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SOUTH AFRICAN SUGAR INDUSTRY
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7610/1 STILLAGE TRIAL

CAT: 1426

OBJECT: To measure the long term effects on the soil of irrigation with distillery effluent at various dilutions, and to determine the nitrogenous fertiliser value of the applied effluent.

THIS CROP: Third ratoon Age: 12,0 months (27.6.84 to 26.6.85)

LOCATION: Hippo Valley Estates, Section 9, Field 10B

SOIL TYPE: PE.1/P.2 sandy clay loam/sandy loam, derived from gneiss

DESIGN: Randomised blocks with split plots, 4 replications

VARIETY: NCo 376 in 1,5 m rows

FERTILISER:

- (1) Nitrogen : see treatments
- (2) Phosphate : 100 kg P₂O₅ /ha as single superphosphate applied at 6 weeks
- (3) Potash : 60 kg K₂O/ha as muriate of potash applied at 6 weeks

RAINFALL: 522 mm IRRIGATION: 1277 mm

TREATMENTS:

- (a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):-
I0 : Control, no stillage
I1 : Stillage diluted 1:400
I2 : Stillage diluted 1:200
I3 : Stillage diluted 1:100
I4 : Stillage diluted 1:50
- (b) Split plot treatments consisted of four nitrogen levels:
NO : Control, no nitrogen
N1 : 60 kg N/ha
N2 : 120 kg N/ha
N3 : 180 kg N/ha
The nitrogen was applied as ammonium nitrate in 2 dressings, half at 4 weeks and half at 8 weeks.

RESULTS

- (a) Yield data:
Cane yields, ERC% cane and ERC yields for the first, second and third ratoons are shown in Table 1.
- (i) Stillage treatments
There were no significant responses of cane yield, ERC% cane and ERC yield to concentrations of distillery effluent in the first, second and third ratoon crops.
 - (ii) Nitrogen treatments
As in previous ratoons, there were highly significant ($P = 0,001$) linear and quadratic responses of cane yields to levels of applied

2/ nitrogen.....

nitrogen in the third ratoon. Yields were suppressed with applications of less than 120 kg N/ha.

ERC% cane showed a significant ($P= 0,05$) linear and quadratic response to levels of applied nitrogen.

ERC yields had a similar response to that of cane yield. ERC yields were suppressed with applications of less than 120 kg N/ha.

(iii) Stillage dilution x nitrogen interactions

Unlike the results of the first and second ratoon crops, no significant interactions were recorded for cane yields, ERC% cane and ERC yields in the third ratoon.

(b) Stalk data:(Table 2)

Stalk populations increased progressively with increasing levels of applied nitrogen

(c) Stillage data:

(i) Composition

The seasonal variation in the total solids content of Hippo Valley Estates' stillage for the period 1982 to 1985 is shown in Figure 1.

The variation of percentage total solids with season for the third ratoon was similar to that for the second ratoon. However, a less pronounced depression was recorded in October and November for the third ratoon, and higher total solids concentrations were recorded for the 3rd ratoon in the period December to April than were obtained for the second ratoon.

(ii) Stillage irrigations

The trial received 15 stillage irrigations out of a total of 22 in the third ratoon. The mean dilution rate, amount of stillage applied, total solids and potassium as K_2O applied to each treatment in the first, second and third ratoons are shown below:

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K_2O (kg/ha)
I1 1:400 dilution	1R	1:330	3,9	1553	229
	2R	1:370	1,6	1313	183
	3R	1:384	1,9	1553	212
	MEAN	1:361	2,5	1473	208
I2 1:200 dilution	1R	1:200	6,4	2459	387
	2R	1:184	4,2	2429	362
	3R	1:195	3,7	3140	418
	MEAN	1:193	4,8	2676	389
I3 1:100 dilution	1R	1:108	11,8	4695	707
	2R	1:99	6,7	4938	709
	3R	1:91	8,3	6487	913
	MEAN	1:99	8,9	5373	776
I4 1: 50 dilution	1R	1:54	23,6	9669	1457
	2R	1:59	12,5	9555	1366
	3R	1:54	15,5	12561	1744
	MEAN	1:56	17,2	10595	1522

An incorrect factor was used to convert the amount of potassium applied from kilograms of K to K₂O in the first and second ratoon crop reports. Thus, the actual applications of potassium were not as high as quoted in previous reports.

The correct factor (1,2047) has been applied to the data in the table on Page 2. As a result the applied K₂O figures for the second and third ratoons have been approximately halved.

With the exception of treatment I1, the potassium and total solids applied in the third ratoon were higher than applications in the first or second ratoon crops.

The mean annual application of potassium as K₂O from the first to the third ratoon was about 1,5 t/ha in the highest stillage treatment I4.

(d) Foliar analysis:

Foliar samples were taken from the trial at 18, 25, 28 and 32 weeks after the second ratoon harvest. Analytical data of foliar N and foliar K at 25 weeks expressed as a percentage of dry matter are presented in Tables 3 and 4 respectively.

(i) Foliar N %

The mean foliar N % values at 0 and at 60 kg N/ha were below the December threshold level of 1,65%.

(ii) Foliar K %

Mean foliar K % values below the threshold level of 1,05 were recorded in the 0 and in the 60 kg N/ha treatments.

(e) Soil analysis:

Analytical data from soil samples taken after the plant, first, second and third ratoon harvests, are shown in Tables 5, 6 and 7.

(i) Soil sample depth 0 to 30 cm

The exchangeable potassium levels in the control plots showed a progressive decline from the plant crop to the third ratoon crop. The exchangeable potassium status was maintained at about the same level in the 1:400 dilution while increases were recorded in the 1:200, 1:100 and 1:50 dilution rates.

(ii) Soil sample depth 30 to 60 cm

The trend was similar to that observed in the 0 to 30 cm level.

(iii) Soil sample depth 60 to 90 cm

The only treatment which showed substantial increases in exchangeable potassium were the high stillage treatments of the 1:100 and 1:50 dilution rates.

(f) Smut infection levels:

Smut rouging was conducted in the third ratoon at 12, 19, 24, 27, 33 and 38 weeks and in the second ratoon at 15, 19, 26, 32 and 38 weeks.

Smut whip data for the second ratoon and third ratoon are presented in Tables 8 and 9 respectively.

In both ratoons there was a progressive decline in the number of smut whips/ha with increasing concentration of applied stillage. Although the correlation was significant ($P = 0,05$), the actual differences in smut whip levels between treatments were not significant.

DISCUSSION

The trial has clearly demonstrated that soil potassium levels will build up with high applications of stillage. However, no adverse effects have been observed on either the soil or on yields because the potassium levels are still too low to be toxic.

Significant interactions between stillage dilution and levels of nitrogen were recorded in the first and second ratoon crops, but not in the third. It appears that, because of the high levels of total solids applied to the third ratoon, and because of a possible build-up in the soil organic matter over the three ratoons, the nitrogen demand in the biodegradation process increased to such a level that significant amounts of applied nitrogen were immobilised and not released in time to be of benefit to the cane.

This effect appears to have occurred in the 1:50, 1:100, and 1:200 stillage dilution treatments, unlike in the first ratoon crop where the effect was only observed in the 1:50 dilution. In this way, the uniform response to levels of nitrogen obtained at varying levels of stillage dilution may have resulted.

Increasing the concentration of applied stillage depressed smut whip levels. This beneficial effect will be investigated further in separate trials.

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7610/1 : STILLAGE TRIAL - FIRST, SECOND AND THIRD RATOON

Table 1 : Yield Data

TREATMENTS	CANE YIELD(t/ha)				ERC% CANE				ERC YIELD(t/ha)			
	1R	2R	3R	Mean	1R	2R	3R	Mean	1R	2R	3R	Mean
Main Plots:												
I0, Control, no stillage	148,69	121,91	113,48	128,03	12,47	12,77	13,14	12,79	18,40	15,48	14,83	16,24
I1, Stillage diluted 1:400	137,84	113,91	113,28	121,68	12,42	12,81	13,25	12,83	16,96	14,42	14,98	15,45
I2, Stillage diluted 1:200	149,28	123,59	116,06	129,64	12,69	12,65	13,08	12,81	18,85	15,47	15,12	16,48
I3, Stillage diluted 1:100	146,92	125,03	117,10	129,68	13,09	12,63	12,98	12,90	19,14	15,70	15,21	16,68
I4, Stillage diluted 1: 50	131,49	134,10	127,98	131,19	13,44	12,57	13,00	13,00	17,60	16,78	16,59	16,99
Significance	NS	NS	NS	-	NS	NS	NS	-	NS	NS	NS	-
S.E. single plot ±	26,37	16,75	14,40	-	1,26	0,95	0,64	-	3,80	2,13	1,79	-
S.E. treatment mean ±	6,59	4,19	3,60	-	0,31	0,24	0,16	-	0,95	0,53	0,45	-
C.V. %	18,46	13,54	12,24	-	9,79	7,52	4,91	-	20,91	13,65	11,63	-
Split Plots:												
N0, Control, no nitrogen	110,88	78,91	70,39	86,73	13,67	13,10	13,10	13,29	15,17	10,29	9,22	11,56
N1, 60 kg/ha N	143,08	111,92	108,78	121,26	12,89	12,96	13,42	13,09	18,34	14,47	14,57	15,79
N2, 120 kg/ha N	153,66	149,93	142,75	150,45	12,40	12,57	13,04	12,67	19,64	18,82	18,59	19,02
N3, 180 kg/ha N	158,75	156,06	148,40	154,40	12,33	12,12	12,81	12,42	19,62	18,70	19,00	19,11
Linear effect	***	***	***	-	***	***	*	-	***	***	***	-
Quadratic effect	***	***	***	-	NS	NS	*	-	**	***	***	-
Cubic effect	NS	*	NS	-	NS	NS	NS	-	NS	NS	NS	-
L.S.D. P = 0,05	8,78	11,27	10,02	-	0,58	0,38	0,33	-	1,62	1,49	1,31	-
P = 0,01	11,72	15,05	13,38	-	0,77	0,50	-	-	2,77	2,00	1,76	-
S.E. single plot ±	13,78	17,69	15,73	-	0,91	0,59	0,52	-	2,55	2,35	2,06	-
S.E. treatment mean ±	3,08	3,06	3,52	-	0,20	0,13	0,12	-	0,57	0,52	0,46	-
C.V. %	9,65	14,20	13,38	-	7,08	4,67	3,99	-	14,02	15,48	13,43	-
Interactions	IN**	IN**	-	-	IN**	-	-	-	IN**	IN**	-	-
	IN**	-	-	-	-	-	-	-	-	-	-	-
Trial mean	142,84	123,71	117,58	128,04	12,82	12,69	13,09	12,87	18,19	15,57	15,35	16,37

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TABLE 2 : STALK DATA

TREATMENTS	STALK COUNTS/HA x 10 ⁻³				STALK LENGTH (m)				LODGING %			
	1R	2R	3R	Mean	1R	2R	3R	Mean	1R	2R	3R	Mean
<u>Main Plots:</u>												
I0, Control, no stillage	135,3	140,5	144,0	139,9	2,78	2,44	2,30	2,51	11	0	0	4
I1, stillage diluted 1:400	130,6	137,3	142,7	136,9	2,66	2,35	2,35	2,45	11	2	6	6
I2, stillage diluted 1:200	135,9	139,7	145,3	140,3	2,80	2,54	2,40	2,58	14	5	5	8
I3, stillage diluted 1:100	134,9	142,4	145,4	140,9	2,67	2,44	2,32	2,48	7	2	3	4
I4, stillage diluted 1: 50	125,5	146,2	150,1	140,6	2,60	2,48	2,54	2,54	3	1	11	5
<u>Split plots:</u>												
No, Control, no nitrogen	117,5	127,9	132,3	125,9	2,35	1,89	1,83	2,02	0	0	0	0
N1, 60 kg/ha N	133,0	139,7	146,7	139,8	2,69	2,29	2,24	2,41	3	0	0	1
N2, 120kg/ha N	138,6	147,9	151,2	145,9	2,92	2,82	2,70	2,81	13	5	7	8
N3, 180kg/ha N	140,6	149,5	151,6	147,2	2,84	2,80	2,75	2,80	21	3	13	12
Mean	132,4	141,2	145,5	139,7	2,70	2,45	2,38	2,51	9	2	5	5

