	HoCP 97-641	2.5	L 98-207	2.6
L 96-40	3.2	HoCP 97-645	3.9	L 98-209	2.5
L 96-92	2.8	HoCP 97-646	3.3		

[a] Resistance ratings assigned on a 1-9 scale in which 1-3 = resistant, 4-6 = moderately susceptible, and 7-9 = highly susceptible.

Table 5. Sugarcane mosaic natural infection levels in yield trials on farms (outfield tests).

Variety	Infection (%)	Rating[a]	Variety	Infection (%)	Rating[a]
CP 70-321	0.53	2	Ho 95-988	0.02	2
CP 70-321 KT[b]	0.00	1	L 96-26	0.16	2
LCP 85-384	0.02	2	L 96-40	0.00	1
LCP 85-384 KT	0.00	1	L 96-92	0.00	1
HoCP 85-845	0.16	2	HoCP 96-503	1.16	2
HoCP 85-845 KT	0.00	1	HoCP 96-509	0.25	2
HoCP 91-555	0.00	1	HoCP 96-540	0.00	1
L 95-462	0.07	2	HoCP 96-561	0.01	2
L 95-485	0.00	1			

[a] Resistance ratings assigned on a scale of 1-9 in which 1-3 = resistant, 4-6 = moderately susceptible, and 7-9 = highly susceptible.
[b] KT = plants produced from Kleentek® seedcane.

Table 6. Smut infection level and resistance ratings for experimental varieties determined from an inoculated test.

Variety	Infection (%)	Rating[a]	Variety	Infection (%)	Rating[a]	Variety	Infection (%)	Rating[a]
CP 65- 357	54	9	L 96-92	0	1	HoCP 97-646	1	2
CP 70-321	2	2	HoCP 96-503	0	1	HoCP 97-665	34	6
CP 73-351	71	9	HoCP 96-509	0	1	L 98-158	1	2
CP 74-383	25	5	HoCP 96-540	4	2	L 98-165	54	8
TucCP 77-042	4	3	HoCP 96-561	6	3	L 98-168	14	4
CP 80-004	81	9	L 97-102	0	1	L 98-173	6	3
CP 81-335	51	8	L 97-128	20	5	L 98-174	69	9
LCP 85-384	12	4	L 97-137	1	2	L 98-181	27	6
HoCP 85-845	1	2	HoCP 97-606	21	5	L 98-183	8	3
HoCP 91-555	0	1	HoCP 97-609	2	2	L 98-186	40	7
L 95-462	0	1	HoCP 97-621	7	3	L 98-192	1	2
L 95-485	0	1	HoCP 97-628	1	2	L 98-197	7	3
Ho 95-988	9	4	HoCP 97-629	8	4	L 98-198	14	4
L 96-26	22	5	HoCP 97-641	0	1	L 98-207	1	2
L 96-40	10	4	HoCP 97-645	32	6	L 98-209	4	3

[a] Resistance ratings assigned on a 1-9 scale in which 1-3 = resistant, 4-6 = moderately susceptible, and 7-9 = highly susceptible.

WEED CONTROL RESEARCH IN SUGARCANE

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For the 2000 growing season, research was conducted at the St. Gabriel Research Station and Ben Hur Research Farm and at off-station sites in East Baton Rouge, Ascension, St. James, and St. Martin parishes. Research primarily concentrated on evaluation of herbicides after planting, in the spring, at layby, after layby over the top of cane, and in fallowed fields. This report summarizes research conducted in 2000.

Milestone (DuPont). Research continues to show that this herbicide has a place in Louisiana sugarcane production. Milestone applied preemergence controls seedling johnsongrass, itchgrass (Raoulgrass), and morningglories (tie vines) and has good soil residual activity. HOCP 85-845 was more sensitive to Milestone when applied in March and April than was LCP 85-384 or LCP 82-89. Since foliar uptake of Milestone can be significant, this response was probably due to the presence of more plant foliage of 845 in the spring when compared with the other varieties. Our research continues to show excellent winter weed control and good crop tolerance when Milestone is applied after planting or in February in combination with Gramoxone Extra or 2,4-D. Even though cane injury can be significant, yield reductions have not been observed even when Milestone was applied after planting, in the spring, and at layby. The label for Milestone is pending at this time.

Command (FMC). Command received a section 18 (emergency use exemption) for use after planting in 2000 and full registration is pending. This herbicide, when in combination with Direx/Karmex (diuron), provides bermudagrass suppression and in some cases control. Whitening or bleaching of cane is evident if applied to foliage, but crop yield reduction has not been observed. The mixture is ineffective if bermudagrass is emerged when application is made. Using the rates that will be labeled in Louisiana, itchgrass control has been somewhat inconsistent and lower in some cases than control obtained with Prowl and Milestone.

Valor (Valent U.S.A.). Full registration of Valor is pending. This herbicide can be used both preemergence and postemergence and cane has good tolerance. As an after planting application, Valor has controlled a variety of winter annual weeds including ryegrass. Its strength as a spring or layby application is broadleaf weeds in particular morningglories, but does not control annual grasses. Valor also has excellent postemergence activity on morningglories.

CGA 362622 (Syngenta formerly Novartis Crop Protection). This herbicide has only postemergence activity and is very good on morningglories. Preliminary results show that control of johnsongrass and itchgrass may be as good or better than Asulox/Asulam. The herbicide is in the registration process. CGA 362622 may serve as an "as needed" postemergence treatment for control of broadleafs and grasses, particularly where johnsongrass and itchgrass are problems.

Spartan/Authority (FMC). This herbicide received a section 18 (emergency use exemption) for use at layby in 2000, but for all practical purposes, availability was too late for use by most producers. This herbicide provides excellent and consistent morningglory control, especially the red-flowered ones. Spartan applied later in the season after layby as a directed treatment has provided very good postemergence and residual activity. The weakness of this herbicide is on grasses and will need to be applied in combination with a grass herbicide in most cases. Full registration is pending.

Velpar (DuPont). This herbicide is currently labeled in cane, but is not widely used in part because of concerns of crop injury. A premix blend containing the active ingredients of Velpar and Karmex in a 4:1 ratio (referred to as Velpar K4) was evaluated. Velpar at 0.5 lb ai/A plus Karmex at 2.0 lb/A provided weed control as good or better than either herbicide applied alone. This rate of Velpar is around a third of the rate that reportedly has injured cane in Louisiana in past years. Results indicate that when applied in fallowed fields, weed control to include itchgrass and seedling johnsongrass along with broadleaf weeds is excellent and the herbicides are not as sensitive as Prowl in respect to need for rainfall shortly after application. No significant injury has been observed when cane was planted following a fallow application or when the mixture was applied immediately after planting and before cane emergence. Indications are that the mixture will also have a place in spring applications over emerged cane and possibly at layby, depending on label restrictions.

Sahara and Arsenal (BASF formerly American Cyanamid). There has not been a definite decision to proceed with registration of these herbicides in cane. If this is pursued, growers can expect to use Sahara (a premix of imazapyr, the active ingredient in Arsenal and diuron, the active ingredient in Karmex/Direx in a 1:8 ratio). As with Command and Velpar, the addition of diuron seems to enhance the activity of the mixture. The premix preemergence controls rhizome johnsongrass and itchgrass, most broadleaf weeds, and provides suppression of bermudagrass. It has looked especially impressive in fallowed fields where a single application has provided control throughout the summer period. Activity is reduced when applied postemergence. Cane has shown excellent tolerance to Sahara when applied as a fallow treatment or after planting, but postemergence application can severely injure cane.

Starane (Dow AgroSciences). This herbicide contains the active ingredient fluroxypyr and currently is labeled for use in fallowed cropland, but not in cane. Starane can be applied in the same manner as 2,4-D with the same weed spectrum i.e. broadleaf weeds, but Starane is not volatile. Starane has shown excellent activity on red morningglories. Its use potential in the industry will depend on acceptance by aerial applicators.

2,4-D Application to Seed Cane. This research involves application of 2,4-D (Weedar 64) at 1.5 qt/A to LCP 85-384 7, 5, 3, and 1 week before planting. Cane was harvested and used for planting both as whole stalks and billets. Plots planted to billets emerged very rapidly and uniformly. Whole stalk plantings emerged much slower and stands were more variable when compared with billets. No distinct differences among the 2,4-D timing treatments in shoot population for either the billet or whole stalk plantings were observed when compared with the respective nontreated controls. This experiment will be continued into the spring to monitor any adverse effects on cane emergence and development. Based on past research with older varieties, it appears that LCP 85-384 may be less sensitive to timing of 2,4-D application.

Evaluation of Drift Reducing Spray Nozzles. Various nozzles to include Greenleaf TurboDrop, AI, Teejet, DG Teejet, and Turbo Teejet were evaluated for weed control when used at the manufacturers recommended spray pressures and spray volumes. Weed control with Roundup Ultra using the various nozzles was comparable to standard flat fan nozzles. These specialized nozzles should be considered when applying herbicides to fallowed fields and for spring applications, especially when herbicides are banded under windy conditions. Control failures with herbicides in the spring under windy conditions are often related to reduced herbicide contact with the target area.

Herbicide Effects on Soil-Borne Pathogens. This is a cooperative research effort with Dr. Jeff Hoy to provide some understanding of why LCP85-384 plant cane treated after planting with Milestone has looked more vigorous in the spring than when treated with other herbicides. This response could be that Milestone as well as other herbicides with the same mode of action may have fungicidal activity. This research is ongoing, and no definitive conclusions have been made.

BILLET PLANTING RESEARCH

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Departments of Plant Pathology[1] and Agronomy[2]

YieldYield results were obtained from field experiments on commercial farmsYield results were obtaine
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ResearchResearch Station, and an experiment was conducted to evaluate the effect of different chopper
harvester settings on physical billet damage. All experiments were conducted with LCP 85-384.

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billet damage, but the secondary fan did not increase billet damage in this experiment.

AA chopper harvester was available during the plantingA chopper harvester was available during the plan
forfor the firfor the first time during 2000. This allowed experiments to be planted examining the effect of
plantingplanting dplanting date and rate, factors that were difficult to incorporate into experiments on comme

farms.farms. In addition, another experiment evaluatingthe effectsfarms. In addition, another experiment evaluating plplantingplanting peplanting perfomance was planted. Finally, plantcane experiments were established on two during fall 2000.

ThereThere There coThere continues to be intense interest in billet planting within the Louisiana sug industry.industry. Spring shoot populations in billet plantings this season are adequateindustry. Spring shoot popula ofof multof multipof multiple freezes during the 2000-2001 winter. In research conducted over six growing seas usingusing machine-cutusing machine-cut billets, stand failures have not been observed whenusing machine-cut b werewere planted atwere planted at higher planting rates. Factors associated withwere planted at higher planting ra billetbillet length, excessive physical billet damage, light planting rate, improper billet length, excessive physic drainage,drainage, and herbicide injury. The addition of fertilizer at planting has improved yields in some,drainage, notnot all, experiments.not all, experiments. No chemical treatment to prevent stalk rot has been identified that con improves billet performance.

InIn most experiments, the yield ofIn most experiments, the yield of wholeIn most experiments, the yield o crop.crop. However, the yield of whole stalk and billet plantings have been comparable over the entire cropcrop cycle. Most of thecrop cycle. Most of the experiments have nowcrop cycle. Most of the experiments have withwith CP 70-321 showed itwith CP 70-321 showed it to be erratic in billet planting performance. Aswith CP 70-3 theirtheir ability to tolerate billet planting will need to be evaluated.their ability to tolerate billet planting will need highesthighest yields over time will be obtained with whole stalk planting. However, when cane is badly lodgedlodged,lodged, it malodged, it may be necessary to plant billets. Billets are more sensitive to any prob plantingplanting praplanting practices planting practices are very important when planting billets. Using th minimize problems should provide yields comparable to whole stalk planting.

TableTableLICPLCP 85-384 yields from anLCP 85-384 yields from an experiment in Lafourche ParishLCP 85-38
stalkstalk plantingstalk planting of LCP 85-384 with and without two rates ofstalk planting of LCP 85-3

		Tons of cane per acre			Sugar per acre (lbs.)		
Planting	Fertilizer	1998	1999	2000	1998	1999	2000
Billet	None	44.1	57.7	46.3	9487	13285	9694
Billet	45-45-45	53.0	56.4	45.5	11204	13055	9480
Billet	90-90-90	51.6	55.1	43.1	11391	12645	8920
Whole	None	46.3	54.8	44.6	10068	12692	9428
Whole	45-45-45	56.0	56.9	45.1	12719	13194	9585
Whole	90-90-90	54.0	56.7	41.7	11893	13380	8596

TableTable 2Yields of LCP 85-384 from an experiment inYields of LCP 85-384 from an experiment in Iberia ParishY billets,billets, and short billetsbillets, and short billets treated with Tilt, Thimet, anbillets, and short bil Tilt plus antitranspirant.[1]

Treatment	Tons of cane per acre[2]		Sugar per acre (lbs.)[2]	
	1999	2000	1999	2000
Whole stalk	42.5 ab	35.8 a	9712 ab	6991 a
Long billet	44.3 a	30.0 b	10095 a	6115 ab
Short billet	44.0 a	33.2 ab	10299 a	6570 ab
Short billet + Tilt	40.6 ab	31.4 b	9362 ab	6462 ab
Short billet + Thimet	38.0 b	30.8 b	8778 b	6100 ab
Short billet + Antitranspirant	40.9 ab	29.6 b	9480 ab	5787 b
Short billet + Tilt + Antitranspirant	37.3 b	32.9 ab	8475 b	6801 a

[1] Tilt (Syngenta, Inc.) is propiconazole fungicide; Thimet (American Cyanamid, Inc.) isTilt (Syngenta, Inc.) is pr soilsoil appliedsoil applied insecticide; and the antitranspirant was Transfilm (PBI/Gordon, Inc.). Valuessoil appl column followed by the same letter were not significantly different (P = 0.05).

Table 3. PlantcanePlantcane yieldPlantcane yields of LCP 85-384 from anPlantcane yields of LCP 85-384 plantingsplantings of billets and whole stalks with and without fertilizer (15-45plantings of billets a planting.

Treatment	Tons of cane per acre[1]	Sugar per acre (lbs.)[1]
Billet	41.5 ab	8013 ab
Billet + Fertilizer	38.0 b	7391 b
Whole stalk	38.4 b	7160 b
Whole stalk + Fertilizer	45.4 a	8543 a

[1] Values within a column followed by the same letter were not significantly different (P = 0.05).

Table 4. PlantcanePlantcane yields of LCP 85-384Plantcane yields of LCP 85-384 from an experiment at comparingcomparing plantings of whole stalks and two rates of billets with and without starter fertilizer.

Planting	Fertilizer	Cane yield	Stalk Number	Stalk Weight	Juice Brix	Juice Sucrose	Sugar yield
		tons/A	1000/A	lbs.	%	%	lbs./A
1xBillet	0-0-0	40.7	46.7	1.74	16.6	14.4	8406
2xBillet	0-0-0	40.3	47.5	1.76	16.8	14.6	8655
Whole	0-0-0	44.4	45.2	1.97	16.6	14.4	9164
1xBillet	45-45-45	43.7	47.1	1.91	16.5	14.2	8880
2xBillet	45-45-45	42.9	45.7	1.97	16.5	14.2	8715
Whole	45-45-45	50.6	46.3	2.23	16.6	14.0	10104
LSD 0.05		2.6	NS	0.33	NS	NS	1004
		Mean Effects					
1xBillet		42.2	46.9	1.83	16.4	14.3	8643
2xBillet		42.1	46.6	1.87	16.6	14.4	8685
Whole		47.5	45.8	2.10	16.4	14.2	9634
LSD 0.05		1.8	NS	0.23	NS	NS	710
	0-0-0	42.1	46.5	1.82	16.7	14.5	8741
	45-45-45	45.8	46.4	2.04	16.4	14.1	9233
LSD 0.05		1.5	NS	0.19	NS	NS	NS

Table 5. Plantcane yield of LCP 85-384 planted with billets at three rates at the Sugar Research Station.

Planting rate	Cane yield	Stalk Number	Stalk Weight	Juice Brix	Juice Sucrose	Sugar yield
	tons/A	1000/A	lbs.	%	%	lbs./A
3	44.2	46.6	1.81	16.4	14.0	8837
5	44.4	49.2	1.81	15.9	13.5	8434
7	46.5	55.1	1.81	16.9	14.7	9796
9	48.6	54.7	1.99	17.0	14.7	10343
LSD 0.05	NS	4.9	NS	NS	NS	NS

Table 6. Effect of different chopper harvester settings on physical damage to sugarcane billets.

Harvester settings	Damaged buds/billet	Total wounds	Undamaged billets (%)
Seed choppers[1], primary fan only	0.32	1.1	42
Seed choppers, slow speed[2], primary only	0.26	1.6	34
Seed choppers, plus secondary fan	0.16	0.9	52
Seed choppers, primary only, leg wraps[3]	0.10	0.5	66
Seed choppers, primary, leg wraps, no kicker bars[4]	0.18	0.7	48
Seed choppers, primary, no kicker bars	0.24	1.2	34
Regular choppers/2 blades, primary fan only	0.34	1.5	30
Regular choppers/2 blades, slow speed, primary	0.36	2.4	20
Regular choppers/2 blades, plus secondary fan	0.38	1.8	32
LSD 0.05	0.21	0.6	-

[1] Billet choppers specially designed with only two blades for cutting longer billets (20-24 in.).
[2] Slow speed of harvester travel down the row (approx. 1 mph).
[3] Metal cylinders that bolt around base cutter shafts.
[4] Lateral bars on last drum to facilitate movement of billets into elevator hopper.

CULTURAL AND LAND MANAGEMENT PRACTICES RESEARCH
IN SUGARCANE IN 2000

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in cooperation with St. Gabriel Research Station

SUMMARY

TwelveTwelve field experiments were conducted in 2000 to test the effectsTwelve field experiments were landland management practices onland management practices on yield componentsland management practices o fromfrom the breeding program were included in the experiments. Results frfrom the breeding program w practicespractices showed that subsequent canepractices showed that subsequent cane yields after thepractices sh iinin September and highest from planting in early November. This year, however, plantcane yields either did not respond or had the opposite response.

ResultsResults from date-of-harvest experiments showedResults from date-of-harvest experiments showe increasedincreased when harvested in December instead of earincreased when harvested in December inste varietiesvarieties was also greater when havarieties was also greater when harvestvarieties was also greater when harv whenwhen the plant and first stwhen the plant and first stubble wwhen the plant and first stubble were ha increasedincreased 9.7% as a resultincreased 9.7% as a result of harvesting plantcane in early December and 5.2%in crop was harvested in early December. Cane yields also increased 12.4% and 9.2%, respectively.

PlantingPlanting rates of seed cane as billets or whole stalks produced more responsPlanting rates of see thanthan in subsequent stubble crothan in subsequent stubble crops.than in subsequent stubble crops. The use cane,cane, but the use of 4 running billeted stalks wascane, but the use of 4 running billeted stalks was equca varietyvariety LCP 85-384. Above normal temperatures and below normal rainfavariety LCP 85-384. Abo growinggrowing season may have contributed togrowing season may have contributed to lessgrowing season may expected. Variety and starter fertilizers did interact with residue management.

OBJECTIVES

ThisThis research is designed to provide information onThis research is designed to provide information on growersgrowers produce maximumgrowers produce maximum economic yields and thereby a more profitablegrow annual progress report is presented to provide the latest availableannual progress report is presented to provide th asas a final recommendation for growers toas a final recommendation for growers to use all of these practices. Rec several years of research data.

RESULTS AND DISCUSSION

TwelveTwelve field experiments were conducted in 2000 on the St. Gabriel Research Station to test thethe effects of various cultural and land management practices on thethe effects of various cultural and land ma sugarcane.sugarcane. The newer cane varieties releasedsugarcane. The newer cane varieties released from the bree andand USDA at Houma were inand USDA at Houma were incland USDA at Houma were included in the e practices.

Date of Planting

AnAn experiment whichAn experiment which was initiated to test the effects of planting dates on theAn ex ofof threeof three varieties was used to evaluate the residual effect of the same parameter on theof three varieties cropcrop (Table 1). The ecrop (Table 1). The earliest (crop (Table 1). The earliest (September 2) planting d lowerlower cane and sugar yields for all varieties. The variety Holower cane and sugar yields for all varieties. plantingplanting date withplanting date with a Nov. 1 plant date producing 25% more sugar and 26% moreplanting 2 plant date. The least sensitive2 plant date. The least sensitive variety was LCP 85-384, which had2 plant date sugarsugar and cane yields, respectively,sugar and cane yields, respectively, when cane was planted on Nov.sugar plantingplanting on subsequent stubble yields consistently indicated that later planting wplanting on subs contributingcontributing input for high yieldscontributing input for high yields (Tables 2, 3, 4). The response in T inin this experiment as it did the previousin this experiment as it did the previous year for plantcanein this experi toto evaluate plantcaneto evaluate plantcane yields this season showed higher yieldsto evaluate plantcane yields th (Oct. 13) planting (Table 5).

Type and Rate of Planting

Plantcane yields didPlantcane yields did respond to seed type and seeding rate, which, in turn, werePlantc byby starter fertilizer applications, date of planting, and variety. Sugar yieldsby starter fertilizer applications, date c almostalmost 21% more with the highest planting rate across seed type when planted on Aualmost 21% more w 5).5). Higher billet rates had a negative effect compared to a three-runni5). Higher billet rates had a negative e varietyvariety (Table 6), although the addition of 45-45-45 starter fertilizervariety (Table 6), although the addition c allall types and rateall types and rates. A billet rall types and rates. A billet rate study using billets obtaine difference in cane ordifference in cane or sugardifference in cane or sugar yield from three to nine running billets seedseed cane had less effectseed cane had less effect on subsequent stubble crops (Tablesseed cane had less effect yield of billet planting did increase almost 16% with a late (Nov. 1) planting date (Table 3).

Harvest Date on Subsequent Yields

ItIt is well established that later harvest of sugarcane often result in greater sugar yield. This occurredoccurred in 2000 (Table 8) and also indicated later harvoccurred in 2000 (Table 8) and also indicated varietiesvarieties because LCP 82-89 produced 18% morevarieties because LCP 82-89 produced 18% more suga inin Oct. Date ofin Oct. Date of harvest also can affect subsequent stubblein Oct. Date of harvest also can affec harvestingharvesting the plantcane crop Nov. 15 instead of Aug. 15 resulted in a 15% increase in sugar yield whenwhen the first stubble crop was hawhen the first stubble crop was harvested when the first stubble crop residualresidual effect of date of plantcaneresidual effect of date of plantcane harvest extends into the second stubb byby date of first stubble harvest and variety. An earlyby date of first stubble harvest and variety. An ea ameliorated to some extent by a late first stubble harvest for variety CP 70-321 (Table 10).

Residue Management/Stubble Protection

OnlyOnly HoCP 85-845 responded to management inputs related toOnly HoCP 85-845 responded to manage managementmanagement (Tablemanagement (Table 11). Compared to the check treatment,management (Table 11 canecane yield 19% when the harvest residuecane yield 19% when the harvest residue remained on the surface. C CPCP 70-321) were not significantly affected when the harvest residue remained.CP 70-321) were not significantl followedfollowed by covering the stubble with soil genfollowed by covering the stubble with soil generally in cover also tended to improve crop response to 45-45-45 starter fertilizer (Table 12).

Table 1. EffectEffect of daEffect of date of plantingEffect of date of planting on first stubble cane yield of three cane Research Station, 2000.

	Planting	First Stubble Cane - 2000					
		Cane	Stalk	Stalk	Normal Juice		Sugar
	1998	T/A	1000/A	lbs.	%	%	lbs/A
LCP 82-89	Sept. 2	35.3	34.2	2.07	17.7	14.5	7365
	Oct. 1	41.2	41.7	2.04	16.7	13.6	7941
	Nov. 1	42.0	39.9	2.26	17.1	14.1	8446
LCP 85-384	Sept. 2	40.4	40.8	2.15	17.4	15.0	8731
	Oct. 1	42.4	42.7	2.26	17.1	14.8	9014
	Nov. 1	43.2	46.3	2.08	17.8	15.3	9596
HoCP 85-845	Sept. 2	31.6	31.8	2.19	17.0	14.2	6400
	Oct. 1	38.5	31.8	2.62	17.1	14.4	7968
	Nov. 1	39.9	30.9	2.70	16.7	14.1	7988
LSD .05 Treatments		3.9	3.7	0.31	NS	1.2	924
		Mean Effect					
	Sept. 2	35.8	35.6	2.14	17.3	14.6	7499
	Oct. 1	40.7	38.7	2.31	17.0	14.3	8308
	Nov. 1	41.7	39.0	2.35	17.2	14.6	8677
LSD .05 Means		2.1	2.2	0.18	NS	NS	534

Planted with a 3-stalk rate on each date in 1998 and harvested as first stubble in 2000.

Table 2. EffectEffect of dateEffect of date of planting, seed size and starter fertilizer on theEffect of date of planting, see
85-845 on the St. Gabriel Research Station, 2000.

Planting Date	Seed Stalk Size	Starter Fert. N-P-K	Cane Yield	Stalk No.	Stalk Wt.	Normal Sucrose	Sugar Yield
			First Stubble Cane - 2000				
1998		lbs/A	T/A	1000/A	lbs.	%	lbs/A
Sept. 1	Whole	0-0-0	47.6	40.6	2.48	11.4	7353
	Whole	45-45-45	46.0	35.0	2.79	11.5	7148
	Billet	0-0-0	50.0	39.4	2.66	11.6	7947
	Billet	45-45-45	47.0	38.1	2.61	11.3	7233
Nov. 1	Whole	0-0-0	47.1	36.6	2.74	11.7	7538
	Whole	45-45-45	51.0	37.9	2.86	12.1	8570
	Billet	0-0-0	47.2	36.6	2.54	12.5	8179
	Billet	45-45-45	47.5	38.9	2.57	12.2	8010
LSD .05 Treatments			4.1	NS	NS	NS	979
			Mean Effect				
Sept. 1			47.6	38.3	2.64	11.5	7420
Nov. 1			48.2	37.5	2.68	12.1	8074
	Whole		47.9	37.5	2.72	11.7	7652
	Billets		47.9	38.3	2.60	11.9	7842
		0-0-0	48.0	38.3	2.61	11.8	7754
		45-45-45	47.9	37.5	2.71	11.8	7740
LSD .05 Date Means			NS	NS	NS	0.6	490
LSD .05 Seed Size Means			NS	NS	NS	NS	NS
LSD .05 Starter Fert. Means			NS	NS	NS	NS	NS

PlantedPlanted with each seed size on each datePlanted with each seed size on each date in 1998 and harvested as first stul
rate,rate, the whole stalks were cut by hand 18 inches long in the plantingrate, the whole stalks were cut by hand 18 inches l
inin the planting furrow in 1998 and normalin the planting furrow in 1998 and normal fertilizer practice was followed in t

TableTableEffectEffect of date of planting, seed size, and starterEffect of date of planting, seed size, and starter fertilizer on t
85-384 on the St. Gabriel Research Station, 2000.

Planting Date	Seed Stalk Size	Starter Fertilizer N-P-K	Second Stubble Cane - 2000 Cane Yield	Stalk No.	Stalk Wt.	Normal Sucrose	Sugar Yield
1997		lbs/A	T/A	1000/A	lbs.	%	lbs/A
Sept. 2	Whole	0-0-0	35.9	45.0	1.60	13.2	6675
	Billets	0-0-0	34.4	44.7	1.38	13.0	6300
	Billets	45-45-45	34.6	48.5	1.44	12.9	6257
Nov. 1	Whole	0-0-0	38.3	49.3	1.50	12.6	6740
	Billets	0-0-0	40.2	51.4	1.49	13.1	7408
	Billets	45-45-45	39.8	49.7	1.62	12.9	7237
LSD .05 Treatments			4.6	6.0	NS	NS	NS
			Mean Effect				
Sept. 2			34.9	46.1	1.47	13.1	6411
Nov. 1			39.4	50.1	1.54	12.9	7128
	Whole	0-0-0	37.1	47.2	1.55	12.9	6708
	Billets	0-0-0	37.3	48.1	1.44	13.1	6854
	Billets	45-45-45	37.2	49.1	1.53	12.9	6747
LSD .05 Date Means			2.6	3.5	NS	NS	677
LSD .05 Seed Size Means			NS	NS	NS	NS	NS

LCPLCP 85-384 was planted at a four-stalkLCP 85-384 was planted at a four-stalk rate on two dates in 1997 and the stalk
inches long. The starter fertilizer was applied in the planting furrow.

Table 4. EffectEffect of date and rate of planting on first stubble cane yield Effect of date and rate of planting on Gabriel Research Station, 2000.

Cane Variety	Planting Date	Rate Of Planting	First Stubble Cane - 2000 Cane Yield	Stalk No.	Stalk Wt.	Normal Sucrose	Sugar Yield
	1998	Stalks	T/A	1000/A	lbs.	%	lbs/A
LCP 82-89	Sept. 2	3	35.3	34.2	2.07	14.5	7365
		4	36.9	35.7	2.21	15.0	7976
		4-Billet	38.6	36.0	2.38	15.3	8599
		5	37.7	39.3	2.06	14.2	7674
	Oct. 1	3	41.2	41.7	2.04	13.6	7941
		4	39.5	42.0	2.33	14.2	8023
		4-Billet	41.7	41.7	2.29	13.9	8225
		5	38.9	40.5	2.05	13.8	7615
	Nov. 1	3	42.0	39.9	2.26	14.1	8446
		4	40.0	39.6	2.46	13.6	7763
		4-Billet	39.9	40.8	2.11	14.2	8083
		5	39.9	40.5	2.29	13.5	7638
LSD .05 Treatments			3.4	3.7	0.29	1.3	NS
			Mean Effect				
	Sept. 2		37.1	36.3	2.18	14.8	7904
	Oct. 1		40.3	41.5	2.18	13.9	7951
	Nov. 1		40.5	40.2	2.28	13.9	7983
		3	39.5	38.6	2.12	14.1	7918
		4	38.8	39.1	2.33	14.3	7921
		4-Billet	40.6	39.5	2.26	14.4	8302
		5	38.8	40.1	2.14	13.8	7642
LSD .05 Date Means			1.7	1.9	NS	0.7	NS
LSD .05 Rate Means			NS	NS	0.17	NS	NS

PlantedPlanted with each rate on each date in 1998 and harvested as firstPlanted with each rate on each date in 1998 and ha billet rate, the whole stalks were cut by hand 18 inches long in the planting furrow.

TableTable 5EffectEffect of date of planting, seed size and rate of planting on the yield ofplantcaneEffect of date of planting, s
on the St. Gabriel Research Station, 2000.

			Plantcane - 2000				
Cane Variety	Planting Date	Planting Rate	Cane Yield	Stalk No.	Stalk Wt.	Normal Sucrose	Sugar Yield
	1999		T/A	1000/A	lbs.	%	lbs/A
LCP 85-384	Aug. 16	3 Whole	37.4	38.9	2.12	15.1	8114
		4 Whole	41.8	40.6	2.28	15.1	9138
		4 Billet	33.2	38.3	2.03	14.9	7149
		5 Billet	42.0	41.4	2.25	15.3	9286
	Oct .13	3 Whole	35.6	36.3	2.56	14.1	7185
		4 Whole	37.1	36.8	2.56	14.3	7570
		4 Billet	38.6	38.0	2.24	14.2	7859
		5 Billet	38.0	36.8	2.30	14.4	7868
HoCP 85-	Aug. 16	3 Whole	39.9	29.0	3.11	13.1	7335
		4 Whole	41.8	31.5	2.90	13.0	7616
		4 Billet	39.8	33.2	2.49	13.7	7705
		5 Billet	39.7	33.3	2.59	13.4	7528
	Oct. 13	3 Whole	39.6	30.2	2.88	12.3	6744
		4 Whole	40.1	31.0	2.83	13.1	7385
		4 Billet	42.0	34.3	2.53	12.5	7343
		5 Billet	40.4	32.4	2.72	13.2	7466
LSD .05 Treatments			5.1	4.6	0.46	0.7	1133
			Mean Effect				
	Aug. 16		39.5	35.8	2.47	14.2	7984
	Oct. 13		38.9	34.5	2.58	13.5	7428
		3 Whole	38.1	33.6	2.67	13.6	7345
		4 Whole	40.2	35.0	2.64	13.9	7927
		4 Billet	38.4	36.0	2.32	13.8	7514
		5 Billet	40.0	36.0	2.47	14.1	8037
LSD .05 Date			NS	NS	NS	0.3	400
LSD .05 Rate			NS	2.3	0.23	0.4	566

PlantcanePlantcane was planted on two dates in 1999. For the billet rates, the whole stalksPlantcane was planted on two date
long in the planting furrow.

Table 6. Effect of seed size, rate of planting and starter fertilizer on the plantcane yield of LCP 85-384 on the St. Gabriel Research Station, 2000.

Seed Stalk Size and Rate	Starter Fertilizer	Cane Yield	Plantcane - 2000 Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
		T/A	1000/A	lbs.	%	%	lbs/A
Whole	0-0-0	44.4	45.2	1.97	16.6	14.4	9164
1X Billet	0-0-0	40.7	46.7	1.74	16.6	14.4	8406
2X Billet	0-0-0	40.3	47.5	1.76	16.8	14.6	8655
Whole	45-45-45	50.6	46.3	2.23	16.3	14.0	10104
1X Billet	45-45-45	43.7	47.1	1.91	16.5	14.2	8880
2X Billet	45-45-45	42.9	45.7	1.97	16.5	14.2	8715
LSD .05 Treatments		2.6	NS	0.33	NS	NS	1004
			Mean Effect				
Whole		47.5	45.8	2.10	16.4	14.2	9634
1X Billet		42.2	46.9	1.83	16.4	14.3	8643
2X Billet		42.1	46.6	1.87	16.6	14.4	8685
	0-0-0	42.1	46.5	1.82	16.7	14.5	8741
	45-45-45	45.8	46.4	2.04	16.4	14.1	9233
LSD .05 Rate Means		1.8	NS	0.23	NS	NS	710
LSD .05 Fall Fert. Mean		1.5	NS	0.19	NS	NS	580

PlantedPlanted with each seed size inPlanted with each seed size in 1999 and harvested as plantcane in 2000.Planted with ea andand planted with a mechanical planter. Starter fertilizer was applied in the pland planted with a mechanical planter normal fertilizer practice was followed in the spring of 2000.
Whole = 3 running stalks.
1X Billet = 6-9 running billets.
2X Billet = 12-18 running billets.

