

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

CODE: VAR 46/03/Sw/Sim 'R'

CAT : 2197

RELEASED VARIETIES ON AN 'R' SET SOIL HARVESTED EARLY SEASON

1. PARTICULARS OF PROJECT

This crop	: Plant	Soil Analysis:	April 2003
Trial crop	: 1 st	pH	OM % Clay % Silt % Sand %
Site	: RSSC (Simunye)	7.04	- - - -
Field	: 604 Panel 15		ppm
Region	: Northern Irrigated (Swd)	P	K Ca Mg (Ca+Mg)/K
Soil Set	: 'R'	21	204 2964 1015 20
Design	: Split plot, 4 replications	Age	: 12.5 months
Variety	: NCo376, N23, N36, N40	Date	: 29/4/2003 – 13/5/2004
Fertilizer	: N P K	Rainfall	: 609mm
kg/ha	120 60 150	Irrigation	: Fully irrigated (surface drip)

2. OBJECTIVES

- To compare the performance of varieties N23, N36, N40 and NCo376 in an early season cycle on an 'R' set soil.
- To determine the ripening response of each variety to Fusilade Super and Ethephon.
- To compare the resistance/susceptibility of NCo376, N23, N36 and N40 to smut and eldana.
- To compare the third leaf nutrient concentrations of N23, N36 and N40 with established NCo376 thresholds.

3. TREATMENTS

- Varieties and ripening treatments in this trial were as follows:

Ripeners (main plots)

Control
Fusilade @ 0.3 l/ha
Fusilade @ 0.45 l/ha

Varieties (sub plots)

NCo376
N23
N36
N40

- Ethrel and Fusilade Super (Fusilade) were applied with a CO₂ constant pressure knapsack sprayer and a hand held 'T' boom fitted with two TK 1.5 nozzles, delivering ± 52 l/ha. Details of ripener treatments are given in Table 1.

Table 1: Details of ripening treatments

Detail	Ethrel	Fusilade
Date applied	3/2/2004	4/2/2004
Age (months)	10.1	11.1
Spray to harvest (weeks)	10.3	5.8
Juice purity at spraying %		
NCo376	66	70
N23	70	72
N36	80	83
N40	85	87

4. FERTILIZERS

- 120kg N/ha (as Urea, 46% N), applied at planting (54 kg/ha) and 21 weeks after planting (66 kg/ha)
- 60kg P/ha (as DAP, 18%N and 20%P) was applied at planting
- 150 kg K/ha (as KCl, 50% K) was applied at planting

5. RESULTS AND DISCUSSION

Leaf Analysis

- Levels of N, P, K, Ca and Mg were satisfactory and above their respective thresholds (Table 1).
- There were statistically significant differences in levels of P, K and Mg among varieties (Table 2).

Table 1: Third leaf nutrient content (% dm) at 6.0 months of age in October

Variety	% dm				
	N	P	K	Ca	Mg
NCo376	2.21	0.23	1.12	0.24	0.22
N23	2.21	0.23	1.19	0.23	0.20
N36	2.22	0.22	1.22	0.24	0.23
N40	2.23	0.23	1.10	0.25	0.22
Mean	2.22	0.23	1.16	0.24	0.22
LSD (0.05)	NS	0.007	0.09	NS	0.009
LSD (0.01)	-	0.010	NS	-	0.012
CV %	2.7	3.8	9.1	8.0	4.8

Table 2: Variety differences in third leaf nutrient content (% NCo376)

Variety					
N23	100	100	106	96	91**
N36	100	96**	109*	100	105*
N40	101	100	98	104	100

* = Significant (P=0.05)

** = Significant (P=0.01)

Growth Measurements

- The stalk populations of N36 and N40 were significantly lower than that of NCo376 towards harvest. (Table 3). N23 was statistically similar to N36.
- N36 produced significantly taller stalks than all the other varieties (Table3). N23 and N40 were statistically similar and had significantly the shortest stalks, while NCo376 was intermediate.