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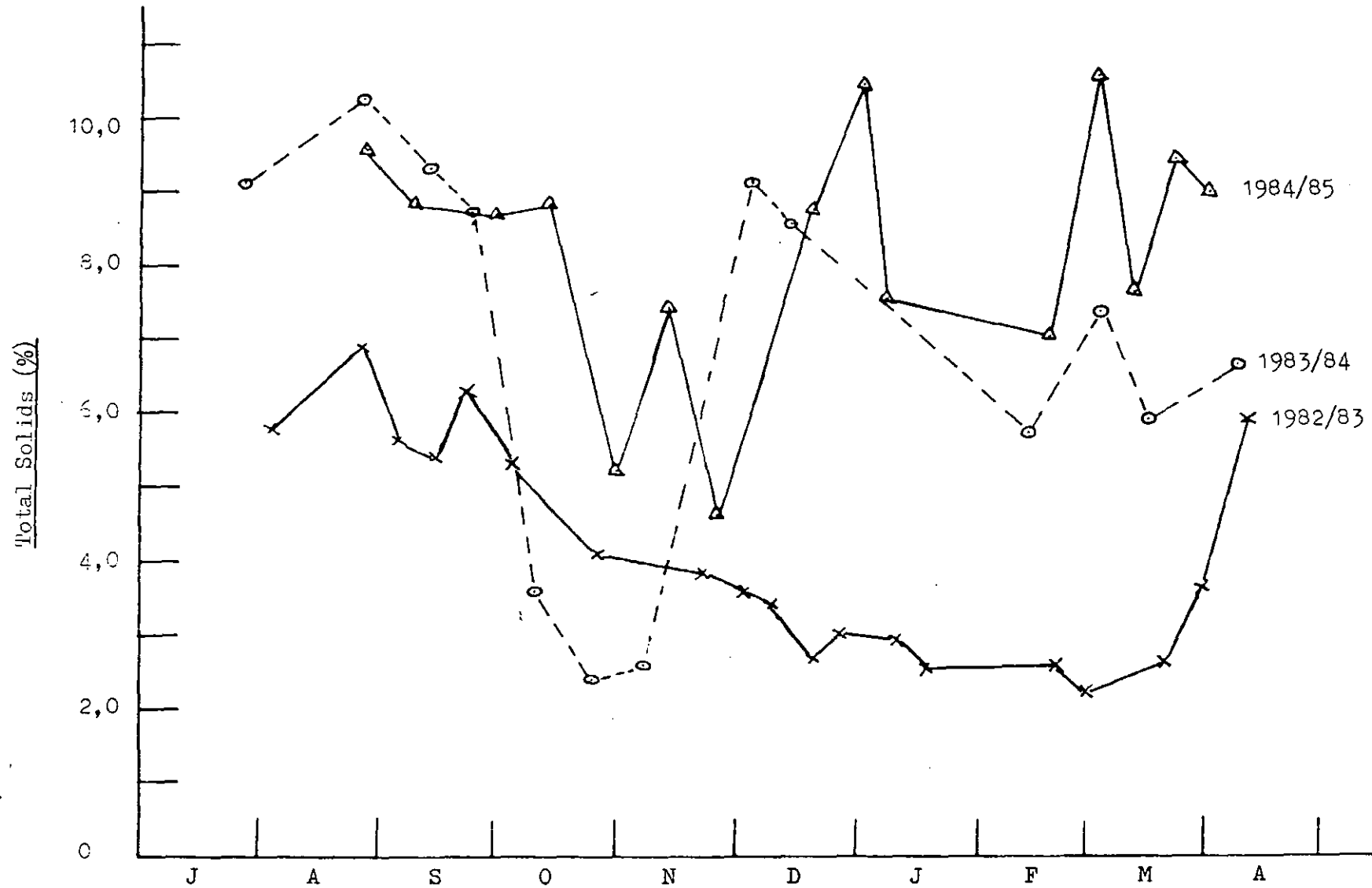


Figure 1 : Variation in Percentage Total Solids in H.V.E. Stillage (1982-85).

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Table 3 : Foliar N%

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0 Control, no stillage	1,30	1,42	1,75	1,70	1,54
I1 1:400 dilution	1,34	1,40	1,71	1,74	1,55
I2 1:200 dilution	1,32	1,43	1,74	1,66	1,54
I3 1:100 dilution	1,44	1,50	1,60	1,68	1,55
I4 1: 50 dilution	1,53	1,56	1,60	1,72	1,60
MEAN	1,39	1,46	1,68	1,70	1,56

Table 4 : Foliar K%

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0 Control, no stillage	0,87	0,96	0,93	1,00	0,94
I1 1:400 dilution	0,99	0,98	1,10	1,13	1,05
I2 1:200 dilution	0,96	1,03	1,10	1,12	1,05
I3 1:100 dilution	0,95	1,01	1,10	1,10	1,04
I4 1: 50 dilution	1,01	1,04	1,14	1,13	1,08
MEAN	0,96	1,00	1,07	1,10	1,03

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PLANT, FIRST, SECOND AND THIRD RATOONS

Table 5 : Soil Analysis Data

Soil sample depth 0-30 cm

TREATMENTS	RATOON	CONDUCTIVITY (SAT. PASTE- MICROS/cm).	pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)			
				K	Ca	Mg	Na
I0 Control: No stillage	P	270	5,82	0,54	10,2	3,5	0,71
	1R	180	5,86	0,39	8,8	3,2	0,42
	2R	208	5,67	0,33	8,9	3,8	0,61
	3R	168	5,68	0,21	14,5	3,9	0,89
	%CH P-3R	-37,8	-2,4	-61,1	+42,2	+11,4	+25,4
I1 1:400 dilution	P	310	6,13	0,46	12,3	3,1	0,72
	1R	230	6,41	0,48	12,7	2,6	0,39
	2R	214	6,31	0,40	12,8	3,4	0,76
	3R	348	6,23	0,48	14,7	2,9	0,68
	%CH P-3R	+12,3	+1,6	+4,3	+19,5	-6,5	-5,6
I2 1:200 dilution	P	275	5,81	0,55	9,5	3,3	0,57
	1R	210	6,50	0,58	9,3	3,1	0,41
	2R	175	6,23	0,46	8,8	3,5	0,54
	3R	243	5,80	0,61	11,4	2,5	0,72
	%CH P-3R	-11,6	-0,2	+10,9	+20,0	-24,2	+26,3
I3 1:100 dilution	P	260	5,55	0,51	9,0	3,5	0,59
	1R	210	5,65	0,75	8,4	3,4	0,49
	2R	219	5,85	0,68	7,9	3,5	0,54
	3R	275	5,94	0,70	10,9	3,8	0,79
	%CH P-3R	+5,8	+7,0	+37,3	+21,1	+8,6	+33,9
I4 1: 50 dilution	P	310	6,39	0,45	12,0	3,5	0,66
	1R	235	6,13	0,79	10,3	2,7	0,51
	2R	265	6,61	1,03	10,3	4,1	0,58
	3R	394	6,09	0,80	14,6	3,6	0,82
	%CH P-3R	+27,1	-4,7	+77,8	+21,7	+2,9	+24,2

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PLANT, FIRST, SECOND AND THIRD RATOONS

Table 6 : Soil Analysis Data

Soil sample depth 30-60 cm

TREATMENTS	RATOON	CONDUCTIVITY (SAT. PASTE- microS/cm)	pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)			
				K	Ca	Mg	Na
I0 Control: No stillage	P	320	6,31	0,22	15,6	4,0	0,74
	1R	220	6,14	0,19	10,6	4,0	0,46
	2R	173	5,78	0,22	9,3	4,2	0,62
	3R	178	5,97	0,20	16,2	4,3	1,00
	%CH P-3R	-44,4	-5,4	-9,1	+3,8	+7,5	+35,1
I1 1:400 dilution	P	335	6,52	0,23	18,9	4,2	0,78
	1R	245	6,48	0,21	15,3	3,8	0,49
	2R	259	6,48	0,24	16,6	3,9	0,69
	3R	408	6,38	0,25	16,1	3,9	0,77
	%CH P-3R	+21,8	-2,1	+8,7	-14,8	-7,1	-1,3
I2 1:200 dilution	P	220	5,84	0,22	8,7	3,4	0,78
	1R	220	6,30	0,15	12,0	3,2	0,59
	2R	180	6,30	0,30	9,9	3,7	0,72
	3R	254	5,69	0,35	10,1	3,4	0,77
	%CH P-3R	+15,5	-2,6	+59,1	+16,1	0,0	-1,3
I3 1:100 dilution	P	295	5,79	0,24	11,7	4,3	0,92
	1R	230	5,95	0,26	10,6	4,5	0,61
	2R	195	5,89	0,35	8,7	4,7	0,59
	3R	354	6,34	0,49	13,9	4,4	0,82
	%CH P-3R	+20,0	+9,5	+104,2	+18,8	+2,3	-10,9
I4 1: 50 dilution	P	305	6,32	0,19	16,1	4,1	0,75
	1R	300	6,44	0,26	14,6	3,1	0,45
	2R	297	6,64	0,52	10,8	4,5	0,62
	3R	424	6,26	0,53	16,1	4,5	0,93
	%CH P-3R	+39,0	-0,9	+178,9	0,0	+9,8	+24,0

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PLANT, FIRST, SECOND AND THIRD RATOONS

Table 7 : Soil analysis Data

Soil sample depth 60-90 cm

TREATMENTS	RATOON	CONDUCTIVITY (SAT, PASTE- microS/cm)	pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)			
				K	Ca	Mg	Na
I0 Control: No stillage	P	330	6,28	0,20	16,3	4,9	0,87
	1R	268	6,01	0,16	13,5	4,1	0,42
	2R	210	6,13	0,20	10,5	4,8	0,65
	3R	208	6,24	0,18	14,7	3,8	0,85
	%CH P-3R	-37,0	-0,6	-10,0	-9,8	-22,4	-2,3
I1 1:400 dilution	P	385	6,35	0,24	17,8	3,9	0,84
	1R	245	5,85	0,20	15,7	4,0	0,54
	2R	279	6,51	0,22	17,5	4,7	0,88
	3R	413	6,47	0,23	15,5	4,1	0,74
	%CH P-3R	+7,3	+1,9	-4,2	-12,9	+5,1	-11,9
I2 1:200 dilution	P	254	5,96	0,23	9,6	4,3	0,91
	1R	224	4,69	0,23	10,6	3,5	0,50
	2R	201	6,45	0,23	8,4	4,6	0,77
	3R	243	5,77	0,22	9,7	3,2	0,80
	%CH P-3R	-4,3	-3,2	-4,3	+1,0	-25,6	-12,1
I3 1:100 dilution	P	298	6,24	0,21	13,3	4,7	0,84
	1R	259	5,84	0,21	12,9	4,8	0,66
	2R	231	6,15	0,27	11,1	5,2	0,62
	3R	366	6,30	0,33	18,5	4,9	0,79
	%CH P-3R	+22,8	+1,0	+57,1	+39,1	+4,3	-6,0
I4 1: 50 dilution	P	377	6,66	0,25	19,1	4,7	0,83
	1R	305	6,51	0,23	15,3	3,7	0,49
	2R	316	6,73	0,41	12,7	4,9	0,60
	3R	475	6,47	0,39	18,9	4,6	0,89
	%CH P-3R	+26,0	-2,9	+56,0	-1,0	-2,1	+7,2