Table 7. EffectEffect of rate of plantinEffect of rate of planting Effect of rate of planting billets on the yield of LCP 85-
Station, 2000.

Planting Rate	Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
	Plantcane - 2000					
	T/A	1000/A	lbs.	%	%	lbs/A
	LCP 85-384					
3 Billets	44.2	46.6	1.81	16.4	14.0	8837
5 Billets	44.4	49.2	1.81	15.9	13.5	8434
7 Billets	46.5	55.1	1.81	16.9	14.7	9796
9 Billets	48.6	54.7	1.99	17.0	14.7	10343
LSD .05 Treatment	NS	4.9	NS	NS	NS	NS

The billets were cut with a combine harvester and hand planted in 1999.

TableTable 8. Effect of date of harvest on the plantcane yieldEffect of date of harvest on the plantcane yield of two cane varieti
Station, 2000.

Cane Variety	Harvest Date	Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
		Plantcane - 2000					
	2000	T/A	1000/A	lbs.	%	%	lbs/A
CP 70-321	Oct. 4	32.1	32.1	2.39	14.7	11.7	5164
	Dec. 4	36.2	31.8	2.62	15.6	13.2	6743
LCP 82-89	Oct. 4	35.9	42.1	1.93	14.5	11.1	5347
	Dec. 4	38.6	41.8	2.12	16.9	14.4	7980
LSD .05 Treatments		2.8	1.4	0.48	0.9	1.3	966
		Mean Effect					
	Oct. 4	34.0	37.1	2.16	14.5	11.4	5256
	Dec. 4	37.4	36.8	2.37	16.3	13.8	7361
LSD .05 Means		2.0	NS	NS	0.6	0.9	683

PlantcanePlantcane was harvested on each date in 2000. ThePlantcane was harvested on each date in 2000. The first stubble
and the yield data will be collected.

Table 9. EffectEffect of date of harvesting plantcane in 1999 onEffect of date of harvesting plantcane in 1999 on the sub
on Commerce soil on the St. Gabriel Research Station, 2000.

Cane Variety	Plantcane Harvest Date	First Stubble Cane - 2000					
		Cane Yield	Stalk No.	Stalk Wt.	Normal Juice		Sugar Yield
					Brix	Sucrose	
	1999	T/A	1000/A	lbs.	%	%	lbs/A
LCP 82-89	Aug. 15	32.0	35.0	2.05	17.3	14.2	6482
	Sept. 15	31.8	39.4	1.65	16.7	13.5	6060
	Oct. 12	35.8	40.0	1.78	17.0	13.6	6871
	Nov. 15	37.0	37.6	2.07	17.5	14.0	7386
LCP 85-384	Aug. 15	36.2	43.6	1.81	17.1	14.7	7686
	Sept. 15	40.6	55.5	1.52	16.3	13.6	7802
	Oct . 12	39.3	44.9	1.77	16.8	14.0	7869
	Nov. 15	45.0	48.7	1.75	16.5	14.1	9032
HoCP 85-845	Aug. 15	34.1	36.5	2.00	16.3	13.3	6376
	Sept. 15	33.4	34.4	1.96	16.5	13.5	6343
	Oct. 12	32.6	33.0	2.14	16.1	13.1	5985
	Nov. 15	41.0	34.7	2.35	16.9	14.0	7282
LSD .05 Treatments		2.1	2.6	0.24	0.8	1.1	888
		Mean Date Effect					
	Aug. 15	34.1	38.4	1.95	16.9	14.1	6848
	Sept. 15	35.3	43.1	1.71	16.5	13.5	6735
	Oct. 12	35.9	39.3	1.90	16.6	13.6	6908
	Nov. 15	39.5	40.3	2.06	17.0	14.0	7900
LSD .05 Means		1.2	1.5	0.14	NS	NS	513

TheThe plantcane of each variety was harvested on fourThe plantcane of each variety was harvested on four dates in 1999 an
in October 2000.

Table 10. EffectEffect of date of harvest in plantcaneEffect of date of harvest in plantcane and first stuEffect of date of varieties on the St. Gabriel Research Station, 2000.

Harvest Date		Second Stubble Cane - 2000				
Plant Cane	1[ST] Stubble	Cane Yield	Stalk No.	Stalk Wt.	Normal Sucrose	Sugar Yield
1998	1999	T/A	1000/A	lbs.	%	lbs/A
				CP 70-321		
Oct. 1	Oct. 1	26.6	28.3	2.07	12.0	4375
	Nov. 1	29.8	30.5	2.09	12.0	4909
	Dec. 1	34.2	34.5	2.37	12.4	5918
Dec. 1	Oct. 1	33.7	36.9	2.02	12.6	5913
	Nov. 1	34.0	36.6	1.98	11.9	5563
	Dec. 1	37.3	32.1	2.55	11.3	5769
				LCP 82-89		
Oct. 1	Oct. 1	28.1	40.5	1.69	12.2	4782
	Nov. 1	28.7	28.4	2.27	11.7	4596
	Dec. 1	26.2	29.3	2.02	11.6	4175
Dec. 1	Oct. 1	29.4	37.8	1.75	11.7	4751
	Nov. 1	29.6	32.3	2.05	11.4	4565
	Dec. 1	31.3	36.3	1.96	11.7	4995
LSD .05 Treat.		4.3	6.2	0.32	1.2	822
				Mean Effect		
Oct. 1		28.9	31.9	2.08	12.0	4792
Dec. 1		32.5	35.3	2.05	11.8	5259
	Oct. 1	29.5	35.9	1.88	12.1	4955
	Nov. 1	30.5	32.0	2.10	11.7	4908
	Dec. 1	32.2	33.0	2.22	11.8	5214
LSD .05 Plantcane		1.8	2.5	NS	NS	335
LSD .05 1[st] Stubble		2.2	3.1	0.16	NS	NS

PlantcanePlantcane was harvested in October and December in 1998. First stubble cane was harvested inPlantcane was NovemberNovember and DecemberNovember and December in 1999. Second stubble yield was measured on the same pl

Table 11. EffectEffect of stEffect of stubbleEffect of stubble protection on the first stubble yield of three cane varieties
Research Station, 2000.

Harvest System	Stubble Protection Treatment	First Stubble Cane - 2000 Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
	1999	T/A	1000/A	lbs.	%	%	lbs/A
				CP 70-321			
Soldier	Burn-Check	39.8	32.6	2.52	15.8	12.9	7154
Combine	Burn-Cover	41.7	34.2	2.62	16.5	13.8	8176
Combine	Trash	37.3	31.8	2.55	17.2	14.7	7874
				LCP 82-89			
Soldier	Burn-Check	37.8	35.2	2.23	17.0	13.9	7497
Combine	Burn-Cover	42.0	39.7	2.13	16.7	13.5	8056
Combine	Trash	40.0	38.4	2.17	17.2	14.1	8069
				HoCP 85-845			
Soldier	Burn-Check	41.7	36.5	2.34	16.7	13.9	8218
Combine	Burn-Cover	37.2	35.2	2.19	16.7	14.1	7461
Combine	Trash	33.6	32.8	2.15	16.2	13.5	6413
LSD .05 Treatments		4.3	3.9	NS	1.2	1.4	1063
				Mean Effect			
Soldier	Burn-Check	39.8	34.8	2.36	16.5	13.6	7623
Combine	Burn-Cover	40.3	36.4	2.31	17.0	13.8	7897
Combine	Trash	37.0	34.3	2.29	16.5	14.1	7452
LSD .05 Means		2.5	NS	NS	NS	NS	NS

TheThe buThe burn plots wereThe burn plots were harvested with each harvest system and the trash was removed by bu
cover was applied over the cane stubbles immediately after harvesting plantcane in 1999.

Table 12. EffectEffect of fall-applied starterEffect of fall-applied starter fertilizer and soil cover on first stubble yieldEffec on the St. Gabriel Research Station, 2000.

Starter Fertilizer $N\text{-}P_2O_5\text{-}K_2O$	Soil Cover	First Stubble Cane - 2000 Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
lbs/A		T/A	1000/A	lbs.	%	%	lbs/A
				LCP 82-89			
0-0-0	Check	36.2	39.4	1.85	17.0	13.8	7084
0-0-0	Cover	38.2	42.3	1.82	16.5	13.1	7050
45-45-45	Check	35.2	43.0	1.62	16.6	13.2	6576
45-45-45	Cover	35.8	40.6	1.94	16.5	13.1	6630
				LCP 85-384			
0-0-0	Check	44.6	48.6	1.90	16.6	13.9	8784
0-0-0	Cover	43.4	51.3	1.75	16.6	13.8	8509
45-45-45	Check	39.6	48.1	1.63	16.3	13.6	7579
45-45-45	Cover	42.5	51.0	1.66	16.5	13.8	8325
				HoCP 85-845			
0-0-0	Check	36.2	35.4	2.06	16.8	13.4	6833
0-0-0	Cover	34.0	36.1	2.04	16.3	13.2	6318
45-45-45	Check	33.4	34.0	2.07	16.2	12.9	6008
45-45-45	Cover	34.4	35.2	2.12	16.2	13.3	6478
LSD .05 Treat.		4.4	3.2	0.41	NS	0.9	731
				Mean Effect			
0-0-0		38.8	42.2	1.90	16.6	13.5	7430
45-45-45		36.8	42.0	1.84	16.4	13.3	6933
	Check	37.5	41.4	1.85	16.6	13.5	7144
	Cover	38.0	42.8	1.89	16.4	13.4	7218
LSD .05 Fall Fert.		1.8	NS	NS	NS	NS	299
LSD .05 Cover		NS	1.3	NS	NS	NS	NS

TheThe fall fertilizer was applied in the planting furrowThe fall fertilizer was applied in the planting furrow as a starter fe after plantcane harvest in 1999.

LONG-TERM EVALUATION OF THE EFFECTS OF COMBINE
TRASH BLANKET ON YIELD
(Cycle One Results)

H. P. Viator
Iberia Research Station

SUMMARY

A study designed toA study designed to evaluate the long-term consequences and benefits of the trashA s generatedgenerated by combine harvesting was initiate usingLCP 85-384generated by combine harvesting was init beginningbeginning withbeginning with the plantcane harvest, three treatments will be established for all ratoonbe cycle-cycle- ratoon cane grown on rows withcycle- ratoon cane grown on rows with thecycle- ratoon cane grown c whichwhich the trash blanket will be removed in the fall (TBR), and ratoon cane grown on rows with residueresidue from theresidue from the combining of cane burned standing (BSTB). The third ratoonresidue from oneone was harvested in 2000. one was harvested in 2000. As an average of allone was harvested in 2000. As an significantlysignificantly higher thansignificantly higher than that for GCTB. Three-year average yields for BSTB, 7,664,7,664, 7,569 and7,664, 7,569 and 6,723 pounds of sugar per acre, respectively.7,664, 7,569 and 6,723 pounds fallow period to monitor differences in N and C content of the treatments.

INTRODUCTION

ResearchResearch underResearch under Louisiana conditions has consistently shown a two to four tons o acreacre decrease in yield when combine residue is not racre decrease in yield when combine residue is no WaitingWaiting to remove trash in February or March by either burning,Waiting to remove trash in February or Ma coconsconsistentconsistent positive results relative to fall removal. The trash blanket negatively influences ratoo yieldsyields by trapping soil moisture, loweringyields by trapping soil moisture, lowering soil tempyields by chemicals.chemicals. Thechemicals. The positive chemicals. The positive effects of the green cane trash b reductionreduction in soil erosion, cold protection, andreduction in soil erosion, cold protection, and the suppress bebe the enhanbe the enhancement ofbe the enhancement of soil organic matter. South African research under shownshown that long-term trash retention (green-cane harvesting) allowed for lower N shown that long-term tr ratesrates after arates after a number of years. The primary objective of this research effort is to evaluate therates a of residue management on cane yield and soil organic properties on a <u>long-term basis</u>.

PROCEDURES

InIn November 1997, a field ofIn November 1997, a field of LCP 85-384In November 1997, a field of LC ofof the rows in eachof the rows in each half was burned standing prior to combining. The rows of cane inof the rov two-thirds of each halftwo-thirds of each half were green chopped,two-thirds of each half were green chopped, ar thethe field bythe field by the combine. Shortly after harvestthe field by the combine. Shortly after harvest the t topstops oftops of half of the rows receiving the combine residue intops of half of the rows receiving the combine treatmentstreatments are: 1) ratoon cane grown on rows with residue ftreatments are: 1) ratoon cane grown standing,standing, 2) ratoon cane grown on rows with rstanding, 2) ratoon cane grown on rows with restandi ratoon cane grown on rows from which combine residue was removed. These same

Research is partially supported by a financial grant from the American Sugar Cane League.

treatmentstreatments will be initiated with plantcane and imposed for each ratoon croptreatments will be initiated w
cyclescycles (cycles (threecycles (three ratoon crops per cycle). Standard herbicide and cultural practices will b
for all treatments. Cane yield and juice quality will be determined at a commercial sugar mill.

TreatmentTreatment plots are three rows wide and 365 feet in length, arrangedTreatment plots are three ro
designdesign and replicated twice. Long-term effedesign and replicated twice. Long-term effects design a
measuringmeasuring the direct effects on cane and sugar yield over timemeasuring the direct effects on cane a
mattermatter content of the soil will be monitored. An appropriate matter content of the soil will be monitore
determine significant differences among the treatment means.

RESULTS

AsAs an average of allAs an average of all three ratoon cropsAs an average of all three ratoon crops (cycle
acreacre yields (table 1) for the cane burned standing prior to harvestacre yields (table 1) for the cane burned sta
werewere both significantly higher than that for green-chopped cane grown on rowere both significantly higher than t
waswas not removed. was not removed. These results arewas not removed. These results are comparable to yie
researchers.researchers. researchers. It should beresearchers. It should be noted that spring emergence occurred un
inin 1998 (over 30in 1998 (over 30 inchesin 1998 (over 30 inches of rain was recorded Jan. - Mar.), under fairly
inin 1999 (approximately 9 inches ofrainin 1999 (approximately 9 inches of rain was recorded Jan. -in 1999 (approx
inin 2000 (only 6.7 inches of rain fell Jan.in 2000 (only 6.7 inches of rain fell Jan. - Mar.).in 2000 (only 6.7 inche
increasinglyincreasingly lower yieldsincreasingly lower yields with each successive ratoon crop. The yield advan
of residue increased to approximately 1,500 pounds of sugar/acre by third ratoon.

Table 1. Influence of combine residue management on sugarcane yields as an average of the first, second and third ratoon crops of cycle one.

Residue Management	tons cane/acre	pounds sugar/acre	CRS
Burned standing prior to harvest (BSTB)	44.3 a	7,664 a	175 a
Combine residue removed in fall (TBR)	44.7 a	7,569 a	170 b
Combine residue allowed to remain (GCTB)	41.2 a	6,723 b	164 c

Means within columns followed by the same letter are not significantly different (P = .10)

SUGARCANE ON CLAY SOIL RESPONDS TO IRRIGATION

H. P. Viator
Iberia Research Station

Ronald Hebert, Jr.
Ronald Hebert Farms, Jeanerette, La.

SUMMARY

SeveralSeveral droughts during the past decade in Louisiana have caused an intensification in the interestinterest in supplemental irrigation for sugarcaneinterest in supplemental irrigation for sugarcane productio researchresearch in Louisiana has been conducted onresearch in Louisiana has been conducted on light-research i heavy-textured,heavy-textured, clay soil is particularly vulnerable to extended periods of soil moisture deficit. The objectiveobjective of thisobjective of this investigation was to evaluateobjective of this investigation was to eval AlligatorAlligator clay soil. Irrigation was scheduled when stalksAlligator clay soil. Irrigation was scheduled whe for the irrigation infor the irrigation in July at which time growth was morefor the irrigation in July at which tim acre-inchesacre-inches of water was supplied in furrows throughacre-inches of water was supplied in furrows th totaltotal of only 19.9 inches of rain from May through October, a rainfall deficit of 15.1total of only 19.9 inche comparedcompared to a 25-year average for the same period. Prior to the first significant rainfall of the drought,drought, irrigated cane grew at approximately twice the rate of the unirrigated cane,drought, irrigated can aa height difference of about 20 inches at harvest. Cane and sugara height difference of about 20 inches at harvest. betweenbetween the irrigated and control plots. Both irrigated cane and sugar yields were 44% higher than that of the control plots. On a perthat of the control plots. On a per acre basis, the additional 10 tons of cane we $27.

INTRODUCTION

PreviousPrevious irrigation studies in Louisiana have generally indicated a lack oPrevious irrigation sugarcanesugarcane to supplemental water. In all of the published investigations, sugarcane in the un-irrigated controlcontrol plots benefitted from timelycontrol plots benefitted from timely rainfall either during the drought o InIn 1998, we conducted and reported on (Sugar Bulletin Vol. 78 NoIn 1998, we conducted and reported on (S measuremeasure the response to irrigation of LCP 85-384 grown onmeasure the response to irrigation of LCP 85- responseresponse to irrigation water in that study wasresponse to irrigation water in that study was attributed to t excessiveexcessive winter rainfall.excessive winter rainfall. That dry soil conditions depress growth of caneexces clayclay soils is wellclay soils is well documented. Root development tends to be less extensive on clay soil, res inin less use of the available soil-water reservoir. A study toin less use of the available soil-water reservoir. A study onon a heavy-textured, clay soilon a heavy-textured, clay soil to supplemental irrigation water was conducted duri 2000.

EXPERIMENTAL METHODS

TheThe experiment site was an Alligator clayThe experiment site was an Alligator clay soil, and the crop 85-384.85-384. Plots of85-384. Plots of the two treatments, irrigated and non-irrigated sugarcane, consisted of85-3 rows.rows. An interplot buffer zone ofrows. An interplot buffer zone of eight rows (46.7 feet) was established t of irrigation water between irrigated and control plots.

TheThe year 2000 was one of the driest since records began in 1889,The year 2000 was one of the driest sinc
thethe initiation of the studthe initiation of the study in Mthe initiation of the study in May to the late-October
precipitationprecipitation for May-October, based on area records for a 2precipitation for May-October, based o
situationsituation was worsened by the occurrence of a relatively drysituation was worsened by the occurrence of
drought.

ApproximatelyApproximately 3 acre-inches of irrigation water were supplied in fApproximately 3 acre
dates:dates: May 5, May 25, July 21, anddates: May 5, May 25, July 21, and August 28, 2000.dates: May 5, Ma
waterwater was pumped. Weekly growth measurements were recorded from early May twater was pumped. Weekly
harvest.harvest. Irrigations were scheduled when growth slowed to 2harvest. Irrigations were scheduled when gro
July irrigation at which time the growth was more than 2 inches per week.

RESULTS

StalksStalks elongated at an accelerated rate in the irrigated plots Stalks elongated at an accelerated ra
significantsignificant rainfall (1.14 inchessignificant rainfall (1.14 inches onsignificant rainfall (1.14 inches on June

the rate of the control. The height advantage for irrigated cane was maintained throughout
the growing season, eventually attaining a 19.3-inch disparity at harvest. It is important to note
thatthat the drought-sthat the drought-stressed cthat the drought-stressed cane in the control plots did not comp
September.September. Both the control and irrigated plots grew 14 inches from the drought-breaking,
SeptemberSeptember 8-10 rains to the late-October harvest, thereby maiSeptember 8-10 rains to the late-Oc
developed earlier in the growing season.

AsAs can be seen in table 1, cane and sugar yields As can be seen in table 1, cane and sugar yields w
betweenbetween the control and irrigatedbetween the control and irrigated plots.between the control and irrigated p
yieldsyields than did the control plots. In contrast tyields than did the control plots. In contrast to beltw

SeptemberSeptember rains that ended the1998 drought, identical CRSs of 213 lbsSeptember rains that ended the19
thethe 2000 studythe 2000 study suggestthe 2000 study suggest normal maturity for the drought-stressed cane. Cl
drydry conditions that prevailed thedry conditions that prevailed the month prior to harvest, accounting for averag
less than an inch per week for the entire month of October 2000.

Table 1. The influence of irrigation water on the yield and quality of cane grown on clay.

Irrigation treatment	Yields of Sugar, lbs/ac	Yields of Cane, tons/ac	CRS, lbs/ton
Irrigated	7,072	33.2	213
Control	4,921	23.1	213
P=	.08	.06	.96

OBSERVATIONS

WhileWhile While it is risWhile it is risky to draw comparisons of the results of sugarcane studies c
differentdifferent seasons involving different soil types, a few observations about the contrary results
obtainedobtained with the two irobtained with the two irrigatioobtained with the two irrigation studies are wa
appearingappearing to be similar in duration and severity, were notably dissimilar in consequences. Although
bothboth years had an extended drought from May through late summer, the 1998 drought was preceded
byby an exceedingly wet January - Marchby an exceedingly wet January - March period and followedby an exceedi
thethe drought, overthe drought, over 60 inchesthe drought, over 60 inches of rain were recorded for most of the S
andand weekly-recordedand weekly-recorded growth measurements strongly indicate, theand weekly-recorded g
excessiveexcessive rains in the winter and spring sustained adequate cane growth onexcessive rains in the winter
soil moisture was replenished by the September rains.

CaneCane suffering through the drought of 2000, howCane suffering through the drought of 2000, how
storedstored from preceding winter rains. Instored from preceding winter rains. In fact, the soil moisture deficit fo
thethe second highest on record since 1889, with a total of only 6.67 inches of rain fallingthe second highest on reco
throughthrough March 2000. It can easily be argued that the 2000 drought actually started with a relatively
drydry 1999 fall and extended through an exceedingly dry January-June 2000 period. Like thedry 1999 fall and ext
of 1998, the drought of 2000 was alleviated by early-September rains.

AlsAlsoAlso complicatAlso complicating the comparison of the results from the irrigation experiments
differencedifference in soil type. A direct comparison of the effects of soil texture on irrigation efficacy was
notnot available in either study. It is, however, likely anot available in either study. It is, however, likely a resp
observed on clay in 1998 and on silt loam in 2000.

UsingUsing estimates from the 1998 irrigation study, cost to supply each Using estimates from the 1998
water totaled $2.44 (unadjusted forwater totaled $2.44 (unadjusted for millwater totaled $2.44 (unadjusted for mi
1010 tons of cane obtained by pumping appr10 tons of cane obtained by pumping approximatel10 tons of cane
$27.$27. This confirms what other researchers$27. This confirms what other researchers have discovered$27. This
11 acre-inch of water will provide a1 acre-inch of water will provide a yield of about 1 ton cane per acre if other fac

ThisThis is aThis is a convenient rule of thumb, butThis is a convenient rule of thumb, but one that is perilous wh
rarely suffer yield-limiting droughts.

TheThe contradictory results of the 1998 and 2000 irrigation studies point to the uncertainty of gettinggetting agetting a responsegetting a response to irrigation in high-rainfall environments. There remains a n techniquestechniques acceptable totechniques acceptable to the grower and accurate enough totechniques accepta investment.investment. Even then the occurrence of unexpected rainfallinvestment. Even then the occurrence of u in humid regions.

ACKNOWLEDGMENTS

TheThe irrigationThe irrigation experiment was supported by the sugarcane growers and millersThe irriga American Sugar Cane League of the U.S.A., Inc.

SOIL FERTILITY RESEARCH IN SUGARCANE IN 2000

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Department of Agronomy

in cooperation with
St. Gabriel Research Station and
Louisiana Cooperative Extension Service

SUMMARY

Four field experiments were conducted in 2000 to test the effects of rates of fertilizers on the yield components of current sugarcane varieties.

Fall- and spring-applied NPK fertilizer rates were tested at cycle intervals of fallow- planted cane on Commerce soil. In first stubble cane, various starter fertilizer rates increased the average cane yield with the exception of 45-0-45. This may indicate a greater need for P in starter fertilizer than other elements. In sixth stubble from succession planted LCP 85-384, 90-90-90 starter fertilizer significantly increased sugar yield, as did the N and NPK applied in the spring. A 160-40-80 NPK spring rate increased the average sugar yields of first stubble CP 70-321 by 8.6% over 160-0-0 averaged across starter fertilizers. Compared to other starter fertilizers, the application of 45-45-45 tended to reduce cane and sugar yield of HoCP 85-845.

OBJECTIVES

This research was designed to provide information on soil fertility in an effort to help cane growers to produce maximum economic yields and to increase profitability in sugarcane production. This annual progress report is presented to provide the latest available data on certain practices and not as a final recommendation for growers to use all of these practices. Recommendations are based on several years of research data.

RESULTS AND DISCUSSION

Four field experiments were conducted in 2000 to test the effects of rates of fertilization on the yield of fallow and succession planted sugarcane. The fallow cane was planted after a fallow year in a normal cane rotation, and succession cane was planted immediately after harvesting a stubble cane crop and preparing the land for replanting without a fallow year.

Starter Fertilizers in Plantcane and First Stubble of Fallow Planted Cane

An experiment was conducted to test the effects of NPK fertilizer rates applied as a starter fertilizer in the fall at planting time in addition to spring-applied fertilizers in fallow planted cane. The starter fall rates were 0-0-0, 15-45-45, 45-0-45, 45-45-0, 45-45-45, and 30-90-90. Spring rates consisting of 160-0-0 and 160-40-80 were applied over each fall rate. This test on first stubble was planted with CP 70-321 after a fallow year, and the fall treatments were applied in the planting furrow. The spring treatments were applied in the off-bar furrow in plantcane in 2000. The plantcane test was planted with HoCP 85-845 after a fallow year. Treatment applications were the same as in the previous test.

Generally, the yield responses to individual treatments indicated the need for P in the starter fertilizer and P and/or K in the spring application (Table 1). The maximum P and K inputs (30-90-90 plantcane starter, 160-40-80 spring-applied) resulted in a 30% increase in sugar yield vs no starter applied and 160-0-0 spring-applied. The use of 45-45-45 starter fertilizer in plantcane tended to reduce plantcane yields compared to other starter fertilizers (Table 2). The amount of N or nutrient balance (N:K) was higher for this fertilizer and may have been a contributing factor

<u>Starter and Spring Applied Fertilizer in Sixth Stubble Cane from Succession Planted Cane</u>

An experiment was initiated in 1993 and continued in sixth stubble cane in 2000 to test the effects of NPK fertilizer rates applied as a starter fertilizer at planting time in addition to spring applied fertilizers on the yield of succession planted cane. The starter fall rates were 0-0-0, 15-45-45, 45-45-45, and 90-90-90 and the spring rates were 0-0-0, 160-0-0, and 160-40-80. The test was planted with LCP 85-384 in succession immediately after harvesting a cane crop in 1993. The fall treatments were applied in the planting furrows, and the spring treatments were applied in the off-bar furrows in 1994-2000.

The data in Table 3 show that the 90-90-90 starter fertilizer rates applied at planting time in 1993 did have a slight positive effect on the sugar yield of sixth stubble cane in 2000. Moreover, the N and NPK spring rates applied each year significantly increased sugar yield. The increases were due mainly to increases in cane yield brought on by higher stalk numbers. In only one case was the cane and sugar yield response different between 160-0-0 and 160-40-80 treatments.

<u>Rates of Spring Applied N Fertilizer</u>

The effect of N fertilizer rate on yield throughout the crop cycle of LCP 85-384 was significant for the first time beginning with the second stubble crop. Sugar yield increased over 14% when N rate increased from 40 to 120 lb./acre. However, at 160 lb N/acre sugar yields declined over 11% below that found at 120 lb N/acre (Table 4).

Table 1. Effect of fall- and spring-applied fertilizer on the yield of first stubble cane CP 70-321 planted after a fallow year on Commerce soil on the St. Gabriel Research Station, 2000.

Fertilizer applied $N-P_2O_5-K_2O$ Fall	Spring	First Stubble Cane - Fallow Planted Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
lbs/A	lbs/A	T/A	1000/A	lbs.	%	%	lbs/A
0-0-0	0-0-0	21.5	25.0	1.96	16.4	14.2	4360
	160-0-0	31.7	26.9	2.56	16.9	14.6	6659
	160-40-80	36.9	31.2	2.49	16.9	14.8	7837
15-45-45	0-0-0	21.5	21.5	2.49	16.8	14.6	4500
	160-0-0	34.7	29.6	2.60	17.1	14.9	7437
	160-40-80	39.2	32.6	2.56	17.2	14.7	8258
45-0-45	0-0-0	21.3	26.9	1.80	16.0	14.0	4240
	160-0-0	35.8	33.9	2.16	16.8	14.3	7311
45-45-0	0-0-0	22.9	22.6	2.52	16.9	14.8	4876
	160-0-0	37.3	32.8	2.44	17.4	15.2	8183
	160-40-80	38.0	36.0	2.12	17.0	14.9	8140
45-45-45	0-0-0	23.5	24.7	2.14	16.1	14.1	4712
	160-0-0	37.6	33.3	2.43	17.2	14.5	7796
30-90-90	0-0-0	26.4	24.2	2.39	16.5	14.5	5480
	160-0-0	36.4	33.6	2.45	17.2	14.9	7815
	160-40-80	40.4	33.4	2.66	17.3	14.9	8661
LSD .05 Treatments		3.6	3.5	0.36	0.8	0.7	727
		Mean Effect					
0-0-0		30.0	27.7	2.34	16.7	14.5	6286
15-45-45		31.8	27.9	2.55	17.0	14.7	6731
45-0-45		31.9	31.2	2.19	16.6	14.3	6549
45-45-0		32.7	30.5	2.36	17.1	15.0	7066
45-45-45		33.0	30.2	2.41	16.8	14.5	6871
30-90-90		34.4	30.4	2.50	17.0	14.7	7318
	0-0-0	22.8	24.2	2.22	16.4	14.4	4695
	160-0-0	35.6	31.7	2.44	17.1	14.7	7533
	160-40-80	38.5	33.1	2.52	17.1	14.8	8183
LSD .05 Fall		2.1	2.0	0.21	0.5	0.4	420
LSD .05 Spring		1.5	1.4	0.15	0.3	0.3	297

The fall fertilizer was applied in the planting furrow as a starter fertilizer in 1998, and spring fertilizer was applied in the off-bar furrow in the spring of each year.

Table 2. Effect of fall- and spring-applied fertilizer on the yield of plantcane HoCP 85-845 planted after a fallow year on Commerce soil on the St. Gabriel Research Station, 2000.

Fertilizer applied $N-P_2O_5-K_2O$ Fall	Spring	Plantcane - Fallow Planted Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
lbs/A	lbs/A	T/A	1000/A	lbs.	%	%	lbs/A
0-0-0	0-0-0	29.0	26.1	2.42	16.6	14.2	5888
	120-0-0	38.0	33.6	2.57	15.9	13.1	7034
	120-40-80	37.2	33.9	2.48	15.9	13.2	6939
15-45-45	0-0-0	31.7	28.7	2.35	16.5	13.9	6238
	120-0-0	41.5	32.7	2.81	15.8	13.4	7812
	120-40-80	41.4	32.9	2.71	15.9	13.4	7846
45-45-45	0-0-0	33.1	30.7	2.47	16.5	14.1	6625
	120-0-0	35.2	31.4	2.67	15.7	13.1	6484
	120-40-80	38.5	32.6	2.73	15.3	12.4	6668
30-90-90	0-0-0	30.9	30.5	2.52	16.3	13.9	6088
120-0-0		39.3	31.6	2.71	16.6	14.1	7886
120-40-80		38.0	32.5	2.58	16.1	13.7	7399
LSD .05 Treat.		3.8	2.2	0.37	0.7	0.9	961
				Mean	Effect		
0-0-0		34.7	31.2	2.49	16.1	13.5	6620
15-45-45		38.2	31.4	2.62	16.1	13.5	7299
45-45-45		35.6	31.6	2.62	15.8	13.2	6592
30-90-90		36.1	31.5	2.60	16.4	13.9	7124
0-0-0		31.2	29.0	2.44	16.5	14.0	6209
120-0-0		38.5	32.3	2.69	16.0	13.4	7304
120-40-80		38.8	33.0	2.62	15.8	13.2	7213
LSD .05 Fall		2.2	NS	NS	0.4	0.5	555
LSD .05 Spring		1.9	1.1	0.18	0.3	0.5	481

The fall fertilizer was applied in the planting furrow as a starter fertilizer in 1999, and the spring fertilizer was applied in the off-bar furrow in 2000.

Table 3. Effect of fall- and spring-applied fertilizer on the yield of sixth stubble cane LCP 85-384 planted in succession on Commerce soil on the St. Gabriel Research Station, 2000.