Table 3: Growth measurements at various ages

Variety	Stalk population ('000/ha)				Stalk height (cm to TVD)			
	Sep (4.9m)	Nov (6.3m)	Jan (8.3m)	Mar (10.2m)	Sep (4.9m)	Nov (6.3m)	Jan (8.3m)	Mar (10.2m)
NCo376	154	199	137	120	23	52	139	247
N23	120	164	131	109	28	54	134	232
N36	143	166	106	99	31	66	165	260
N40	143	168	109	97	27	55	139	228
Mean	140	174	121	106	27	57	144	242
LSD (0.05)	17	19	14	11	2	5	11	12
LSD (0.01)	23	26	19	15	3	7	15	16
CV %	14.7	13.2	13.6	12.1	8.4	11.3	9.4	5.7

Pests and Diseases

- All varieties were affected by Eldana damage at harvest. There were no measurable differences among varieties (Table 4).
- Levels of smut were extremely low and none was detected in N23, N36 and N40 (Table 4).

Table 4: Eldana damage at harvest and smut levels between July and November

Variety	Eldana	% Smut whips		
	% Int. damaged	Jul (2.4m)	Sep (4.9m)	Nov (6.3m)
NCo376	0.52	0.15	0.31	0.40
N23	0.74	0.00	0.00	0.00
N36	0.74	0.00	0.00	0.00
N40	0.58	0.00	0.00	0.00
Mean	0.65	0.04	0.08	0.10
LSD (P=0.05)	NS	NS	0.19	0.14
LSD (P=0.01)	-	-	0.26	0.18
CV %	69.5	692.8	290.2	160.7

Sucrose samples

- Juice purity at the time of ripener application indicated that all varieties other than N36 and N40 were sufficiently immature to respond to both Ethrel and Fusilade (Appendix 1). N36 and N40 were suitable at Fusilade application only.
- Although juice purity was high at ripener spraying, both Ethrel and Fusilade significantly improved mean sucrose and erc % cane at harvest (Figures 1 and 2). All varieties responded to both Ethrel and Fusilade. There was no interaction.
- Fusilade significantly reduced moisture % cane at harvest. N36 and N40 had significantly the lowest moisture % cane, hence the highest sucrose and erc % cane. NCo376 had significantly the highest moisture % cane, while N23 was intermediate.
- N23 and NCo376 were statistically similar and produced the lightest stalks at harvest, while N36 produced the heaviest. N40 was intermediate.
- Whilst N36 had significantly the highest sucrose and erc mass, there were no statistical differences when compared to N40. N23 and NCo376 were similar and statistically less than N40.
- N36 and N40 therefore yielded significantly higher sucrose % dry matter, while N23 and NCo376 were statistically similar and had the lowest.