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SECOND RATOON

Table 8 : Smut whips/ha x 10⁻³

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0 Control, no stillage	15,40	24,96	20,49	20,81	20,41
I1 1:400 dilution	16,45	15,64	20,45	19,97	18,13
I2 1:200 dilution	15,86	12,40	23,45	17,07	17,20
I3 1:100 dilution	15,02	15,43	14,75	16,61	15,45
I4 1: 50 dilution	13,93	13,46	15,32	15,78	14,62
MEAN	15,33	16,38	18,89	18,05	17,16

Table 9 : Smut whips/ha x 10⁻³

THIRD RATOON

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0 Control, no stillage	9,31	9,53	8,96	9,93	9,43
I1 1:400 dilution	7,66	7,95	7,90	10,87	8,59
I2 1:200 dilution	8,51	6,11	9,61	7,23	7,86
I3 1:100 dilution	8,31	6,75	5,85	6,78	6,92
I4 1: 50 dilution	5,24	6,52	7,60	5,99	6,33
MEAN	7,80	7,37	7,98	8,16	7,83

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Cat. No.: 1426

- Object:** To measure the long term effects on the soil of irrigation with distillery effluent at various dilutions, and to determine the nitrogenous fertiliser value of the applied effluent.
- This crop:** Fourth ratoon Age: 12,0 months (26.6.85 to 25.6.86).
- Location:** Hippo Valley Estates, Section 9, Field 10B.
- Variety:** NCo376 in 1,5m rows.
- Fertiliser:**
- 1) Nitrogen : see treatments.
 - 2) Phosphate : 100 kg P₂O₅/ha as single superphosphate, applied at 5 weeks.
 - 3) Potash : 60 kg K₂O/ha as muriate of potash, applied at 5 weeks.
- Rainfall:** 584,0 mm **Irrigation:** 1325,0 mm
- Treatments:**
- a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):-
I0 : Control, no stillage
I1 : Stillage diluted 1:400
I2 : Stillage diluted 1:200
I3 : Stillage diluted 1:100
I4 : Stillage diluted 1: 50
 - b) Split plot treatments consisted of four nitrogen levels:-
N0 : Control, no nitrogen
N1 : 60 kg N/ha
N2 : 120 kg N/ha
N3 : 180 kg N/ha
- The nitrogen was applied as ammonium nitrate in two dressings, half at 5 weeks and half at 9 weeks.

RESULTS

(a) Yield data:

The cane yield, ERC% cane and ERC yield data for the first to the fourth ratoon crops are shown in Tables 1, 2, and 3.

- (i) Stillage treatments: In the fourth ratoon crop there was a significant ($P = 0,05$) increase in cane and ERC yields with increasing concentrations of applied stillage and simultaneously there was a significant ($P = 0,05$) tendency towards depressed ERC% cane values with increasing concentration of applied stillage.
- (ii) Nitrogen treatments: Responses in the fourth ratoon crop were similar to those obtained in previous crops. There were highly significant ($P = 0,01$) linear and quadratic responses of cane and ERC yields to levels of applied nitrogen. Yields were suppressed with applications of 120 kg N/ha and below.
ERC% cane showed a significant cubic effect ($P = 0,05$) to levels of applied nitrogen.

2/(iii).....

- (iii) Stillage dilution x nitrogen interaction(Table 4): Significant interactions were recorded for cane and ERC yields in the fourth ratoon. In the absence of applied nitrogen there was an increase in both cane and ERC yield with increasing concentration of applied stillage, but the effect was not maintained, at rates of applied nitrogen between 60 and 180 kg N/ha.
- (b) Stalk data:(Tables 5 and 6)
In all four ratoons stalk populations and the percentage of ledged stalks increased progressively with increasing levels of applied nitrogen.
- (c) Stillage data:
- (i) Composition: (Figure 1) No great variation in percentage total solids content of the stillage with season was recorded in the fourth ratoon crop. Total solids ranged between 8% and 11% in contrast to, for example, the second ratoon crop where a large variation between 2% and 10,5% was recorded.
- (ii) Stillage irrigations: The trial received 13 stillage irrigations out of a total of 25 irrigations in the fourth ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied to each treatment in all crops to date are shown in Table 7.
The mean annual application of potassium as K₂O from the first to the fourth ratoon was about 1,5 t/ha in the highest stillage treatment I4.
- (d) Foliar analysis:
- Foliar samples were taken from the trial at 13, 17, 21, 25, and 28 weeks after the third ratoon harvest. Foliar N and foliar K at 21 weeks expressed as a percentage of dry matter are presented in Tables 8 and 9 respectively.
- (i) Foliar N%: The foliar N% values were all above the December threshold level of 1,65%. The values ranged from 2,00% to 2,15%. The fourth ratoon values were all higher than those recorded at comparable times in the second and third ratoon crops.
- (ii) Foliar K%: Mean values obtained in the control where no stillage was applied were all below the critical value of 1,05%. There was also a tendency for foliar K% to increase with increasing levels of applied nitrogen.
- (e) Soil analysis:
- Analytical data from soil samples taken after each of the crops to date are shown in Tables 10, 11, and 12.
- (i) Soil sample depth 0 to 30cm: The 1M ammonium acetate extractable potassium in the control plots has shown a decline of 57,4% from the plant to the fourth ratoon harvest. There has been an accumulation of extractable potassium over the same period in the 1:100 and 1:50 dilutions amounting to 58,8% and 171,1% of plant harvest levels respectively.
A small increase (7%) in total extractable cations (K, Ca, Mg, Na) in the 1:100 and 1:50 dilutions was registered over the same period.
- (ii) Soil sample depth 30 to 60cm:
The potassium trend was similar to that recorded in the 0 to 30cm depth, the only differences being that much higher relative increases were recorded and that the gain in extractable K began at the 1:400 dilution and increased progressively to the 1:50 dilution.
Total extractable cation values for the period plant to fourth ratoon did not exhibit a consistent trend.

- (iii) Soil sample depth 60-90cm: In the 1:100 and 1:50 dilutions extractable K has shown gains of 38,1% and 96,0% from the plant to the fourth ratoon harvest, while a decrease of 35,1% has occurred in the control plot receiving no stillage.
- (f) Smut infection levels: Smut roguing was conducted in the fourth ratoon at 8, 15, 21, 25, and 28 weeks. Smut whip data are represented in Table 13. The general tendency which was observed in previous crops of declining whips with increasing stillage application was maintained in the fourth ratoon.

DISCUSSION

In the fourth ratoon significant interactions were obtained between stillage applications and levels of applied nitrogen. At each given level of applied nitrogen there was a general tendency towards increased cane yields with increasing stillage applications and at each given stillage dilution rate there was also an increase in cane yields with increasing applied nitrogen.

The significant linear increase in cane yield with increasing stillage application rates, in the absence of applied nitrogen showed that stillage can supply appreciable amounts of nitrogen. The cane yield in the absence of applied nitrogen increased from 55,88 t/ha in the control where no stillage was applied, to 110,78 t/ha in the 1:50 stillage application. The cane yield, in the absence of applied stillage rose from 55,88 t/ha where no nitrogen was applied, to 109,03 t/ha where 60 kg N/ha was applied. These increases are of similar magnitude and it can therefore be concluded that the highest stillage application rate provided the equivalent of about 60 kg N/ha in the fourth ratoon.

Unfortunately this estimate of nitrogen supplied by stillage could not be checked against the total nitrogen content of the applied stillage, since no total nitrogen analyses had been done on the stillage at each irrigation. These analyses will commence in the fifth ratoon.

BM/Oct'86

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7610/1 : STILLAGE TRIAL - 1R, 2R, 3R and 4R

Table 1 : Cane Yield Data

TREATMENTS	CANE YIELD (t/ha)				
	1R	2R	3R	4R	Mean
<u>Main Plots:</u>					
I0, Control no stillage	148,69	121,91	113,48	114,04	124,53
I1, Stillage diluted 1:400	137,84	113,91	113,28	116,31	120,34
I2, Stillage diluted 1:200	149,28	123,59	116,06	119,18	127,03
I3, Stillage diluted 1:100	146,92	125,03	117,10	124,22	128,32
I4, Stillage diluted 1: 50	131,49	134,10	127,98	142,00	133,89
SIGNIFICANCE	N.S.	N.S.	N.S.	*	-
L.S.D. P = 0,05	-	-	-	15,65	-
P = 0,01	-	-	-	-	-
S.E. single plot ±	26,37	16,75	14,40	20,31	-
S.E. treatment mean ±	6,59	4,19	3,60	5,08	-
C.V.%	18,46	13,54	12,24	16,49	-
<u>Split Plots:</u>					
N0, Control no nitrogen	110,88	78,91	70,39	74,97	83,79
N1, 60 kg N/ha	143,08	111,92	108,78	118,22	120,50
N2, 120 kg N/ha	158,66	149,93	142,75	144,21	148,89
N3, 180 kg N/ha	158,75	156,06	148,40	155,21	154,61
Linear effect	***	***	***	***	-
Quadratic effect	***	***	***	***	-
Cubic effect	N.S.	*	N.S.	N.S.	-
L.S.D. P = 0,05	8,78	11,27	10,02	6,80	-
P = 0,01	11,72	15,05	13,38	9,09	-
S.E. single plot ±	13,78	17,69	15,73	10,67	-
S.E. treatment mean ±	3,08	3,06	3,52	2,39	-
C.V.%	9,65	14,20	13,38	8,67	-
Interactions	IN'*	IN'*	=	IN'***	=
Trial Mean	142,84	123,71	117,58	123,15	126,82

7610/1 : STILLAGE TRIAL - 1R, 2R, 3R and 4R

Table 2 : ERC% Cane Data

TREATMENTS	ERC % CANE				
	1R	2R	3R	4R	Mean
<u>Main Plots:</u>					
IO, Control no stillage	12,47	12,77	13,14	13,05	12,86
I1, Stillage diluted 1:400	12,42	12,81	13,25	13,08	12,89
I2, Stillage diluted 1:200	12,69	12,65	13,08	12,85	12,82
I3, Stillage diluted 1:100	13,09	12,63	12,98	12,88	12,90
I4, Stillage diluted 1: 50	13,44	12,57	13,00	12,34	12,84
SIGNIFICANCE	N.S.	N.S.	N.S.	*	-
L.S.D. P = 0,05	-	-	-	0,49	-
P = 0,01	-	-	-	-	-
S.E. single plot ±	1,26	0,95	0,64	0,64	-
S.E. treatment mean ±	0,31	0,24	0,16	0,16	-
C.V.%	9,79	7,52	4,91	4,97	-
<u>Split Plots:</u>					
NO, Control no nitrogen	13,67	13,10	13,10	12,63	13,13
N1, 60 kg N/ha	12,89	12,96	13,42	13,08	13,09
N2, 120 kg N/ha	12,40	12,57	13,04	12,76	12,69
N3, 180 kg N/ha	12,33	12,12	12,81	12,87	12,53
Linear effect	***	***	*	N.S.	-
Quadratic effect	N.S.	N.S.	*	N.S.	-
Cubic effect	N.S.	N.S.	N.S.	*	-
L.S.D. P = 0,05	0,58	0,38	0,33	0,36	-
P = 0,01	0,77	0,50	-	-	-
S.E. single plot ±	0,91	0,59	0,52	0,57	-
S.E. treatment mean ±	0,20	0,13	0,12	0,13	-
C.V.%	7,08	4,67	3,99	4,44	-
Interactions	IN**	-	-	-	-
Trial Mean	12,82	12,69	13,09	12,84	12,86