Fertilizer applied $N-P_20_5-K_20$ Fall	Spring	Sixth Stubble Cane - Succession Planted Cane Yield	Stalk No.	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
lbs/A	lbs/A	T/A	1000/A	lbs.	%	%	lbs/A
0-0-0	0-0-0	19.5	39.4	1.12	16.3	13.6	3761
	160-0-0	25.9	43.8	1.13	16.0	12.9	4681
	160-40-80	24.5	45.6	1.41	16.4	13.7	4744
15-45-45	0-0-0	20.3	42.6	1.07	16.5	14.1	4088
	160-0-0	28.3	44.0	1.83	17.0	14.1	5683
	160-40-80	24.6	45.4	1.00	16.0	13.3	4607
45-45-45	0-0-0	21.2	40.2	0.95	16.8	14.3	4319
	160-0-0	26.1	44.0	1.88	15.8	12.8	4660
	160-40-80	26.9	45.1	1.15	16.8	14.0	5365
90-90-90	0-0-0	19.9	38.7	1.16	16.7	14.2	4031
	160-0-0	26.1	45.3	1.21	16.7	14.0	5213
	160-40-80	28.2	46.2	1.04	17.1	13.6	5454
LSD .05 Treatments		3.0	3.6	0.53	0.5	1.3	826
		Mean Effect					
0-0-0		23.3	42.9	1.23	16.2	13.4	4395
15-45-45		24.4	44.0	1.30	16.5	13.8	4793
45-45-45		24.5	43.1	1.33	16.4	13.7	4781
90-90-90		24.7	43.4	1.13	16.6	13.9	4899
	0-0-0	20.2	40.3	1.08	16.6	14.1	4050
160-0-0		26.6	44.3	1.51	16.4	13.4	5059
	160-40-80	25.9	45.5	1.15	16.4	13.6	5042
LSD .05 Fall		NS	NS	NS	NS	NS	477
LSD .05 Spring		1.5	1.8	0.26	NS	NS	413

The fall fertilizer was applied in the planting furrow as a starter fertilizer in 1993, and spring fertilizer was applied in the off-bar furrow each crop year.

Table 4. Effect of nitrogen fertilizer rates on the second stubble yield of LCP 85-384 on the St. Gabriel Research Station, 2000.

Nitrogen Fertilizer	Cane Yield	Stalk Wt.	Normal Juice Brix	Normal Juice Sucrose	Sugar Yield
lbs/A	T/A	lbs.	%	%	lbs/A
40-0-0	34.8	1.94	17.7	15.0	7541
80-0-0	37.1	1.77	18.0	15.2	8162
120-0-0	39.6	1.84	17.5	15.1	8614
160-0-0	36.4	1.51	17.4	14.6	7632
LSD .05 Treat.	NS	NS	NS	NS	989

The nitrogen fertilizer rates were applied to plots in the spring of each crop year.

EFFECT OF POTASSIUM SULFATE VS. POTASSIUM CHLORIDE ON SUGARCANE YIELDS

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SUMMARY

Results in 2000 for plantcane showed that the use of potassium sulfate vs. potassium chloride at three different rates of K2O (70, 140, and 210 lb/A) did not result in statistical (P>0.10) differences for stalk weights, plant population, commercially recoverable sugar (lbs/ton), cane yield or sugar yield for sugarcane variety HoCP 85-845. Potassium application rates did not affect the measured plantcane yield parameters in 2000 using either potassium source. Sulfur application also had no effect on sugarcane yields.

INTRODUCTION

In recent years, sustainable agriculture advocates have convinced some sugarcane producers in Louisiana that potassium chloride is harmful to soil health. These advocates have persuaded sugarcane producers to use potassium sulfate in the place of potassium chloride. Since potassium sulfate is more expensive (per pound of K) than potassium chloride, the sustainable ag advocates have instructed producers to compensate for this by reducing their K application rates. They have further argued that this is justified because "K from potassium sulfate is more available than K from potassium chloride." No research, however, in Louisiana has been done that supports or refutes the contentions about K put forward by sustainable-ag advocates. Consequently, this research was initiated.

OBJECTIVES

To compare potassium sulfate and potassium chloride fertilizer rates in their effects on sugarcane yield parameters, available soil K, and nutrient content of sugarcane at harvest.

MATERIALS AND METHODS

A Baldwin silty clay loam soil very low in K was selected for this study. Soil analysis showed a pH, organic matter, and exchangeable bases of 5.9, 0.67%, and 13.1 meg/100g; and P, Na, K, Mg, and Ca ppm levels of 83 (medium), 42 (very low), 113 (very low), and 406 (very high), and 1865 (low), respectively.

In September of 1999, sugarcane variety HoCP 85-845 (first progeny Kleentek) was planted at three stalks and a lap of two joints on 6-foot-wide rows. The experimental treatments in Table 2 were imposed on the experimental site in May of 2000. All treatments were replicated eight times in a Latin square experimental design. Plots consisted of three 6-foot by 30-foot rows with a 10-foot alley separating the ends of all plots. A blanket application of 120 lb N and 40 lb P2O5/A were added along with the potassium fertilizer. Treatments 2, 4, and 6 used ammonium sulfate as a sulfur source so that S rate would not differ in comparisons between the two K sources. Ammonium nitrate was used as the main N source. After fertilization, the sugarcane rows were hipped up and the cane was grown to maturity using standard cultural practices.

In September of 2000, the number of millable stalks in each sugarcane plot were counted. In December, the experimental plots were harvested with a two-row soldier harvester and weighed with a weigh rig. Ten stalks were randomly selected from each plot to measure average stalk weight and commercially recoverable sugar (CRS). Three additional stalks were also taken from each plot for nutrient analysis to determine the effect of the treatments on nutrient uptake.

RESULTS AND DISCUSSION

Table 1 shows that potassium sources and potassium rates did not affect ($P>0.10$) any of the sugarcane yield parameters measured for plantcane in 2000. The % coefficient of variation (CVs) for stalk weight, plant population, and CRS were good (below 10%), but those for cane tonnage and sugar yield were a little high.

Table 2 shows how the N, K, S, and Cl rates in the eight treatments were derived. Since K rates from potassium sulfate also included S, this difference was screened out by using ammonium sulfate as part of the nitrogen source (the remaining N was composed of ammonium nitrate). Consequently, each K rate, using both K sources, had the same amount of S (T2 vs. T3, T4 vs. T5, and T6 vs. T7). This resulted in the K sources differing only in Cl rates. Since sustainable ag advocates claim that Cl is bad for the soil and, thereby, decreases crop yields, this gave us a good way to test this claim. Comparison of T1 vs. T3, T5, and T7 (Table 2) are used to determine the effect of potassium sulfate rates on sugarcane yield variables (Table 3). Comparison of T2 vs. T3, T4 vs. T5, and T6 vs. T7 (Table 2) shows the effect of Cl application on sugarcane yields (Table 3), while comparing T8 vs. T4 (Table 2) shows the effect of S application on sugarcane yields (Table 3).

Table 3 shows that the yields obtained with HoCP 85-845 were very respectable given the severe drought experienced in the summer of 2000. The average stalk weights for the variety were very good. In 2000 our plantcane yield variables were not affected by K rates or K sources. We will continue the test in 2001 to see if this changes for first-stubble cane.

Table 1. F-values and statistical parameters for effect of treatments on plantcane yield variables.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
Treatments (T)	7	1.02	1.29	0.71	0.66	0.54
HREP	7	0.97	1.62•	0.12	1.19	0.95
VREP	7	2.01~	2.54*	2.10~	1.27	0.48
RMSE		0.2779	1627	9.796	4.873	1090
% CV		9.15	4.73	4.85	12.05	13.36
Mean		3.038	34,390	201.8	40.45	8160

• ~, and * denote statistical significance at the P# 0.25, 0.10, and 0.05 levels, respectively.

Table 2. Fertilizer treatments used in study.

T#	NH_4NO_3	$(NH_4)_2SO_4$	$(NH_4)_2SO_4$	$K_2(SO_4)$	KCl	Cl	$K_2(SO_4)$	P
	------------lb N/A---------		------------lb S/A----------		K_2O/A	lb Cl/A	lb K_2O/A	lb P_2O_5/A
1	120	0	0	0	0	0	0	40
2	94.9	25.1	28.7	0	70	63.5	0	40
3	120	0	0	28.7	0	0	70	40
4	69.8	50.2	57.4	0	140	127.0	0	40
5	120	0	0	57.4	0	0	140	40
6	44.7	75.3	86.1	0	210	190.5	0	40
7	120	0	0	86.1	0	0	210	40
8	120	0	0	0	140	127.0	0	40

Table 3. Effect of fertilizer on plantcane yield variables.

T#	S	K_2O	Cl	Stalk wt.	Plant pop.	CRS	Cane yield	Sugar yield
	----------------lb/A--------------			lb/stalk	1000/A	lb/T	T/A	lb/A
1	0	0	0	3.06	34.5	206	39.5	8090
2	28.7	70	63.5	2.91	34.8	201	40.3	8110
3	28.7	70	0	2.93	34.1	206	38.9	7990
4	57.4	140	127.0	3.14	34.8	199	41.6	8270
5	57.4	140	0	2.97	34.4	202	39.9	8040
6	86.1	210	190.5	3.19	34.2	201	42.4	8510
7	86.1	210	0	3.02	33.1	198	39.0	7710
8	0	140	127.0	3.08	35.3	204	42.1	8570
LSD 0.10				NS	NS	NS	NS	NS
LSD 0.25				NS	NS	NS	NS	NS

NS denotes statistical non significance at the indicated probability level.

EFFECT OF COPPER AND POTASSIUM FERTILIZATION ON YIELD AND PLANT NUTRIENT STATUS OF SUGARCANE

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SUMMARY

Four rates of potassium chloride (0, 80, 160, and 240 lb K2O/A) were applied to plantcane variety LCP 85-384 on a Jeanerette silt loam soil near Parks, La. Potassium application rates did not affect ($P>0.10$) sugarcane stalk weights, commercially recoverable sugar, cane yield, or sugar yield in 2000.

JUSTIFICATION

Preliminary research (private communication with Therian LaFleur, Chastant Brothers, Inc.) shows that spraying sugarcane foliage with copper sulfate may increase plant potassium levels and result in higher cane yields.

It is generally assumed that sugarcane yields in Louisiana will not respond positively to micronutrient application. However, little research has been done to support this assumption. Also, no formal research in Louisiana has shown whether copper and potassium fertilizer application interact positively to increase cane yields.

OBJECTIVES

Our project will test whether sugarcane yields in Louisiana respond to copper fertilization. The specific objective is to determine the effect of soil-applied potassium chloride and foliar applied copper sulfate on plant nutrient status and sugarcane yield parameters across a cane production cycle.

MATERIALS AND METHODS

Sugarcane variety LCP 85-384 was planted in September 1999 at three stalks and a lap of two joints using first progeny Kleentek seedcane. The experimental design was a Latin square split-plot with four potassium chloride rates as main plots and three copper sulfate rates as sub-plots. All experimental plots consisted of three 6-foot by 50-foot rows, with 10-foot alleys separating the ends of the plots. The sides of each plot were buffered by three border rows. All treatments were replicated four times.

The soil used in the study was a Jeanerette silt loam with an initial analysis of 5.1, 14.8, and 0.66 for pH, sum of bases (meg/100g), and % organic matter; P, Na, Mg, K, and Ca concentrations were 81 (medium), 47 (very low), 500 (very high), 144 (low), and 2027 ppm (low), respectively.

Potassium fertilizer rates (0, 80, 160, and 240 lb K2O/A) were applied in May 2000 along with a blanket application of N, P2O5, and S at 120, 60, and 24 lb/A as ammonium nitrate, polyphosphate, and calcium sulfate, respectively. The cooperating producer (Richard Latiolais) did not wish to apply the copper sulfate treatments in 2000 as planned because of the severe drought.

Plants were sampled for leaf tissue (for nutrient analyses) from all plots in August 2000. Plant populations were not determined in September as originally planned because of severe lodging. All plots were harvested with a two-row soldier harvester in early January 2001 and weighed with a weigh rig. A 10-stalk sample was taken from each plot to determine average stalk weight and commerciably recoverable sugar.

RESULTS AND DISCUSSION

F-values and statistical parameters for the test are given in Table 1. The results (Tables 1 and 2) show that potassium chloride fertilizer rates did not affect ($P>0.10$) stalk weights, CRS, cane yield, or sugar yield of plantcane in 2000.

Table 1. F-values and statistical parameters for effect of potassium chloride on plantcane yield variables.

Source	Stalk weight	CRS	Cane yield	Sugar yield
main-plots				
Treatments (T)	0.34	2.02$^{\bullet}$	0.23	0.33
HREP	4.93**	1.47$^{\bullet}$	1.23	0.99
VREP	0.43	4.41**	4.83**	1.94$^{\bullet}$
RMSE	0.1924	6.871	2.502	638.9
% CV	9.99	2.83	7.63	8.04
Mean	1.927	242.5	32.80	7949

$^{\bullet}$, and ** denotes statistical significance at the P# 0.25, and 0.01 levels, respectively.

Table 2. Effect of potassium chloride on plantcane yield variables.

T #'s	K rates	Stalk weight	CRS	Cane yield	Sugar yield
	lb K_2O/A	lb/stalk	lb/T	T/A	lb/A
1	0	1.97	244	33.1	8070
2	80	1.91	245	32.8	8000
3	160	1.94	244	32.3	7870
4	240	1.90	238	33.0	7850
LSD 0.10		NS[%]	NS	NS	NS
LSD 0.25		NS	3	NS	NS

[%]NS denotes that the LSD was not significantly different at the indicated probability level.

EFFECT OF GIBBERELLIC ACID ON SUGARCANE YIELDS[1]

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SUMMARY

Application of gibberellic acid (0.5, 1.0 and 2.0 qt/A three times during the growing season) to sugarcane variety LCP 85-384 did not significantly ($P<0.10$) affect sugar yields across three years. However, application of gibberellic acid did increase ($P<0.10$) commercially recoverable sugar in the cane at harvest.

INTRODUCTION

Anecdotal data from Florida indicate that gibberellic acid may increase sugarcane yields. Some cane producers have expressed interest in using gibberellic acid in Louisiana. Our research was initiated to determine whether gibberellic acid can be used to increase sugarcane yields in Louisiana.

PROCEDURES

A gibberellic acid (SUL-15) study was initiated in the spring of 1998 using second progeny Kleentek variety LCP 85-384 plantcane. The six treatments used in the study are given in Table 2. The gibberellic acid rates used were 0.5 qt/A (0.5x), 1.0 qt/A (1.0x), and 2.0 qt/A (2.0x). The SUL-15 treatments were applied in 10 gallon/A of water along with a surfactant (1.5 pt of 820 surfactant per 100 gallons of water) using a high-clearance sprayer. The first application of SUL-15 was sprayed directly over the top of the cane, and the second and third applications were sprayed over the top and to the sides of the cane. In 1999 the study was continued on the 1998 research plots with first-stubble cane using the application dates shown in Table 2. Because of lodged cane, treatments 4 and 6 did not receive gibberellic acid in 1999 at the third application date (August 24).

The soil used in the study was a Baldwin silty clay loam with a pH of 4.5 and a soil analysis of 248, 30, 202, 2233, and 505 ppm, respectively, for P, Na, K, Ca, and Mg. The study used a 6x6 Latin square design with six replications. Experimental plots consisted of three 5-foot10-inch by 50-foot rows with a 10-foot alley at the ends of the plots. All plots were separated on both sides by three 5-foot 10-inch by 50-foot border rows.

[1]Research was partially supported by PRO-CHEM Chemical Company.

The cane was grown to maturity each year using recommended fertilizer rates and standard cultural practices. All plots were harvested with a two-row soldier harvester and weighed with a weigh rig. A 10-stalk sample was randomly taken at harvest from each plot each year to determine stalk weight and commercially recoverable sugar (CRS) per ton of harvested cane. Plant height was also determined for this 10-stalk sample in 1998 and 1999. Plant populations were determined before harvest each year.

RESULTS AND DISCUSSION

Table 1 shows that the gibberellic acid treatments used in the study (Table 2) did not significantly ($P>0.10$) affect the measured yield variables, except commercially recoverable sugar. There was, however, a trend toward significance ($P<0.25$) for effect of treatments on sugar yield. Harvest year affected all of the measured variables (Table 1) in the study, and the year x treatment interaction was not significant ($P>0.10$) for any of the variables. Yields in 1999 with first-stubble were very good (Table 3) and were higher than for plantcane in 1998, or second stubble in 2000.

Table 3 shows that treatments 5 and 6 had significantly ($P<0.10$) higher CRS values (averaged across the three years) than the check (T1), demonstrating that application of the 0.5x and 2.0x gibberellic acid rates (Table 2) increased the sugar concentration of the stalks.

Table 1. F-values and statistical parameters for effect of gibberellic acid treatments and harvest years on sugarcane yield variables.

Source	df	Stalk weight	Plant pop.	Plant§ height	CRS	Cane yield	Sugar yield
<u>main-plots</u>							
Treatments (T)	5	1.41	0.88	0.77	2.31~	0.97	1.56•
HREP	5	0.23	1.38	3.60*	7.75**	2.31~	4.69**
VREP	5	2.86*	2.79*	1.45•	0.38	5.93**	6.04**
<u>sub-plots</u>							
Years (Y)	2	127.38****	313.72****	56.58****	307.75****	19.51****	84.54****
TxY	5	0.47	1.11	1.55•	0.52	0.54	0.41
RMSE for main-plots		0.2005	4499	0.3275	7.454	3.620	825.6
% CV “ ” “		10.25	8.92	3.66	3.44	8.72	9.17
RMSE for sub-plots		0.2289	4563	0.3735	11.66	4.088	1028
% CV “ ” “		11.71	9.04	4.18	5.38	9.84	11.42
Mean		1.956	50450	8.944	216.9	41.53	9004

§Plant height was not measured for the 2000 crop.

•, ~, *, **, and **** denotes statistical significance at the P# 0.25, 0.10, 0.05, 0.01, and 0.0001 levels, respectively.

Table 2. Gibberellic acid rates and timing for three years.

T#	For 1998[‡]	For 1999	For 2000
1	SUL-15 not applied		
2	1.0x SUL-15 applied on: 4/9	5/7	4/6
3	1.0x SUL-15 applied on: 4/9, 5/22	5/7, 6/24	4/6, 5/31
4	1.0x SUL-15 applied on: 4/9, 5/22, 7/6	5/7, 6/24, 7/24[~]	4/6, 5/31, 7/21
5	0.5x SUL-15 applied on: 4/9, 5/22, 7/6	5/7, 6/24, 7/24	4/6, 5/31, 7/21
6	2.0x SUL-15 applied on: 4/9,5/22, 7/6	5/7, 6/24, 7/24[~]	4/6, 5/31, 7/21

[‡]The 0.5x, 1.0x, and 2.0x rates denote gibberellic acid rates of 0.5, 1.0, and 2.0 qt/A, respectively, for each of the indicated dates.
[~] The August 24 application was not applied on these two treatments because the cane was lodged.

Table 3. Effect of gibberellic acid treatments on sugarcane yield variables averaged across harvest years.

T#	Stalk weight	Plant pop.	Plant[a] height	CRS	Cane yield	Sugar yield
	lb/stalk	1000/A	ft.	lb/T	T/A	lb/A
1	1.92	50.4	8.94	213	41.0	8750
2	1.96	51.5	8.90	216	41.6	8980
3	2.01	49.8	8.86	216	42.2	9120
4	2.03	49.4	9.03	216	40.7	8800
5	1.91	49.7	8.87	220	40.9	8960
6	1.90	51.8	9.06	220	42.8	9420
LSD 0.10	NS	NS	NS	4	NS	NS
LSD 0.25	NS	NS	NS	3	NS	330

[a]Plant height are based on 1998 and 1999; treatments were not measured for plant height in 2000.
NS denotes that the treatments did not affect the indicated yield variables at the designated significance levels.

Table 4. Effect of harvest year on sugarcane yield parameters averaged across gibberellic acid treatments.

Year	Stalk weight	Plant pop.	Plant[a] height	CRS	Cane yield	Sugar yield
	lb/stalk	1000/A	ft.	lb/T	T/A	lb/A
1998	1.94	50.7	8.61	227	38.1	8,660
1999	2.39	36.8	9.28	245	43.9	10,720
2000	1.53	63.8	-	179	42.6	7,630
LSD 0.10	0.09	1.8	0.15	5	1.6	400
LSD 0.25	0.06	1.2	0.10	3	1.1	280

[a]Plant heights at harvest were not made in 2000.

EFFECT OF NITROGEN FERTILIZER RATES AND LIME STABILIZED SEWAGE SLUDGE ON LCP 85-384 PLANTCANE YIELDS

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SUMMARY

Applying 10 and 20 tons/acre (dry weight basis) of lime-treated sewage sludge under cane at planting reduced ($P<0.10$) LCP 85-384 plantcane sugar and cane yields in 2000. Nitrogen application increased ($P<0.10$) cane yields, but did not affect sugar yields. There was a significant ($P<0.10$) sludge x nitrogen interaction for commercially recoverable sugar (CRS).

INTRODUCTION

Past research has shown that composted municipal waste can be safely and effectively used to grow sugarcane. However, municipalities in the Sugar Belt of Louisiana do not produce composted municipal waste. Consequently, if municipal waste is to be used, it will necessarily occur in the form of sewage sludge. At present, lime stabilized (class B) sewage sludge can be used in sugarcane production only with a special permit. Such a permit was obtained by the Iberia Research Station and the City of New Iberia for a sewage sludge x nitrogen fertilizer study in Iberia Parish.

OBJECTIVE

To determine the effect of nitrogen fertilizer rates and lime stabilized sewage sludge rates and placement on sugarcane yields.

MATERIALS AND METHODS

A Baldwin silty clay soil near Olivier was selected as the test site. The experimental design was a Latin square, split-plot with four replications. Experimental plots consisted of three 5-foot 10-inch by 30-foot rows with a 10-foot alley at the ends of each plot. All experimental plots were separated by three border rows that were fertilized according to recommended rates for plantcane. Main-plot treatments consisted of four different class B lime stabilized sewage sludge rates and application methods (Table 2). One main-plot did not receive sludge; a second had 10 T/A (dry weight basis) of sludge broadcast over rows and incorporated into the soil; and the third and fourth main plots received 10 and 20 T/A, respectively, of sewage sludge applied to opened rows immediately before planting first progeny Kleentek variety LCP 85-384 at three stalks and a lap of two joints in September of 1999.

Nitrogen fertilizer rates (0, 50, 100, and 150 lb N/A as ammonium nitrate) served as the split plots. All experimental plots received a blanket application of P_2O_5, K_2O, and S at 40, 120, and 24 lb/A as polyphosphate, potassium chloride, and gypsum, respectively. Fertilizer was applied to the plots in May of 2000.

Cane was grown until mid-November using standard cultural practices, and plant populations were taken in September from all plots. The experiment was harvested with a two row soldier harvester, and all plots were weighed with a weigh rig. A 10-stalk sample was taken from each plot to determine average stalk weight and commercially recoverable sugar (CRS) per ton of harvested cane.

RESULTS AND DISCUSSION

Table 1 shows that sewage treatments had a significant ($P<0.10$) effect on stalk weights, cane yield, and sugar yield, while nitrogen fertilizer rates only affected cane yield. There also was a significant sludge x nitrogen interaction for CRS.

The relatively low coefficient of variations for CRS, cane yield, and sugar yield indicate that the experimental design did a good job of removing variability from the study.

Table 2 shows that the 10-under and 20-under sludge treatments significantly ($P<0.10$) decreased stalk weight, and cane and sugar yield compared to the check. The 10-mix treatment also decreased cane yield. The reason for the decrease in yield with sludge application may be related to the sensitivity of LCP 85-384 to overfertilization with nitrogen. Previous research with starter fertilizer on fallow cane shows that applying more that 15 lb N/A in the furrow with cane at planting can reduce sugar yields.

Table 3 shows that increasing nitrogen fertilizer to 50 lb/A and beyond increased ($P<0.10$) cane tonnage, but did not significantly affect the other yield variables.

Table 4 shows the significant ($P<0.10$) interactive effect of sludge and N rates on commercially recoverable sugar. Nitrogen fertilizer decreased CRS (T4 vs. T1) in the absence of sludge, decreased it (T7 vs. T5) and increased it (T8 vs. T7) with the 10-mixed treatment, increased it (T10 vs. T9) and decreased it (T12 vs. T10) with the 10-under treatments, and had no effect with the 20-under sludge treatment.

Conversely, applying sludge reduced ($P<0.10$) CRS in the absence of nitrogen fertilizer (T9 vs. T1), had no effect at the 50 and 100 lb N rates, and increased it (T8 vs. T4) and decreased it (T12 vs. T8) at the 150 lb N rate.

Table 1. F-values and statistical parameters for effect of sewage sludge and nitrogen application rates on LCP 85-384 plantcane yield variables.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar Yield
main plots						
Sewage (S)	3	6.06*	2.13•	0.56	7.75*	3.79~
HREP	3	2.28•	0.82	1.91•	5.93 *	2.83•
VREP	3	3.32~	1.07	3.89~	1.89•	2.09•
sub-plots						
Nitrogen (N)	3	1.13	0.92	0.88	2.62~	1.27
SxN	9	1.48•	1.74•	2.05~	1.25	1.32
RMSE for main plots		0.1770	4976	9.762	1.620	549.3
% CV for main plots		11.34	10.23	4.27	4.79	7.10
RMSE for sub-plots		0.1764	3686	8.234	1.785	517.7
% CV for main plots		11.30	7.58	3.60	5.28	6.69
Mean		1.561	48,620	228.6	33.82	7732

•, ~, and * denote statistical significance at the P#0.25, 0.10, and 0.05 levels, respectively.

Table 2. Effect of sewage sludge rates and placement on sugarcane yield variables averaged across N rates.

Sewage sludge	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
T/A	lb/stalk	1000/A	lb/T	T/A	lb/A
0	1.70	46.1	230	35.3	8110
10 - mixed	1.60	49.5	231	34.0	7740
10 - under	1.49	50.2	226	33.3	7550
20 - under	1.46	48.7	228	32.7	7530
LSD 0.10	0.12	NS	NS	1.1	380
LSD 0.25	0.08	2.2	NS	0.7	250

NS denotes statistical nonsignificance at the indicated P level.

Table 3. Effect of nitrogen fertilizer rates on sugarcane yield variables averaged across sewage sludge treatments.

N-rate	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
lb N/A	lb/stalk	1000/A	lb/T	T/A	lb/A
0	1.57	47.8	230	32.8	7520
50	1.62	47.9	231	34.0	7850
100	1.55	49.2	226	34.2	7750
150	1.51	49.5	228	34.3	7810
LSD 0.10	NS	NS	NS	1.1	NS
LSD 0.25	NS	NS	NS	0.8	NS

NS denotes statistical nonsignificance at the indicated P level.

Table 4. Effect of nitrogen fertilizer rates and sewage sludge treatments on plantcane yield variables.

T#'s	Sewage sludge	N-rate	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
	T/A	lb/A	lb/stalk	1000/A	lb/T	T/A	lb/A
1	0	0	1.69	44.5	236	33.4	7870
2	0	50	1.73	44.8	230	36.7	8470
3	0	100	1.81	44.3	230	35.4	8150
4	0	150	1.56	50.6	222	35.8	7930
5	10-mixed	0	1.58	49.1	230	34.4	7930
6	10-mixed	50	1.74	47.2	227	33.0	7480
7	10-mixed	100	1.38	50.9	219	34.3	7530
8	10-mixed	150	1.69	50.9	236	34.1	8050
9	10-under	0	1.52	52.3	222	31.6	7040
10	10-under	50	1.55	49.6	235	33.6	7880
11	10-under	100	1.50	50.9	226	33.1	7500
12	10-under	150	1.39	48.1	223	34.8	7770
13	20-under	0	1.49	45.4	230	31.6	7250
14	20-under	50	1.46	50.0	231	32.8	7570
15	20-under	100	1.49	50.6	231	33.9	7830
16	20-under	150	1.40	48.6	230	32.5	7480
LSD 0.10 for N within sludge			NA	NA	10	NA	NA
LSD 0.25 " " " "			0.15	3.1	7	NA	NA
LSD 0.10 for sludge within N			NA	NA	13	NA	NA
LSD 0.25 " " " "			0.16	4.5	9	NA	NA

NA denotes that the LSD is nonapplicable because the sludge x N interaction was not significant at the indicated probability level.

EFFECT OF HIGH GYPSUM APPLICATION RATES ON PLANTCANE YIELDS FOR A HEAVY-TEXTURED SOIL

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SUMMARY

Applying up to 20 tons/acre of by-product gypsum to an Alligator clay soil did not significantly affect HoCP91-555 plantcane sugar yields in 2000. However, applying gypsum did result in lower ($P<0.10$) commercially recoverable sugar.

INTRODUCTION

Research in Louisiana shows that application of high amounts of gypsum (5-10 T/A) can result in significant (12%) yield responses on heavy-textured soils in stubble crops. There is also a school of thought that says "optimum crop yields cannot be obtained on heavy-textured soils unless the Ca/Mg ratio of soil (based on % cation exchange capacity) is close to 7:1." We conducted our study to test this theory and to determine the effect of gypsum application rates on crop yields and soil moisture and physical properties.

MATERIALS AND METHODS

An Alligator clay soil was selected for use in this study. Initial soil analysis (3385 and 630 ppm Ca and Mg, respectively, with a CEC of 21.2) indicated that it would require 17.3 T/A of gypsum to bring the Ca/Mg ratio (based on % CEC) up to the desired 7:1 value. To achieve this goal 0, 1.5, 5, 10, 15, and 20 T/A of gypsum were broadcast applied to experimental plots on August 23, 1999, and incorporated into the soil. Prior to incorporation the 1.5 T/A gypsum treatment also received 1.5 T/A of by-product lime and 15 gallon/A of a liquid biological solution. In May of 2000 this treatment also received 1 T/A of bagasse compost.

A 6x6 Latin square experimental design was used in the experiment. All treatments were replicated six times. Plots consisted of three 5-foot 10inch by 40-foot rows with a 10-foot alley at the ends of all plots. All plots were separated by three border rows on each side that did not receive gypsum. The experiment was planted in September 1999 with first progeny Kleentek variety HoCP 91-555 at four stalks and a lap of two joints.

Cane was grown to maturity using standard cultural practices. Plant populations were determined in September. The test was harvested in early December using a two-row soldier harvester, and plots were weighed with a weigh rig. A 10-stalk sample was taken from each plot to determine average stalk weight and commercially recoverable sugar (CRS) per ton of harvested cane.

RESULTS AND DISCUSSION

Table 1 shows that the experimental treatments did not affect (P>0.10) stalk weight, plant population, cane yield or sugar yield in 2000. The treatments did, however, affect CRS (Table1) as is shown by the lower (P<0.10) CRS values for all treatments receiving gypsum (Table 2). Furthermore, treatments receiving 10, 15, and 20 T/A of gypsum (T #'s 3, 4, and 5) had lower CRS values than Treatment Numbers 6 and 2, which received only 1.5 and 5.0 T/A of gypsum, respectively.

Our experiment was meant to test the effect of gypsum on soil moisture and physical properties, and their influence on crop yields. The severe drought in the summer of 2000 was not the ideal time to test this. Hopefully, the 2001, 2002, and 2003 crop years will provide "normal" moisture years so that a "fair" test can be conducted.

Table 1. Effect of gypsum rates on F-values and statistical parameters of plantcane yield variables.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
Treatments (T)	5	0.63	0.83	6.42^{***}	0.70	$1.59^{\bullet}$
HREP	5	1.29	0.86	0.43	4.00^{*}	3.68^{*}
VREP	5	$2.11^{\bullet}$	12.86^{****}	11.06^{****}	1.16	6.98^{***}
RMSE		0.1680	2474	7.983	1.752	417.6
% CV		10.92	5.42	4.17	5.39	6.71
Mean		1.539	45,650	191.4	32.48	6220

$^{\bullet}$, *, ***, and ****denote statistical significance at the P#0.25, 0.05, 0.001, and 0.0001 levels, respectively.

Table 2. Effect of gypsum treatments on plantcane yield variables.

T#	Gypsum	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
	T/A	lb/stalk	1000/A	lb/T	T/A	lb/A
1	0	1.53	45.3	206	31.6	6530
2	5.0	1.47	45.8	195	33.1	6430
3	10.0	1.51	45.0	185	32.4	6000
4	15.0	1.58	45.3	185	33.1	6140
5	20.0	1.53	47.4	184	32.8	6030
6	1.5[+]	1.62	45.0	194	32.0	6190
LSD 0.10		NS	NS	8	NS	NS
LSD 0.25		NS	NS	5	NS	290

[%]This treatment also received 1.5 T/A of Domino by-product lime when the gypsum was applied, 15 G/A (on 8/23/99) of liquid biologicals, and 1 T/A of USL compost in April 2000.

EFFECT OF INORGANIC FERTILIZER AND FISH[2]
EMULSION ON SUGARCANE YIELDS

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SUMMARY

Highest ($P<0.10$) LCP 85-384 sugar yields across two years were obtained where 75 lb N/A and 5 gallon/A of fish emulsion were sidedressed in the spring. Spring-applied fertilizer and fish emulsion treatments, however, did not affect ($P>0.10$) stalk weights, plant population, or commercially recoverable sugar. Fall-applied fish emulsion did not significantly ($P>0.10$) affect the sugarcane yield variables.

INTRODUCTION

Liquid fish emulsion is a by-product of the fish industry. This material is rich in nutrients and, therefore, should have value as a fertilizer in the growing of sugarcane. To date, little research has been conducted to determine whether fish emulsion has economic value in sugarcane culture.

OBJECTIVES

1) Determine the effect on sugarcane yields of placing various fish emulsion rates under cane at planting.

2) Determine the effect of fish emulsion on inorganic fertilizer requirements.

3) Determine if using fish emulsion in sugarcane production can increase the number of ratoon crops obtained from one planting.

MATERIALS AND METHODS

In September 1998 Kleentek variety LCP 85-384 sugarcane was planted at three stalks and a lap of two joints for a fish emulsion by inorganic fertilizer rate study. The experiment used a Latin square, split-plot design with four replications. Main plots consisted of the four spring-applied inorganic fertilizer and fish emulsion rates shown in Table 2. Split-plots consisted of the four fall-applied fish emulsion rates shown in Table 3. The fall-applied fish emulsion rates were applied to opened rows under cane at planting. The spring-applied fertilizer and fish emulsion rates were applied to the inner off bar of each row receiving that particular treatment (Table 2) in April of 1999 and 2000.

Experimental sub-plots consisted of three 6-foot by 40-foot rows with a 10-foot alley separating the ends of the plots. The sugarcane plots were grown to maturity using standard cultural practices.

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[2]Research was partially supported by Omega Protein, Inc.