Figure 1: Sample data at harvest

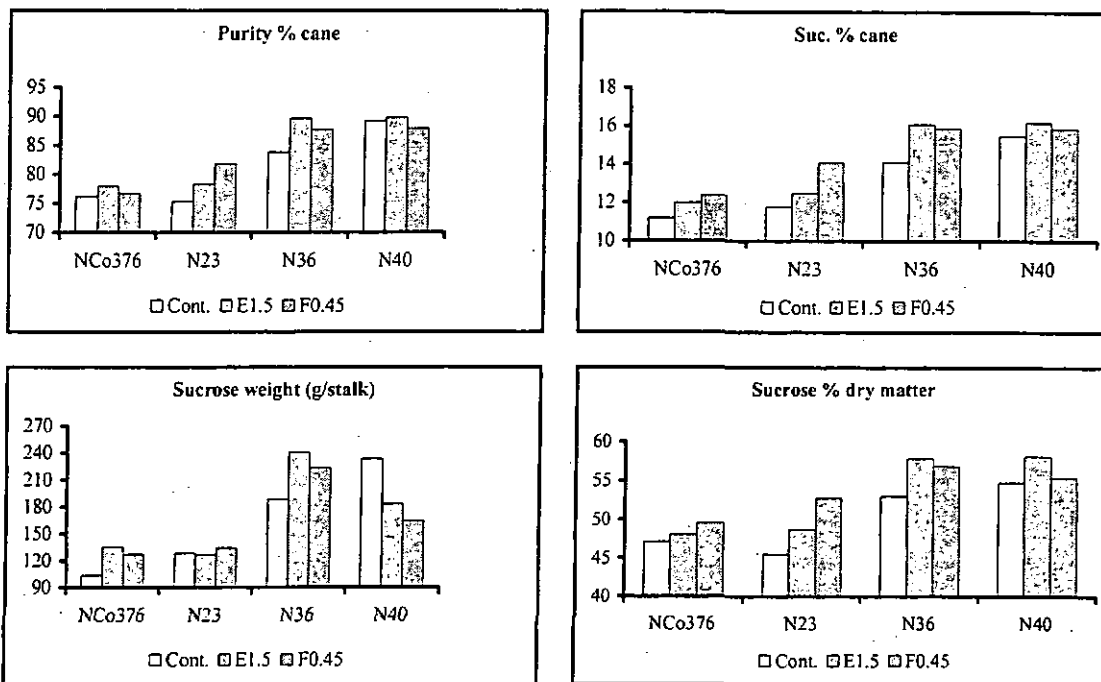
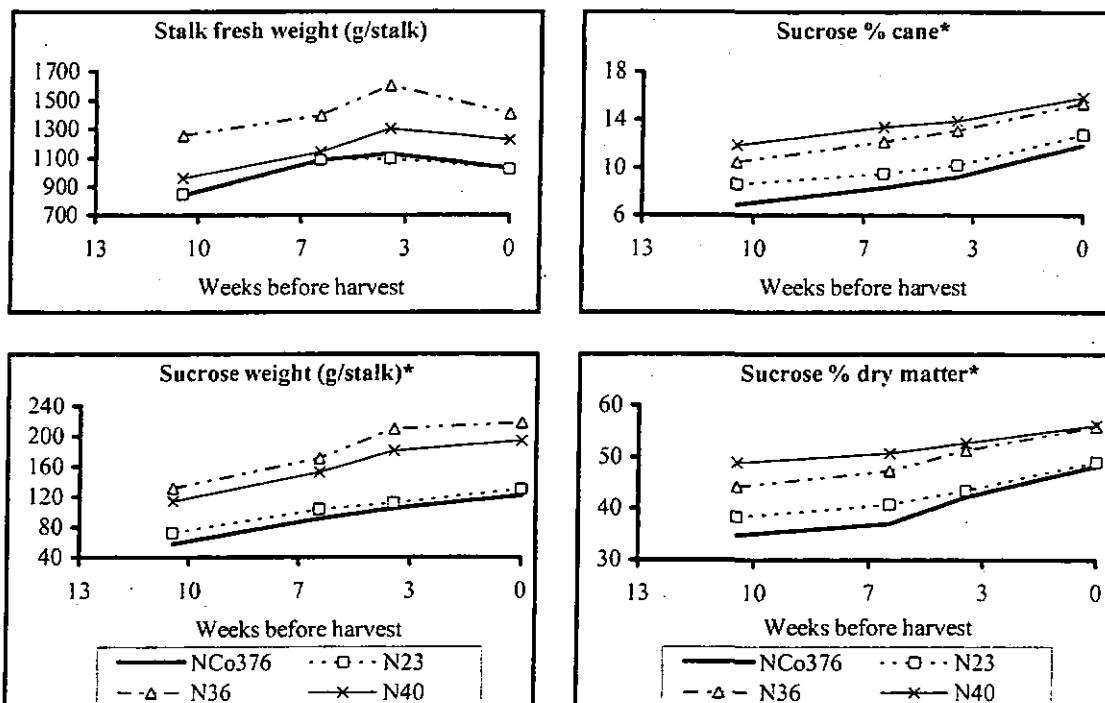


Figure 2: Sample graphs (variety means)



Harvest Results

- There were no significant differences in cane yield amongst the varieties (Table 5).
- Cane quality (sucrose % cane and erc % cane) was significantly higher in N36 and N40 than in N23 and NCo376 (see Sucrose samples above).
- Both Ethrel and Fusilade did not significantly improve sucrose and erc yields (see sucrose sample results above).
- N36 and N40 were statistically similar and yielded significantly higher sucrose and erc yields when compared to N23 and NCo376, which yielded similarly.