7610/1 : STILLAGE TRIAL - 1R, 2R, 3R and 4R

Table 3 : ERC Yield Data

TREATMENTS	ERC YIELD (t/ha)				
	1R	2R	3R	4R	Mean
Main Plots:					
I0, Control no stillage	18,40	15,48	14,83	14,86	15,89
I1, Stillage diluted 1:400	16,96	14,42	14,98	15,19	15,39
I2, Stillage diluted 1:200	18,85	15,47	15,12	15,31	16,19
I3, Stillage diluted 1:100	19,14	15,70	15,21	16,02	16,52
I4, Stillage diluted 1: 50	17,60	16,78	16,59	17,49	17,12
SIGNIFICANCE	N.S.	N.S.	N.S.	*	-
L.S.D. P = 0,05	-	-	-	1,69	-
P = 0,01	-	-	-	-	-
S.E. single plot ±	3,80	2,13	1,79	2,20	-
S.E. treatment mean ±	0,95	0,53	0,45	0,55	-
C.V.%	20,91	13,65	11,63	13,93	-
Split Plots:					
N0, Control no nitrogen	15,17	10,29	9,22	9,36	11,01
N1, 60 kg N/ha	18,34	14,47	14,57	15,43	15,70
N2, 120 kg N/ha	19,64	18,82	18,59	18,38	18,86
N3, 180 kg N/ha	19,62	18,70	19,00	19,93	19,31
Linear effect	***	***	***	***	-
Quadratic effect	**	***	***	***	-
Cubic effect	N.S.	N.S.	N.S.	N.S.	-
L.S.D. P = 0,05	1,62	1,49	1,31	0,80	-
P = 0,01	2,77	2,00	1,76	1,07	-
S.E. single plot ±	2,55	2,35	2,06	1,26	-
S.E. treatment mean ±	0,57	0,52	0,46	0,28	-
C.V.%	14,02	15,48	13,43	7,99	-
Interactions	IN'*	IN'*	-	IN'***	-
Trial Mean	18,19	15,57	15,35	15,77	16,22

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Table 4 : Interaction Table

TREATMENTS	CANE YIELD (t/ha)					ERC YIELD (t/ha)				
	LEVELS OF NITROGEN(kg/ha)				MEAN	LEVELS OF NITROGEN(kg/ha)				MEAN
	0	60	120	180		0	60	120	180	
I0, Control no stillage	55,83	109,63	142,03	148,64	114,04	7,33	14,39	18,28	19,46	14,86
I1, Stillage diluted 1:400	59,13	110,21	144,31	151,60	116,31	7,64	14,73	18,84	19,57	15,19
I2, Stillage diluted 1:200	70,41	115,85	133,52	156,95	119,18	8,79	15,42	16,79	20,24	15,31
I3, Stillage diluted 1:100	78,62	112,48	149,80	156,00	124,22	9,90	14,65	19,10	20,45	16,02
I4, Stillage diluted 1: 50	110,78	142,96	151,39	162,87	142,00	13,15	17,98	18,88	19,95	17,49
MEAN	74,97	118,22	144,21	155,21	123,15	9,36	15,43	18,38	19,93	15,77
Significant Interaction	IN****					IN****				
L.S.D. P = 0,05 P = 0,01	15,20 20,30					1,80 2,40				

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Table 5 : Stalk Data

TREATMENTS	STALK COUNTS/ha x10 ⁻³					STALK LENGTHS(m)				
	1R	2R	3R	4R	Mean	1R	2R	3R	4R	Mean
<u>Main Plots:</u>										
I0, Control no stillage	135,3	140,5	144,0	150,8	142,7	2,78	2,44	2,30	2,33	2,46
I1, Stillage diluted 1:400	130,6	137,3	142,7	146,9	139,4	2,66	2,35	2,35	2,42	2,45
I2, Stillage diluted 1:200	135,9	139,7	145,3	148,7	142,4	2,80	2,54	2,40	2,47	2,55
I3, Stillage diluted 1:100	134,9	142,4	145,4	149,6	143,1	2,67	2,44	2,32	2,41	2,46
I4, Stillage diluted 1: 50	125,5	146,2	150,1	152,5	143,6	2,60	2,48	2,54	2,70	2,58
<u>Split Plots:</u>										
N0, Control no nitrogen	117,5	127,9	132,3	139,5	129,3	2,35	1,89	1,83	1,86	1,98
N1, 60 kg N/ha	133,0	139,7	146,7	153,7	143,3	2,69	2,29	2,24	2,29	2,38
N2, 120 kg N/ha	138,6	147,9	151,2	153,3	147,8	2,92	2,82	2,70	2,79	2,81
N3, 180 kg N/ha	140,6	149,5	151,6	152,2	148,5	2,84	2,80	2,75	2,93	2,83
MEAN	132,4	141,2	145,5	149,7	142,2	2,70	2,45	2,38	2,46	2,50

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Table 6 : Stalk Lodging % Data

TREATMENTS	LODGING %				
	1R	2R	3R	4R	Mean
<u>Main Plots:</u>					
I0	11	0	0	0	3
I1	11	2	6	19	10
I2	14	5	5	31	14
I3	7	2	3	29	10
I4	3	1	11	59	19
<u>Split Plots:</u>					
N0	0	0	0	5	1
N1	3	0	0	11	4
N2	13	5	7	34	15
N3	21	3	13	60	24
MEAN	9	2	5	27	11

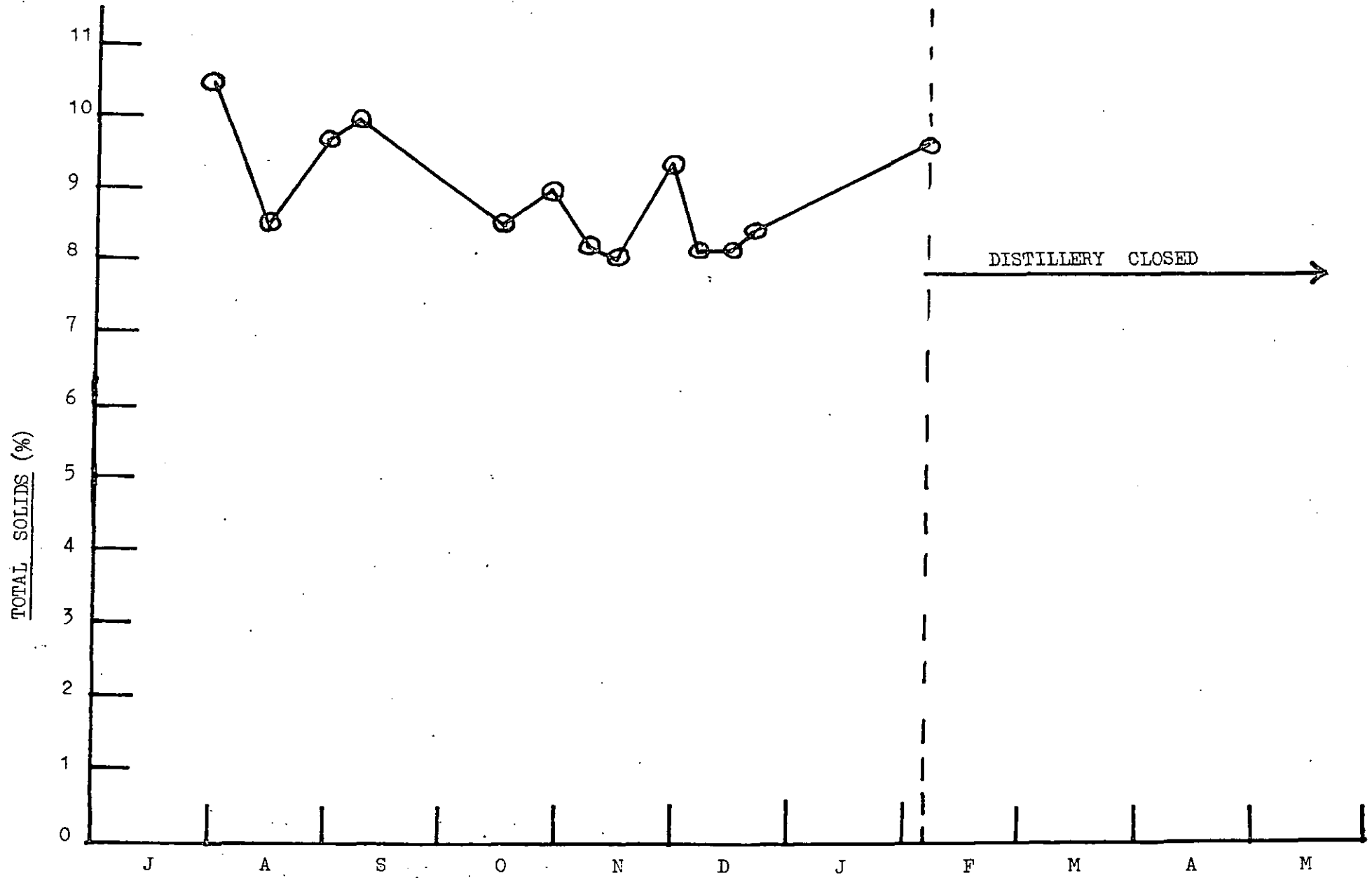


Figure 1 : Variation in Percentage Total Solids in HVE Stillage (1985-86)

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Table 7 : Stillage Data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K ₂ O (kg/ha)
I1 1:400 Dilution	1R	1:330	3,9	1 553	229
	2R	1:370	1,6	1 313	183
	3R	1:384	1,9	1 553	212
	4R	1:406	1,6	1 414	207
	MEAN	1:373	2,3	1 458	208
I2 1:200 Dilution	1R	1:200	6,4	2 459	387
	2R	1:184	4,2	2 429	362
	3R	1:195	3,7	3 140	418
	4R	1:207	3,1	2 779	413
	MEAN	1:197	4,4	2 702	395
I3 1:100 Dilution	1R	1:108	11,8	4 695	707
	2R	1: 99	6,7	4 938	709
	3R	1: 91	8,3	6 487	913
	4R	1: 98	6,5	5 670	871
	MEAN	1: 99	8,3	5 448	800
I4 1: 50 Dilution	1R	1: 54	23,6	9 669	1 457
	2R	1: 59	12,5	9 555	1 366
	3R	1: 54	15,5	12 561	1 744
	4R	1: 57	12,6	11 265	1 660
	MEAN	1: 56	16,1	10 763	1 557

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Table 8 : Foliar N%

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0, Control no stillage	2,00	2,02	2,03	2,10	2,04
I1, 1:400 Dilution	2,02	2,01	2,04	2,06	2,03
I2, 1:200 Dilution	2,05	2,02	2,03	2,10	2,05
I3, 1:100 Dilution	2,02	2,01	2,03	2,05	2,03
I4, 1: 50 Dilution	2,09	2,12	2,15	2,14	2,12
MEAN	2,04	2,04	2,06	2,09	2,05

Table 9 : Foliar K%

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0, Control no stillage	0,95	0,93	0,91	0,94	0,93
I1, 1:400 Dilution	1,01	0,96	1,03	1,16	1,04
I2, 1:200 Dilution	1,02	1,03	1,11	1,08	1,06
I3, 1:100 Dilution	1,05	1,01	1,12	1,19	1,09
I4, 1: 50 Dilution	1,19	1,27	1,39	1,32	1,29
MEAN	1,04	1,04	1,11	1,14	1,08

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Table 10 : Soil Analysis Data