Plant populations for each sub-plot were determined in October of each year. The study was harvested each year using a two-row soldier harvester, and the plots were weighed with a weigh rig. Ten stalks were randomly selected from each sub-plot for determination of commercially recoverable sugar (CRS) and average stalk weight.

RESULTS AND DISCUSSION

Table 1 shows that the spring-applied fertilizer and fish emulsion rates significantly (P<0.10) affected cane and sugar yields of LCP 85-384 across the two years. However, the fall-applied fish emulsion rates did not affect the five yield parameters measured. The spring by fall interaction was not significant (P<0.10) for any of the five yield variables (Table 1), though there was a trend (P<0.25) toward significance for stalk weight. The low % coefficient of variations (less than 10) for CRS, cane yield and sugar yield show that the statistical design did a good job of keeping the variability in the study low.

Table 2 shows that the 0.75x fertilizer and 5 G/A spring-applied fish emulsion treatment had the highest (P<0.10) sugar yields across the two years. Further increasing the fertilizer rate from 0.75x to 1.0x (increasing nitrogen from 75 lb/A to 100 lb/A and not adding fish emulsion) resulted in reduced (P<0.10) sugar yields. Likewise, decreasing the fertilizer rate from 0.75x to 0.5x (reducing nitrogen fertilizer from 75 lb/A to 50 lb/A) resulted in reduced sugar yields.

Table 1 shows that the year x spring, year x fall, and year x spring x fall interactions were not significant (P>0.10) for cane or sugar yield. There was a trend (P<0.25), however, toward significance for the year x spring x fall interaction for sugar (Table 3).

Table 1. F-values and statistical parameters for effect of inorganic fertilizer and fish emulsion on LCP 85-384 yield variables for two years.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar Yield
main-plots						
Spring (S)	3	1.42	0.81	0.16	14.68**	34.63**
HREP	3	0.35	1.27	3.83$^{\sim}$	12.84**	11.90**
VREP	3	8.82*	1.33	11.93**	15.15**	70.95**
sub-plots						
Fall (F)	3	0.50	1.03	1.18	0.80	0.17
SxF	9	1.77$^{\bullet}$	0.98	1.32	1.07	0.97
sub-sub-plots						
Years (Y)	1	112.20**	128.68**	583.71**	0.03	512.80**
YxS	3	4.82**	3.95*	0.18	0.11	0.54
YxF	3	0.47	0.58	0.44	0.20	0.96
YxSxF	9	0.50	0.96	1.10	0.97	1.72$^{\bullet}$
RMSE for main-plots		0.2922	8058	9.646	2.067	273.60
% CV for main-plots		13.14	15.76	5.01	4.70	3.24
RMSE for sub-plots		0.1806	5725	10.34	3.219	781.4
% CV for sub-plots		8.12	11.20	5.37	7.33	9.26
RMSE for sub-sub-plots		0.2225	5146	14.02	3.552	653.1
% CV for sub-sub-plots		10.01	10.06	7.29	8.08	7.74
Mean		2.224	51,140	192.4	43.94	8436

$^{\bullet}$, $^{\sim}$, *, and ** denotes statistical significance at the P#0.25, 0.10, 0.05, 0.01, and 0.0001 levels, respectively.

Table 2. Effect of spring fertilizer and fish emulsion rates on sugar yields for two years.

Fertilizer app. in spring	Fish emulsion app. in spring	Plant cane	First stubble	Total
	G/A	---------------------	lb/A	--------------------
0x	0	9,390	6,750	16,140
0.5x	5	9,700	7,120	16,820
0.75x	5	10,210	7,310	17,520
1.0x	0	9,750	7,250	17,000
LSD 0.10		190	190	270
LSD 0.25		130	130	180

Table 3. Effect of spring fertilizer and fish emulsion and fall fish emulsion rates on sugar yields for two years.

T#	Spring fert.	Fish emulsion appl. in spring	Fish emulsion appl. in fall	Plant cane	First stubble
		G/A	G/A	--------------lb/A	--------------
1	0.0x	0	0	9,040	6,720
2	0.0x	0	25	9,960	6,650
3	0.0x	0	50	9,320	6,660
4	0.0x	0	100	9,250	6,970
5	0.5x	5	0	10,060	7,220
6	0.5x	5	25	10,200	7,180
7	0.5x	5	50	9,800	6,590
8	0.5x	5	100	8,850	7,370
9	0.75x	5	0	10,390	7,110
10	0.75x	5	25	9,840	6,920
11	0.75x	5	50	10,030	7,580
12	0.75x	5	100	10,590	7,640
13	1.0x	0	0	9,520	7,550
14	1.0x	0	25	9,700	7,690
15	1.0x	0	50	10,000	6,800
16	1.0x	0	100	9,760	6,970
LSD 0.25 for effect of spring fertilizer treatments				250	250

LSD 0.25 for effect of fall fish treatments	660	660

EFFECT OF NITROGEN FERTILIZER RATES, A[1] NITROGEN STABILIZATION PACKAGE, AND VARIETIES ON SUGARCANE YIELDS

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SUMMARY

Results showed that sugarcane variety LCP 85-384 yielded higher (P#0.10) than varieties CP 70-321 and HoCP 85-845 across four nitrogen fertilizer rates (60, 100, 140, and 180 lb/A) and two years. Also, adding urea nitrogen (that contained a nitrogen stabilization package) to row furrows of HoCP 85-845 in December-January resulted in sugar yields as high as where nitrogen was applied the following April.

INTRODUCTION

In recent years, there has been a dramatic increase in the acreage planted to sugarcane variety LCP 85-384. However, it is not clear whether this variety needs more or less nitrogen fertilizer compared to other sugarcane varieties. To address this question adequately, LCP 85-384 needs to be compared with other recommended sugarcane varieties in a nitrogen fertilizer test.

Also, because of market conditions, urea can be purchased 10-15% cheaper in the fall and winter than in the spring and summer. If inorganic nitrogen fertilizer could be stabilized to prevent urea volatilization, denitrification, and the leaching of nitrate, urea could be applied to sugarcane in the fall and winter when the cost of nitrogen is lower. Applying a nitrogen stabilization package (calcium chloride, and a urease and nitrification inhibitor, supplied by Stoller Enterprises, Inc.) to liquid urea should reduce nitrogen losses from the above causes. Also, applying the liquid urea and nitrogen stabilization package in the furrow between the sugarcane rows in the fall or winter may help improve soil water drainage through the effect of calcium and ammonia (derived from the applied urea) in improving the permeability of the soil to water movement.

OBJECTIVES

1) To determine the effect of spring-applied nitrogen fertilizer rates and sugarcane varieties on sugarcane yield.

2) To determine the effect of winter-applied nitrogen, with a nitrogen stabilization package, on sugarcane yields.

PROCEDURES

Kleentek sugarcane varieties CP 70-321, LCP 85-384, and HoCP 85-845 were planted in early October 1998 at three stalks and a lap of two joints. Experimental plots consisted of three 6-

[1]Research was partially supported by Stoller Enterprises, Inc.

foot by 30-foot rows, with a 10-foot alley at the ends of each plot. The experimental design used was a Latin square, split plot with four replications. Nitrogen rates (Table 2) were main plots, and varieties and nitrogen timing (Table 3) were the split plots. Spring nitrogen (urea) was applied to the inner off bar of each row in the split-plot and did not receive the nitrogen stabilization package (which contained calcium chloride and a urease and nitrification inhibitor). Treatments receiving winter fertilizer had their nitrogen (urea) applied in mid-December or January in a 1-inch band in the furrow between the rows. The two inner furrows of each three row split plot received all the nitrogen for the three rows.

The test was harvested each year with a two-row soldier harvester, and the split-plots were weighed with a weigh rig. Ten stalks were randomly taken from each split plot to determine stalk weight and commercially recoverable sugar (CRS). All split plots were rated for lodging prior to harvest.

RESULTS AND DISCUSSION

Table 1 shows that nitrogen rates affected (P#0.10) cane and sugar yields. Nitrogen rates also interacted with harvest years to affect cane and sugar yields. Sugarcane varieties and nitrogen timing (spring vs. winter) affected all the measured variables, as did harvest years.

Table 2 shows that the 100 lb N/A rate had lower cane and sugar yields than the lower (60 lb N/A) and higher (140 and 180 lb N/A) nitrogen rates. This is hard to explain.

Table 3 shows that applying nitrogen stabilized urea (which contained calcium chloride and a urease and nitrification inhibitor) to variety HoCP 85-845 in the winter vs. the spring resulted in higher (P#0.10) cane yields and stalk weights, but did not significantly affect sugar yields. Variety LCP 85-384 also had higher cane and sugar yields and more lodging than varieties CP70-321 and HoCP 85-845 (Table 3).

Table 4 shows the interactive effect (P#0.05) of nitrogen fertilizer rates with harvest years on sugar yield. Sugar yields tended to decrease with increased nitrogen application to plantcane (1999), while first stubble sugar tended to increase.

Table 1. F-values and statistical parameters for effect of spring-winter-variety x N treatments and harvest years on sugarcane yield variables.

Source	df	Stalk weight	CRS	Cane yield	Sugar Yield	Lodging
main plots						
Nitrogen (N)	3	2.07•	0.09	5.46*	6.44*	1.31
HREP	3	19.07****	3.73~	2.27•	0.34	2.22•
VREP	3	4.33~	0.87	2.39•	1.04	4.38~
sub-plots						
Spring-winter-variety	3	16.04**	23.01**	15.22**	16.78**	2.57~
N x SWV	9	0.45	0.92	0.84	0.49	0.62
sub-sub-plots						
Year (Y)	1	25.17**	409.30**	139.91**	18.67**	183.90**
N x Y	3	0.35	0.95	4.53**	3.13*	0.17
SWV x Y	3	3.18*	0.85	0.03	0.59	5.07**
N x SWV x Y	9	0.59	0.91	0.79	0.71	0.82
RMSE for main plots		0.1650	12.81	4.092	707.3	0.6595
% CV for main plots		7.40	6.56	9.36	8.50	25.97
RMSE for sub-plots		0.2694	11.99	4.073	899.7	0.7977
% CV for main plots		12.08	6.14	9.32	10.81	31.42
RMSE for sub-sub-plots		0.3304	15.57	3.640	990.1	0.7235
% CV for sub-sub-plots		14.81	7.98	8.33	11.90	28.49
Mean		2.231	195.2	43.72	8323	2.539

•, ~, *, and ** denote statistical significant at the $P<0.25$, 0.10, 0.05, and 0.01 levels, respectively.

Table 2. Effect of nitrogen fertilizer rates on sugarcane yield variables across spring-winter-variety treatments and harvest years.

Nitrogen	Stalk weight	CRS	Cane yield	Sugar yield	Lodging[+]
lb N/A	lb/stalk	lb/T	T/A	lb/A	
60	2.29	196	44.0	8,380	2.38
100	2.23	195	41.3	7,860	2.50
140	2.21	195	45.4	8,660	2.60
180	2.20	195	44.3	8,400	2.69
LSD 0.10	NS	NS	2.0	350	NS
LSD 0.25	0.05	NS	1.3	230	NS

[+]Lodging was rated on a 1-5 scale, where 1 had all plants erect and 5 had all plants lodged.

Table 3. Effect of spring-winter-variety treatments on sugarcane yield variables across nitrogen rates and harvest years.

Variety	Fertilizer applied in	Stalk weight	CRS	Cane yield	Sugar yield	Lodging
		lb/stalk	lb/T	T/A	lb/A	
CP 70-321	Spring (S)	2.45	204	39.7	7,800	2.41
LCP 85-384	S	2.01	204	46.8	9,370	2.88
HoCP 85-845	S	2.15	188	42.9	7,930	2.47
HoCP 85-845	Winter (W)	2.30	185	44.9	8,170	2.41
LSD 0.10		0.14	7	1.6	430	0.30

LSD 0.25	0.10	5	1.1	3

Table 4. Effect of nitrogen fertilizer rates and harvest years on sugar yields averaged across spring-winter variety treatments.

	Harvest year	
N-rate	1999	2000
lb N/A	-------------------lb/A-----------------	
60	9390	7550
100	8450	7310
140	8960	8370
180	8410	8390
LSD 0.10	500	500
LSD 0.25	330	330

EFFECT OF COMBINE RESIDUE MANAGEMENT[1] AND A NITROGEN STABILIZATION PACKAGE ON FIRST STUBBLE SUGARCANE YIELDS

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SUMMARY

Research across a two-year residue management study shows that spraying combine trash (in late January each year) with 60 lb N/A as nitrogen stabilized urea (containing a urease and nitrification inhibitor), and applying the remaining urea (30 or 60 lb N/A) in the spring, resulted in a sugar yield as good as where the trash was burned (in January) and all the urea nitrogen (120 lb N/A) was applied in the spring. Also, applying 90 lb N/A as urea treated with a urease inhibitor (Agrotain) in the spring resulted in a sugar yield as high as where 120 lb N/A as untreated urea was applied in the spring.

INTRODUCTION

Approximately 85% of the sugarcane acreage in Louisiana is now harvested with combine harvesters. Much of this cane is harvested green chopped, which results in a residue blanket on the soil surface that can reduce sugar yields (500 to 1000 lb/A) for the following crop if it is not removed or burned. Removing the residue blanket from the row tops and placing it in the furrow can cause cultivation problems the following spring. Many producers burn the residue blanket after harvest, which may result in allergy problems for the public. Burning the residue also results in loss of nitrogen and organic matter that could improve soil fertility and soil manageability if the residue blanket were not destroyed.

At present, the sugarcane combine residue blanket is more of a liability than an asset. The research in this study seeks to determine if there is a way to manage the residue blanket so that it becomes an asset instead of a liability.

OBJECTIVES

1) Compare the effect of burning combine harvest residue vs. spraying it with liquid super urea (which contains a urease and nitrification inhibitor) on sugar yields.

2) Determine if applying super urea to the trash blanket can reduce the nitrogen fertilizer requirements of sugarcane.

[1]Research was partially supported by IMC Global Operations, Inc.

MATERIALS AND METHODS

In late January 1999 and 2000, the six treatments in Table 2 were imposed on a Baldwin silty clay soil where LCP 85-384 plantcane and first stubble had been harvested with a combine in mid-January. The treatments were replicated six times in a 6x6 Latin square design. Experimental plots consisted of three 6-foot by 50-foot rows with 10-foot alleys at the ends of each plot. Three border rows also separated each plot on both sides of the plot. Treatments 1, 2, and 6 had their plots burned in late January each year, and treatment 4 and 5 plots had 60 lb N/A as super urea (stabilized with both a urease and nitrification inhibitor) sprayed on the residue blanket in late January. In April of 1999 and 2000 treatments 1-5 received spring urea nitrogen (Table 2) sprinkled by hand on the row tops. Treatment 6 urea (which contained Agrotain urease inhibitor) also was sprinkled on the row tops at the same time. All plots received a blanket application of 40 lb/A of P_2O_5 (as polyphosphate) and 120 lb/A of K_2O (as potassium chloride).

The first stubble and second stubble cane crops were grown to maturity using standard cultural practices. Cane tonnage in each experimental plot was estimated by harvesting 10 feet from the middle row of each plot. Five stalks were randomly selected from the 10-foot section to estimate commercially recoverable sugar (CRS) and average stalk weights. Three stalks also were taken to analyze for nutrient uptake.

RESULTS AND DISCUSSION

Table 1 shows that the trash management and fertilizer treatments (Table 2) did not significantly ($P>0.10$) affect cane and sugar yields across the two crop years. The treatments did affect ($P<0.10$) stalk weights, and there was a trend ($P<0.25$) toward an effect for CRS.

The % coefficient of variations for main plots and sub-plots of stalk weight, cane yield, and sugar yield were large, which indicates that variability was brought into the study by using only a 10-foot section of the center row from each plot to estimate the yield variables.

Table 2 shows the effect of the trash and fertilizer treatments on the four measured yield variables. Sugar yields for Treatments 4 and 5 (which had nitrogen stabilized liquid urea sprayed on the trash blanket in January each year after harvest) were as good as for Treatment 1 where the trash blanket was burned and urea was applied to row tops in April each year. This indicates that spraying the trash blanket in the winter with N-stabilized urea may be an alternative to burning.

The results also show that applying 90 lb N/A as agrotain treated urea in April each year, to cane rows that had their trash blanket burned the previous January (Treatment 6), yielded as well as Treatment 1 where the trash had been burned and 120 lb N/A as untreated urea was added.

Table 2 shows that the stalk weights for Treatment 4 were significantly ($P<0.10$) larger than for Treatments 1,5, and 6.

Table 1. F-values and statistical parameters for effect of harvest years and residue and fertilizer management on LCP 85-384 yield variables.

Source	df	Stalk weight	CRS	Cane yield	Sugar Yield
main plots					
Treatments (T)	5	3.35*	1.94•	0.81	0.58
HREP	5	1.15	0.67	2.19~	2.40~
VREP	5	2.08~	1.17	0.31	1.03
sub-plots					
Years (Y)	1	69.19****	485.89****	67.38****	194.20****
T x Y	5	1.20	0.29	0.55	0.50
RMSE for main plots		0.2383	12.58	6.838	1443
% CV for main plots		13.81	6.68	19.15	20.19
RMSE for sub-plots		0.3083	17.31	7.342	1800
% CV for sub-plots		17.86	9.195	20.56	25.53
Mean		1.726	188.2	35.70	7048

•, ~, *, and ****, denote statistical significance at the P#0.25, 0.10, 0.05, and 0.0001 levels, respectively.

Table 2 . Effect of urea treatments and residue management on LCP 85-384 yield variables across two years.

T#	Residue blanket	Urea source	Urea applied to rows in	Urea N. rate	Stalk weight	CRS	Cane yield	Sugar yield
				lb/A	lb/stalk	lb/T	T/A	lb/A
1	burned in winter	untreated urea	spring	120	1.69	181	37.3	7,090
2	burned in winter	untreated urea	spring	90	1.81	189	33.4	6,630
3	not burned	untreated urea	spring	120	1.76	188	34.5	6,690
4	not burned	Super U	winter spring	60 60	1.91	193	35.7	7,220
5	not burned	Super U	winter spring	60 30	1.55	194	35.2	7,220
6	burned in winter	Agrotain	spring	90	1.65	185	38.1	7,430
LSD 0.10					0.17	NS[a]	NS	NS
LSD 0.25					0.12	6	NS	NS

[a]NS denotes that the means of the indicated variable was not statistically different at the indicated significance levels.

EFFECT OF WINTER FERTILIZATION AND A NITROGEN[1] STABILIZATION PACKAGE ON SUGARCANE YIELDS

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SUMMARY

Our results show across a three-year study that applying nitrogen stabilized urea in the winter resulted in a cane and sugar yield as good as where the N-stabilized urea was added in the spring.

INTRODUCTION

Sugarcane in Louisiana is usually fertilized in April or May. However, urea is 10-15% cheaper when it is purchased in the fall or winter. Also, because of the high amounts of clay in most of Louisiana's sugarcane soils, water is frequently trapped in the furrow between sugarcane rows after harvest (especially when sugarcane is harvested under wet conditions so that the fields are rutted up and drainage ways are not reopened).

If liquid urea could be stabilized (by using a urease inhibitor) and mixed with liquid calcium chloride it may be possible to add nitrogen between the sugarcane rows (in the furrow) in a narrow (one inch) band in the winter after harvest. This could improve water drainage through the effect of calcium and ammonium (derived from the applied urea) in improving the permeability of the soil to water movement so that sugarcane yields are increased.

OBJECTIVES

1) To determine the effect of nitrogen-stabilized liquid urea on sugarcane yields when applied in the winter after sugarcane harvest.

2) To determine the effect of nitrogen fertilizer rates on sugarcane yields.

PROCEDURES

In late September of 1997, a sugarcane study was initiated at the Iberia Research Station on a Baldwin silty clay soil. The experiment consisted of eight treatments (Table 2) replicated eight times in an 8x8 Latin square design. Experimental plots consisted of three 5-foot10-inch by 50-foot rows with 10-foot alleys at the end of each plot.

The experiment was planted with second progeny Kleentek variety CP 70-321 at three stalks and a lap of two joints. Experimental treatments 7 and 8 had 1 ton per acre of gypsum applied under cane at planting. Treatments 3 and 6 had their N-hib Ca and liquid urea mixed together immediately before they were added to the two furrows between the three rows (all the nitrogen for

[1]Research was partially supported by Stoller Enterprises, Inc; N-hib Ca is one of their products.

the three rows was added to the two inner furrows) in each plot in December of 1997 and 1998 and January of 2000. Treatments 1, 2, 4, 5, 7, and 8 had their liquid urea and N-hib Ca mixed and applied to the inner off bar of each of the three rows in each plot in May of 1998, 1999 and 2000. A blanket application of polyphosphate and muriate of potash was applied to the outer off bar of all sugarcane rows in the study at 60 and 90 lb per acre of P_2O_5 and K_2O, respectively, all three years.

Plant populations were determined in September each year. Cane was grown to maturity each year using standard cultural practices and was harvested at maturity with a two-row soldier harvester. Each experimental plot was weighed with a weigh rig. A 10-stalk sample was taken from each plot to determine average stalk weight and commercially recoverable sugar (CRS) per ton of harvested cane.

RESULTS AND DISCUSSION

Table 1 shows that the fertilizer treatments (Table 2) affected (P<0.10) CRS and cane yield. There was also a trend (P<0.25) toward significance for sugar yield. Harvest year affected all the measured yield variables except cane yield, and there was a tend (P<0.25) toward significance for the treatment x year interaction for cane and sugar yield (Table 1).

Table 2 shows the effect of the eight fertilizer and gypsum treatments on sugarcane yield variables averaged across three years. Increasing nitrogen application from 120 to 180 lb N/A (T1 vs. T4) did not significantly (P>0.10) affect CRS or cane yield. Applying 120 lb N/A of N stabilized urea in the winter vs. the spring (T3 vs. T2) increased (P<0.10) cane yield, but did not affect CRS. However, applying 180 lb N/A as N stabilized urea in the winter vs. the spring (T6 vs. T5) had no effect on CRS or cane yield.

Table 2 also shows that increasing N and Ca applied in the spring (T5 vs. T2) increased (P<0.10) cane yields but decreased CRS. Applying 40 lb Ca/A to the 120 lb N/A rate that had received gypsum at planting (T8 vs. T7) resulted in reduced CRS. Table 2 also shows that adding gypsum under cane at planting increased cane yields and decreased CRS where the N-stabilization package was used (T8 vs. T2), but had no effect where the stabilization package was not used (T7 vs. T1).

While the gypsum and fertilizer treatments did not significantly (P>0.10) affect sugar yield (Table 2), there was a trend (P<0.25) toward significance (Table 1). Table 2 shows that there was a trend (P<0.25) toward higher sugar yields where: 120 lb N/A of nitrogen was added in the winter vs. spring (T3 vs. T2); nitrogen rates were increased from 120 to 180 lb N/A (T4 vs. T1), and higher N and Ca rates were added in the spring with the N stabilization package (T5 vs. T2). Conversely, there was a trend (P<0.25) toward lower sugar yields where: the N-stabilization package was added to 120 lb N/A of spring-applied N (T2 vs. T1), and where the N stabilization package was added to the 120 lb/A N rate that received gypsum (T8 vs. T7). Table 3 shows the interactive (P<0.25) effect of treatments and harvest years on sugar yield.

Table 1. F-values and statistical parameters for effect of experimental treatments and harvest years on sugarcane yield variables.

Source	df	Stalk wt.	Plant pop.	CRS	Cane yield	Sugar yield
<u>main plots</u>						
Treatments(T)	7	1.02	1.20	2.07$^{\sim}$	2.31*	1.56$^{\bullet}$
HREP	7	0.84	1.62$^{\bullet}$	0.36	1.42$^{\bullet}$	2.14$^{\sim}$
VREP	7	5.65**	1.54$^{\bullet}$	4.51**	4.91*	3.86*
<u>sub-plots</u>						
Years (Y)	2	3.20*	246.58****	210.62****	1.31	44.85****
TxY	7	1.18	0.70	0.85	1.46$^{\bullet}$	1.49$^{\bullet}$
RMSE for main plots		0.2892	2248	9.738	2.982	550.7
%C/V " " "		12.30	6.42	5.33	8.24	8.35
RMSE for sub-plots		0.2790	2487	12.63	3.916	928.7
%CV " " "		11.86	7.10	6.92	10.83	14.07
Mean		2.352	35,020	182.6	36.17	6600

$^{\bullet}$, $^{\sim}$, *, **, and **** denote statistical significance at the P#0.25, 0.10, 0.05, 0.01, and 0.0001 levels, respectively.

Table 2. Effect of urea and N-hib Ca fertilizer treatments on sugarcane yield variables averaged across three years.

T#	Urea	N-hib Ca	Fert. applied in	Gypsum applied	Stalk wt.	Plant pop.	CRS	Cane yield	Sugar yield
	lb N/A	lb Ca/A		T/A	lb/stalk	1000/A	lb/T	T/A	lb/A
1	120	0	Spring	0	2.34	35.3	184	35.6	6560
2	120	40	Spring	0	2.27	35.1	184	34.4	6340
3	120	40	Winter	0	2.39	34.7	183	35.9	6580
4	180	0	Spring	0	2.40	34.5	187	36.3	6750
5	180	60	Spring	0	2.25	35.8	179	37.2	6650
6	180	60	Winter	0	2.36	35.6	179	37.3	6700
7	120	0	Spring	1.0	2.40	34.8	184	36.5	6730
8	120	40	Spring	1.0	2.41	34.4	179	36.1	6470
LSD 0.10					NS	NS	5	1.5	NS
LSD 0.25					NS	NS	3	1.0	190

Table 3. Effect of urea and N-hib Ca fertilizer treatments on sugar yields for three years.

T#'s	Urea	N-hib CA	Fert. appl. in	Gypsum applied	Plant cane	First stubble	Second stubble	Total
	lb N/A	lb Ca/A		T/A	--------------------lb/A----------------------			
1)	120	0	Spring	0	6870	6950	5,850	19,670
2)	120	40	Spring	0	6510	7070	5,450	19,030
3)	120	40	Winter	0	6300	7930	5,500	19,740
4)	180	0	Spring	0	6580	7390	6,290	20,260
5)	180	60	Spring	0	6410	7430	6,120	19,960
6)	180	60	Winter	0	7310	7300	5,490	20,100
7)	120	0	Spring	1.0	7500	7080	5,620	20,200
8)	120	40	Spring	1.0	6560	7140	5,720	19,420
LSD 0.10					NS	NS	NS[%]	NS
LSD 0.25					320	320	320	560

%NS denotes that treatments did not affect (P#0.10) the indicated yield variables.

EFFECT OF POWER PERK ON PLANTCANE YIELD VARIABLES AND SOIL PENETRATION RESISTANCE

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SUMMARY

Application rates and different methods of application of a soil conditioner (Power Perk) did not significantly (P<0.10) affect sugarcane yield variables in 2000 under drought conditions. However, broadcasting 20 gallons/acre of Power Perk on sugarcane rows immediately after planting did significantly (P<0.10) reduce soil penetrometer resistance at one of two sampling dates.

Further research is needed to determine whether Power Perk can increase sugarcane yields through decreased soil penetration resistance and improved water drainage.

INTRODUCTION

Power Perk is a liquid product produced by OrganiCal Inc. and is registered as an agricultural mineral and soil conditioner. This product has a pH of approximately 0.4 and is meant to be diluted at least 1:20 with water before application. It is used on construction sites and golf courses as a soil conditioner to correct and/or increase water percolation in clay and saline/sodic soils. Promoters of this product claim that it will reduce the expansion index of clay soils so water can percolate through it and, thereby, reduce resistance to root growth. Since the heavy-textured soils used to grow sugarcane in south Louisiana are known to have drainage problems, we decided to test this product.

OBJECTIVES

To determine the effect of Power Perk on:

1) Soil water concentration and soil penetration resistance.
2) Sugarcane yields across a four-year cane cycle.

MATERIALS AND METHODS

An Alligator clay soil was selected for use in the study. First progeny Kleentek variety HoCP 91-555 was planted at three stalks and a lap of two joints in September of 1999. The experiment used a 6x6 Latin square design with six replications. Experimental plots consisted of three 5-foot 10-inch by 40-foot rows, with a 10-foot alley at the ends of the plots. All treatment plots were separated from adjacent treatments by three border rows.

Experimental treatments (Table 2) were applied immediately after planting. The Power Perk was diluted 1:10 with water before application. Treatments 2-4 were applied as a broadcast spray (from furrow-to-furrow). Treatments 5 and 6 had their Power Perk applied two ways: half in a narrow (1-inch) band (in the furrow between the rows) and the other half in a 4-inch band on the row top.

Cane was grown to maturity using standard cultural practices, and plant populations were determined for each plot in September. The experiment was harvested with a two-row soldier harvester and weighed with a weigh rig. A 10-stalk sample was taken from each plot to determine average stalk weight and commercially recoverable sugar (CRS) per ton of harvested cane. Soil penetrometer resistance was measured on July 14 and August 4 on all plots.

RESULTS AND DISCUSSION

Tables 1 and 2 show that the Power Perk treatments (Table 2) did not significantly ($P > 0.10$) affect plantcane yield variables in 2000. The coefficient of variations for CRS, cane yield, and sugar yield were all below 10%, showing that the variability in the study had been kept to an acceptable level. The severe drought experienced in the summer of 2000 was probably responsible for the relatively low yields produced (Table 2).

Table 3 shows that there was a significant ($P < 0.10$) treatment by sampling date interaction for soil penetrometer resistance. Table 4 shows that broadcast applying 20 G/A of Power Perk reduced soil resistance to the penetrometer by 122 lb per square inch at the July 14 sampling. These results are promising and indicate that the Power Perk was working to reduce soil penetration resistance. Further research is needed to determine the effect of Power Perk on soil properties and sugarcane growth.

Table 1. F-values and statistical parameters for effect of Power Perk application rates and placement on plantcane yield variables.

Source	df	Stalk weight	Plant population	CRS	Cane yield	Sugar yield
Treatments (T)	5	1.06	$1.84^{\bullet}$	0.37	1.34	$1.85^{\bullet}$
HREP	5	$2.29^{\sim}$	0.63	0.43	5.16^{**}	4.19^{*}
VREP	5	1.23	$1.96^{\bullet}$	0.87	3.03^{*}	4.60^{**}
RMSE		0.1615	8202	8.354	2.579	516.3
% CV		10.30	16.48	4.142	7.79	7.74
Mean		1.568	49,770	201.7	33.11	6668

$^{\bullet}$, $^{\sim}$, *, **, and ***denote statistical significance at the P#0.25, 0.10, 0.05, 0.01, and 0.001 levels, respectively.

Table 2. Effect of Power Perk rates and placement on plantcane yield variables.

T#	Power Perk	Stalk weight	Plant population	CRS	Cane yield	Sugar yield
	G/A	lb/stalk	1000/A	lb/T	T/A	lb/A
1	0 - furrow to furrow	1.57	50.9	204	33.4	6840
2	10 - “ ” “	1.64	57.6	201	33.5	6740
3	20 - “ ” “	1.63	49.2	203	34.2	6950
4	30 - “ ” “	1.51	44.1	198	31.3	6190
5	5 in furrow +5 over row top	1.60	46.9	202	31.7	6390
6	10 in furrow + 10 over row top	1.47	49.8	201	35.3	7020
LSD 0.10		NS	NS	NS	NS	NS
LSD 0.25		NS	5.6	NS	NS	370

NS denotes nonsignificance at the indicated P level.

Table 3. F-values and statistical parameters for effect of Power Perk application rates and placement on soil penetrometer resistance.

Source	df	Penetration
main-plots		
Treatments (T)	5	0.84
HREP	5	1.65•
VREP	5	12.07***
sub-plots		
Date (D)	1	57.10****
TxD	5	2.20~
RMSE for main-plots		79.90
% CV " " "		12.85
RMSE for sub-plots		56.61
% CV " " "		9.11
Mean		621.7

•, ~, ***, and **** denotes statistical significance at the P# 0.25, 0.10, 0.001, and 0.0001 levels, respectively.

Table 4. Effect of Power Perk treatments and sampling date on soil penetrometer resistance.

T#	Power Perk	Sampling date July 14	Sampling date August 4
	G/A	---------lb/in.²----------	
1	0 - furrow to furrow	628	681
2	10 - " " "	582	652
3	20 - " " "	506	671
4	30 - " " "	568	675
5	5 in furrow +5 over row top	547	698
6	10 in furrow + 10 over row top	598	657
LSD 0.10 for treatment within sampling date		78	78

LSD 0.25	“	”	“	”	“		54	54

NS denotes nonsignificance at the indicated P level.

EFFECT OF NITROGEN FERTILIZER AND BAGASSE[1] -COMPOST ON SUGARCANE YIELDS ACROSS TWO YEARS

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SUMMARY

Highest cane and sugar yields averaged across plant and first stubble cane were obtained at the 50 lb N/A rate for variety LCP 85-384. Increasing N rates to 100 and 150 lb N/A did not result in higher cane and sugar yields. Applying 4.6 tons/acre of bagasse compost in opened rows under cane at planting resulted in the highest cane ($P<0.10$) and sugar ($P<0.25$) yields.

INTRODUCTION

Past research in Louisiana has shown that using compost in growing sugarcane can result in significant increases in sugar yield. This research also showed that the yield response from compost was over and beyond that obtained from commercial inorganic fertilizer. Sugar mills in Louisiana produce an excess of bagasse that could be used to make compost for growing sugarcane.

OBJECTIVES

1) To determine if compost made from sugarcane bagasse can be used as a soil amendment and organic fertilizer to increase sugarcane yields.

2) To determine if use of compost can decrease sugarcane's inorganic nitrogen (N) fertilizer requirements.

PROCEDURES

Kleentek variety LCP 85-384 was planted for a N by compost study in late September 1998. All treatments were replicated four times in a Latin square, split-plot design on a Baldwin silty clay soil. Nitrogen fertilizer rates (from ammonium nitrate) were main plots, and compost rates (dry weight basis) were the split plots. The compost was obtained from the LSU Agricultural Center and was made from sugarcane bagasse and sudan grass.