Table 5: Harvest results

Treatment	Tcane/ha				Suc. % cane				Tsuc/ha				Erc % cane				Terc/ha			
	Cont.	E	F	Mean	Cont.	E	F	Mean	Cont.	E	F	Mean	Cont.	E	F	Mean	Cont.	E	F	Mean
NCo376	160	172	154	162	11.2	12.0	12.4	11.9	18.1	20.5	19.2	19.3	9.0	9.9	10.1	9.7	14.7	16.8	15.6	15.7
N23	158	148	148	151	11.8	12.5	14.1	12.8	18.6	18.5	20.8	19.3	9.4	10.3	12.1	10.6	14.8	15.3	17.8	16.0
N36	160	154	161	158	14.1	16.1	15.9	15.4	22.5	24.7	25.7	24.3	12.3	14.6	14.3	13.7	19.5	22.5	23.0	21.7
N40	152	141	136	143	15.5	16.2	15.9	15.9	23.4	22.7	21.7	22.6	14.0	14.7	14.3	14.3	21.2	20.6	19.5	20.4
Mean	158	154	150	154	13.2	14.2	14.6	14.0	20.7	21.6	21.9	21.4	11.2	12.4	12.7	12.1	17.6	18.8	19.0	18.4
Interaction	NS				NS				NS				NS							
LSD Ripener (0.05)	NS				0.50				NS				0.68							
(0.01)	-				0.76				-				1.02							
LSD Variety (0.05)	NS				0.91				2.11				1.09							
(0.01)	-				1.23				2.85				1.48							
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS							
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS							
CV%	10.9				7.8				11.8				10.8							

6. CONCLUSIONS

- Sucrose and erc yields were statistically similar for N36 and N40 and significantly higher than N23 and NCo376.
- Sucrose sample results at harvest indicated that all varieties responded significantly to both Ethrel and Fusilade.
- Smut and Eldana levels were very low in this trial and differences in susceptibility among varieties were immeasurable. Only NCo376 had smut.
- Varietal differences in third leaf nutrient concentrations indicate that thresholds established for NCo376 may not be appropriate for the new N varieties.
- This trial has been continued and is now in its 1st ratoon.

APPENDICES

Appendix 1: Sample Data

Stalk fresh wt (g/stalk)	Date of sample (weeks before harvest)															
	1 Mar 2004 (10.4)				1 Apr 2004 (6.0)				16 April 2004 (3.8)				13 May 2004 (0)			
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	885	888	741	838	941	1330	988	1086	1152	1163	1082	1132	925	1150	1016	1030
N23	891	827	823	847	1112	1105	1052	1090	1117	1133	1043	1098	1101	1015	960	1025
N36	1289	1170	1313	1257	1363	1382	1446	1397	1538	1663	1609	1603	1325	1499	1405	1410
N40	1016	947	918	960	1084	1279	1066	1143	1371	1311	1230	1304	1509	1146	1031	1229
Mean	1020	958	949	976	1125	1274	1138	1179	1295	1318	1241	1284	1215	1203	1103	1174
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				NS				NS			
Variety (0.05)	96				170				106				171			
Variety (0.01)	130				230				144				231			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
CV%	11.7				17.3				9.9				17.4			
Moisture % cane																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	80.3	80.2	79.7	80.1	77.4	77.1	78.3	77.6	79.0	77.5	78.3	78.3	76.3	75.0	75.0	75.4
N23	77.7	78.4	76.9	77.7	77.2	76.6	76.6	76.8	76.8	76.3	77.0	76.7	74.3	74.3	73.3	74.0
N36	76.0	76.4	76.3	76.2	74.4	74.3	74.0	74.2	75.3	74.0	74.5	74.6	73.3	72.3	72.0	72.5
N40	75.3	76.6	75.0	75.6	72.4	74.1	74.4	73.6	73.3	74.0	73.8	73.7	71.8	72.3	71.3	71.8
Mean	77.3	77.9	77.0	77.4	75.4	75.5	75.8	75.6	76.1	75.5	75.9	75.8	73.9	73.5	72.9	73.4
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				NS				0.76			
Ripener (0.01)	-				-				-				NS			
Variety (0.05)	0.78				0.85				0.76				0.90			
Variety (0.01)	1.05				1.14				1.03				1.22			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
CV%	1.2				1.3				1.2				1.5			
Stalk dry wt (g/stalk)																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	175	175	150	167	213	305	217	245	243	261	236	247	220	285	255	253
N23	199	179	190	189	254	259	246	253	260	269	239	256	282	261	257	267
N36	310	277	310	299	351	358	376	362	381	433	411	408	354	416	393	388
N40	251	222	230	234	300	331	272	301	368	342	323	344	426	316	297	346
Mean	234	213	220	222	280	313	278	290	313	326	302	314	321	320	301	314
Interaction	NS				NS				NS				**			
Ripener (0.05)	NS				NS				NS				NS			
Variety (0.05)	23				44				27				41			
Variety (0.01)	31				60				36				55			
LSD subplot in same whole plot (0.05)	NS				NS				NS				71			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				71			
CV%	12.4				18.3				10.3				15.6			