Soil Sample Depth 0-30cm

TREATMENTS	RATOON	COND(micro μ /cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (me %)				
		Sat Paste	Sat Extract*		K	Ca	Mg	Na	Total
I0 Control: No stillage	P	270	-	5,82	0,54	10,2	3,5	0,71	15,0
	1R	180	219	5,86	0,39	8,8	3,2	0,42	12,8
	2R	208	188	5,67	0,33	8,9	3,8	0,61	13,6
	3R	168	185	5,68	0,21	14,5	3,9	0,89	19,5
	4R	242	316	5,81	0,23	9,8	3,2	0,48	13,7
	%CH P-4R	-10,4	+44,3	-0,2	-57,4	-3,9	-8,6	-32,4	-8,7
I1 1:400 dilution	P	310	-	6,13	0,46	12,3	3,1	0,72	16,6
	1R	230	300	6,41	0,48	12,7	2,6	0,39	16,2
	2R	214	380	6,31	0,40	12,8	3,4	0,76	17,4
	3R	348	533	6,23	0,48	14,7	2,9	0,68	18,8
	4R	239	301	6,17	0,45	13,0	2,9	0,64	17,0
	%CH P-4R	-22,9	+0,3	+0,7	-2,2	+5,7	-6,5	-11,1	+2,4
I2 1:200 dilution	P	275	-	5,81	0,55	9,5	3,3	0,57	13,9
	1R	210	315	6,50	0,58	9,3	3,1	0,41	13,4
	2R	175	203	6,23	0,46	8,8	3,5	0,54	13,3
	3R	243	334	5,80	0,61	11,4	2,5	0,72	15,2
	4R	247	289	6,33	0,49	9,9	2,8	0,51	13,7
	%CH P-4R	-10,2	-8,3	+9,0	-10,9	+4,2	-15,2	-10,5	-1,4
I3 1:100 dilution	P	260	-	5,55	0,51	9,0	3,5	0,59	13,6
	1R	210	295	5,65	0,75	8,4	3,4	0,49	13,0
	2R	219	206	5,85	0,68	7,9	3,5	0,54	12,6
	3R	275	298	5,94	0,70	10,9	3,8	0,79	16,2
	4R	235	245	6,46	0,81	9,7	3,4	0,68	14,6
	%CH P-4R	-9,6	-16,9	+16,4	+58,8	+7,8	+2,9	+15,3	+7,4
I4 1: 50 dilution	P	310	-	6,39	0,45	12,0	3,5	0,66	16,6
	1R	235	338	6,13	0,79	10,3	2,7	0,51	14,3
	2R	265	365	6,61	1,03	10,3	4,1	0,58	16,0
	3R	394	481	6,09	0,80	14,6	3,6	0,82	19,8
	4R	269	314	6,78	1,22	12,5	3,3	0,71	17,7
	%CH P-4R	-13,2	-7,1	+6,1	+171,1	+4,2	-5,7	+7,6	+6,6

* %CH = 1R-4R

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Table 11 : Soil Analysis Data
Soil Sample Depth 30-60cm

TREATMENTS	RATOON	COND(micro s/cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (me%)				
		Sat Paste	Sat* Extract		K	Ca	Mg	Na	Total
I0 Control: No stillage	P	320	-	6,31	0,22	15,6	4,0	0,74	20,6
	1R	220	219	6,14	0,19	10,6	4,0	0,46	15,3
	2R	173	220	5,78	0,22	9,3	4,2	0,62	14,3
	3R	178	189	5,97	0,20	16,2	4,3	1,00	21,7
	4R	283	326	5,85	0,16	11,8	3,7	0,46	16,1
	%CH P-4R	-11,6	+48,9	-7,3	-27,3	-24,4	-7,5	-37,8	-21,8
I1 1:400 dilution	P	335	-	6,52	0,23	18,9	4,2	0,78	24,1
	1R	245	281	6,48	0,21	15,3	3,8	0,49	19,8
	2R	259	360	6,48	0,24	16,6	3,9	0,69	21,4
	3R	408	483	6,38	0,25	16,1	3,9	0,77	21,0
	4R	292	361	6,39	0,26	14,8	3,6	0,63	19,3
	%CH P-4R	-12,8	+28,5	-2,0	+13,0	-21,7	-14,3	-19,2	-19,9
I2 1:200 dilution	P	220	-	5,84	0,22	8,7	3,4	0,78	13,1
	1R	220	290	6,30	0,15	12,0	3,2	0,59	15,9
	2R	180	214	6,30	0,30	9,9	3,7	0,72	14,6
	3R	254	364	5,69	0,35	10,1	3,4	0,77	14,6
	4R	181	316	6,34	0,30	10,8	3,2	0,56	14,9
	%CH P-4R	-17,7	+9,0	+8,6	+36,4	+24,1	-5,9	-28,2	+13,7
I3 1:100 dilution	P	295	-	5,79	0,24	11,7	4,3	0,92	17,2
	1R	230	303	5,95	0,26	10,6	4,5	0,61	16,0
	2R	195	155	5,89	0,35	8,7	4,7	0,59	14,3
	3R	354	388	6,34	0,49	13,9	4,4	0,82	19,6
	4R	248	250	6,54	0,41	10,8	4,1	0,69	16,0
	%CH P-4R	-15,9	-17,5	+13,0	+70,8	-7,7	-4,7	-25,0	-7,0
I4 1: 50 dilution	P	305	-	6,32	0,19	16,1	4,1	0,75	21,1
	1R	300	340	6,44	0,26	14,6	3,1	0,45	18,4
	2R	297	286	6,64	0,52	10,8	4,5	0,62	16,4
	3R	424	451	6,26	0,53	16,1	4,5	0,93	22,1
	4R	293	291	6,95	0,60	14,8	3,6	0,72	19,7
	%CH P-4R	-3,9	-14,4	+10,0	+215,8	-8,1	-12,2	-4,0	-6,6

* %CH = 1R - 4R

7610/1 STILLAGE TRIAL - 1R, 2R, 3R and 4R

Table 12 : Soil Analysis Data
Soil Sample Depth 60-90cm

TREATMENTS	RATOON	COND(micro s/cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (me%)				
		Sat Paste	Sat * Extract		K	Ca	Mg	Na	Total
R0 Control: No stillage	P	330	-	6,28	0,20	16,3	4,9	0,87	22,3
	1R	268	295	6,01	0,16	13,5	4,1	0,42	18,2
	2R	210	238	6,13	0,20	10,5	4,8	0,65	16,2
	3R	208	263	6,24	0,18	14,7	3,8	0,85	19,5
	4R	296	337	6,08	0,13	12,4	4,4	0,56	17,5
	%CH P-4R	-10,3	+14,2	-3,2	-35,0	-23,9	-10,2	-35,6	-21,5
I1 1:400 dilution	P	385	-	6,35	0,24	17,8	3,9	0,84	22,8
	1R	245	255	5,85	0,20	15,7	4,0	0,54	20,4
	2R	279	305	6,51	0,22	17,5	4,7	0,88	23,3
	3R	413	511	6,47	0,23	15,5	4,1	0,74	20,6
	4R	313	309	6,38	0,26	15,7	3,8	0,64	20,4
	%CH P-4R	-18,7	+21,2	+0,5	+8,3	-11,8	-2,6	-23,8	-10,5
I2 1:200 dilution	P	254	-	5,96	0,23	9,6	4,3	0,91	15,0
	1R	224	251	4,69	0,23	10,6	3,5	0,50	14,8
	2R	201	194	6,45	0,23	8,4	4,6	0,77	14,0
	3R	243	249	5,77	0,22	9,7	3,2	0,80	13,9
	4R	202	277	6,39	0,19	11,0	3,5	0,60	15,3
	%CH P-4R	-20,5	+10,4	+7,2	-17,5	+14,6	-18,6	-34,1	+2,0
I3 1:100 dilution	P	298	-	6,24	0,21	13,3	4,7	0,84	19,1
	1R	259	295	5,84	0,21	12,9	4,8	0,66	18,6
	2R	231	198	6,15	0,27	11,1	5,2	0,62	17,2
	3R	366	321	6,30	0,33	18,5	4,9	0,79	24,5
	4R	237	290	6,66	0,29	11,1	4,2	0,67	16,3
	%CH P-4R	-20,5	-1,7	+6,7	+38,1	-16,5	-10,6	-20,2	-14,7
I4 1: 50 dilution	P	377	-	6,66	0,25	19,1	4,7	0,83	24,9
	1R	305	348	6,51	0,23	15,3	3,7	0,49	19,7
	2R	316	304	6,73	0,41	12,7	4,9	0,60	18,6
	3R	475	510	6,47	0,39	18,9	4,6	0,89	24,8
	4R	306	312	6,87	0,49	16,1	3,9	0,72	21,2
	%CH P-4R	-18,8	-40,3	+3,2	+96,0	-15,7	-17,0	-13,3	-14,9

* %CH = 1R-4R

7610/1 STILLAGE TRIAL : FOURTH RATOON

Table 13 : Smut whips/ha x 10⁻³

STILLAGE TREATMENTS	LEVELS OF N (kg/ha)				MEAN
	0	60	120	180	
I0 control-no stillage	5,10	5,75	5,25	5,32	5,35
I1 1:400 dilution	2,74	3,08	3,97	5,90	3,92
I2 1:200 dilution	3,10	3,61	4,85	3,61	3,79
I3 1:100 dilution	3,53	3,96	2,10	3,14	3,18
I4 1: 50 dilution	3,96	4,31	3,21	3,97	3,86
MEAN	3,69	4,14	3,88	4,39	4,02

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

7610/1 STILLAGE TRIAL

Catalogue: 1426

Object: To measure the long term effects on the soil of irrigation with distillery effluent at various dilutions, and to determine the nitrogenous fertiliser value of the applied effluent.

This crop: Fifth ratoon Age: 11,8 months (25.6.86 to 18.6.87)

Location: Hippo Valley Estates, Section 9, Field 10B.

Variety: NCo376 in 1,5m rows.

Fertiliser:

- 1) Nitrogen : see treatments.
- 2) Phosphate : 100 kg P₂O₅/ha as single superphosphate applied at 5 weeks.
- 3) Potash : 60 kg K₂O/ha as muriate of potash, applied at 5 weeks.

Rainfall: 222,8mm Irrigation: 1 542,0mm

Treatments:

- a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):-
 - I0 : Control, no stillage,
 - I1 : Stillage diluted 1:400,
 - I2 : Stillage diluted 1:200,
 - I3 : Stillage diluted 1:100,
 - I4 : Stillage diluted 1:50,
- b) Solit plot treatments consisted of four nitrogen levels:-
 - N0 : Control, no nitrogen,
 - N1 : 60 kg N/ha,
 - N2 : 120 kg N/ha,
 - N3 : 180 kg N/ha.

The nitrogen was applied as ammonium nitrate in two dressings, half at 5 weeks and half at 10 weeks.

RESULTS

(a) Yield data:

The cane yield, ERC% cane and ERC yield data for the first to the fifth ratoon crops are shown in Tables 1, 2 and 3.

- (i) Stillage treatments: In the fourth and fifth ratoon crops there were significant (P=0,05) increases in cane and in ERC yields with increasing concentrations of applied stillage and simultaneously there was a significant tendency towards depressed ERC% cane values with increasing concentration of applied stillage.
- (ii) Nitrogen treatments: Cane and ERC yield responses in the fifth ratoon crop, were similar to those obtained in previous crops. There were highly significant (P=0,01) linear and quadratic responses of cane and ERC yield to levels of applied nitrogen. Yields increased progressively from the lowest to the highest nitrogen treatment. ERC% cane showed a significant (P=0,01) linear and quadratic response to levels of applied nitrogen. Applications of 60 kg N/ha tended to boost ERC% cane values while those above 60 kg N/ha tended to depress them.