Nitrogen fertilizer rates were applied in May of 1999 and 2000 to the inner off bar of the rows receiving nitrogen. Compost rates were placed in open rows before the cane was planted at three stalks and a lap of two joints. All sub-plots consisted of three 6-foot x 40-foot rows, with a 10-foot alley separating the ends of the sub-plots. Cane was grown to maturity each year using standard cultural practices.

[1]Research was partially supported by the American Sugar Cane League.

Plant populations were determined in September each year before harvest for each sub-plot. The plots were harvested with a two-row soldier harvest and weighed with a weigh rig. Ten stalks were randomly selected from each sub-plot to determine average stalk weight and commercially recoverable sugar (CRS).

RESULTS AND DISCUSSION

Table 1 shows that nitrogen fertilizer rates had a significant (P<0.10) effect on cane and sugar yields. Compost rates also affected (P<0.10) cane yields and stalk weights, and there was a trend (P<0.25) toward significance for sugar yields, CRS, and the nitrogen x compost interaction for all five yield variables (Table 1). Harvest year affected (P<0.10) five yield variable and there was a trend (P<0.25) toward significance for the nitrogen x year interaction for CRS, cane yield, and sugar yield.

Table 2 shows that highest cane and sugar yields were obtained at the 50 lb N/A rate, which produced significantly (P<0.10) higher yields than the O N rate, but not the 100 and 150 lb N/A rates. There was, however, a trend (P<0.25) toward higher sugar yields for the 50 lb N/A rate compared to the 100 and 150 lb N/A rate.

Table 3 shows that the 4.6 T/A compost rate resulted in the highest (P<0.10) cane yields and stalk weights. This compost rate also trended (P<0.25) toward higher sugar yields and lower CRS values. The trend toward lower CRS values continued at the 9.2 T/A compost rate. The lower cane yields with the 9.2 T/A compost rate could have been caused by excess nitrogen since applying more than 15 lb N/A under cane at planting has been shown to reduce cane yields.

Table 4 shows the interactive (P<0.25) effect of compost and fertilizer rates on the five measured yield variables, while Table 5 shows the interactive (P<0.25) effect of N x harvest year on CRS, cane yield, and sugar yield.

Table 1. F-values and statistical parameters for effect of nitrogen fertilizer, compost, and harvest years on sugarcane yield variables.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar Yield
<u>main plots</u>						
Nitrogen (N)	3	2.19$^{\bullet}$	1.15	0.09	5.76*	5.98*
HREP	3	8.10**	0.90	1.42	2.10$^{\bullet}$	0.57
VREP	3	28.54**	0.16	2.67$^{\bullet}$	2.14$^{\bullet}$	5.86*
<u>sub-plots</u>						
Compost (C)	2	3.71*	0.52	1.77$^{\bullet}$	3.17$^{\sim}$	2.48$^{\bullet}$
N x C	6	1.86$^{\bullet}$	1.86$^{\bullet}$	1.85$^{\bullet}$	1.47$^{\bullet}$	1.95$^{\bullet}$
<u>sub-sub-plots</u>						
Year (Y)	1	107.33**	380.41**	393.46**	29.65**	18.75**
N x Y	3	1.21	0.59	1.79$^{\bullet}$	1.57$^{\bullet}$	2.06$^{\bullet}$
C x Y	2	0.44	0.72	1.12	0.74	0.79
N x C x Y	6	0.43	0.66	0.98	0.56	0.76
RMSE for main plots		0.1115	6611	15.63	4.423	883.0
% CV for main plots		6.25	13.22	7.56	10.15	9.84
RMSE for sub-plots		0.1584	4407	10.09	4.155	1058
% CV for sub-plots		8.88	8.81	4.88	9.53	11.80
RMSE for sub-sub-plots		0.2156	4443	10.33	3.881	993.1
% CV for sub-sub-plots		12.09	8.88	4.99	8.90	11.07
Mean		1.784	50,010	206.8	43.59	8973

$^{\bullet}$, $^{\sim}$, *, and ** denotes statistical significance at the P#0.25, 0.10, 0.05, and 0.01 levels, respectively.

Table 2. Effect of nitrogen fertilizer rates on sugarcane yield variables averaged across compost rates and harvest years.

N-rates	Stalk weight	Plant population	CRS	Cane yield	Sugar yield
lb N/A	lb/stalk	1000/A	lb/T	T/A	lb/A
0	1.76	48.0	208	40.5	8400
50	1.83	50.2	209	45.5	9450
100	1.79	49.6	206	43.8	8990
150	1.76	52.5	205	44.6	9060
LSD 0.10	NS	NS	NS	2.5	500
LSD 0.25	0.04	NS	NS	1.7	330

NS denotes statistical non significance at the indicated P level.

Table 3. Effect of compost application rates on sugarcane yield variables averaged across nitrogen rates and harvest years.

Compost rates	Stalk weight	Plant population	CRS	Cane yield	Sugar yield
T/A	lb/stalk	1000/A	lb/T	T/A	lb/A
0	1.78	50.2	210	42.8	8920
4.6	1.85	50.2	207	45.1	9300
9.2	1.72	49.7	203	42.8	8700
LSD 0.10	0.07	NS	NS	1.8	NS
LSD 0.25	0.05	NS	3	1.2	320

Table 4. Effect of nitrogen and compost rates on sugarcane yield variables averaged across harvest years.

N-rates	Compost rates	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
lb N/A	T/A	lb/stalk	1000/A	lb/T	T/A	lb/A
0	0	1.77	49.9	211	42.0	8840
0	4.6	1.71	49.4	207	42.0	8680
0	9.2	1.79	44.6	205	37.6	7680
50	0	1.84	48.1	208	43.9	9060
50	4.6	1.86	51.6	213	47.0	9920
50	9.2	1.81	50.9	206	45.6	9360
100	0	1.76	50.2	215	43.1	9210
100	4.6	1.93	47.8	201	43.7	8740
100	9.2	1.65	50.9	201	44.5	9020
150	0	1.75	52.4	204	42.4	8550
150	4.6	1.89	52.0	208	48.1	9930
150	9.2	1.63	52.9	202	43.8	8780
LSD 0.10 for N within compost		NS	NS	NS	NS	NS
LSD 0.25 “ ” “ ”		0.07	4.3	10	2.9	570
LSD 0.10 for compost within N		NS	NS	NS	NS	NS
LSD 0.25 “ ” “ ”		0.10	2.6	6	2.5	640

Table 5. Effect of nitrogen rates and harvest years on sugarcane yield variables averaged across compost rates.

N-rates	Harvest year	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
lb N/A		lb/stalk	1000/A	lb/T	T/A	lb/A
0	1999	2.02	39.4	233	39.6	9230
0	2000	1.49	56.5	182	41.4	7570
50	1999	2.12	40.8	231	43.1	9930
50	2000	1.55	59.6	187	47.9	8960
100	1999	2.03	40.9	228	41.5	9440
100	2000	1.56	57.5	186	45.9	8570
150	1999	1.95	41.5	224	40.3	9020
150	2000	1.60	61.6	188	48.2	9100
LSD 0.10 for N within year		NA	NA	NS	NS	NS
LSD 0.25 " " " "		NA	NA	7	2.3	470
LSD 0.10 for year within N		NA	NA	NS	NS	NS
LSD 0.25 " " " "		NA	NA	5	1.9	480

NA denotes that the LSD is not applicable because the N x Y interaction was not significant at the designated P level for the indicated variable.

EFFECT OF CARPRAMID ON FERTILIZER USE EFFICIENCY AND[1] PLANTCANE YIELDS ON HEAVY- AND LIGHT-TEXTURED SOILS

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SUMMARY

Adding 1, 2, and 3 quarts/A of Carpramid to liquid fertilizer did not significantly (P>0.10) increase plantcane sugar yields for sugarcane variety LCP 85-384 grown on a heavy- or light-textured soil. However, applying liquid fertilizer (120, 40, 80, and 10 lb/A of N, P_2O_5, K_2O, and S, respectively) also did not increase plantcane sugar yields over where fertilizer was not added. This demonstrates that fertilizer did not limit plantcane yields on either soil type. Consequently, it was not a good year to test the effect of Carpramid on fertilizer use efficiency. A better test of Carpramid should occur this coming year with first stubble cane where fertilizer is usually deficient.

INTRODUCTION

University trials have demonstrated that fluid fertilizers in combination with a biodegradable polymer (carpramid) affect growth and production of corn, wheat, and cotton. This increase in production is thought to be related to increased nutrient uptake efficiency, which has been associated with increased root branching and root hair development.

To date, carpramid has not been tested in controlled studies in Louisiana with sugarcane. Consequently, our objective is to: determine the effect of carpramid application rates on fertilizer use efficiency and sugarcane yields.

MATERIALS AND METHODS

In May of 2000 the fertilizer plus Carpramid rates in Table 2 (for a Baldwin silty clay soil) and Table 4 (for a Jeanerette silt loam soil) were added at each experimental site (Olivier and Parks, respectively). The Carpramid was added to the liquid fertilizer (120, 40, 80, and 10 lb/A of N, P_2O_5, K_2O, and S, respectively) immediately before being applied to the insides of each row in the experimental plot.

The experiment used a Latin square experimental design with seven replications. Plots consisted of three 6-foot by 30-foot rows, with 10-foot alleys at the ends of the plots.

The studies were grown to maturity using standard cultural practices. Plant populations were made at Olivier on the heavy-textured soil in September. However, because of extreme lodging, plant populations were not taken at Parks on the light-textured soil.

[1]Research was partially supported by a grant from the Donlar Corporation.

The test at Olivier was harvested in mid November, and the one at Parks was harvested in early January. Experimental plots at both sites were harvested with a two-row soldier harvester and weighed with a weigh rig. Ten-stalk samples were taken from each plot at both experimental sites for determination of commercially recoverable sugar and average stalk weight.

RESULTS AND DISCUSSION

Tables 1 and 3 show that the experimental treatments did not significantly affect the plantcane yield variables at either test site in 2000. There was, however, a trend (P<0.25) toward significance for the effect of treatments on CRS and stalk weights at the Parks site for the Jeanerette silt loam soil (Table 3). The % coefficient of variations for the yield variables at both sites were very low (Tables 1 and 3), indicating that the experimental design did a good job of removing variability from the studies.

Results from Tables 2 and 4 show the yield data from the two test sites. The extreme drought experienced in the summer of 2000 most likely reduced cane and sugar yield at both test sites. Since liquid fertilizer rates (0, 0.5x, and 1.0x) did not affect (P>0.25) cane or sugar yields in 2000, it was not a good year to test the effect of Carpramid on fertilizer use efficiency. A more valid test of this product should occur with first stubble cane in the 2001 crop year.

Table 1. F-values and statistical parameters for effect of treatments on LCP 85-384 plantcane yield variables on a heavy-textured soil.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
Treatments	6	0.32	0.79	0.76	0.55	0.26
HREP	6	0.64	0.63	2.86*	5.13***	3.56**
VREP	6	2.73*	1.18	5.64***	12.98****	6.65****
RMSE		0.1887	3585	8.003	1.854	442.1
%CV		10.83	8.155	3.54	6.17	6.521
Mean		1.742	43,960	226.2	30.05	6780

*, **, ***, and **** denote statistical significance at the P#0.05, 0.01, 0.001, and 0.0001 levels, respectively.

Table 2. Effect of treatments on plantcane yield variables for a heavy-textured soil.

T#'s	Liq.[%] fert.	Liq.[P] Carp.	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield
		Qt/A	lb/stalk	1000/A	lb/T	T/A	lb/A
1	0	0	1.82	41.8	230	29.1	6670
2	0.5x	0	1.69	44.4	222	30.6	6780
3	1.0x	0	1.74	44.4	226	30.1	6800
4	0.5x	1	1.73	43.4	229	30.3	6910
5	0.5x	2	1.72	44.8	227	29.7	6740
6	0.5x	3	1.76	45.5	224	30.0	6700
7	1.0x	2	1.73	43.5	227	30.5	6860
LSD 0.10			NS	NS	NS	NS	NS
LSD 0.25			NS	NS	NS	NS	NS

[%] The 1.0x fertilizer rate was 120, 40, 80 and 10 lb/A, respectively, for N, P_2O_5, K_2O, and S.
[3] The liquid carpramid rates were added to the liquid fertilizer immediately before being applied to the soil.

Table 3. F-values and statistical parameters for effect of treatments on LCP 85-384 plantcane yield variables on a light-textured soil.

Source	df	Stalk weight	CRS	Cane yield	Sugar yield
Treatments	6	1.90$^{\bullet}$	1.73$^{\bullet}$	0.65	1.24
HREP	6	4.50**	2.94*	2.87*	1.21
VREP	6	2.96*	0.58	3.87**	3.11
RMSE		0.1453	5.066	1.465	379.9
%CV		7.40	2.30	4.14	4.87
Mean		1.963	220	35.4	7800

•, *, and ** denote statistical significance at the P#0.25, 0.05, and 0.01 levels, respectively.

Table 4. Effect of treatments on plantcane yield variables for a light-textured soil.

T#'s	Liq.[%] fert.	Liq.[P] Carp.	Stalk weight	CRS	Cane yield	Sugar yield
		Qt/A	lb/stalk	lb/T	T/A	lb/A
1	0	0	1.95	219	35.8	7840
2	0.5x	0	1.97	221	34.8	7700
3	1.0x	0	1.87	219	35.5	7760
4	0.5x	1	2.02	222	35.5	7890
5	0.5x	2	1.91	216	35.0	7560
6	0.5x	3	2.10	224	36.1	8070
7	1.0x	2	1.92	221	35.3	7800
LSD 0.10			NS	NS	NS	NS
LSD 0.25			0.09	3	NS	NS

[%] The 1.0x fertilizer rate was 120, 40, 80, and 10 lb/A, respectively, for N, P_2O_5, K_2O, and S.
[3] The liquid carpramid rates were added to the liquid fertilizer immediately before being applied to the soil.

EFFECT OF UREA NITROGEN RATES[1], A NITROGEN STABILIZATION PACKAGE, AND WINTER VS. SPRING NITROGEN FERTILIZATION ON SUGARCANE YIELDS

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SUMMARY

Highest sugar yields across two harvest years (plant and first stubble cane) were obtained at 140 lb N/A using sugarcane variety LCP 85-384. Increasing nitrogen rates from 140 to 180 lb N/A reduced ($P<0.10$) average sugar yields across the two years by 780 lb/A. Results also showed that applying N-stabilized urea in a narrow 0.75-inch band to sugarcane furrows in the winter resulted in a trend ($P<0.25$) toward higher sugar yields and reduced soil moisture compared to where liquid urea was applied in the spring.

INTRODUCTION

Research conducted at the Iberia Research Station shows that adding liquid calcium chloride (plus a urease inhibitor, supplied by Stoller Enterprises, Inc.) to liquid urea in a spring nitrogen fertilization program increased (P#0.10) sugar yields by 2630 lb/A (11.6%) and reduced nitrogen fertilizer requirements (by 60 lb N/A each year) across a four-year study.

Because of market conditions, urea can be purchased 10-15% cheaper in the fall and winter than in the spring and summer. If inorganic nitrogen fertilizer could be stabilized to prevent urea volatilization, denitrification, and the leaching of nitrate, urea could be applied to sugarcane in the fall and winter when the cost of nitrogen is lower. Applying a nitrogen stabilization package (calcium chloride, and a urease and nitrification inhibitor) to liquid urea should reduce nitrogen losses from the above causes. Also, applying the liquid urea and nitrogen stabilization package in the furrow between the sugarcane rows in the fall or winter may help improve soil drainage through the effect of calcium and ammonium (derived from the applied urea) in improving the permeability of the soil to water movement.

OBJECTIVE

1) To determine the effect of spring and winter nitrogen fertilizer rates and a spring- vs. winter-applied nitrogen stabilization package (calcium chloride plus a urease and nitrification inhibitor) on soil water drainage and sugarcane yields.

[1] Research was partially supported by Stoller Enterprises, Inc.

MATERIALS AND METHODS

Kleentek variety LCP 85-384 sugarcane was planted in late September 1998 at three stalks and a lap of two joints. All treatments in the study were replicated four times in a Latin square, split-plot design. Nitrogen (liquid urea) fertilizer rates were main plots, and winter vs. spring nitrogen application and the check vs. nitrogen stabilization package (calcium chloride plus a urease and nitrification inhibitor) were the split plots. Winter nitrogen was applied in December 1998 and January 2000 in a 0.75-inch band to the two furrows between the three sugarcane rows in each plot. Spring nitrogen was applied in April of 1998 and 1999 to the inside of three 6-foot by 30-foot rows, with a 10-foot alley between plots. Soil samples were taken down to 6 inches perpendicular to the sides of the sugarcane rows on July 14 and September 1 of 2000 and used to determine soil moisture.

The test was grown to maturity each year using standard cultural practices. Plant populations and cane lodging were determined prior to harvest. The study was harvested with a two-row soldier harvester, and each plot was weighed with a weigh rig. Ten stalks were randomly taken from each plot to determine average stalk weights and commercially recoverable sugar (CRS).

RESULTS AND DISCUSSION

Table 1 shows that nitrogen fertilizer rates had a significant ($P<0.10$) effect on cane and sugar yields. The winter-spring-Ca treatments did not significantly affect any of the variables measured, though there was a trend ($P<0.25$) toward significance for sugar yield and lodging.

Table 2 shows that the highest sugar yield was obtained at 140 lb N/A, which was significantly higher than at 60 or 180 lb N/A.

Table 3 shows that the winter-spring-N stabilization package treatments did not significantly ($P>0.10$) affect sugar yields. However, there was a trend ($P<0.25$) toward significantly higher sugar yields where the N-stabilization package was used with winter-applied nitrogen and where N-stabilized urea was added in the winter vs. the spring. This trend toward higher sugar yields could be an indication that the N-stabilized urea applied in the winter may have been increasing yields through improved soil water drainage.

Table 4 shows that stalk weights, CRS, lodging and sugar yields were larger in 1999, while cane tonnage and plant populations were higher in 2000.

Table 5 shows that nitrogen rates and winter-spring-N stabilization treatments did not significantly ($P>0.10$) affect soil moisture measurements in 2000. There was, however, a trend ($P<0.25$) toward significance with the WS Ca treatments. This is reflected in Table 6 where the nitrogen applied to the row furrows in the winter had lower ($P<0.25$) soil moisture levels than where nitrogen was applied in the off-bar in the spring. This trend toward decreased soil water may be a reflection of the ability of the winter-applied nitrogen (in a narrow 0.75 band) to reduce excess water (during the winter), that may have been responsible for the trend toward higher sugar yields for the winter plus N-stabilized urea treatment (Table

3).

Table 1. Effect of nitrogen fertilizer, fertilizer timing and a nitrogen stabilization package, and harvest year on F-values and statistical parameters for variety LCP 85-384 yield variables.

Source	df	Stalk weight	Plant pop.	CRS	Cane yield	Sugar Yield	Lodging
<u>main plots</u>							
Nitrogen (N)	3	0.91	1.27	0.46	14.00^{**}	13.02^{**}	$2.35^{\bullet}$
HREP	3	0.38	1.65	$2.01^{\bullet}$	4.78^{*}	$3.88^{\sim}$	1.30
VREP	3	$3.11^{\bullet}$	0.48	46.52^{**}	65.96^{**}	27.87^{**}	5.30^{*}
<u>sub-plots</u>							
winter-spring-Ca(WSCa)	3	0.04	0.27	0.48	1.16	$1.67^{\bullet}$	$1.75^{\bullet}$
N x WSCa	9	1.06	0.32	0.24	1.25	0.90	$1.64^{\bullet}$
<u>sub-sub-plots</u>							
Year (Y)	1	118.25^{**}	24.01^{**}	796.38^{**}	55.99^{**}	67.69^{**}	708.51^{**}
N x Y	3	0.84	5.39^{**}	0.05	$2.75^{\sim}$	1.25	0.31
WSCa x Y	3	0.42	0.35	0.39	0.03	0.10	0.60
N x WSCa x Y	9	0.61	0.81	0.36	2.17^{*}	1.21	0.97
RMSE for main plots		0.3066	6,093	6.544	2.373	544.4	0.4895
% CV for main plots		16.26	10.37	3.16	5.38	6.02	15.21
RMSE for sub-plots		0.1771	4,422	12.39	4.897	1055	0.5667
% CV for main plots		9.39	7.52	5.97	11.11	11.67	17.60
RMSE for sub-sub-plots		0.1979	3,898	12.55	4.030	1124	0.6575
% CV for sub-sub-plots		10.49	6.63	6.05	9.14	12.43	20.43

Mean	1.886	58,770	207.4	44.09	9,041	3.219

•, ~, *, and ** denote significance at the P<0.25, 0.10, 0.05, and 0.01 levels, respectively.

Table 2 . Effect of nitrogen fertilizer rates on LCP 85-384 yield variables across harvest years and spring-winter treatments.

Nitrogen	Stalk weight	Plant population	CRS	Cane yield	Sugar yield	Lodging[%]
lb N/A	lb/stalk	1000/A	lb/T	T/A	lb/A	
60	1.81	55.1	207	43.3	8,900	3.16
100	1.91	60.2	207	45.4	9,240	3.06
140	1.93	59.8	209	45.5	9,410	3.34
180	1.89	59.9	207	42.2	8,630	3.31
LSD 0.10	NS	NS	NS	1.2	270	NS
LSD 0.25	NS	NS	NS	0.8	170	0.16

[%]Lodging was rated on a 1-5 scale, where 1 had all plants erect and 5 had all plants lodged.

Table 3. Effect of spring vs. winter fertilization and a nitrogen stabilization package on LCP 85-384 yield variables across nitrogen rates and harvest years.

Time of N App	N Stab. Package	Stalk weight	Plant pop.	CRS	Cane yield	Sugar yield	Lodging
		lb/stalk	1000/A	lb/T	T/A	lb/A	
Winter (W)	No	1.89	58.2	206	43.1	8,790	3.31
W	Yes	1.88	58.8	210	45.3	9,380	3.03
Spring (S)	No	1.89	58.2	207	44.0	8,970	3.22
S	Yes	1.88	59.9	207	44.0	9,010	3.31
LSD 0.10		NS	NS	NS	NS	NS	NS
LSD 0.25		NS	NS	NS	NS	310	0.17

Table 4. Effect of harvest year on sugarcane yield variables averaged across N fertilizer rates and fertilizer timing, and a nitrogen stabilization package.

Harvest year	Stalk weight	Plant population	CRS	Cane yield	Sugar yield	Lodging
	lb/stalk	1000/A	lb/T	T/A	lb/A	
1999	2.08	55.3	239	41.4	9880	4.77
2000	1.70	60.5	176	46.8	8220	1.67
LSD 0.10	0.06	1.5	4	1.2	330	0.19
LSD 0.25	0.04	1.0	3	0.8	230	0.14

Table 5. F-values and statistical parameters for effect of treatments and time of sampling on soil moisture for first stubble cane.

Source	df	Soil Moisture
main plots		
Nitrogen (N)	3	0.48•
HREP	3	1.78•
VREP	3	1.29
sub-plots		
WSCa	3	1.42•
N x WSCa	9	0.86
sub-sub plots		
Date (D)	1	86.95****
N x T	3	0.88
WSCA x T	3	0.57
N x WSCA x T	9	1.14
RMSE for main plots		3.086
%CV " " "		19.08
RMSE for sub-plots		2.398
%CV " " "		14.83
RMSE for sub-sub-plots		2.414
%CV " " "		14.93
Mean		16.17

•, and **** denote statistical significance at the P#0.25, and 0.0001 levels, respectively.

Table 6. Effect of fertilizer treatments and sampling time on soil-row moisture averaged across nitrogen fertilizer treatments for sugarcane variety LCP 85-384 first stubble.

Time of N App	Calcium~ chloride	Soil moisture at sampling time 7/14	9/1	Mean
		--------------------%-----------------		
Winter (W)	No	18.1	13.5	15.8
W	Yes	18.0	13.6	15.8
Spring (S)	No	18.4	15.3	16.8
S	Yes	18.2	14.4	16.3
LSD 0.10 for effect of treatments within dates				NS
LSD 0.25 " " "				0.7
Mean		18.2	14.2	

~The nitrogen stabilization package contained calcium chloride and a urease and nitrification inhibitor.

THE EFFECT OF NITROGEN RATES ON LCP 85-384[1]

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SUMMARY

One field experiment was conducted in 2000 at Rebecca Plantation, Schriever, La. to test the effects of three rates of nitrogen fertilization (single dose rates of 140 and180 lbs and a split application of 140 + 40 lbs N/A as 32% liquid N), on yields of tons cane per acre (TC/A), estimated theoretical recoverable sugar per ton cane (TRS/TC), and estimated theoretical recoverable sugar per acre (TRS/A) for the sugarcane variety LCP 85-384 in the third-stubble crop. There were no differences in yields of TC/A, TRS/TC, or TRS/A for any of the three treatments. In this experiment, maximum sugarcane yields were obtained with 140 lbs N/A. There was apparently no advantage to increasing the amount of N/A to 180 lbs, either as a single dose or as a split application of 140 and 40 lbs.

INTRODUCTION

Nitrogen is used in fairly large amounts by sugarcane. Nitrogen is supplied to the plant by fertilizers, residual nitrogen in the soil, decomposition of organic matter, and atmospheric sources of nitrogen. Nitrogen rates in sugarcane are based on soil type [whether the soil is light (sandy) or heavy (clayey)], stand age (plant cane vs. stubble cane), and whether the cane stand is strong (high population) or weak (low population). For light-textured soils, the current recommended rates for stubble cane range from 120-140 lbs N/A for strong stands to 100-120 lbs N/A for weak stands. For heavy textured soils, the rate is 140-160 lbs N/A for strong stands to 120-140 lbs N/A for weak stands.

The recommended time for nitrogen application is April 1-30, but nitrogen applications made in May generally yield almost as well as those made in April. Nitrogen applied earlier than April 1 can be lost because of leaching and de-nitrification and can stimulate early weed growth.

Split application of nitrogen may be beneficial under certain situations. These include high tonnage cane free of weeds and with weather conditions which lead to nitrogen loss, such as excessive rainfall. If nitrogen is to be split, apply two-thirds of the recommended rate in early April and the remainder at lay-by (middle of May to first of June).

[1] Research is partially supported by a financial grant from the American Sugar Cane League.

In recent years, it has been speculated that the sugarcane variety LCP 85-384 tends to respond to nitrogen at the lower end of the recommended rate in both the plantcane and the first stubble crops, whereas it tends to respond to nitrogen at the upper end of the recommended rate for older stubble crops. However, little or no data are available on the effect of timing or split application of nitrogen on the yield of TC/A, TRS/TC, or TRS/A for LCP 85-384.

OBJECTIVES

1) To determine the effect of nitrogen fertilizer rates on sugarcane yields on a light- textured soil.

2) To determine the effect of split application of nitrogen fertilizer on sugarcane yields.

PROCEDURES

The experiment consisted of three nitrogen treatments (single dose rates of 140 and180 lbs N/A and a split application of 140 + 40 lbs N/A) replicated four times on a Commerce silty loam in a randomized complete block design. Experimental plots consisted of six rows (36 feet wide by approximately 750 feet long). (The length of each row was measured at harvest for accuracy in determining cane yield). The field chosen for the experiment was planted in 1996 with disease-free progeny of the sugarcane variety LCP 85-384. A blanket application of phosphorus and potassium was applied in the spring according to soil test. The nitrogen (32% liquid) for the single dose treatments and the initial dose of the split application was knifed in by ground rig on April 11, 2000. The second nitrogen application (32% liquid) for the split application was dribbled to either side of the cane drill by a high boy on May 16, 2000.

Cane was grown to maturity using standard cultural practices. The experiment was harvested on December 14, 2000, using a cane combine and a weigh wagon using hydraulic load cells. The fan speed of the combine was set at 1,000 rpm and its forward speed was approximately 3 mph. Yield of cane per acre (tons/acre) for each plot was estimated by harvesting and weighing all the cane on the 3rd and 5th row of each plot. Tons/acre for each row was calculated by multiplying the harvested weight by the area harvested adjusted to an acre basis. The two data sub-sets were then averaged to obtain the ton/acre for each plot. Two, 15 whole-stalk sub-samples were removed from each of the harvested rows. The yield of theoretical recoverable sugar per ton cane (TRS/TC) for each sub-sample was derived using the core/press method of analyses. The analyses for the two sub-samples were then averaged to determine the TRS/TC for each plot. The yield of estimated theoretical recoverable sugar per acre (TRS/A) for each plot was the product of TC/A and TRS/TC. Analysis of variance was performed for each yield component.

RESULTS AND DISCUSSION

Table 1 shows the effects of nitrogen fertilizer rates and split application of nitrogen on yields of TC/A, TRS/TC, and TRS/A. There were no differences in yields amongst treatments for any of the yield components measured. There was apparently no benefit from increasing nitrogen fertilizer rates above the 140 lb N/A, which is currently recommended for a strong stand on a light textured soil for all varieties. Apparently, the recommended fertilizer rate for LCP 85-384 also falls within these parameters. However, since there was no fertilizer rate lower than the 140 lbs N/A, it is not known whether the yields obtained in this experiment can be maintained at nitrogen rates lower than 140 lbs N/A for LCP 85-384.

Further, there was no obvious benefit from splitting the nitrogen application for LCP 85-384 although there was a trend toward higher yield of TC/A with the split application of 180 lbs N/A when compared to the single dose rate of 140 lbs N/A. However, weather conditions in 2000 were very dry, which might have negated any significant benefit from the split application.

REFERENCES

Funderburg, E.R. and W.F. Faw. 1995. Sugarcane Fertilization. Publication 2473. LSU AgCenter, LCES, Baton Rouge, LA

Table 1. Effect of nitrogen fertilizer rates and split application of nitrogen on yields of cane per acre (TC/A), estimated theoretical recoverable sugar per ton cane (TRS/TC), and estimated theoretical recoverable sugar per acre (TRS/A)[1].

Fertilizer Rate (lbs/A)	TC/A (tons)	TRS/TC (lbs)	TRS/A (lbs)
140	34.1	227	7,741
180	35.4	221	7,823
140+40 (Split)	35.7	228	8,140
LSD (.05)	NS	NS	NS

[1] Sugarcane variety, LCP 85-384; N applied as 32% liquid on April 11 (single dose rates and first application of split) and May 16 (second application of split), 2000; harvested, Dec.14, 2000.

EFFECT OF MULCH RESIDUE ON THE USE OF ALTERNATIVE HERBICIDES AND SUGARCANE YIELD[1]

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INTRODUCTION

The effect of surface crop residues on interception, subsequent wash-off, and movement of herbicide in the soil profile is the primary focus associated with conservation measures in today's agriculture. Various forms of soil conservation are highly recommended in an effort to reduce soil losses and runoff of applied agricultural chemicals. Conservation production systems are characterized by the presence of mulch residue left on the soil surface to protect it from water and soil erosion. Over the last five years, the sugarcane industry is shifting toward an alternative harvesting system. The traditional harvest system involves the use of soldier harvesters where the whole stalks of sugarcane plants are cut, piled, burned, picked up, and transported to the mill. The new system involves the use of a combine harvester that cuts the cane stalks into billets, which are directly loaded into wagons for transport to the mill. Extractor fans in the combine separate leaf material from billets and deposit the plant residue on the soil surface. However, the mulch produced from the leaf material and plant residue is believed to promote disease and low yields in the next crop. As a result, burning the leaves off the whole stalks before harvest or burning of the residue on the soil surface after harvest are measures to reduce their impact on disease and/or possible yield reduction. Burning of the residue before or after harvest is a major environmental air pollution concern. Therefore, there is considerable interest in the impact of plant residue or mulch cover on weed controls, diseases, and insects. Numerous studies on several crops have shown that crop residue or surface mulch can enhance control of weeds and reduce herbicide loss. This information is essential for the implementation of control measures or corrective actions needed to reduce herbicide leaching and sediment losses from crop lands and thus reduce watershed's total maximum daily loads (TMDLs).

OBJECTIVES

Generation of a viable, effective management practice that prevents atrazine movement to groundwater and surface water is necessary. The combination of a management practice that protects water quality, avoids the burning of the combine harvester trash, and maintains the use of atrazine would be optimal. The specific objectives are:

- Compare the concentration of atrazine in surface water runoff from sugarcane grown under conventional sugarcane practices and best management practices (BMPs).

- Obtain quantifiable surface water data on the concentrations of atrazine and metribuzin present in surface runoff and the amounts remaining in the soil when the best management practices are

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used. This information will lead to understanding and implementation of corrective actions needed to reduce herbicide off-target movement from sugarcane fields.

- Make a recommendation on a BMP that is effective in significantly reducing atrazine runoff.

EXPERIMENTAL METHODS

The experimental site is located at the St. Gabriel Research Station of the Louisiana State University Agricultural Center. The experimental site was approximately 3.5 acres (1.5 ha), and the soil was classified as a commerce silt loam (Aeric Fluvaquent, fine-silty, mixed, nonacid, thermic). In 1997, the land was rowed and prepared for 6-foot rows (1.8 m spacing) where six plots (two replications x three treatments) running east to west were outlined with levees on each side of each treatment (see Figure 5). Recent planting of sugarcane variety CP70-321, a major variety for Southern Louisiana, was chosen, and planting was completed in September 1997.

At the lowest part (northeast corner) of each plot, we installed sumps (corrugated, galvanized culverts, 36 inches in diameter and 6 1/2 feet in depth (approximately 0.92 m I.D., and 2 m in length). A plate (sheet metal 1/16-inch thick) was welded at the bottom of each sump. A hole was dug and was subsequently back filled following installation of the sumps, and the remaining soil was used to close the levees surrounding each plot. Additional earth moving was carried out to ensure that each plot was completely leveed and that runoff water was collected into each sump through a V-type opening. In each sump, a water-pump connected to a flow meter was installed. As a result, the only outlet for surface runoff water was through the pump and flow meter and exiting into the levees between plots. Adjacent to each sump, we placed an ISCO water sampler and connected the sampler tubing and sensors to each sump by placing the sampler cup and a sensor at the bottom of each sump. Sample collection was triggered when the sensor placed in the sump detected runoff water.