Appendix 1: Sample data (continued)

Juice Purity %	Date of sample (weeks before harvest)															
	1 Mar 2004 (10.4)				1 Apr 2004 (6.0)				16 April 2004 (3.8)				13 May 2004 (0)			
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	67.1	63.8	66.1	65.7	71.9	70.5	68.6	70.3	71.3	74.2	72.0	72.5	76.2	78.0	76.7	77.0
N23	70.2	69.3	70.1	69.9	71.5	72.5	71.3	71.8	70.5	76.0	73.1	73.2	75.3	78.3	81.8	78.5
N36	80.7	80.7	78.4	79.9	83.2	80.9	85.8	83.3	83.3	86.0	83.8	84.4	83.8	89.6	87.7	87.0
N40	84.1	83.6	86.2	84.6	87.6	86.7	86.3	86.9	88.0	87.3	87.1	87.5	89.2	89.8	87.9	89.0
Mean	75.5	74.4	75.2	75.0	78.6	77.7	78.0	78.1	78.3	80.9	79.0	79.4	81.1	83.9	83.5	82.9
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				NS				NS			
(0.01)	-				-				-				-			
Variety (0.05)	2.03				2.13				2.15				2.99			
(0.01)	2.74				2.87				2.91				4.04			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
CV%	3.2				3.3				3.2				4.3			
Sucrose % cane																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	7.2	6.5	7.1	6.9	8.4	8.8	7.7	8.3	8.8	9.8	8.9	9.2	11.2	12.0	12.4	11.9
N23	8.5	8.4	8.7	8.5	9.2	10.1	9.2	9.5	9.3	11.2	9.9	10.1	11.8	12.5	14.1	12.8
N36	10.5	10.7	10.3	10.5	12.0	12.1	12.6	12.2	12.6	13.7	12.9	13.1	14.1	16.1	15.9	15.4
N40	11.9	11.4	12.4	11.9	13.2	13.8	13.1	13.4	13.6	14.1	13.9	13.9	15.5	16.2	15.9	15.9
Mean	9.5	9.3	9.6	9.5	10.7	11.2	10.7	10.9	11.1	12.2	11.4	11.6	13.2	14.2	14.6	14.0
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				NS				0.50			
(0.01)	-				-				-				0.76			
Variety (0.05)	0.51				0.54				0.49				0.91			
(0.01)	0.69				0.72				0.67				1.23			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
CV%	6.4				5.9				5.1				7.8			
Ere % cane																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	5.1	4.3	4.9	4.8	6.4	6.5	5.5	6.1	6.7	7.7	6.8	7.1	9.0	9.9	10.1	9.7
N23	6.3	6.2	6.4	6.3	6.9	7.8	6.9	7.2	7.0	9.0	7.7	7.9	9.4	10.3	12.1	10.6
N36	8.8	9.0	8.4	8.7	10.3	10.2	11.0	10.5	10.9	12.1	11.1	11.4	12.3	14.6	14.3	13.7
N40	10.3	9.9	10.9	10.4	11.7	12.2	11.6	11.8	12.1	12.6	12.4	12.4	14.0	14.7	14.3	14.3
Mean	7.6	7.4	7.7	7.5	8.8	9.2	8.8	8.9	9.2	10.4	9.5	9.7	11.2	12.4	12.7	12.1
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				NS				0.68			
(0.01)	-				-				-				1.02			
Variety (0.05)	0.58				0.61				0.57				1.09			
(0.01)	0.78				0.83				0.77				1.48			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
CV%	9.1				8.2				7.1				10.8			

Appendix 1: Sample data (continued)