- (iii) Stillage dilution x nitrogen interaction (Table 4): Responses were similar in the fourth and fifth ratoons. Significant interactions were recorded for cane and ERC yields. In the absence of applied nitrogen there was an increase in both cane and ERC yield with increasing concentration of applied stillage, but the effect was not maintained at rates of applied nitrogen between 60 and 180 kg N/ha. There was a linear increase in cane yield with increasing levels of applied nitrogen at each stillage treatment. While there was also a linear increase in ERC yield with increasing levels of applied nitrogen in the control treatment receiving no stillage; the trend was quadratic in the presence of stillage with no yield response to the high (180 kg/ha) level of N.
- b) Stalk data (Tables 5 and 6):
In all five ratoons, stalk populations increased progressively with increasing applied nitrogen. In the fifth ratoon, the highest lodging percentages were recorded in the treatments receiving 180 kg N/ha and in the most concentrated stillage treatments.
- c) Stillage data:
(i) Total solids: (Figure 1) Total solids ranged from 3,5% to 7,9% in the fifth ratoon.
(ii) Stillage irrigations: The trial received 21 stillage irrigations out of a total of 28 irrigations in the fifth ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied to each treatment in all crops to date are shown in Table 7. The mean annual application of potassium as K₂O to date was about 1,6 t/ha in the highest stillage treatment, I4. The total nitrogen application in the fifth ratoon was 408 kg N/ha in the I4 treatment.
- d) Foliar analysis:
Foliar samples were taken from the trial at 14, 18, 22, 26, and 30 weeks after the fourth ratoon harvest. Foliar N and foliar K at 22 weeks expressed as a percentage of dry matter are presented in Tables 8 and 9 respectively.
(i) Foliar N%: The foliar N% values were all above the November threshold level of 1,60%. The values ranged from 1,98% to 2,19%.
(ii) Foliar K%: Values were above the critical level of 1,05% in all treatments in the fifth ratoon.
- e) Soil analysis:
Analytical data from soil samples taken after each of the crops to date are shown in Tables 10, 11 and 12.
(i) Soil sample depth 0 to 30cm: The 1M ammonium acetate extractable potassium in the control plots has declined 27,8% from the plant to the fifth ratoon harvest. All treatments receiving stillage have shown gains in extractable K over the same period with the largest increases of 119,6% and 197,8% being recorded in the 1:100 and 1:50 stillage dilutions respectively.
(ii) Soil sample depth 30 to 60cm: All treatments showed gains in extractable K over the period first to fifth ratoon. However, the largest increases of 229,2% and 373,7% were recorded in the 1:100 and 1:50 stillage dilutions respectively.
(iii) Soil sample depth 60 to 90cm: Extractable K data trends were similar to those in the 30 to 60cm depth. The largest gains of 190,5% and 152,0%, over the period first to fifth ratoon, were recorded in the 1:100 and in the 1:50 stillage treatments respectively.

f) Smut infection levels:

smut roquing was conducted in the fifth ratoon at 8, 14, 21, 25, and 30 weeks after the fourth ratoon harvest. Smut whip data are presented in Table 13.

The beneficial effect of stillage application was not as pronounced as in previous crops, but there was still evidence of smut suppression in the stillage treatments.

DISCUSSION

There was a significant ($P=0,05$) increase in cane yield with increasing stillage application in both the fourth and fifth ratoon crops in plots receiving no applied nitrogen showing that stillage can compensate to some extent for lack of nitrogen.

The cane yield in the absence of applied nitrogen increased from 44,78 t/ha in the I0 treatment to 87,14 t/ha in the I4 treatment, in the fifth ratoon; while in the absence of applied stillage it rose from 44,78 t/ha in the zero N treatment to 84,29 t/ha in the 60 kg N/ha treatment. Thus in this crop - as in the fourth ratoon - the highest stillage application rate provided a benefit equivalent to about 60 kg N/ha.

In the 0 to 30cm and the 30 to 60cm profiles, extractable K levels increased with increasing concentrations of applied stillage in the fifth ratoon. Except for the 1:200 dilution, the same trend was maintained in the 60 to 90cm depth. It will be interesting to see whether this trend is maintained in the long term. However, it appears that present extractable K levels are not high enough to cause adverse effects on either the soil or on yields.

EM/Sept'87

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7610/1 STILLAGE TRIAL - 1R to 5R

TABLE 1 : Cane Yield data

TREATMENTS	CANE YIELD (t/ha)					
	1R	2R	3R	4R	5R	Mean
Main Plots:						
I0 - Control, no stillage	148,69	121,91	113,48	114,04	91,13	117,85
I1 - Stillage diluted 1:400	137,84	113,91	113,28	116,31	95,02	115,27
I2 - Stillage diluted 1:200	149,28	123,59	116,06	119,18	101,83	121,99
I3 - Stillage diluted 1:100	146,92	125,03	117,10	124,22	101,53	122,96
I4 - Stillage diluted 1: 50	131,49	134,10	127,98	142,00	115,85	130,28
Significance	N.S.	N.S.	N.S.	*	*	-
LSD P = 0,05	-	-	-	15,65	12,59	-
P = 0,01	-	-	-	-	-	-
S.E. single plot ±	26,37	16,75	14,40	20,31	16,34	-
S.E. treatment mean ±	6,59	4,19	3,60	5,08	4,08	-
C.V. %	18,46	13,54	12,24	16,49	16,16	-
Split Plots:						
N0 - Control, no nitrogen	110,88	78,91	70,39	74,97	61,50	79,33
N1 - 60 kg N/ha	143,08	111,92	108,78	119,22	92,17	114,83
N2 - 120 kg N/ha	158,66	149,93	142,75	144,21	118,17	142,74
N3 - 180 kg N/ha	158,75	156,06	148,40	155,21	132,35	150,15
Linear effect	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	-
Cubic effect	N.S.	*	N.S.	N.S.	N.S.	-
LSD P = 0,05	8,78	11,27	10,02	6,80	6,55	-
P = 0,01	11,72	15,05	13,38	9,09	8,73	-
S.E. single plot ±	13,78	17,69	15,73	10,67	10,27	-
S.E. treatment mean ±	3,08	3,06	3,52	2,39	2,30	-
C.V. %	9,65	14,20	13,38	8,67	10,16	-
Interactions	IN'*	IN'*	-	IN'***	IN'*	-
	IN'***	-	-	-	-	-
Trial mean	142,84	123,71	117,58	123,15	101,07	121,67

7610/1/5R - 1R to 5R

TABLE 2 : ERC% cane Data

TREATMENTS	ERC% CANE					Mean
	1R	2R	3R	4R	5R	
Main Plots:						
I0 - Control, no stillage	12,47	12,77	13,14	13,05	13,60	13,01
I1 - Stillage diluted 1:400	12,42	12,81	13,25	13,08	13,30	12,97
I2 - Stillage diluted 1:200	12,69	12,65	13,08	12,85	13,25	12,90
I3 - Stillage diluted 1:100	13,09	12,63	12,98	12,88	12,98	12,91
I4 - Stillage diluted 1: 50	13,44	12,57	13,00	12,34	11,88	12,65
Significance	N.S.	N.S.	N.S.	*	*	-
LSD P = 0,05	-	-	-	0,49	1,08	-
P = 0,01	-	-	-	-	-	-
S.E. single plot †	1,26	0,95	0,64	0,64	1,40	-
S.E. treatment mean †	0,31	0,24	0,16	0,16	0,35	-
C.V.%	9,79	7,52	4,91	4,97	10,79	-
Split Plots:						
N0 - Control, no nitrogen	13,67	13,10	13,10	12,63	13,23	13,15
N1 - 60 kg N/ha	12,89	12,96	13,42	13,08	13,40	13,15
N2 - 120 kg N/ha	12,40	12,57	13,04	12,76	13,17	12,79
N3 - 180 kg N/ha	12,33	12,12	12,81	12,87	12,20	12,47
Linear effect	***	***	*	N.S.	***	-
Quadratic effect	N.S.	N.S.	*	N.S.	**	-
Cubic effect	N.S.	N.S.	N.S.	*	N.S.	-
LSD P = 0,05	0,58	0,38	0,33	0,36	0,54	-
P = 0,01	0,77	0,50	-	-	0,71	-
S.E. single plot †	0,91	0,59	0,52	0,57	0,84	-
S.E. treatment mean †	0,20	0,13	0,12	0,13	0,19	-
C.V.%	7,08	4,67	3,99	4,44	6,49	-
Interactions	IN'*	-	-	-	-	-
Trial mean	12,82	12,69	13,09	12,84	13,00	12,89

7610/1/5R - 1R to 5R

TABLE 3 : ERC Yield Data

TREATMENTS	ERC YIELD (t/ha)					
	1R	2R	3R	4R	5R	Mean
Main Plots:						
I0 - Control, no stillage	18,40	15,48	14,83	14,86	12,38	15,19
I1 - Stillage diluted 1:400	16,96	14,42	14,98	15,19	12,54	14,82
I2 - Stillage diluted 1:200	18,85	15,47	15,12	15,31	13,28	15,61
I3 - Stillage diluted 1:100	19,14	15,70	15,21	16,02	13,03	15,82
I4 - Stillage diluted 1: 50	17,60	16,78	16,59	17,49	13,57	16,41
Significance	N.S.	N.S.	N.S.	*	N.S.	-
LSD P = 0,05	-	-	-	1,69	-	-
P = 0,01	-	-	-	-	-	-
S.E. single plot ±	3,80	2,13	1,79	2,20	1,60	-
S.E. treatment mean ±	0,95	0,53	0,45	0,55	0,40	-
C.V. %	20,91	13,65	11,63	13,93	12,35	-
Split Plots:						
N0 - Control, no nitrogen	15,17	10,29	9,22	9,36	7,99	10,41
N1 - 60 kg N/ha	18,34	14,47	14,57	15,43	12,26	15,01
N2 - 120 kg N/ha	19,64	18,82	18,59	18,38	15,53	18,19
N3 - 180 kg N/ha	19,62	18,70	19,00	19,93	16,07	18,66
Linear effect	***	***	***	***	***	-
Quadratic effect	**	***	***	***	***	-
Cubic effect	N.S.	N.S.	N.S.	N.S.	N.S.	-
LSD P = 0,05	1,62	1,49	1,31	0,80	0,93	-
P = 0,01	2,77	2,00	1,76	1,07	1,24	-
S.E. single plot ±	2,55	2,35	2,06	1,26	1,46	-
S.E. treatment mean ±	0,57	0,52	0,46	0,28	0,33	-
C.V. %	14,02	15,48	13,43	7,99	11,25	-
Interactions	IN'*	IN'*	-	IN'***	IN'***	-
Trial mean	18,19	15,57	15,35	15,77	12,96	15,57

7610/1 STILLAGE TRIAL - FIFTH RATOON

Table 4 : Interaction Table

TREATMENTS	CANE YIELD (t/ha)					ERC YIELD (t/ha)				
	LEVELS OF NITROGEN (kgN/ha)				MEAN	LEVELS OF NITROGEN (kgN/ha)				MEAN
	0	60	120	180		0	60	120	180	
I0 - Control, no stillage	44,78	84,29	111,47	124,00	91,13	6,08	11,59	12,45	16,42	12,38
I1 - Stillage diluted 1:400	51,91	82,42	117,06	128,70	95,02	6,96	11,46	15,91	15,82	12,54
I2 - Stillage diluted 1:200	58,01	87,56	124,92	136,83	101,83	8,07	12,05	16,55	16,46	13,28
I3 - Stillage diluted 1:100	65,68	91,28	116,04	133,14	101,53	8,69	12,52	14,72	16,20	13,03
I4 - Stillage diluted 1: 50	87,14	115,32	121,88	139,07	115,85	10,14	13,66	15,04	15,44	13,57
MEAN	61,50	92,17	118,27	132,35	101,07	7,99	12,26	15,53	16,07	12,96
Significant Interaction	IN'*					IN'***				
LSD P= 0,05	14,62					2,08				
P =0,01	-					2,77				

Table 5 : Stalk Data

TREATMENTS	STALK COUNTS/ha x 10 ⁻³						STALK LENGTHS (m)					
	1R	2R	3R	4R	5R	MEAN	1R	2R	3R	4R	5R	MEAN
I0 - Control, no stillage	135,3	140,5	144,0	150,8	153,1	144,7	2,78	2,44	2,30	2,33	2,06	2,38
I1 - Stillage diluted 1:400	130,6	137,3	142,7	146,9	152,1	141,9	2,66	2,35	2,35	2,42	2,20	2,40
I2 - Stillage diluted 1:200	135,9	139,7	145,3	148,7	155,6	145,0	2,80	2,54	2,40	2,47	2,26	2,49
I3 - Stillage diluted 1:100	134,9	142,4	145,4	149,6	158,5	146,2	2,67	2,44	2,32	2,41	2,13	2,39
I4 - Stillage diluted 1: 50	125,5	146,2	150,1	152,5	157,3	146,3	2,60	2,48	2,54	2,70	2,32	2,53
Split Plots:												
N0 - Control, no nitrogen	117,5	127,9	132,3	139,5	145,6	132,6	2,35	1,89	1,83	1,86	1,93	1,97
N1 - 60 kg N/ha	133,0	139,7	146,7	153,7	158,3	146,3	2,69	2,29	2,24	2,29	2,09	2,32
N2 - 120 kg N/ha	138,6	147,9	151,2	153,3	158,4	149,9	2,92	2,82	2,70	2,79	2,42	2,73
N3 - 180 kg N/ha	140,6	149,5	151,6	152,2	158,9	150,6	2,84	2,80	2,75	2,93	2,39	2,74
MEAN	132,4	141,2	145,5	149,7	155,3	144,8	2,70	2,45	2,38	2,46	2,21	2,44