For the preceding growing season, the sugarcane at the St Gabriel site was harvested on December 7, 1999. We harvested plots 1, 3, 5, and 6. Then we burned plots 2 and 4 with the sugarcane standing. Then we harvested plots 2 and 4. We measured the amount of mulch residue on the soil surface for all plots. No herbicides were applied or cultural operations carried out following harvest during the winter. During early spring (February 25, 2000), all plots were cultivated. This was carried out where all row middles were off-barred where top of the rows remained totally undisturbed.

Herbicide Applications

On April 7, 2000, all plots were sprayed according to the map below with metribuzin at the rate of 0.9 lb/acre of active ingredient on plots 3 and 5. All other plots received atrazine at the rate of 1 lb/acre of active ingredient. All herbicides were applied on a 36-inch band on top of the rows as described earlier. In addition, all plots received 2,4-D at the rate 1 quart/acre (active ingredient). Layby application was carried out on June 5 for all plots. This layby application consisted of broadcast atrazine application of 2 lb/acre (active ingredient) throughout the entire field.

RESULTS AND DISCUSSION

Runoff and Rainfall

During 2000 at the St. Gabriel site as well as south Louisiana, rainfall was considerably below of normal. This resulted in no runoff being collected during the 2000 growing season. The total rainfall (in inches) for 2000 was 40.48, 71% of normal and third driest year in history.

Surface Mulch versus Time

To assess the impact of the presence of a surface mulch residue on the retention of herbicides, the amount of mulch was measured. First, we measured the amount of mulch residue left on the field for each plot after harvest (December 7, 1999) using the combine harvester. Four plots were harvested, and the mulch was not removed. The other two plots were burned with the sugarcane standing before harvest. Four additional measurements were made during January, April and May, and August. Because of the disappearance/decay of the residue, no additional sampling was made thereafter. The average amount of mulch on the surface of the no-burn plots decreased continuously from a high of 8.04 ± 2.12 tons/acre on December 7, 1999, to a low of 1.66 ± 0.32 on August 18, 2000 (see Table 1). The mulch results are given in Figure 1 along with one standard deviation. It is of interest to point out that the measured amount of mulch during 1999 at another site south of Baton Rouge was well within that measured during 2000 as shown in Figure 1.

Weed Assessment

Weed assessment for all plots was carried out several times during the growing season before spring application of herbicides and following layby application. The following are notes from Dr. Griffin's visits.

Visual assessment of the experimental plots was made on the following dates: March 29, April 24, June 12, August 1, and August 30, 2000. At each of these dates, notes were made with regard to amount of mulch remaining on the row tops, weed control, and crop response.

March 29, 2000: In the burn plot treatments (plots # 2 and 4) there was very little mulch residue on the soil surface. Annual ryegrass, sow thistle, rescue grass, timothy grass, and Virginia pepper weed were present in significant quantity. This was in direct contrast with the other no-burn plot treatments (plots # 1, 3, 5, and 6), where mulch did an excellent job of suppressing weed growth. Cane plants were emerging in all plots at this rating. On April 7, plots were off-barred and sprayed according to the designated treatment. Additionally, 2,4-D was applied to the entire experimental area.

April 24, 2000: Winter broadleaf weeds, of which the predominant species was sow thistle, were controlled at least 95% by the 2,4-D application. Grass weeds were unaffected by the herbicide treatments. Timothy grass and rescue grass were naturally maturing with most plants dead. In contrast, annual ryegrass was headed and just at the flowering stage, but plants were still green. Cane was actively growing and not negatively affected by the herbicide treatments.

Cane mulch residue was visible on the surface of row tops and was continuing to suppress weed emergence.

<u>*June 12, 2000:*</u> Weed control in all plots was considered very good. Annual ryegrass had matured and dead plants were present. Cane had been worked (layby), was actively growing, and not negatively affected by the herbicide treatments. Cane shoot population did not seem to vary among the herbicide treatments.

<u>*August 1, 2000:*</u> It was difficult to denote much difference in regard to specific treatments. In all plots, weed control was considered very good. Annual ryegrass that had already died and dried up was still present in some plots. Very few weeds had emerged on the row tops or row middles since the cane had been cultivated at layby and treated with atrazine. There was some evidence of triazine injury on emerging morning glories. Based on visual observations alone, it is estimated that stalk populations in late August as well as cane yields were equivalent for all treatments (see separate section on yields and stock counts) section.

Overall Weed Evaluation

Weed control and sugarcane growth were not negatively affected by mulch present on the soil surface. Weeds were controlled with atrazine whether or not mulch was present. Avoidance of the off-barring tillage operation in the spring did not negatively affect the efficiency of cultivation or herbicide application at layby. As would be expected, sugarcane yields did not appear to be affected by either mulch management, tillage program, or herbicide application.

Previous research at the LSU AgCenter has shown that mulch distributed on the field during the combine harvesting operation can delay sugarcane emergence and growth in the spring but also can be positive in delaying weed emergence. A standard practice among growers is to remove the mulch from the row tops during the winter or early spring by burning or by mechanical removal. Another common practice is not to allow mulch to be deposited on the soil surface by burning the standing cane before harvest to remove extraneous leaf material. All of these methods accomplish the same goals of preventing mulch from interfering with cane growth in the following crop year and of preventing mulch from delaying the drying of fields and subsequent tillage operations in spring. Mulch cover during the winter, however, can be positive in helping to prevent freeze damage of sugarcane during severe winters and in reducing soil runoff losses.

From a practical viewpoint, unless there is a ban on burning, growers who harvest cane with combines will either burn the cane standing before harvest or come in after harvest during December or January and burn the mulch after it has dried. Burning standing cane can enhance sugar recovery by the mill. The possibility of the mulch cover delaying cane growth in spring is a major concern to growers. The benefits of the mulch in helping to minimize soil erosion and reduce pesticide movement from fields should be emphasized when considering changes in management programs.

Sugar Yield

A primary concern before recommendation of a new management practice is the effect on yield. In the 2000-growing season, the sugarcane was harvested on November 19 using a combine harvester. This was carried out in a similar manner as during the previous growing season. In addition, two weeks before harvest, the number of stalks per 100 ft of sugarcane rows (in triplicates) was recorded for all six plots (see Table 2). Moreover, subsamples of sugarcane stalks were taken to the laboratory for complete sugar analysis. The table below provides the results for all three treatments: no-burn metribuzin, no-burn atrazine, and burn atrazine. Bases on our analysis, no significant differences of sugar yields (tons per acre) were observed among all three treatments (see Table 3). In fact no single parameter indicated significant differences among all treatments. Such a finding is significant and illustrates the success of the use of alternative herbicides as a best management practice (BMP) for sugar. It is important to point out that sugar yields in all plots of the second replication (plots 4, 5, and 6), lower yields were observed. Such observation was perhaps caused by higher weed infestation in this part of the southern section of field at the St. Gabriel site.

CONCLUSIONS

Under conditions where mulch was not removed, it was concluded that there was no significant difference in sugar yield among the various treatments. Specifically, the use of band application of metribuzin for spring application provided equally good weed control in comparison atrazine and is thus recommended as an alternative pre-emergent herbicide for sugarcane in south Louisiana. Moreover, no significant differences of sugar yields (tons per acre) were observed among all three treatments. Such a finding is significant and illustrates the success of the use of surface mulch as well as metribuzin as an alternative herbicide as a best management practice (BMP) for sugarcane.

Table 1. Weight of sugarcane mulch residue in the various experimental plots (tons/acre), St. Gabriel, La., during the 2000 growing season.

Plot*	Date of measurement				
	12/17/1999	1/21/2000	4/6/2000	5/23/2000	8/18/2000
1	9.68	8.13	6.76	6.27	1.76
2	3.63**				
3	8.47	5.84	4.97	5.47	1.74
4	1.21**				
5	7.26	5.96	7.34	5.31	1.27
6	9.08	5.50	5.20	3.84	1.88
Overall Average	8.04	6.60	5.97	5.22	1.66
Standard Error	2.12	1.01	0.96	0.96	0.32

* Plots 1 & 6: No-burn, atrazine
Plots 2 & 4: Burn, atrazine
Plots 3 & 5: No-burn, metribuzin
** Not included in the overall average

Table 2. Stalk count (in triplicates) along a 100-feet long segment at St. Gabriel experimental site.

Number	Average	Replicate		
Plot Label	Stalk number	1	2	3
Plot 1	464	487	444	460
Plot 2	420	420	411	430
Plot 3	417	400	450	400
Plot 4	396	437	380	370
Plot 5	447	430	410	500
Plot 6	360	330	380	370

Table 3. Sugarcane yields for the different treatments during 2000.

TREATMENT	Rep. Number	Plot Number	Number of Stalk per acre	Cane Yield tons/acre	Total solids (BRIX) %	Sucrose %	Sugar Yield lbs/ acre
No Burn Metribuzin	1	3	30,300	31.0	15.5	12.7	5483
	2	5	32500	24.4	16.1	13.5	4654
	Average		31400	27.7	15.8	13.1	5069
No Burn Atrazine	1	1	33,700	34.7	15.2	12.4	5959
	2	6	26,100	17.3	15.7	13.2	3194
	Average		29,900	26.0	15.5	12.8	4577
Burn Atrazine	1	2	30,500	37.0	15.8	13.2	6840
	2	4	28,700	25.9	15.6	12.9	4655
	Average		29,600	31.5	15.7	13.1	5748
LSD 0.05			NS	NS	NS	NS	NS

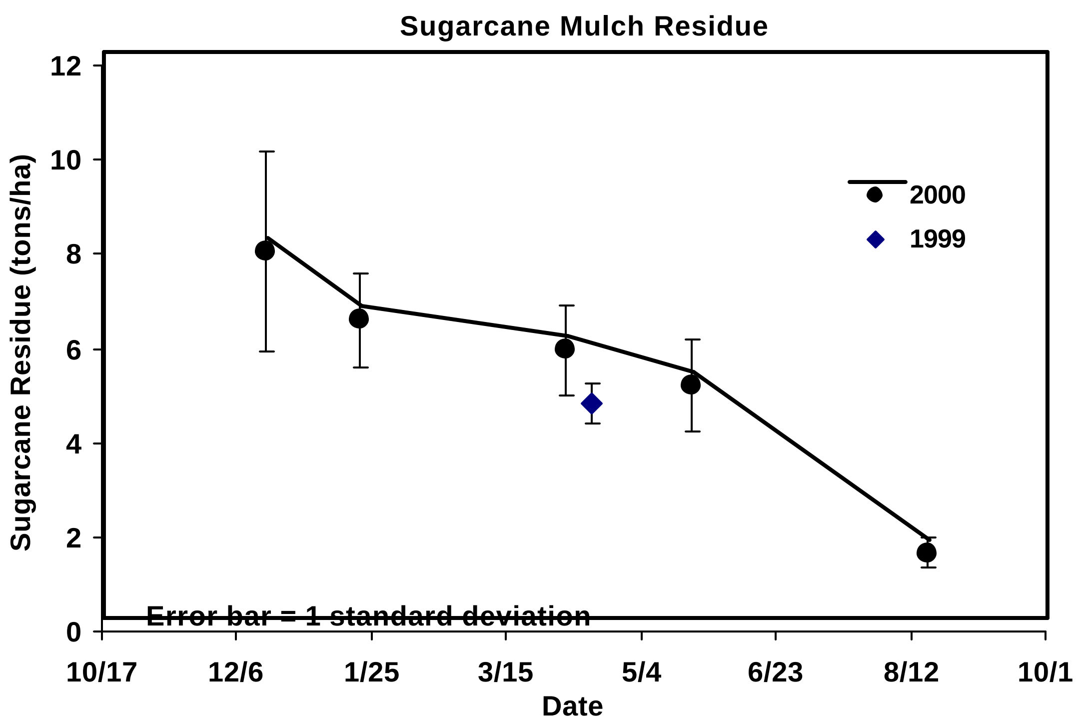

Figure 1. Amount of mulch residue remaining on the soil surface versus time during the growing season.

ATRAZINE ADSORPTION-DESORPTION BY SUGARCANE MULCH RESIDUE[2]

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INTRODUCTION

Various forms of soil conservation are highly recommended in continuing efforts to reduce soil losses and runoff of applied agricultural chemicals. Several conservation production systems are characterized by the presence of mulch residue left on the soil surface to protect it from water and soil erosion. In fact, numerous studies on best management practices have shown distinct advantages of minimum or no-till systems (Dao, 1991;1995, Banks and Robinson, 1982). However, we are not aware of published research that has been carried out on correlating the effectiveness of plant or mulch residue remaining on the soil surface, following sugarcane harvest, on the retention of applied herbicides, leaching losses in the runoff, and their downward movement in soil profile. We are also not aware of research efforts on the adsorption-desorption kinetics of herbicides such as atrazine or their fate during the crop's growing season as influenced by mulch residue over time following harvest. Such information is a prerequisite in quantifying the role of mulch residue in minimizing the leaching losses of applied agricultural chemicals.

MATERIAL AND METHODS

Bulk sample of sugarcane residue was collected from a private farm south of Baton Rouge on April 16, 1999, before application of herbicides. The residue was collected to quantify the adsorption-desorption behavior of sugarcane mulch for atrazine. The site was chosen to evaluate several BMPs, including mulch management practices, to determine their effect on herbicide retention and runoff losses. The soil was a Commerce silt loam soil (Aeric Fluvaquent, fine-silty, mixed, nonacid, thermic, and the sugarcane variety was LCP85-384. The mulch residue was dried at 55^0C for 24 hours and then cut into 1-cm sections (in length) and stored in a closed container before the experiments.

Atrazine adsorption-desorption by mulch residue was carried out using batch equilibration technique (Zhu and Selim, 2000). Radioactive atrazine was used as a tracer to monitor the extent of retention. Six ^{14}C-atrazine spikes having initial concentrations (C_i) of 3.37, 6.36, 12.34, 18.22, 24.30 and 30.16 μg mL^{-1} in distilled water were used. Adsorption was initiated by mixing 1 g of dried and cut sugarcane residue with 30 mL of the various atrazine concentration solutions in a 40-mL Teflon centrifuge tube. The mixtures were kept shaking and centrifuged at 500 $\times$ g for 10 minutes for each specific reaction time before sampling. A 0.5-mL aliquot was sampled from the supernatant at reaction times of 2, 8, 24, 48, 96, 192, 288 and 504 hours. The mixtures were returned to the shaker after each sampling. The collected samples were analyzed using liquid scintillation counting (LSC). Desorption commenced immediately after the last adsorption time step (504 hour). Each desorption step was conducted by replacing the

[2] This study was supported in part by a grant from Louisiana Department of Environmental Quality Non-Point Source Program (section 319), Jan Boydstun, project officer.

supernatant with atrazine free 0.005 M $CaCl_2$ solution and shaking for 24 hours. Six desorption steps were carried out with a total desorption time of six days. After the sixth step, one further extraction using a 4:1 methonal:water 0.005 M $CaCl_2$ solution was carried out.

RESULTS AND DISCUSSION

The amount of atrazine in soil solution versus that retained by the mulch residue is presented in Figure 1. These results are for the various reaction times used and are often referred to as adsorption or sorption isotherms. In most studies, isotherms based on 24-hour equilibration time are commonly accepted. Retention results for atrazine by the mulch residue were well described using a linear model. Specifically, for all reaction times of adsorption, the isotherms appear to be linear within the concentration range used. As a result, we obtained best-fit parameters values for the slope of the relationships shown in Figure 1, for each adsorption time. This slope is referred to as the distribution coefficient (K_d) and represents the partitioning between the amount of atrazine in the solution phase and that retained by the solid phase (see Ma and Selim, 1997).

The K_d values, which represent the affinity or strength of adsorption by the mulch residue, exhibited a gradual increase with the time for reaction from 16.4 to 23.40 cm^3/g after 24 and 504 h, respectively (see Table 1). These results are indicative of strong kinetic behavior of atrazine adsorption by the mulch residue. The change of K_d values for the mulch residue versus time is shown in Figure 2. Such kinetic behavior also is manifested by the change in concentration versus time during adsorption by the mulch residue for the wide range of concentrations used shown in Figure 3. It is clear following the initial decrease in concentration, a gradual decrease with time was observed for the entire range. This data, when expressed in terms of the amount adsorbed versus time, clearly illustrates the kinetic of the retention mechanisms by the mulch residue (see Figure 4). The continued but slow increase of the amount sorbed is indicative of a kinetic reversible as well as irreversible reactions. Such kinetic retention also is depicted by the adsorption isotherms for the different retention times.

Values for mulch residue K_d were an order of magnitude higher than that found for the soil matrix of Commerce soil. This was expected since organic matter is the principal soil component affecting the adsorption of many herbicides in the soil environment. These results are clearly illustrated when we compare our adsorption isotherms for the soil matrix given in Figure 5 with that for the mulch residue of Figure 1 to compare the extent of retention by the soil matrix. Specifically, the K_d values for the soil matrix were obtained (see Table 2). These values ranged from 2.095 to 2.352 cm^3/g after 24 and 384 h of reaction time, respectively. Moreover, the K_d values for the soil matrix exhibited limited kinetic behavior of atrazine as shown in Figure 6. In contrast extensive kinetics were observed for the mulch residue (Figure 2). Therefore, we conclude that results from our laboratory study of the retention kinetics of the mulch residue were consistent with field measurements. A distribution coefficient (K_d) for mulch residue (23.40 cm^3/g) was an order of magnitude higher than for the Commerce soil (2.352 cm^3/g).

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Table 1. Goodness of fit of the linear model for the different retetntion time for atrazine adsorption and desorption by the sugarcane mulch residue.

	Time (hours)	Kd (mL/g)	r^2
Adsorption	2	10.40±0.1619	0.996
	8	14.27±0.1399	0.998
	24	16.40±0.1597	0.998
	48	17.22±0.1596	0.997
	96	17.58±0.1540	0.998
	192	19.43±0.1949	0.998
	288	20.37±0.1836	0.998
	504	23.40±0.2398	0.998
Desorption	528	40.47±0.4960	0.998
	552	72.54±1.0380	0.996
	576	124.67±2.4870	0.993
	600	215.20±4.6560	0.992
	624	345.20±8.5260	0.989
	648	505.30±4.6160	0.986

Table 2. Goodness of fit of the linear model for the different retetntion time for atrazine adsorption and desorption by the Commerce soil.

	Time (hrs)	Kd, (mL/g)	Standard error (mg/L)	r^2
Adsorption	2	1.843	0.04325	0.9973
	6	1.972	0.05716	0.9958
	12	2.073	0.04707	0.9974
	24	2.095	0.0492	0.9973
	48	2.055	0.05692	0.9962
	96	2.328	0.07493	0.9948
	192	2.248	0.08431	0.993
Desorption	384	2.352	0.09246	0.9923
	408	4.856	0.2145	0.9903
	432	10.004	0.4585	0.9896
	456	19.768	0.8398	0.9911
	480	34.506	1.3956	0.9919
	504	57.807	2.6203	0.9898
	528	91.756	2.9795	0.9948

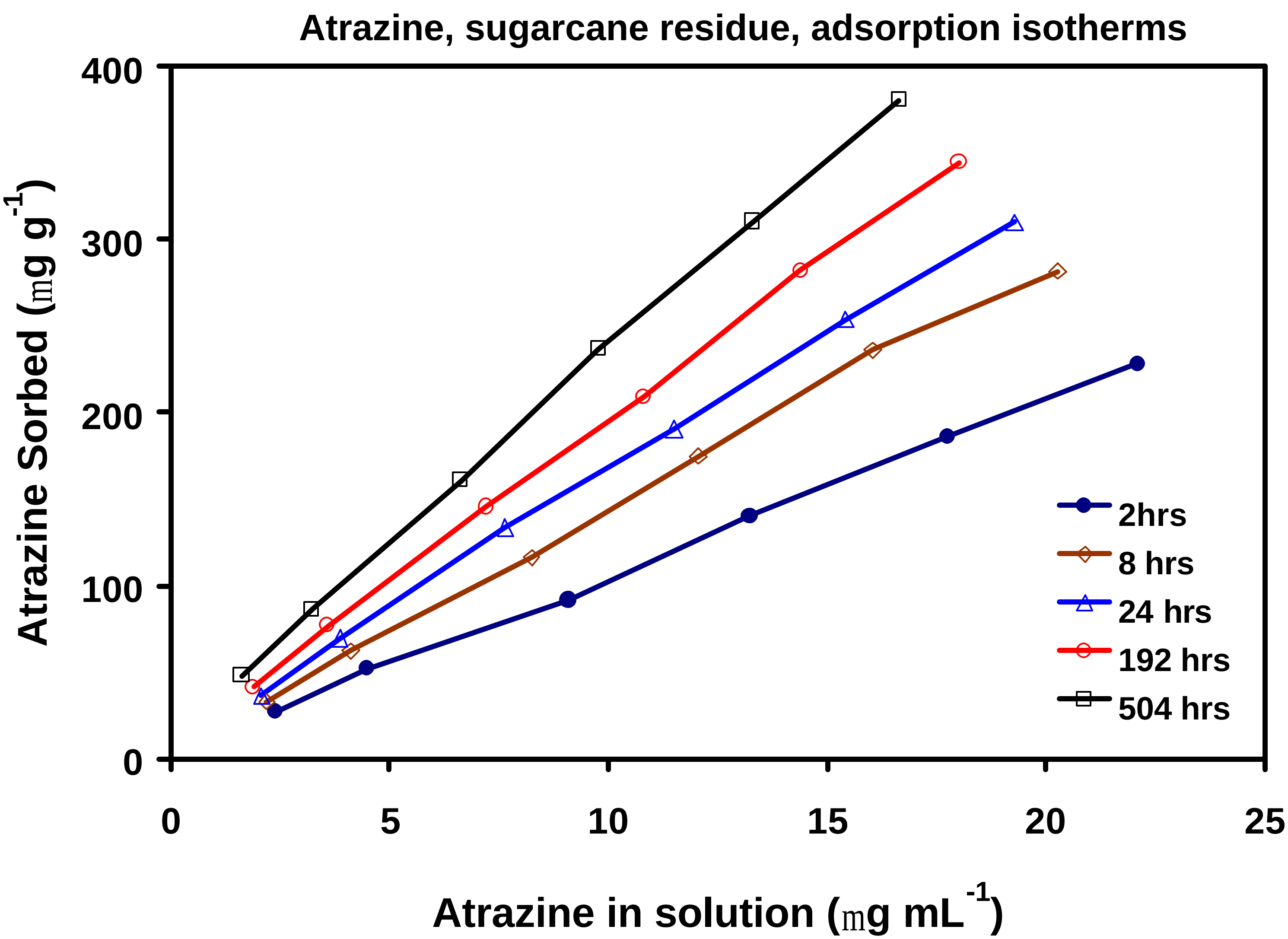

Figure 1. Atrazine adsorption isotherms for sugarcane mulch residue as a function of retention time.

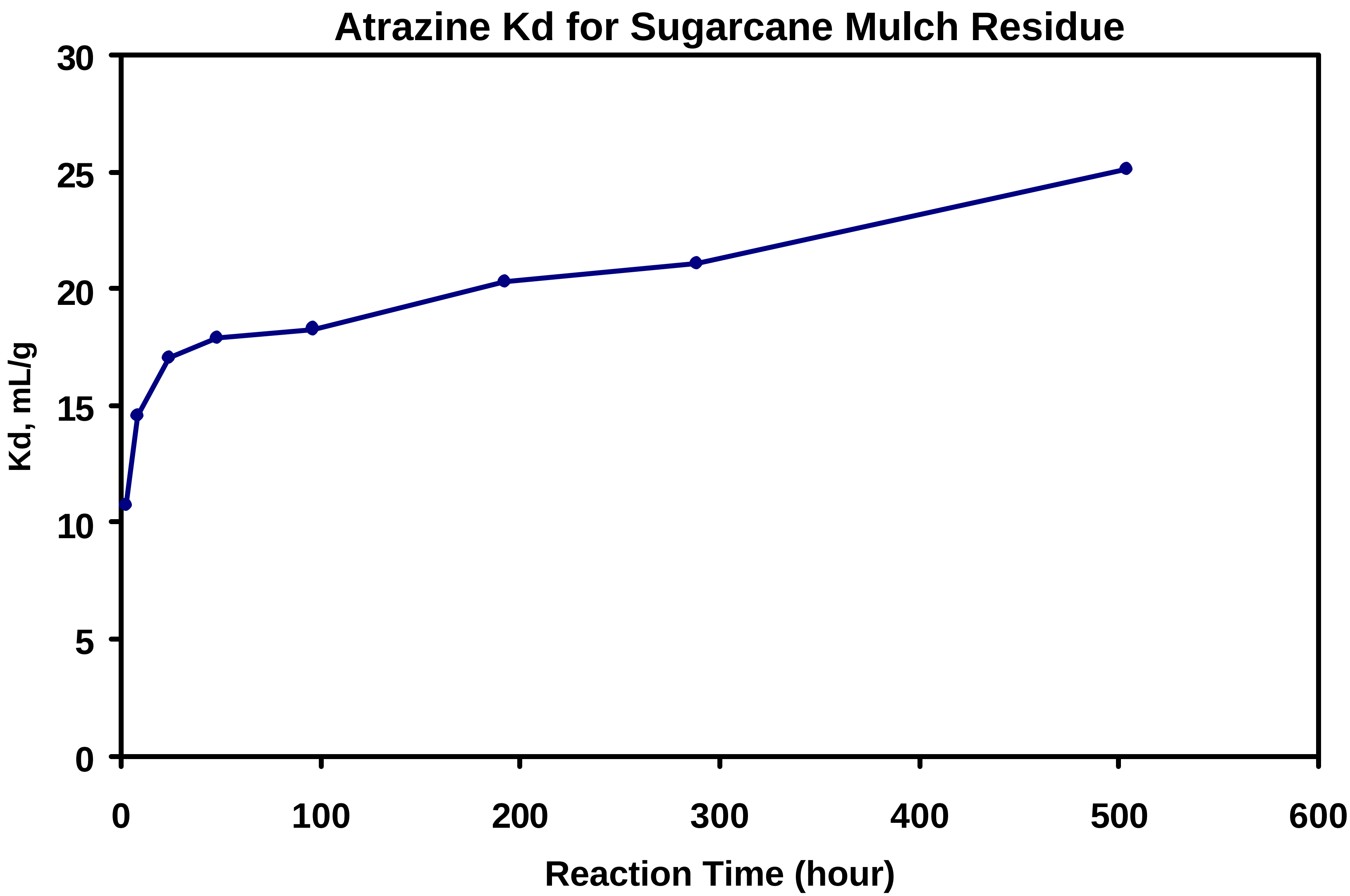

Figure 2. Measured atrazine distribution coefficient (Kd) versus reaction time for sugarcane mulch residue.

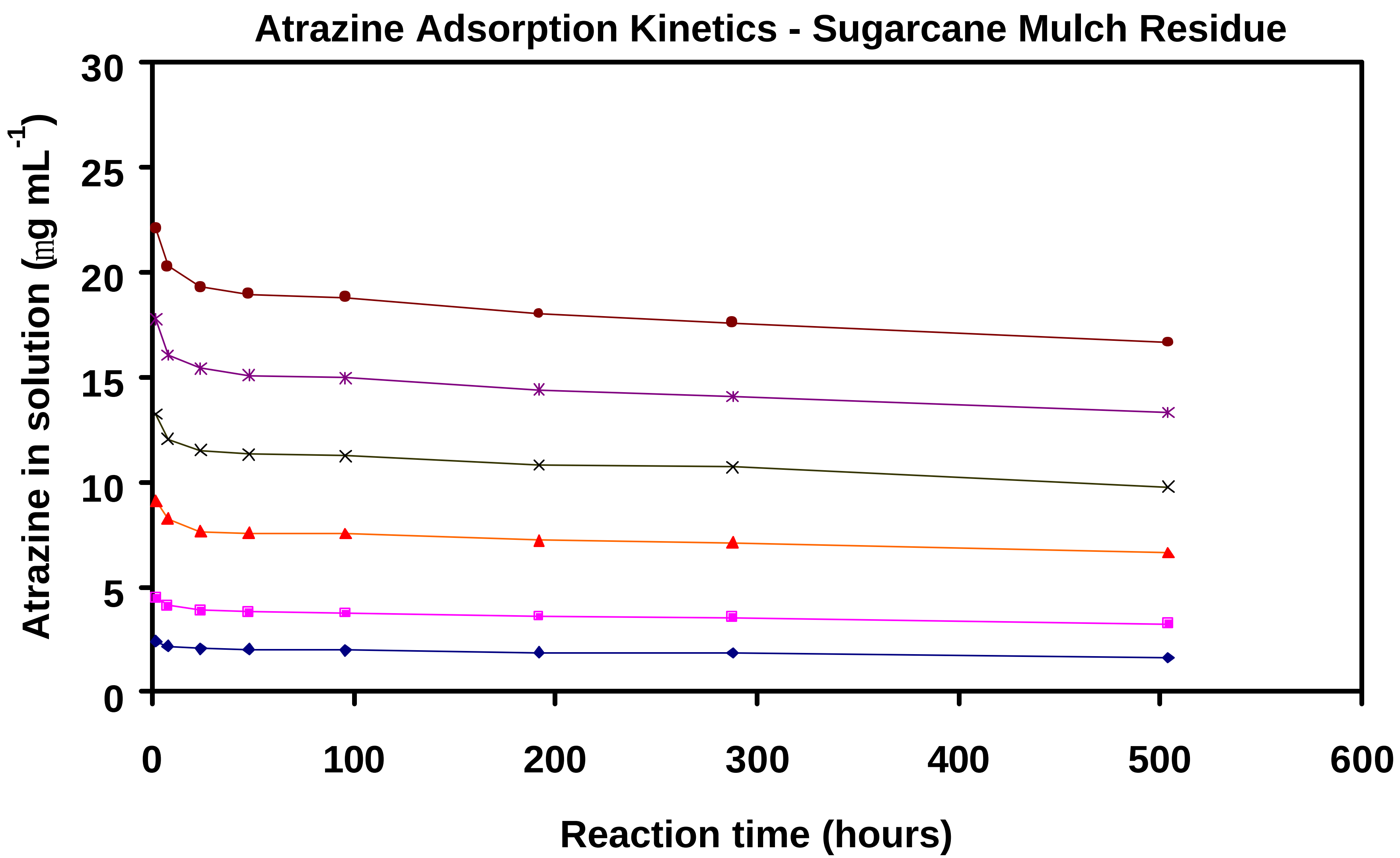

Figure 3. Measured atrazine concentration versus reaction time for different initial concentration (C_I) for sugarcane.

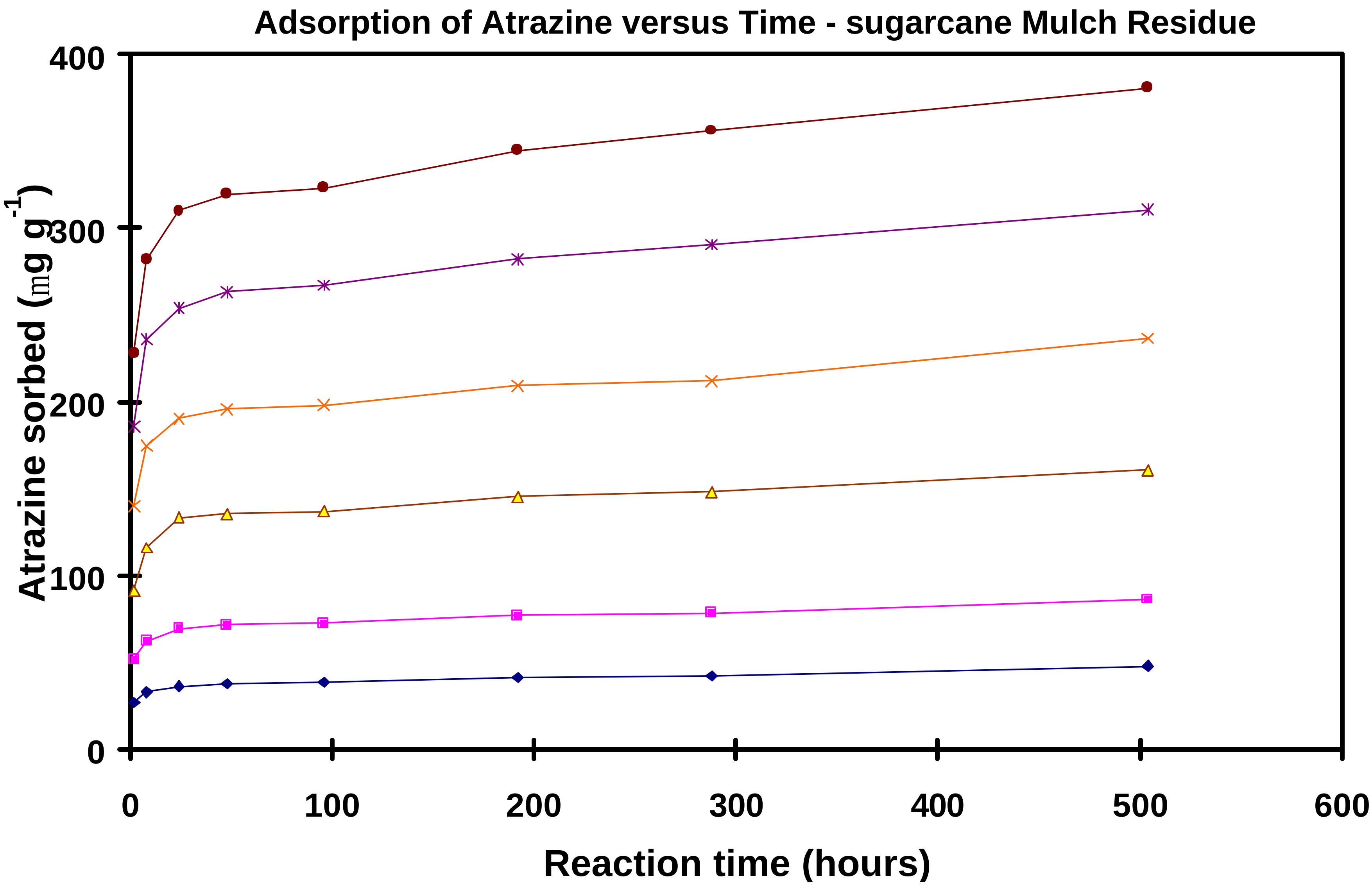

Figure 4. Measured sorbed concentration of atrazine versus reaction time for different initial concentration (C_I) for sugarcane mulch residue.