Sucrose wt (g/stalk)	Date of sample (weeks before harvest)															
	1 Mar 2004 (10.4)				1 Apr 2004 (6.0)				16 April 2004 (3.8)				13 May 2004 (0)			
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	64.1	57.4	52.4	58.0	78.9	116.7	76.9	90.8	102.5	113.9	97.0	104.5	103.8	136.0	127.5	122.4
N23	75.3	69.8	72.1	72.4	102.0	111.7	96.2	103.3	105.1	126.9	104.0	112.0	128.4	126.8	134.8	130.0
N36	134.2	125.6	135.4	131.7	164.2	166.8	181.6	170.9	193.9	227.7	207.2	209.6	188.8	240.7	223.9	217.8
N40	120.8	108.5	113.9	114.4	143.0	174.9	139.2	152.4	186.1	184.8	171.3	180.7	233.4	183.7	164.9	194.0
Mean	98.6	90.3	93.5	94.1	122.0	142.5	123.5	129.3	146.9	163.3	144.9	151.7	163.6	171.8	162.8	166.1
Interaction	NS				NS				NS				*			
LSD Ripene (0.05)	NS				NS				NS				NS			
Variety (0.05)	10.58				19.87				12.20				24.00			
(0.01)	14.29				26.85				16.49				32.43			
LSD subplot in same whole plot (0.05)	NS				NS				NS				41.56			
(0.01)	-				-				-				NS			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				41.55			
(0.01)	-				-				-				NS			
CV%	13.4				18.4				9.6				17.3			
Ere weight (g/stalk)																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	45.4	37.8	36.2	39.8	59.4	86.4	55.9	67.2	77.8	89.2	74.1	80.4	83.7	111.2	104.0	99.6
N23	55.8	50.9	53.3	53.3	77.0	85.7	72.2	78.3	78.9	101.8	80.6	87.1	102.0	104.3	114.9	107.1
N36	112.2	105.4	111.2	109.6	141.1	140.6	159.5	147.1	167.6	201.1	179.5	182.7	164.2	218.8	200.9	194.6
N40	104.6	93.8	100.5	99.6	127.3	155.3	122.9	135.2	166.4	165.0	152.6	161.3	211.2	167.2	148.3	175.6
Mean	79.5	71.98	75.3	75.59	101.2	117	102.6	106.9	122.7	139.3	121.7	127.9	140.3	150.4	142	144.2
Interaction	NS				NS				NS				**			
LSD Ripene (0.05)	NS				NS				NS				NS			
(0.01)	-				-				-				-			
Variety (0.05)	9.75				17.26				11.40				22.29			
(0.01)	13.17				23.32				15.40				30.12			
LSD subplot in same whole plot (0.05)	NS				NS				NS				38.61			
(0.01)	-				-				-				52.17			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				37.86			
(0.01)	-				-				-				55.52			
CV%	15.4				19.3				10.7				18.5			
Sucrose % dm																
Ripener Treatment	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean	Cont.	E1.5	F0.45	Var. Mean
NCo376	36.6	32.8	34.9	34.8	37.2	38.3	35.4	37.0	42.0	43.6	40.9	42.2	47.1	48.0	49.6	48.2
N23	38.1	39.2	37.8	38.4	40.2	43.1	39.1	40.8	40.0	47.4	43.2	43.5	45.5	48.7	52.8	49.0
N36	43.8	45.3	43.4	44.2	46.8	47.0	48.2	47.3	50.8	52.7	50.4	51.3	53.0	57.9	56.9	55.9
N40	48.1	48.9	49.5	48.8	47.7	53.2	51.2	50.7	50.7	54.3	53.1	52.7	54.8	58.2	55.4	56.1
Mean	41.7	41.6	41.4	41.5	43.0	45.4	43.5	44.0	45.9	49.5	46.9	47.4	50.1	53.2	53.7	52.3
Interaction	NS				NS				NS				NS			
Ripener (0.05)	NS				NS				2.64				2.14			
(0.01)	-				-				NS				NS			
Variety (0.05)	2.55				1.81				2.18				3.18			
(0.01)	3.44				2.44				2.95				4.30			
LSD subplot in same whole plot (0.05)	NS				NS				NS				NS			
(0.01)	-				-				-				-			
LSD subplot in diff. whole plot (0.05)	NS				NS				NS				NS			
(0.01)	-				-				-				-			
CV%	7.3				4.9				5.5				7.3			

NB: Sucrose measured as pol