7610/1 : STILLAGE TRIAL - 1R to 5R

Table 6 : Stalk Lodging % Data

TREATMENTS	LODGING %					
	1R	2R	3R	4R	5R	Mean
<u>Main Plots</u>						
I0	11	0	0	0	0	2
I1	11	2	6	19	3	8
I2	14	5	5	31	2	11
I3	7	2	3	29	3	9
I4	3	1	11	59	16	18
<u>Split Plots</u>						
N0	0	0	0	5	3	2
N1	3	0	0	11	1	3
N2	13	5	7	34	1	12
N3	21	3	13	60	15	22
Mean	9	2	5	27	5	10

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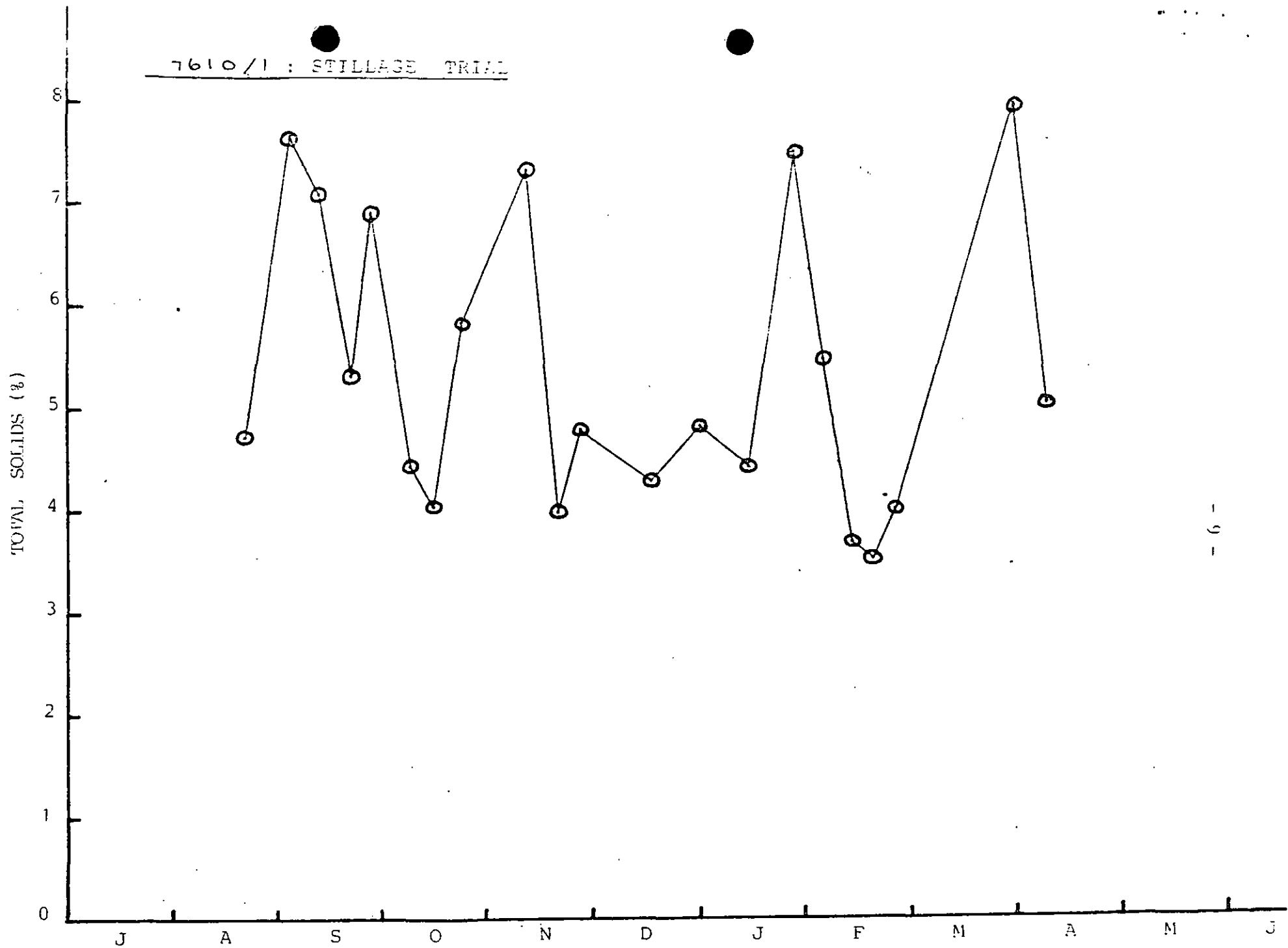


Figure 1 : Variation in Percentage Total Solids in HVE Stillage (1986-'87)

7610/1 STILLAGE TRIAL - 1R to 5R

Table 7 : Stillage Data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K ₂ O (kg/ha)	NITROGEN AS N (kg/ha)
I1 1:400 dilution	1R	1:330	3,9	1 553	229	-
	2R	1:370	1,6	1 313	183	-
	3R	1:384	1,9	1 553	212	-
	4R	1:406	1,6	1 414	207	-
	5R	1:336	3,1	1 747	250	49
	MEAN	1:365	2,4	1 516	216	49
I2 1:200 dilution	1R	1:200	6,4	2 459	387	-
	2R	1:184	4,2	2 429	362	-
	3R	1:195	3,7	3 140	418	-
	4R	1:207	3,1	2 779	413	-
	5R	1:179	6,3	3 311	491	102
	MEAN	1:193	4,7	2 824	414	102
I3 1:100 dilution	1R	1:108	11,8	4 695	707	-
	2R	1: 99	6,7	4 938	709	-
	3R	1: 91	8,3	6 487	913	-
	4R	1: 98	6,5	5 670	871	-
	5R	1: 90	12,5	6 492	997	230
	MEAN	1: 97	9,2	5 656	839	230
I4 1: 50 dilution	1R	1: 54	23,6	9 669	1 457	-
	2R	1: 59	12,5	9 555	1 366	-
	3R	1: 54	15,5	12 561	1 744	-
	4R	1: 57	12,6	11 265	1 660	-
	5R	1: 49	24,9	13 794	1 962	403
	MEAN	1: 55	17,8	11 369	1 630	403

7610/1 STILLAGE TRIAL - FIFTH RATOON

Table 8 : Foliar N%

STILLAGE TREATMENTS	LEVELS OF N(kgN/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	1,98	1,99	1,99	2,02	2,00
I1 - 1:400 dilution	2,06	2,14	2,08	2,13	2,10
I2 - 1:200 dilution	2,11	2,09	2,19	2,10	2,12
I3 - 1:100 dilution	2,13	2,18	2,13	2,17	2,15
I4 - 1: 50 dilution	2,06	2,07	2,10	2,12	2,09
MEAN	2,07	2,09	2,10	2,11	2,09

Table 9 : Foliar K%

STILLAGE TREATMENTS	LEVELS OF N(kgN/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	1,16	1,18	1,28	1,20	1,20
I1 - 1:400 dilution	1,21	1,30	1,22	1,29	1,25
I2 - 1:200 dilution	1,22	1,16	1,27	1,27	1,23
I3 - 1:100 dilution	1,34	1,31	1,43	1,44	1,30
I4 - 1: 50 dilution	1,36	1,49	1,47	1,42	1,43
MEAN	1,26	1,29	1,33	1,32	1,30

7610/1 : STILLAGE TRIAL 1R to 5R

Table 10 : Soil Analysis Data

Soil Sample Depth 0 - 30 cm

TREATMENTS	RATON	COND(microS/cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (m.e. %)				
		Sat. Paste	Sat. Extract*		K	Ca	Mg	Nh	Total
I0 Control : No stillage	P	270	-	5,82	0,54	10,2	3,5	0,71	15,0
	1R	180	219	5,86	0,39	8,8	3,2	0,42	12,8
	2R	208	188	5,67	0,33	8,9	3,8	0,61	13,6
	3R	168	185	5,68	0,21	14,5	3,9	0,89	19,5
	4R	242	316	5,81	0,23	9,8	3,2	0,49	13,7
	5R	245	306	5,94	0,39	8,5	3,4	0,63	12,9
	%CH P-5R	- 9,3	+76,3	+ 2,1	-27,8	-16,7	- 2,9	-11,3	-14,0
I1 1:400 dilution	P	310	-	6,13	0,45	12,3	3,1	0,72	16,6
	1R	230	300	6,41	0,48	12,7	2,6	0,39	16,2
	2R	214	300	6,31	0,40	12,8	3,4	0,76	17,4
	3R	343	533	6,23	0,43	14,7	2,9	0,68	18,8
	4R	239	301	6,17	0,45	13,0	2,9	0,64	17,0
	5R	226	346	6,21	0,65	9,9	3,2	0,55	14,3
	%CH P-5R	-27,1	+15,3	+ 1,3	+13,5	-19,5	+ 3,2	-23,6	-13,9
I2 1:200 dilution	P	275	-	5,01	0,55	9,5	3,3	0,57	13,9
	1R	210	315	6,50	0,58	9,3	3,1	0,41	13,4
	2R	175	203	6,23	0,46	8,8	3,5	0,54	13,3
	3R	243	334	5,80	0,61	11,4	2,5	0,72	15,2
	4R	247	289	6,33	0,49	9,9	2,8	0,51	13,7
	5R	265	452	6,35	0,75	8,5	3,2	0,68	13,1
	%CH P-5R	- 3,6	+43,5	+ 9,3	+36,4	-10,5	- 3,0	+19,3	- 5,8
I3 1:100 dilution	P	260	-	5,55	0,51	9,0	3,5	0,59	13,5
	1R	210	295	5,65	0,75	8,4	3,4	0,49	13,0
	2R	219	206	5,85	0,68	7,9	3,5	0,54	12,6
	3R	275	298	5,94	0,70	10,9	3,8	0,79	16,2
	4R	235	245	6,46	0,81	9,7	3,4	0,69	14,6
	5R	238	380	6,30	1,12	8,6	3,6	0,71	14,0
	%CH P-5R	- 8,5	+28,8	+13,5	+119,6	- 4,4	+ 2,9	+20,3	+ 2,9
I4 1: 50 dilution	P	310	-	6,39	0,45	12,0	3,5	0,65	16,6
	1R	235	338	6,13	0,79	10,3	2,7	0,51	14,3
	2R	265	365	6,61	1,03	10,3	4,1	0,59	16,0
	3R	394	431	6,09	0,80	14,6	3,6	0,82	19,8
	4R	269	314	6,78	1,22	12,5	3,3	0,71	17,7
	5R	302	464	6,80	1,34	11,4	3,9	0,60	17,2
	%CH P-5R	- 2,6	+37,3	+ 6,4	+197,8	- 5,0	+11,4	- 9,1	+ 3,6