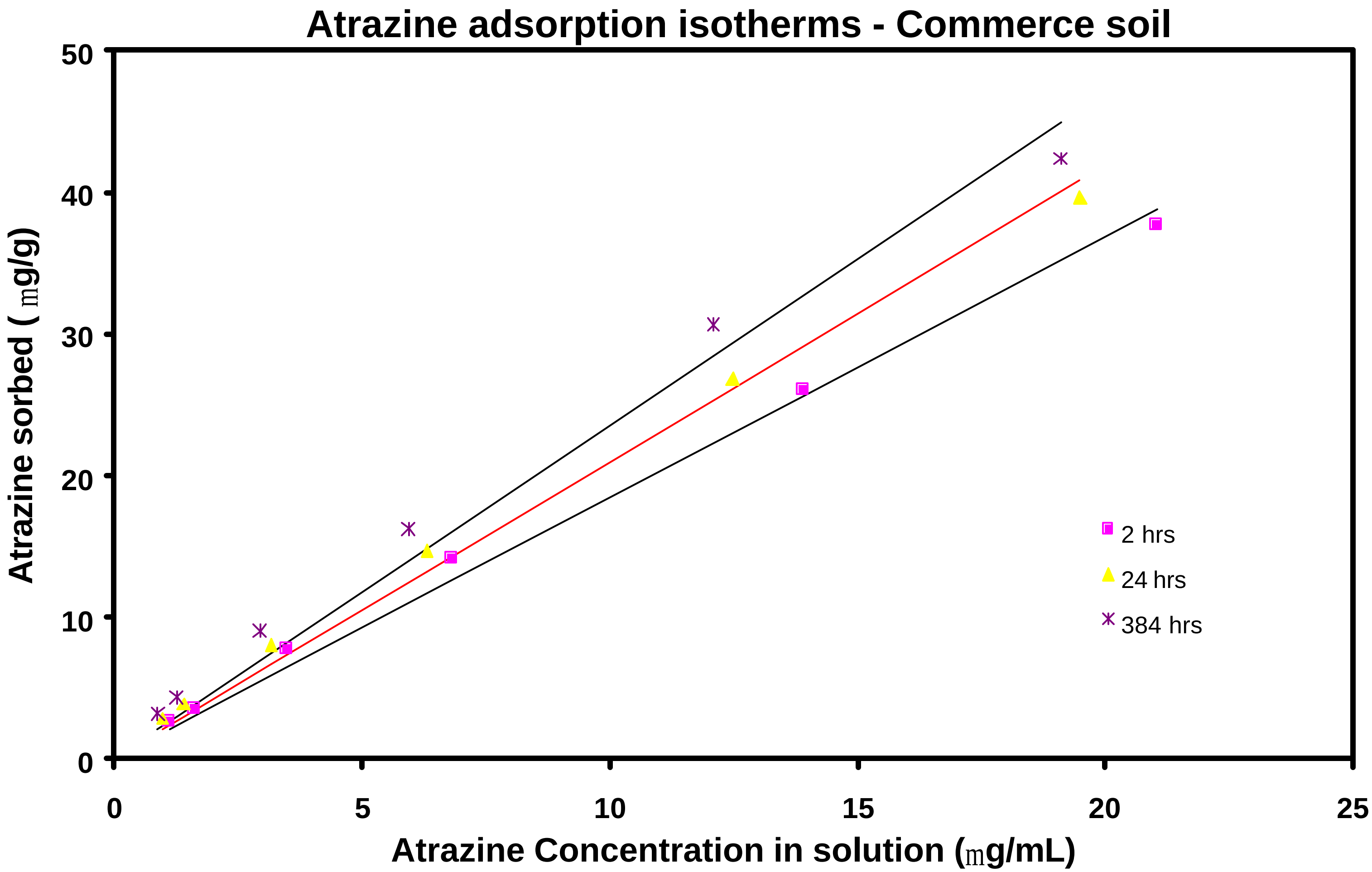

Figure 5. Atrazine adsorption isotherms at different reaction time for Commerce silt loam soil. Solid lines are the predictions using a linear model.

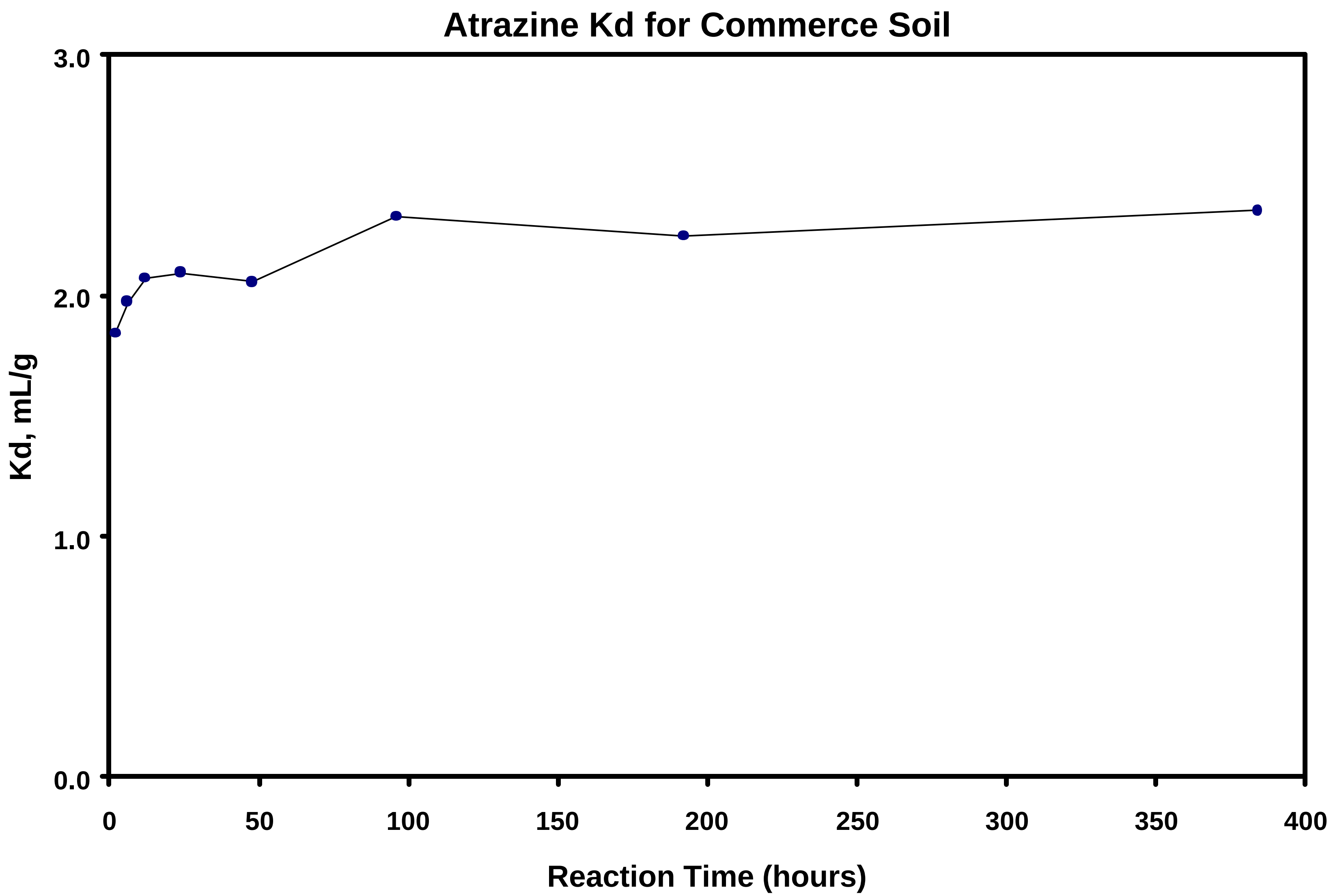

Figure 6. Measured atrazine distribution coefficient (Kd) versus reaction time for Commerce silt loam soil.

ECONOMIC RESEARCH IN SUGARCANE IN 2000

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Projected costs and returns for the various stages of sugarcane production in Louisiana were estimated for the 2001 crop year. Sugarcane producers were surveyed to update information on production and tillage practices. Input suppliers and equipment dealers were surveyed in November 2000 for input prices. Specific operations for which production costs were estimated included field operations on fallow land, seedbed preparation, cutting and planting heat-treated seedcane, planting cultured seedcane, field operations on plantcane, first stubble, second stubble, and third stubble, succession planting, as well as the costs of harvesting with wholestalk and combine harvesters. Costs and returns were estimated for tenant-operators, reflecting the predominant land tenure situation, and reflect a mill payment of 39% of production and a land rent payment of 20% of the "after milling crop" proceeds (12.2% of production). Total costs of production plus overhead for crop cycles through harvest of second, third and fourth stubble were estimated and breakeven prices to cover direct and total specified production costs were estimated for one-fifth and one-sixth share rental arrangements. Summary breakeven prices to cover production costs through harvest of third stubble for alternative yield levels are shown in table 1.

Costs of precision grading sugarcane fields were estimated for the case in which the producer would purchase the laser-leveling and dirt-moving equipment and perform the work with on-farm labor. Both variable and fixed costs associated with precision grading were estimated on a per hour of operation basis as well as costs per acre and per cubic yard of dirt moved. Two key cost considerations include whether a producer should perform the work himself or hire it on a custom basis and determining how many years will be required to recover the investment in precision grading equipment. Results of the study found that the total costs of purchasing the equipment and performing the work with on-farm labor were in the range of \$0.50 to \$0.60 per cubic yard of dirt moved, compared to custom charges of \$0.80 to \$0.90 per cubic yard. Increased production due to removal of some ditches in the field would result in increased annual returns, allowing for a 4- to 6-year cost recovery of investment in precision grading equipment. Estimated costs of precision grading are shown in tables 2 and 3.

Table 1. Breakeven Selling Prices for Raw Sugar for Selected Yield Levels, Arrangements, Harvest Through Third Stubble, Tenant-Operators, Louisiana, 2001

	Selected Yield Levels				
	-20%	-10%	Base	+10%	+20%
Cane yield per harvested acre[1] (tons)	31.0	34.4	38.7	42.6	46.4
Sugar yield per harvested acre[2] (lbs)	6,192	6,889	7,740	8,514	9,288
Sugar yield per rotational (farm) acre[3]	4,712	5,242	5,890	6,479	7,068
One-fifth Land Share Rent:					
	----------pounds of sugar per rotational acre------				
Share of production per rotational acre:					
Mill share (39.0%)	1,838	2,045	2,297	2,527	2,757
Landlord share (12.2%)	575	640	719	790	862
Grower share (48.8%)	2,300	2,558	2,875	3,162	3,449
	---------------dollars per pound of sugar---------				
Breakeven price to recover[4]:					
Direct costs	0.136	0.123	0.114	0.106	0.099
Total specified costs	0.177	0.160	0.146	0.135	0.126
Total costs plus overhead	0.205	0.185	0.169	0.156	0.145
One-sixth Land Share Rent:					
	----------pounds of sugar per rotational acre------				
Share of production per rotational acre:					
Mill share (39.0%)	1,838	2,045	2,297	2,527	2,757
Landlord share (10.2%)	481	535	601	661	721
Grower share (50.8%)	2,394	2,663	2,992	3,292	3,591
	---------------dollars per pound of sugar---------				
Breakeven price to recover[4]:					
Direct costs	0.130	0.118	0.109	0.101	0.095
Total specified costs	0.170	0.154	0.141	0.130	0.121
Total costs plus overhead	0.197	0.178	0.163	0.150	0.139

[1] Average farmyield across harvested acreage of plantcane, 1st stubble, 2nd stubble, and 3rd stubble (base yield of 40 tons plantcane, 42 tons 1st stubble, 38 tons 2nd stubble, 35 tons 3rd stubble).

[2] Average yield in tons per acre multiplied by a 200 CRS.

[3] Assumes standard land rotation of 20% each of fallow, plantcane, 1st stubble, 2nd stubble and 3rd stubble.

[4] Breakeven prices are calculated by dividing grower's share of production into direct costs, total specified costs, and total specified costs plus overhead. No adjustment is made for molasses payments, hauling rebate, or other adjustments.

Table 2. Estimated costs of precision grading per hour of operation.

	Tractor large 4 wd 300 hp	Scraper 17 cu. yd. capacity	Laser equip.	Labor	Total costs
Purchase price ($)	115,000	32,000	20,000	–	–
Expected life (years)	10	15	10	–	–
Salvage value[a] ($)	11,500	3,200	2,000	–	–
Annual use (hours)	1,000	441	441	–	–
Precision grading use[b] (hours)	441	441	441	–	–
Repair cost factor[c] (%)	96	66	20	–	–
Operating costs per hour:					
Fuel costs[d] ($)	12.96	–	–	–	12.96
Repair costs[e] ($)	11.04	3.19	0.91	–	15.14
Labor costs ($)	–	–	–	10.00	10.00
Total operating costs ($)	24.00	3.19	0.91	10.00	38.10
Fixed costs per hour:					
Depreciation ($)	10.35	4.35	4.08	–	18.78
Interest on investment[f] ($)	6.33	3.99	2.49	–	12.81
Total fixed costs ($)	16.68	8.35	6.57	–	31.59
Total costs per hour ($)	40.68	11.53	7.48	10.00	69.69

[a] Salvage value equals 10% of purchase price.

[b] Estimated grading hours based on 8 cycles per hour, 17 cubic yards moved per cycle, 300 cubic yards moved per acre, and 200 acres precision graded annually.

[c] Total repair costs over equipment life as a percentage of purchase price.

[d] Fuel consumption is 14.4 gallons of diesel per hour with diesel priced at 90 cents per gallon.

[e] Total estimated repair cost divided by total hours of use over the useful life of the equipment.

[f] Interest on average investment charged at an annual rate of 10%.

Table 3. Estimated costs of precision grading per acre and per cubic yard of soil moved.

	Tractor large 4 wd 300 hp	Scraper 17 cu. yd. capacity	Laser equip.	Labor	Total costs
Total costs per acre[a]:			*(dollars per acre)*		
Operating costs	52.94	7.04	2.00	22.06	84.04
Fixed costs	36.78	18.40	14.50	–	69.68
Total costs	89.72	25.44	16.50	22.06	153.72
Total costs per cubic yard[a]:			*(dollars per cubic yard)*		
Operating costs	0.18	0.02	0.01	0.07	0.28
Fixed costs	0.12	0.06	0.05	–	0.23
Total costs	0.30	0.08	0.06	0.07	0.51

[a] Estimated grading hours based on 8 cycles per hour, 17 cubic yards moved per cycle, 300 cubic yards moved per acre, and 200 acres precision graded annually.

BOILING OPTIMIZATION PROGRAM

M. Saska
Audubon Sugar Institute

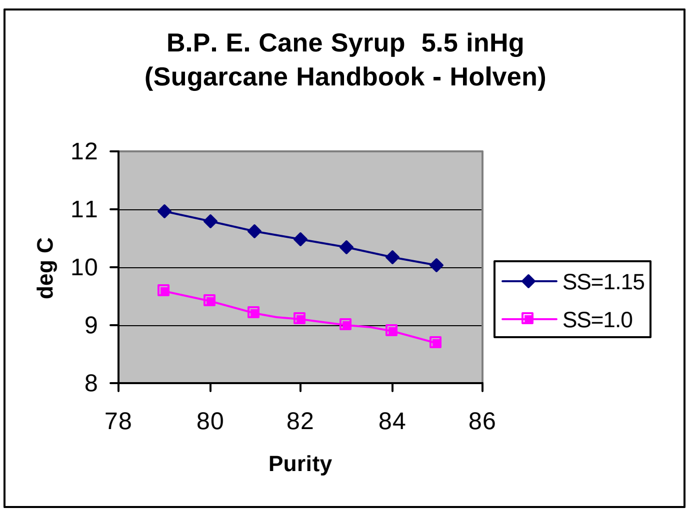
This is to report on the activities related to the boiling program from August, 2000 to February 2001. A brief account is given of the accomplishments as well as comments where the actual work deviated from the tentative plans.

Accomplishments / Comments

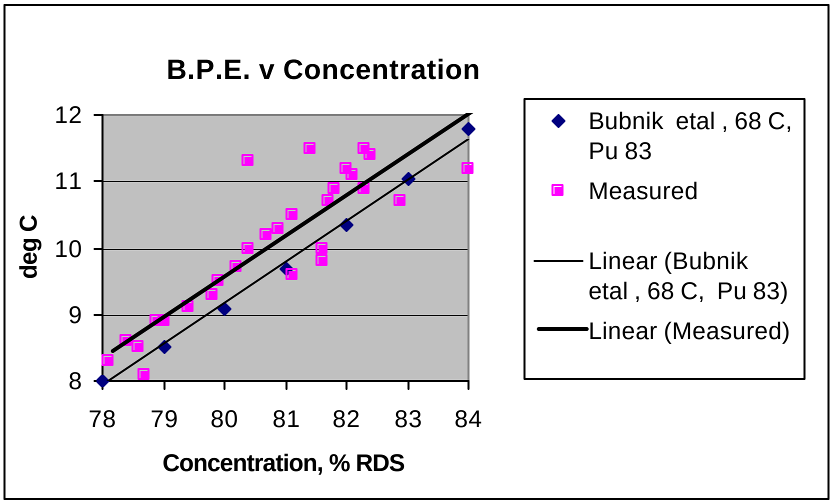
1. "Development of a standard boiling protocol – Pan No. 1"

A number of repeat boilings with syrup brought to ASI from the Cinclaire factory were performed in ASI Pan No. 1 with the objective of developing the standard boiling protocol for syrup boiling. This testing extended throughout the 2000 grinding season, but is now considered completed. Some of the difficulties that were encountered had to do with correct determination of the boiling point elevation at which to seed the pan, and apparently, at times, inconsistent readings from the Dynamic Systems conductivity sensor. Main points follow:

- BPE tables of Holven / Sugarcane Handbook were reviewed because the values previously used at ASI (as per H. Birkett) at supersaturation 1.15 were found too high, leading to excessive false grain formation. The data appear suitable for seeding, at ss value of 1.00 to 1.05,



- A literature equation (Sugar Technologists Manual, Bartens, 1995) for BPE of industrial sugar liquors was reviewed and found to agree with the experimental data from Pan No. 1.



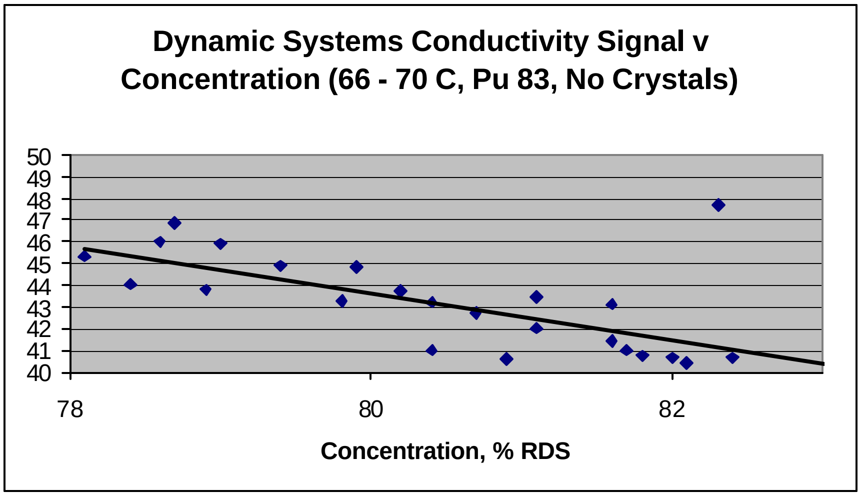
- the conductivity sensor appeared suited for A massecuite boilings, but it is realized in retrospect that the limited sensitivity experienced may have been caused by the way the probe was calibrated before the season's start.

- the automated boiling with the Foxboro I/E system, from start (brixing up the 60 Bx syrup) – BPE control, through seeding , growing of crystals (conductivity control) and "tightening up" - stirrer power control were accomplished.

- standard procedure involved conditioning of the massecuite overnight in a temperature controlled crystallizer at 60 C.

- centrifugation, 1% was water on sugar was found to produce sugar of color comparable to factory raw sugar.

- response of the Dynamic Systems' conductivity probe to syrup Brix and massecuite crystal content was measured .



Based on the more recent experience with the same probe on Pan No. 2, it is expected that the sensitivity can be increased by recalibration that will be performed before the next round of tests on Pan No. 1.

2. Impurity Transfer in sugar boiling

All feeds and sugar produced in the series of boiling trials were analyzed among others for color, ash, polysaccharides, dextran and starch (the latter analyses were performed at SPRI laboratory). The results were tabulated and expressed in terms of the elimination coefficients of the individual impurities, viz. Color, dextran, etc. A sample of the results is below:

Summary of Boiling Tests - Non Filtered (Conventional)

Color (Icu units)

Test No.	**Feed**	**Sugar Whole**	**Affined**	**Elimination Feed-Wh**	**Feed-Aff**	**Whole-Aff**
2	14,600	*430*	75	97.1	99.5	82.6
3	11,000	1,121	145	89.8	98.7	87.1
4	11,400	1,607	215	85.9	98.1	86.6
5	12,300	1,505	164	87.8	98.7	89.1
6	9,400	1,617	182	82.8	98.1	88.7
Average	**11,025**	**1,463**	**177**	**86.6**	**98.4**	**87.9**

More detail on these findings is available in the February 2001 ASSCT presentation authored by M. Saska, S. Goudeau, and M. A. Godshall.

3. Effect of ethanol on molasses exhaustion

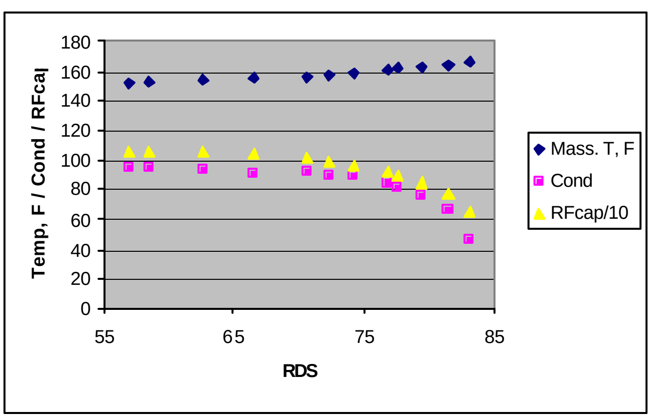
This program, led by Dr. M. Decloux, a visiting researcher at SPRI, was performed in the ASI facilities and was completed by performing several tests with beet molasses supplied by three U.S. beet processors. The results were consistent with previous tests with cane molasses. Very small or nil effect of ethanol addition on molasses exhaustion, and an approx. ten-fold drop in mother liquor viscosity. These somewhat surprising results are being summarized into a publishable form by M. Decloux.

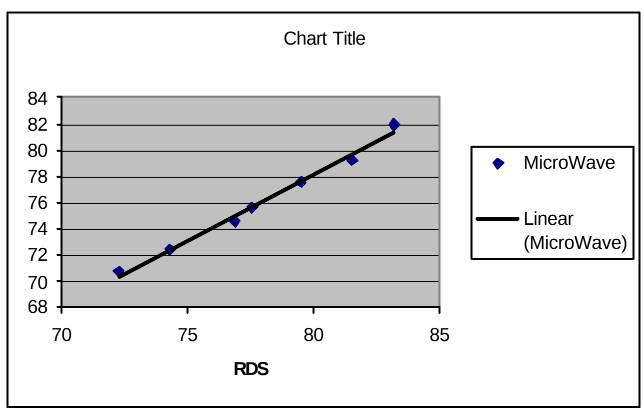
4. Boiling of membrane treated refinery liquors

Several runs of concentrating 100 L quantities of dilute permeates from membrane filtration of refinery liquors and boiling in pan No. 1 of the concentrated permeates were accomplished by Dr. Iqbal of SPRI in the ASI facilities and under supervision and assistance from ASI personnel.

5. Instrumentation and testing of Pan No. 2

The pan has now been instrumented with conductivity, microwave, and RF supersaturation sensors, and a Honeywell UMC controller has been installed. To date the automatic control of absolute pressure and steam pressure have been implemented. The automatic control of the syrup feed valve and stirrer power meter are yet to be implemented pending purchase of an additinal I/P, frequency controller, and load cell. The calibration and setup of the three supersaturation sensors are under way. The preliminary results indicate good performance of the conductivity and microwave probes. The RF probe performance is still being tested. An interesting similarity of the RF-capacitance and Dynamic Systems conductivity signals has been noted and is illustrated below. The linearity of the microwave signal has been confirmed.





CANE WASHING LOSSES AT LOUISIANA FACTORIES

Harold Birkett and Jeanie Stein
Audubon Sugar Institute

SUMMARY

Cane and cane wash water were sampled at several Louisiana sugar factories during the 2000 crop. Sugar losses caused by cane washing averaged 6 lb/ton cane. Washing efficiency averaged 37%, and the amount of entrained wash water entering the factory with the cane averaged about 7%.

INTRODUCTION

This was the final year of a three year study to investigate cane washing. Sugarcane arrives at the factory with extraneous matter (leaves, dirt) and must be washed before processing. Objectives of this project were to:

(1) Determine amount of sugar lost when washing cane.

(2) Determine washing efficiency of existing equipment.

(3) Determine amount of entrained water entering the factory with the washed cane.

PROCEDURES

Cane Washwater Losses

Incoming and outgoing cane wash water samples were collected with two Omega variable speed peristaltic metering pumps. Sample collection times ranged from 15 minutes to 3 hours. Samples were preserved using a few drops of Clorox (5.25% sodium hypochlorite), filtered through 0.45 micron filters and placed on ice. Samples were analyzed as soon as they reached the lab using the phenol-sulfuric acid method for determining sugar concentration.

A Polysonics Doppler flow meter was purchased for the 2000 crop to measure the cane washwater flow rate. Values given by this meter are considered minimal since the meter, despite comparing favorably with similar instruments from the manufacturer, on several occasions gave readings much lower than thought to be realistic by factory personnel and on two occasions gave readings lower than those physically measured. Therefore, if the meter is considered to be in error, cane washing losses reported should be considered as a minimum.

This project was funded by grants from the American Sugar Cane League.

Washing Efficiency and Entrained Water

Cored cane (directly from incoming loads of sugarcane) and washed prepared cane samples were collected throughout the sampling periods of 30-60 minutes. Standard methods were used to determine fiber and ash content of all samples. The calculations used were as follows:

Washing Efficiency, % =

[(Ash % Fiber Cored Cane - Ash % Fiber Prepared Cane)
/ (Ash % Fiber Cored Cane - Ash % Fiber Clean Cane)] x 100

Entrained Wash Water, % =

[(100 x Fiber % Cored Cane) / Fiber % Prepared Cane] - 100

RESULTS

Table 1 shows cane processed per hour along with the quantity of water used for washing. Sugar losses, based on the meter's flow rate and 2 physically measured flow rates, range from a low of 2.49 lb/ton cane to a high of 9.91 lb/ton cane. Average losses were 6.15 lb/ton cane and should be considered a minimum for the reason stated earlier.

A summary of ash in cane before and after washing is presented in Table 2. Also shown is the variability in washing efficiency, ranging from about 5% to 78%. Entrained washwater is also given and averaged 7.5% during the 2000 crop.

A comparison of washing efficiency, entrained cane washwater and sugar losses for the past three years is presented in Table 3.

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Table 1. Summary of pounds sugar lost in cane washwater per ton of cane.

Factory	Tons Cane/Hr	Cane Wash-water, Gal/Min	Sugar Losses, Lb/TC
S	375	897	6.52
K	322	3,565	9.46
K	322	3,457	9.23
K	318	3,698	8.12
A	380	10,500	9.35
H	500	5,200	6.59
P	280	5,160	3.13
E	275	11,725	4.42
S	325	897	7.09
A	400	10,500	3.49
P	275	7,082	2.49
G	438	4,941	3.37
D	430	4,882	3.71
D	430	4,864	5.68
S	350	1,048	5.49
S	350	1,048	5.27
D	325	4,952	4.83
D	325	4,901	7.31
D	420	4,800	3.22
D	415	4,755	8.19
D	380	5,314	9.82
D	380	3,270	4.80
D	375	5,365	9.91
AVG:	365	4,905	6.15

Table 2. Summary of ash in cane before and after washing along with washing efficiency and entrained cane washwater.

Factory	Ash % Corer Cane	Ash % Washed Cane	Fiber % Corer Cane	Fiber % Washed Cane	Ash % Fiber Cane	Ash % Fiber Washed	% Washing Efficiency	Entrn. CWW, %
S	1.45	0.96	11.36	11.13	12.76	8.65	49.16	2.07
K	1.88	1.36	11.67	11.08	16.07	12.28	32.43	5.32
K	1.88	1.37	11.67	11.62	16.07	11.79	36.66	0.43
K	1.80	1.25	11.90	10.92	15.08	11.48	33.70	8.97
A	3.23	2.76	13.55	12.09	23.87	22.84	5.29	12.08
H	7.04	5.21	12.17	10.59	57.86	49.17	16.25	14.92
S	3.38	1.58	12.95	10.48	26.13	15.08	50.88	23.62
A	3.95	3.10	12.47	12.71	31.65	24.40	26.62	-1.89
S	4.07	1.27	11.80	11.50	34.49	11.03	77.98	2.62
S	4.18	3.43	11.96	10.50	34.94	32.67	7.46	12.35
S	4.45	1.46	11.88	11.56	37.46	12.63	75.11	2.77
AVG:	3.39	2.16	12.13	11.29	27.85	19.27	37.41	7.57

Table 3. Comparison of washing efficiency, entrained cane washwater and cane washing losses for the past three years.

Year	Washing Efficiency, %	Entrained Cane Washwater, % Cane	Sugar Losses, Lb/TC
1998	45.55	9.66	8.22
1999	58.93	5.08	8.03
2000	37.16	7.57	6.15

FALLING FILM PLATE EVAPORATOR

W. H. Kampen and H. Njapau
Audubon Sugar Institute

Both rising film plate evaporators and falling film plate evaporators have very compact plate evaporator designs and high rates of heat transfer. None of these units are in use in the Louisiana sugar industry. Fear of high rates of fouling and blockages exist. A rising film version (Alpha Laval) was tested successfully in 1999 at the Cora-Texas Sugar Company in White Castle. The falling film version was tested at the Raceland Sugar Company toward the end of the 2000 grinding season.

Balcke Durr donated the distributor for an operating feed range of 8.3 to 16.0 GPM and the plate pack with a heat exchange surface area of 10 square meters or 130.7 sq.ft.

Housing, valving, piping, and instrumentation were provided by the Audubon Sugar Institute, and the unit was installed with the assistance of Raceland. The unit was only ready for manual operation by December 12, 2000. The average data obtained during three days of manual operation were: > 16 lbs/(h)(sq.ft.) of evaporation at an overall heat transfer coefficient of 748 Btu/(h)(sq.ft.)(°F). It is intended to operate the unit continuously and automatically during this year's grinding season so that the effects of fouling can be established.

ELECTROCOAGULATION TO MINIMIZE EVAPORATOR SCALING

W. H. Kampen and H. Njapau
Audubon Sugar Institute

This project is a continuation from last year's project at Cora-Texas Sugar Manufacturing Company. A new and improved reactor (open design, two stage) was rented from Kaselco of Shiner, Texas. The unit contains sacrificial steel plates, to which a DC-current with changing polarity is applied, which is treating the clarified juice. At the anode, for each mole of iron going into solution, one ferric ion and one electron are formed. The latter reacts with water molecules at the cathode forming hydrogen and hydroxyl ions. The end result is the formation of colloidal ferric hydroxide, which in turn forms the nuclei for mineral aggregates of impurities consisting of mainly silicon (dioxide), calcium, magnesium, and phosphorus. Because of the formation of small amounts of oxygen (1 mg for every mg of Fe into solution) as well as dissolved gases in the juice, these aggregates float to the top. By gentle stirring and the use of a flocculent, they rapidly settle. The settled "mud" can be pumped to the filters for sugar recovery. The clear supernatant goes to the evaporators.

By optimizing the current and the juice flow rate, small amounts of iron are added to the juice (up to 15 - 20 ppm), while silicon dioxide levels are reduced from 350 - 400 ppm to some 25 ppm. Calcium, magnesium, and phosphorus levels are reduced by 10 to 40%. Hence, the removal of scale formers is highly significant. The treatment cost is < 0.02 cents per pound of sugar and the estimated cost of a complete electrocoagulation unit for a 12,000 TCD factory is $ 300,000. Expectations are that the evaporator cleaning interval can be increased significantly. In the new reactor, Reynolds numbers for flow are around 12 (hence strongly laminar), and the superficial velocity was around 0.075 ft/sec. Residence time per stage was 50 seconds. Current levels were 30 DCA at 5 DCV.

Drums of clarified juice (as is and treated with electrocoagulation) have been stored in the freezer for further processing in small evaporators at ASI. A quadruple effect is being simulated, and the scale from each stage will be collected. The syrups will be boiled into sugar. This work is in progress.

Additionally, several dirty tubes from each effect of a quadruple effect evaporator at Iberia Sugar Coop have been obtained for scale analysis as well as scale removal tests with chelates (BASF) and a special acid (Jamison Chemical Company). Scale samples from the last catch-all at the Iberia Sugar Coop are also being processed. This work is in progress as well.

PROSPECTS FOR THE USE OF NIR MEASUREMENTS IN THE LOUISIANA INDUSTRY

P. W. Rein
Audubon Sugar Institute

What is NIR?

Near-Infra Red spectroscopy (commonly referred to as NIR) uses recently developed techniques to measure the absorbance of wavelengths of light in the near infrared region, either by measuring transmission through the sample or by reflectance from the sample.

All substances of plant and animal origin are composed of constituents possessing functional groups of atoms such as -CH, -OH, and -NH- that absorb in the NIR region (700 to 2500nm). Their characteristic absorbance pattern can be traced down the spectra as overtones (simple multiples of the fundamental frequencies) and combination bands (the result of the interaction of two fundamental frequencies) (Petersen 1999). The wavelength of an absorption band often reveals the nature of the chemical bonds responsible for the absorption, and quantitative measurements can be made based on the Beer-Lambert law.

Modern chemometrics software packages analyze the information present in the NIR spectra and develop mathematical models which can be used to provide quantitative results based on the spectra of unknown samples. The vibrated modes for sucrose molecules were examined by Clarke et al. (1993) using a saturated sucrose solution and were found to display unique absorptions at 2088nm and 2272nm, with HOH groups absorbing at 1435nm and 1940nm.

Why is it of advantage to pursue this technique?

Schäffler (2000) has been studying the feasibility of using NIRS for analyzing raw sugar factory process streams. As he notes, the technique is theoretically capable of monitoring multiple analytes quickly and conveniently. It gives results rapidly, within a minute or two, and requires very little labor.

The same instrument can be used for all product streams in a factory, with no sample preparation required, other than perhaps dilution.

It can be said that it can supply more accurate answers, more quickly, without chemicals and using less labor than any other methods. Better results at lower cost are possible.

NIR has been shown to be a valid assessment of cane quality; the method is far more precise and the error in the method is much less than in the conventional Louisiana cane analysis method (Edye and Clarke 1996).

It should be possible to use the technique for analysis of solid materials, cane, and bagasse, using a reflectance measurement technique. One analysis should be able to give a full analysis (moisture, fiber, brix, and pol).

A considerable amount of work has been done on this technique, in Australia, South America, South Africa, and North America. The time may now be appropriate for us to capitalize on previous work.

The experience gained elsewhere should be used to help achieve the improvements in measurement accuracy at reduced cost.

What are the pitfalls?

If it is not done correctly, it could be the quickest way to get the wrong answer!

It is a secondary measurement technique in that it relies on being calibrated against other measurements. The accuracy of the answers is no more accurate than the primary analyses on which the calibrations are based.

Selecting appropriate samples for use in an effective database and developing practical equations are demanding tasks. Many spectra and results have been discarded thus far in various investigations (Schaffler 2000).

Global calibrations have not yet been developed, and calibrations still need to be updated routinely. An operator or supervisor experienced in the techniques and sensitive to the analyses is still crucial to keep NIR errors to a minimum (Johnson 1999; Schaffler and Meyer 1996).

Dirt in cane affects the accuracy of fiber analyses (Staunton et al 1999)

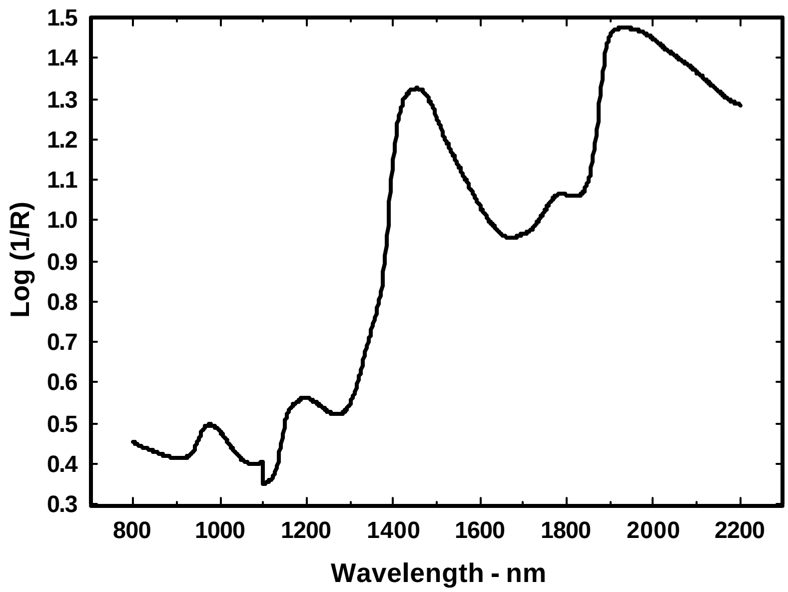
Where are these techniques currently being used?

NIR has been used routinely for cane variety assessment over many years in Australia (Brotherton and Berding 1998) and in South Africa (Meyer 1997, Meyer 1998).

At the American Crystal Sugar Company uses include: on-line NIR determination of sucrose, RDS (refractometer Brix) and betaine levels in the molasses desugarisation plant; the use of AOTF (acousto-optic tuneable filter) equipment; the measurement of key parameters of factory juices by both scanning and AOTF machines; and use of NIR in the factory laboratories (Jacobson *et al* 2000).

Techniques for analysis of liquid products are already well established (Schaffler 1997, Schaffler 2000) and can be totally automated.

Figure 1. Mean spectrum of samples in fibrated mature-stalk sugarcane (n=1764), from Berding and Brotherton (1999).



Fully automatic NIRS analysis of a number of components including sugar and total solids and purity in liquid process samples is used in CSM beet factories in Holland (de Bruijn 1997).

NIR is used for juice analysis for cane payment purposes in some Florida mills (Johnson 2000).

During the 1994 sugar cane harvest season in Sao Paulo, Brazil, the NIR technique was field tested by COPERSUCAR and the results led to the approval of NIR as an acceptable technique for the analysis of pol and Brix in cane juice. Today, the technique is in use for cane payment by factories in the state of Sao Paulo (Petersen 1999).

Attention is now being given to the direct analysis of cane in both Australia and South Africa (Meyer 1997, Brotherton & Berding 1998). Sample preparation and presentation to the instrument are still important issues receiving attention. A typical spectrum of fibrated cane (Fig. 1) shows the dominance of the moisture peaks (≈ 1,440 and 1,920 nm) and portions of the spectrum with reflectance values (log (1/R)) higher than 1.3 that tend to non-linearity.

NIR has been used on-line in the chute of the first mill at Mulgrave in Australia for on-line analysis of fiber (Staunton et al 1999)

What is the way forward for Louisiana and Audubon Sugar Institute?

Audubon Sugar Institute has the necessary analytical capability for the accurate measurement of sugars in any process streams via chromatographic techniques. In addition ASI has on loan an NIR instrument which is being applied to the analysis of molasses. The next step would be to install the instrument at a mill and establish the practicality of its use on a comprehensive basis. Method development has been studied by others, but proving work would still be required in a Louisiana mill. Initial work has just been completed at St. James mill. This would take probably two crushing seasons to establish its viability. Thereafter the practicability and cost savings can be properly evaluated.

A visit to the Sugar Milling Research Institute in South Africa has already been undertaken to assess progress and make contact with the researchers. In Australia in September 2001, the opportunity will be taken to assess progress in the Australian industry. Thereafter the implications for the adoption of these techniques in Louisiana would need to be evaluated.

Foss has approached Audubon Sugar Institute with a proposal to install a system to measure cane quality on line, and this will be pursued in the coming season.

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A SURVEY OF MOLASSES EXHAUSTION IN LOUISIANA MILLS

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ABSTRACT

The results of the survey of analyses of weekly molasses samples from the Louisiana mills for the 2000/01 season are presented. These are related to the South African target purity equation, which is considered to be the most appropriate as a benchmark. This is supported by laboratory exhaustion tests. The results indicate that, on average, significant reductions in molasses purity can be achieved, with substantial savings for the industry. The analyses of monosaccharides indicate the widespread occurrence of Maillard reaction in the massecuites, which hampers good molasses exhaustion.

INTRODUCTION

The loss of sugar in molasses is generally the largest loss suffered by a sugar mill. It is therefore important that reliable data on molasses exhaustion be obtained. The normal measurements used in a sugar mill laboratory are not accurate enough at the low purities associated with final molasses. Chromatographic methods of measurement of sugars content in molasses are now well developed and can be relied upon to give accurate and reliable answers.

In the past, Audubon Sugar Institute undertook analyses of molasses samples for the mills in Louisiana. This was discontinued after the 1997 season, but it was considered to be important to reintroduce the analyses of weekly composite molasses samples to provide the mills with reliable information on how well the molasses is being exhausted.

To assess the degree of exhaustion achieved, a benchmark is necessary. This is generally available in the form of a “target purity” equation. A number of these have been proposed in the past, and it is necessary to choose the most appropriate for Louisiana conditions.

Background to target purity equations

A number of different target purity equations have been proposed over the years. Essentially they have been derived by laboratory trials on various molasses samples under controlled conditions, establishing in essence equilibrium purity under specified conditions.

A target purity can be thought of in two ways, either the lowest molasses purity achievable in a lab (equilibrium purity) or the target realistically achievable in a factory. The former is preferred, since it is an objective standard related to what can be achieved and is not dependent on a subjective assessment of what is acceptable. The difference between actual and target purities is referred to as the Target Purity Difference (TPD) and gives an indication of potential improvement; obviously this should be as small as possible.

The target purity is significantly affected by the measurement methods used in the process of deriving the formula. The effect of analytical methods makes it essential to specify the methods used for each target purity equation. Those which have been used in the past are shown in Table 1.

Table 1. Target purity equations proposed in the literature.

		Analytical Method			
Reference	Equation	Dry Solids	Sucrose	Monosaccharides	Ash
Foster 1960	40.7-17.8log(RS/A)	Drying	Double pol	L & E	Sulfated
Miller et al 1998	39.4-10.6log(RS/A)	Drying	Double pol	HPLC	Sulfated
Bruijn et al 1972	39.9-19.6log(RS/A)	Drying	L & E	L & E	Sulfated
Rein & Smith 1981	37.7-17.6log(RS/A)	Drying	L & E	L & E	Sulfated
Rein & Smith 1981	33.9-13.4log(RS/A)	Drying	GLC	GLC	Sulfated
Smith 1995	43.1-17.5[1 - exp(-0.74RS/A)]	Drying	GLC	GLC	Sulfated
ASI 1993	42.4-12.3log(RS/A)	RDS Correlation	HPLC	HPLC	Conduct.

The monosaccharides fructose and glucose are most accurately measured by GLC (gas liquid chromatography) or HPLC (high performance liquid chromatography). They are commonly referred to as reducing sugars (RS) and measured by the Lane & Eynon method (L & E). Reducing sugars decreases the solubility of sucrose in molasses, while most inorganic components, which constitute the ash, tend to increase the solubility. These target purity equations all take these two effects into account in the ratio of reducing sugars to ash (RS/A). This is a convenient approach, leading to a simple form of target purity equation. High values of RS/A will generally enable lower molasses purities to be achieved.

Choice of Target Purity Equation as a Benchmark

The ASI (Audubon Sugar Institute) equation was derived originally simply by fitting the lower range of factory molasses purities and is now considered too lenient (Saska et al 1999). The South African formula (Rein and Smith 1981) was assumed to be the most appropriate for the following reasons:

- It is based on an extensive experimental program.
- It makes use of the most accurate and reliable measurements (GLC).
- It has been used extensively in Southern Africa for 20 years, and has been reliable under all conditions.
- Subsequent laboratory exhaustion work on molasses from other cane-producing areas has confirmed its general applicability, generally within one unit of purity (Sahadeo 1998).
- A recent survey of molasses from around world shows TPD values in the range of 3 to 7 units, in the expected range, confirming its general applicability (Sahadeo 1999).

The use of HPLC techniques has now been shown to give accuracy similar to the use of GLC, on which the equation was derived. HPLC is a much easier technique to use and is accepted for use with this equation.

It has been shown that in the Tongaat-Hulett mills in South Africa, the TPD values recorded are very similar to the purity rises measured on curing (Smith 1995). This indicates that the massecuite is well exhausted after the crystallizers and provides further evidence for the suitability of this formula.

In practice therefore it is very unusual for a factory to achieve a zero TPD. The best factories will report a TPD of around two to three units, roughly equal to the rise in mother liquor purity across the centrifugals.

PROCEDURE FOR THE ANALYSES OF WEEKLY MOLASSES SAMPLES

Sample handling and preparation:

Upon arrival each sample is number coded and the mill name blacked out. A key is made to identify the sample numbers with the factories. The samples are then mixed and a portion separated for analyses. Each week, one to three samples of a control sample are coded and mixed in with factory samples. The original samples are stored for future analyses if required. After thorough mixing, 30 grams or more of the sample are weighed and diluted with an equal amount of warm deionized water. The diluted samples are then mixed for five minutes using a Burrell Shaker. From the diluted samples, 26 and 4 grams are weighed into 200 ml volumetric flasks for Pol and conductivity ash analyses, respectively. A 15 ml centrifuge tube is filled with the diluted sample for Brix and HPLC analyses.

After analyses the remainder of the diluted sample in the centrifuge tube is frozen and retained for the season. A portion of the coded sample is saved until the end of the season when they are combined into two composites for each factory, one for each half of the crop, for elemental analysis. The remainder of the coded sample is discarded.

The data from the analyses are entered into a spreadsheet and associated with the appropriate factory or control. Weekly results are reported to each mill by fax and the results are posted on the ASI's website.

Procedures:

Pol: Twenty-six grams of the 1:1 diluted sample is weighed in a 200ml volumetric flask and diluted to volume with deionized water. The solution is then transferred to a glass jar and two teaspoons of Octapol are added. The sample is shaken well filtered and read on the saccharimeter.

Brix: The diluted sample is read directly on the refractometer. True solids were not measured directly, but were calculated from a relationship developed by Matthesius and Mellet (1976):

True Solids = 100 / ((101.3 / Refractometer Brix) + (.932 / True Sucrose)).

Conductivity Ash: A 1% molasses sample is prepared by diluting four grams of 1:1 sample solution to 200 ml in a volumetric flask. The sample is then brought to 20°C in a water bath and the conductivity is read in µS on a conductivity meter. The ash is calculated using the following formula:

Conductivity Ash = 9.224 x K x C + 2.5119
K = cell constant (.99 cm^{-1}).
C = measured conductivity in µS

This formula was derived from data collected over three (1990-1993) seasons on 405 samples.

Sugars by HPLC: Approximately one gram of the diluted sample is weighed into a 100ml volumetric flask. The sample weight is recorded to a minimum of three decimal places. The sample is then diluted with Type I water and filtered through a 0.45 µm filter into a sample vial. The sample vial is placed into the auto sampler and the true solids weight, calculated from the Brix reading of the 1:1 solution, is entered into the integrator along with the sample number. Standards are ran at the beginning and end of each sample set and every five to six samples to verify accuracy.

Equipment used for analyses:

Apparent Purity:
Bellingham and Stanley Limited RFM90 Refractometer.
Rudolph Research Autopol IIS Saccharimeter.

Conductivity Ash:
Radiometer Copenhagen CDM3 Conductivity Meter.

Sugars by HPLC:

Column:	Bio-Rad HPX-87K 300 X 7.8mm.
Column Heater:	Waters Column Heater Module at 85°C.
Solvent:	0.01 M K_2SO_4 at 0.6 ml/min.
Detector:	Waters 410 Differential Refractometer.
Integration:	Spectra-Physics SP4270 Integrator.
Auto Sampler:	Bio-Rad AS100 HRLC with 20 µl sample loop and temperature control at 5°C.
Pump:	Waters Model 510.

Verification of Methods and Instrument Accuracy:

Several of the methods are similar to the ICUMSA methods procedures, but they vary from the ICUMSA method in the amount of sample used or the amount of dilution. Comparison studies using ASI and ICUMSA methods will be conducted to determine if the differences between the methods are significant. The ICUMSA methods will be used for the following seasons. As mentioned above, the True Solids calculation will be evaluated using the data collected in the NIR study.

Providing a more stable temperature for ASI's instruments is of great concern. ASI will be looking into the current locations, conditions, capabilities, and calibration procedures for equipment so that ASI can assure the best accuracy possible is provided for our customers.

Season survey results, 2000/01

The average values for the analyses for the season for all mills are given in Table 2 and the TPD values are shown in Figure 1. Note that some mills provided only a few samples during the season, in particular Factory J. Average values for each week of the season for all mills are given in Table 3. The averages for each week of the season are shown in Figure 2, as well as the variation during the season of the average monosaccharide / ash ratio.

The monosaccharide / ash ratio shows the expected trend during the season, starting at a higher than average value, dropping as the season commences, and rising toward the end of the season. The TPD values in Figure 1 show higher values at the beginning and end of the season, reflecting startup and liquidation problems at the end of the season. An unusual peak in mid-November is evident. This is caused mainly by high values recorded in the southern most mills and is thought to be associated with the heavy rain experienced at the time. This introduces additional delays in harvesting and transport, leading to massecuites which are difficult to process.

Of interest is the performance of one of the mills, Factory Q, which is generally known as an efficient processor. A graph of its TPD is shown in Figure 3. Initially it showed a very high TPD value of around 12 units; midway through the season it made some substantial improvements, and the TPD dropped to a very respectable number of around 5 units.

Laboratory exhaustion trials

A previous lab exhaustion trial gave results which supported the applicability of the target purity equation being used (Saska et al 1999). With the apparent exhaustion problems at Factory Q, samples of molasses from that factory were collected and subjected to exhaustion trials at ASI. The procedures and the equipment used are described elsewhere (Saska et al 1999). The molasses was concentrated up in a 150 L pilot pan, seeded with fine sugar, concentrated up to the required consistency, and cooled down to 40 C in pilot crystallizers. Samples were taken periodically for analysis of mother liquor purity. The results as a function of cooling time are shown in Figure 4.

Two sets of runs were undertaken, with a high and a low brix after concentration being used in each set of runs. The two lower graphs in Figure 4 represent the high brix case and show that, after about 50 hours, very little extra exhaustion is achieved. The target purity predicted by the equation for this massecuite is 36.0, and it can be seen that this purity is achieved.

Figure 5 shows the final purities achieved as a function of mother liquor brix. This emphasizes the importance of concentrating up the massecuite to as high a level as possible to achieve good exhaustion.

DISCUSSION

The weakness of this work lies in the fact that true solids were not measured but were inferred from refractometer brix. However it is unlikely that this simplification affects the true purity by more than one unit, within the accuracy of the whole determination. Further work will be done on these samples, specifically to investigate the use of NIR as a routine measurement for this purpose.

Dextran affects the viscosity of massecuites, and, above levels of about 10 000 ppm on brix (roughly twice the normal Louisiana level), the target purity should be increased by one unit or more (Sahadeo 1998). In times of long delays, therefore, when dextran levels rise, TPD values are expected to be higher.

The value of the fructose/glucose ratio (F/G) is of considerable interest. The F/G ratio was measured at 1.17 in mixed juice on some samples from Factory R, but averaged 1.6 for the industry in molasses, with a range of values 1.4 to 2.0. The variation in these values is shown in Figure 6. In general the value in juice should be close to one, and it is the occurrence of Maillard reaction which causes this ratio to change. In South Africa in 1999, values of 1.2 - 2.0 with an average of 1.4 were reported (Lionnet 2000). The higher the value of F/G, the greater the extent of the reaction.

Maillard reaction is a reaction between reducing sugars and amino nitrogen. It results in the formation of color and aerates the massecuite, significantly increasing viscosity (Newell 1979). It is also known as the phenomenon which causes molasses swelling in crystallizers and explosions in molasses tanks, since it is exothermic (Wong et al 1996). It destroys reducing sugars, forming additional impurity and increasing molasses losses. Glucose is consumed preferentially in the reaction, which leads to values of F/G higher than one, although some fructose also reacts. The RS/ash ratio is reduced, affecting massecuite exhaustion. High concentrations and high temperatures promote the reaction, with a 5 C increase in temperature leading to a doubling of the reaction rate. The reaction can be minimized by boiling pans at as low a temperature as possible. In general, particularly with C massecuites, to minimize the reaction temperatures should be kept below 63 C (145 F) at strike and cooled as quickly as possible. Molasses backblending also may help.

CONCLUSIONS

The new target purity formula does seem to represent Louisiana conditions. Some work needs to be done on refining and updating analytical techniques. Further work will be done using NIR on these molasses samples. Molasses purities on average are 5 units higher than they could be. This is worth 2.5 units of overall recovery, or $20 million a year to the Louisiana industry. Efforts to reduce molasses purities would be assisted by reducing the prevalence of Maillard reactions.

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Table 2. Weekly averages for all Louisiana mills.

Week Ending	Ref. Brix	True Solids	App. Purity	True Sucrose	Ratio pol /sucrose	True Purity	Fructose F	Glucose G	Cond. Ash	(F+G)/ Ash	Target Purity	T. P. Diff.	F/G Ratio
09/30/00	80.8	78.1	36.7	34.8	0.85	44.6	8.6	5.3	15.5	0.91	34.6	9.9	1.62
10/07/00	81.4	78.7	35.1	34.8	0.82	44.2	7.6	4.9	16.2	0.77	35.5	8.7	1.55
10/14/00	81.1	78.3	36.1	33.4	0.87	42.7	7.4	4.9	16.6	0.74	35.7	7.0	1.52
10/21/00	80.6	77.9	35.7	33.5	0.86	43.0	7.4	5.1	16.8	0.74	35.7	7.4	1.46
10/28/00	80.7	78.0	36.6	34.2	0.86	43.9	7.2	4.8	16.8	0.72	35.9	8.0	1.51
11/04/00	80.8	78.2	37.5	35.3	0.86	45.2	6.8	4.8	16.7	0.69	36.1	9.1	1.43
11/11/00	80.2	77.6	37.3	36.0	0.83	46.4	6.8	4.4	16.7	0.67	36.3	10.1	1.54
11/18/00	80.6	78.0	37.6	35.8	0.85	45.9	6.3	4.1	17.7	0.59	37.0	8.9	1.55
11/25/00	80.8	78.2	36.9	35.6	0.84	45.5	6.6	4.1	17.8	0.60	36.9	8.6	1.61
12/02/00	81.2	78.5	33.5	35.3	0.77	45.0	7.8	4.8	17.6	0.72	35.8	9.2	1.61
12/09/00	81.6	78.9	34.1	36.0	0.77	45.6	7.2	4.3	18.0	0.64	36.6	9.0	1.68
12/16/00	81.5	78.9	34.4	36.4	0.77	46.2	7.5	4.1	17.8	0.65	36.4	9.8	1.81
12/23/00	80.9	78.2	35.4	36.8	0.78	47.0	7.1	4.0	17.7	0.63	36.6	10.4	1.79
12/30/00	81.8	79.1	36.2	37.1	0.80	46.9	7.1	3.9	17.4	0.64	36.6	10.3	1.79
01/06/01	82.0	79.3	36.9	37.5	0.81	47.2	7.2	3.7	16.8	0.65	36.4	10.8	1.92
01/13/01	83.4	80.7	38.8	37.7	0.86	46.7	7.5	4.3	14.9	0.79	35.3	11.4	1.75
Average	81.2	78.5	36.2	35.6	0.83	45.4	7.2	4.5	16.9	0.70	36.1	9.3	1.63

Table 3. Seasonal average values for each factory.

Factory	Ref. Brix	True Solids	App. Purity	True Sucrose	Ratio pol /sucrose	True Purity	Fructose F	Glucose G	Cond. Ash	(F+G)/ Ash	Target Purity	T. P. Diff.	Ratio F/G
	% mol.	% mol.	%	% mol.		%	% mol.	% mol.	% mol.		%		
A	80.7	78.0	37.2	36.0	0.84	46.1	6.9	4.4	17.2	0.65	36.4	9.7	1.58
B	79.3	76.7	35.8	34.7	0.82	45.3	6.4	4.0	17.7	0.58	37.1	8.2	1.60
C	80.0	77.4	35.5	35.0	0.81	45.2	6.6	3.5	17.3	0.59	37.0	8.2	1.90
D	82.1	79.4	35.1	35.7	0.81	45.0	7.1	4.2	17.3	0.66	36.4	8.6	1.68
E	83.7	80.9	35.1	35.4	0.83	43.7	7.7	5.6	17.7	0.75	35.6	8.2	1.36
F	82.0	79.3	36.5	36.1	0.83	45.5	7.5	5.3	16.4	0.79	35.4	10.1	1.42
G	79.5	76.9	37.2	35.5	0.83	46.2	7.1	5.2	16.9	0.72	35.8	10.4	1.37
H	82.2	79.4	34.8	35.4	0.81	44.6	7.5	4.6	17.5	0.69	36.1	8.5	1.62
I	80.5	77.9	37.5	35.9	0.84	46.1	8.2	6.3	16.5	0.88	34.6	11.5	1.31
J	83.5	80.7	34.0	36.7	0.77	45.5	7.5	3.7	17.5	0.64	36.5	9.0	2.01
K	80.7	78.0	35.3	34.6	0.83	44.3	7.2	4.4	17.4	0.68	36.3	8.0	1.64
N	81.4	78.6	34.3	34.4	0.81	43.8	7.5	4.2	17.3	0.68	36.2	7.6	1.79
O	79.5	76.9	36.1	35.2	0.82	45.8	7.3	4.3	16.0	0.73	35.8	10.0	1.70
P	78.3	75.7	35.1	33.7	0.81	44.6	6.6	3.6	17.4	0.59	37.0	7.6	1.82
Q	82.4	79.7	36.2	36.7	0.81	46.1	7.2	4.4	18.3	0.64	36.6	9.5	1.64
R	79.0	76.4	37.5	35.1	0.85	45.9	6.8	4.7	17.1	0.68	36.2	9.7	1.46
S	83.5	80.8	37.4	37.0	0.84	45.8	7.0	4.0	16.2	0.68	36.2	9.7	1.76
W	82.2	79.4	34.3	34.3	0.82	43.2	7.5	4.5	17.3	0.70	36.0	7.2	1.65
Average	81.1	78.4	35.8	35.4	0.82	45.2	7.2	4.5	17.2	0.69	36.2	9.0	1.60

MICROBIOLOGICAL ASPECTS OF CANE WASHING SYSTEMS: EFFECTS ON JUICE QUALITY AND SUGAR LOSSES

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In Louisiana, the rapid shift from whole stalk harvesting to billet harvesting has resulted in unanticipated alterations of traditional processing systems in the sugar factories. One such alteration has been higher sugar losses on cane washing. Increased amounts of sugar have gone into wash pond systems designed to handle lower BOD inputs. It would be expected that higher sugar would bring about concomitant increases in both microbial and organic acid loading of wash waters. Day and Birkett (2001) reported a 10-15 % carry-through of washwater from cane washing to the juice. An increase in organic acid loading in the mixed juice may cause processing problems ranging from increased scale formation, higher lime usage, and higher sugar losses to more rapid equipment corrosion. This study documented both the types and amounts of organic acids carried through to the sugar process streams due to cane washing and as well the carry through to mixed juice.

The objective of this project was the establishment of baseline data on organic acid levels present in washwaters in and around the wash tables at Louisiana sugar mills and organic acid carry through to mixed juice.

METHODS

Organic Acids in Washwaters: The sugar factories tested were grouped according to rate or water recycle in their wash systems. Those with a rapid turnaround of their washwater (less than 24 hours) and minimal treatment are group A; those with a very long washwater recycle time (more than 30 days) are group B; those with a rapid turnaround, but extensive aeration, are group C; and those with an intermediate time and treatment regime are group D. Washwaters entering and exiting the wash tables were analyzed for pH, Brix, lactic, formic, and acetic acids. These acids were chosen because they are primary products of anaerobic microbial action on sugars (Sokatch 1969). Brix analysis was conducted by refractometry after mud removal by centrifugation. Organic acids were analyzed by HPLC.

RESULTS AND DISCUSSION

Solids Loss on Washing: Average Brix increase in washwater across wash table was 0.21 Brix (range 0.1 - 0.7). There was no relationship between loss and type of wash system. This is an estimated loss of 0.017 lb. soluble solids/gal of washwater (at 5,000 gpm this amounts to 122,000 lb./day of solids), and is well in line with previous reports. A significant portion of this is probably recoverable sugar. This loss should be factored in when the cost of cane washing is calculated.

Organic Acid Levels: Concentrations of lactic, formic, and acetic acids were determined in water going onto the wash tables and categorized according to wash pond treatment and in the mixed juice produced at the same time (Table1).

Table 1. Organic acids in cane washwater and mixed juice.

Group A* Sample Day	washwater lactic (ppm)	washwater acetic (ppm)	washwater formic (ppm)	mixed juice lactic (ppm)	mixed juice acetic (ppm)	mixed juice formic (ppm)
1	1233	301	119	124	31	6
5	548	766	271	134	46	7
12	661	320	302	382	76	20
27	161	274	8	62	42	8
32	2	215	18	34	28	7
Group B						
5	1	0.5	0	69	49	7
12	0.7	0.1	0.2	109	2	8
Group C						
8	4	0.3	0.5	36	62	7
12	1.6	0.2	0.5	133	241	21
25	5.3	0.5	0.2	56	17	6
Group D						
19	141	56	55	62	160	32
25	500	221	208	56	51	7

*Mills grouped according to washwater recycle and treatment. Acid concentrations are given as ppm on volume.

The concentration of organic acids in the washwater reflected the state of the wash pond. Levels were low with once through, or well-aerated water, and high where the holding time was very short or aeration was inadequate (Figure 1). The organic acid which was most prevalent was lactic acid. It also was the most responsive to changes in wash pond conditions. Where lime was used to control the pH of the wash system (Group A), the concentrations of lactic acid dropped, presumably because of formation of calcium lactate. A similar effect was seen with formic acid concentrations, but acetic acid levels did not appear to change in tandem with the other two test acids.

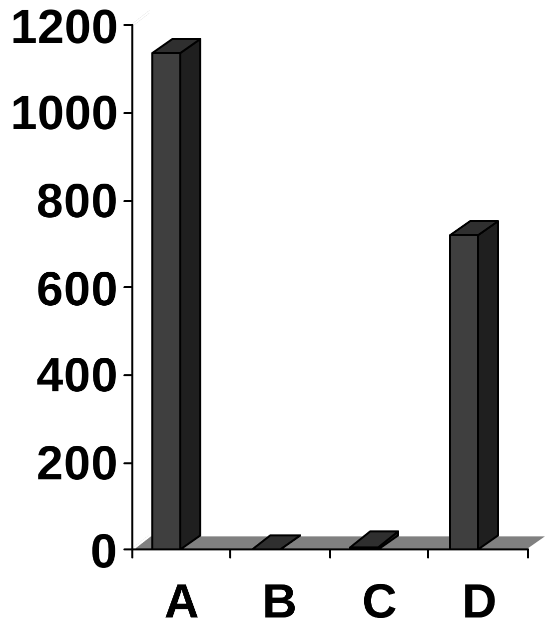

Figure 1. Average organic acid levels in washwater as a function of pond treatment. Values are for lactic, acetic, and formic acids over a one-month period.

Organic Acid Carry-through: There was concern that corrosion found within the factory may be caused by acid carry over from cane washing. A comparison of the lactic acid levels in cane wash and in mixed juice showed no correlation. In some cases high levels in the juice had low levels in the wash or the reverse. On average there was a relatively constant concentration of organic acids found in mixed juice, around 60 ppm on volume (Figure 2). This was independent of the type of washing or concentration of the organic acids in the washwater. It is likely that mixed juice organic acid levels are more a reflection of cane deterioration than cane washing.

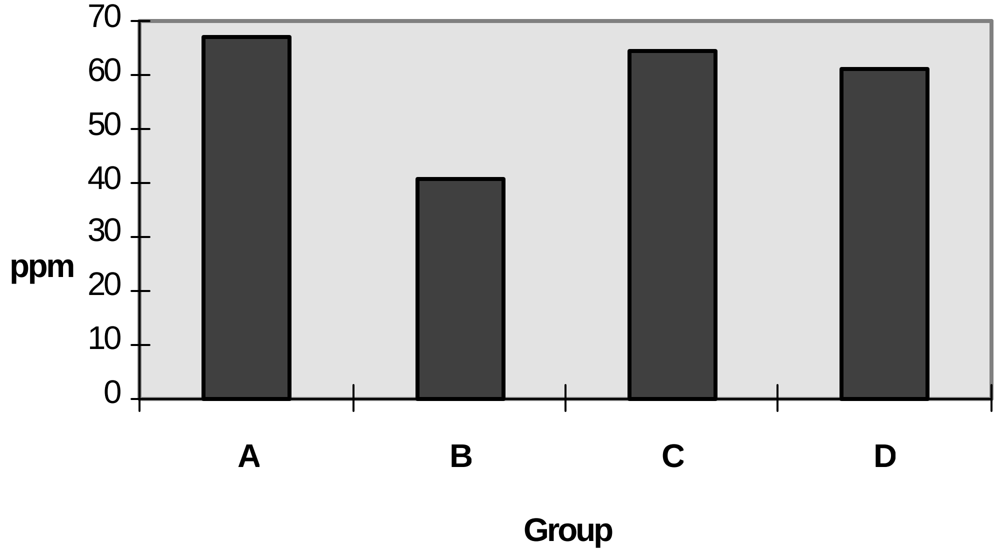

Figure 2. Average organic acid (lactic, acetic, formic) concentrations in mixed juice. Values are given as ppm on volume.

It is probable that the levels of organic acid found in the juice are a reflection of the amount of deterioration in the cane and that there is little or no increase in acid juice levels because of the washing system. However, there are fluctuating but significant amounts of acids found in the juice, which may have deleterious effects on downstream processing.

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