* %CH = 1R-5R

7610/1 : STILLAGE TRIAL 1R to 5R

Table 11 : Soil Analysis Data

Soil Sample Depth 30 - 60 cm

TREATMENTS	RATIOON	COND(microS/cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (m.e. %)				
		Sat. Paste	Sat. Extract*		K	Ca	Mg	Na	Total
I0 Control: No stillage	P	320	-	6,31	0,22	15,6	4,0	0,74	20,6
	1R	220	219	6,14	0,19	10,6	4,0	0,46	15,3
	2R	173	220	5,78	0,22	9,3	4,2	0,52	14,3
	3R	178	189	5,97	0,20	16,2	4,3	1,00	21,7
	4R	283	326	5,85	0,16	11,8	3,7	0,46	16,1
	5R	261	307	6,19	0,28	10,3	4,0	0,61	15,2
	%CH P-5R	-18,4	+40,2	- 1,9	+27,3	-34,0	0,0	-17,6	-26,2
I1 1:400 dilution	P	335	-	6,52	0,23	18,9	4,2	0,78	24,1
	1R	245	281	6,48	0,21	15,3	3,8	0,49	19,8
	2R	259	360	6,48	0,24	16,6	3,9	0,69	21,4
	3R	408	483	6,38	0,25	16,1	3,9	0,77	21,0
	4R	292	361	6,39	0,26	14,8	3,6	0,63	19,3
	5R	271	282	6,45	0,40	11,4	3,7	0,65	16,2
	%CH P-5R	-19,1	+ 0,4	- 0,9	+73,9	-39,7	-11,9	-16,7	-32,8
I2 1:200 dilution	P	220	-	5,84	0,22	8,7	3,4	0,78	13,1
	1R	220	290	6,30	0,15	12,0	3,2	0,59	15,9
	2R	180	214	6,30	0,30	9,9	3,7	0,72	14,6
	3R	254	364	5,69	0,35	10,1	3,4	0,77	14,6
	4R	181	316	6,34	0,30	10,8	3,2	0,56	14,9
	5R	267	360	6,45	0,43	9,1	3,6	0,68	13,8
	%CH P-5R	+21,4	+24,1	+10,4	+95,5	+ 4,5	+ 5,9	+12,8	+ 5,3
I3 1:100 dilution	P	290	-	5,79	0,24	11,7	4,3	0,92	17,2
	1R	230	303	5,95	0,26	10,6	4,5	0,61	16,0
	2R	195	155	5,89	0,35	8,7	4,7	0,59	14,3
	3R	354	388	6,34	0,49	13,9	4,4	0,82	19,6
	4R	248	250	6,54	0,41	10,8	4,1	0,69	16,0
	5R	271	326	6,50	0,79	10,6	4,2	0,73	16,3
	%CH P-5R	- 6,6	+ 7,6	+12,3	+229,2	- 9,4	- 2,3	-20,7	- 5,2
I4 1: 50 dilution	P	305	-	6,32	0,19	16,1	4,1	0,75	21,1
	1R	300	340	6,44	0,26	14,6	3,1	0,45	18,4
	2R	297	286	6,64	0,52	10,8	4,5	0,62	16,4
	3R	424	451	6,26	0,53	16,1	4,5	0,93	22,1
	4R	293	291	6,95	0,60	14,8	3,6	0,72	19,7
	5R	326	388	6,86	0,90	12,9	3,9	0,60	18,5
	%CH P-5R	+ 6,9	+14,1	+ 8,5	+373,7	-19,9	- 4,9	+ 6,7	-12,3

* %CH = 1R-5R

7610/1 : STILLAGE TRIAL 1R to 5R

Table 12 : Soil Analysis Data

Soil Sample Depth 60 - 90 cm

TREATMENTS	RATIOON	COND (microS/cm)		pH (CaCl ₂)	EXTRACTABLE CATIONS (m.e. %)				
		Sat. Paste	Sat. Extract*		K	Ca	Mg	Na	Total
I0 Control: No stillage	P	330	-	6,28	0,20	16,3	4,9	0,87	22,3
	1R	268	295	6,01	0,16	13,5	4,1	0,42	18,2
	2R	210	238	6,13	0,20	10,5	4,8	0,65	16,2
	3R	208	263	6,24	0,18	14,7	3,8	0,85	19,5
	4R	296	337	6,08	0,13	12,4	4,4	0,56	17,5
	5R	259	284	6,24	0,27	9,3	4,2	0,59	14,4
	%CH P-5R	-21,5	- 3,7	- 0,6	+35,0	-42,9	-14,3	-32,2	-35,4
I1 1:400 dilution	P	385	-	6,35	0,24	17,8	3,9	0,84	22,8
	1R	245	255	5,85	0,20	15,7	4,0	0,54	20,4
	2R	279	305	6,51	0,22	17,5	4,7	0,88	23,3
	3R	413	511	6,47	0,23	15,5	4,1	0,74	20,6
	4R	313	309	6,38	0,26	15,7	3,8	0,64	20,4
	5R	277	312	6,39	0,35	12,1	4,1	0,62	17,2
	%CH P-5R	-28,1	+22,4	+ 0,6	+45,8	-32,0	+ 5,1	-26,2	-24,6
I2 1:200 dilution	P	254	-	5,96	0,23	9,6	4,3	0,91	15,0
	1R	224	251	4,69	0,23	10,6	3,5	0,50	14,8
	2R	201	194	6,45	0,23	8,4	4,6	0,77	14,0
	3R	243	249	5,77	0,22	9,7	3,2	0,80	13,9
	4R	202	277	6,39	0,19	11,0	3,5	0,60	15,3
	5R	299	371	6,25	0,33	9,0	4,1	0,79	14,2
	%CH P-5R	+17,7	+47,8	+ 4,9	+43,5	- 6,3	- 4,7	-13,2	- 5,3
I3 1:100 dilution	P	298	-	6,24	0,21	13,3	4,7	0,84	19,1
	1R	259	295	5,84	0,21	12,9	4,8	0,66	18,6
	2R	231	198	6,15	0,27	11,1	5,2	0,62	17,2
	3R	366	321	6,30	0,33	18,5	4,9	0,79	24,5
	4R	237	290	6,66	0,29	11,1	4,2	0,67	16,3
	5R	336	342	6,50	0,61	11,6	4,3	0,73	17,2
	%CH P-5R	+12,8	+15,9	+ 4,2	+190,5	-12,8	- 8,5	-13,1	- 9,9
I4 1: 50 dilution	P	377	-	6,66	0,25	19,1	4,7	0,83	24,9
	1R	305	348	6,51	0,23	15,3	3,7	0,49	19,7
	2R	316	304	6,73	0,41	12,7	4,9	0,60	18,6
	3R	475	510	6,47	0,39	18,9	4,6	0,89	24,8
	4R	306	312	6,87	0,49	16,1	3,9	0,72	21,2
	5R	363	404	6,75	0,63	13,6	4,2	0,60	19,0
	%CH P-5R	- 3,7	+16,1	+ 1,4	+152,0	-28,8	-10,6	-27,7	-23,7

* %CH = 1R - 5R

7610/1 STILLAGE TRIAL : FIFTH RATOON

Table 13 : Smut whips/ha x10⁻³

STILLAGE TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	3,89	1,68	2,00	2,43	2,50
I1 - 1:400 dilution	1,33	1,72	1,36	2,03	1,61
I2 - 1:200 dilution	1,18	1,86	2,31	1,18	1,63
I3 - 1:100 dilution	1,40	1,07	1,46	1,99	1,48
I4 - 1: 50 dilution	3,06	1,68	1,21	1,46	1,85
MEAN	2,17	1,60	1,67	1,82	1,82

Category: 1426

Object: To measure the long term effects on the soil of irrigation with distillery effluent at various dilutions and to determine the nitrogenous fertiliser value of the applied effluent.

This crop: Sixth ratoon Age: 12,2 months (18.6.87 to 23.6.88)

Location: Hippo Valley Estates, Section 9, Field 10B.

Variety/Spacing: NCo376 in 1,5m rows.

Fertiliser:

- (1) Nitrogen : see treatments.
- (2) Phosphate : 100 kg. P_{205} /ha as single superphosphate applied at 5 weeks.
- (3) Potash : 60 kg. K_2O /ha as muriate of potash applied at 5 weeks.

Treatments:

- (a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):
 - I0:Control, no stillage
 - I1:Stillage diluted 1:400
 - I2:Stillage diluted 1:200
 - I3:Stillage diluted 1:100
 - I4:Stillage diluted 1:50
- (b) Split plot treatments consisted of four nitrogen levels:
 - N0:Control, no nitrogen
 - N1:60 kg N/ha
 - N2:120 kg N/ha
 - N3:180 kg N/ha
 The nitrogen was applied as ammonium nitrate in two dressings, half at 5 weeks and half at 10 weeks.

Rainfall: 507,7mm Irrigation: 1 359,0mm

RESULTS

(a) Yield data: The cane yield, ERC% cane, ERF% cane, ERC yield and ERF yield data for the first to the sixth ratoon crops are shown in Tables 1 to 5.

(i) Stillage: In the sixth ratoon there were highly significant ($P=0,01$) increases in cane yield, ERC yield, and ERF yield, with increasing levels of applied stillage and corresponding depressions ($P=0,05$) in ERC% and ERC% cane values.

(ii) Nitrogen treatments: As in previous crops, highly significant ($P=0,01$) quadratic responses in cane, ERC and ERF yields were obtained in the sixth ratoon. There were also highly significant ($P=0,01$) negative linear ERC% cane and ERF% cane responses to nitrogen values dropping with increasing levels of applied nitrogen.

(iii) Stillage dilution x nitrogen interaction (Tables 6 and 7): Cane, ERC and ERF yield interactions were similar in the fourth, fifth and sixth ratoons. For applied nitrogen levels of up to 60 kg N/ha, there were increases in cane, ERC and ERF yields with increasing concentration of applied stillage but this effect was not obtained at rates of applied nitrogen exceeding 60 kg N/ha. There was a linear increase in cane yield with increasing levels of applied nitrogen at each stillage treatment. There were progressive increases in ERC yield and ERF yield with increasing levels of applied nitrogen in most stillage

treatments; exceptions being the 1:50 stillage dilution (for both ERC and ERF yields) and the 1:200 stillage dilution (for ERC yield only).

Significant stillage x nitrogen interactions were also obtained with ERC% cane. For nitrogen applications up to 60 kg N/ha, lower ERC% cane values were recorded with increasing stillage concentrations. This trend was not as marked at 120 kg N/ha and was not expressed at 180 kg N/ha. In the control and in the 1:400 stillage treatments there were tendencies towards depressed ERC% cane values with increasing levels of applied nitrogen. This effect was more marked in the 1:200 and 1:100 stillage treatments but the trend was reversed in the 1:50 stillage treatment.

- (b) Stalk data (Tables 8, 9, and 10): In the sixth ratoon, stalk populations were slightly depressed in the absence of nitrogen and they increased slightly with increasing stillage concentration up to the 1:100 stillage treatment. Stalk lengths increased with both increasing nitrogen applications and increasing stillage concentration.

As in previous ratoons, high lodging % was generally associated with high nitrogen applications.

- (c) Flowering (Tables 11 and 12): Climatic conditions were more ideal for flowering in the sixth ratoon than in all previous ratoons and as a result estimated flowering percentages were very much higher. There were no significant % flowering differences between irrigation treatments. However, there were significant linear ($P=0,01$) and quadratic ($P=0,01$) flowering responses to nitrogen treatments.

There was also a significant stillage x nitrogen interaction: thus at levels of applied nitrogen of zero and of 60 kg N/ha, flowering increased with increasing concentration of stillage while at 180 kg N/ha flowering decreased with increasing stillage concentration. The lowest flowering rates were recorded in the treatment combinations 0 kg N/ha plus no stillage and also in the 0 kg N/ha plus 1:400 stillage dilution. The highest flowering rates were recorded in the plots receiving 180 kg N/ha plus no stillage.

- (d) Stillage data:

(i) Total solids (Figure 1): Total solids ranged from 4,31% to 12,74% in the sixth ratoon.

(ii) Stillage irrigations: The trial received 19 stillage irrigations out of a total of 24 irrigations in the sixth ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied in all crops to date are shown in Table 13. The mean annual application of potassium as K_2O to date was 1,6 t/ha in the highest stillage treatment, 14. The total nitrogen application in the sixth ratoon was 458 kg N/ha in the 14 treatment.

- (e) Foliar analysis: Foliar samples were taken from the trial at 14, 18, 22, 26 and 30 weeks after the fifth ratoon harvest. Foliar N and foliar K at 22 weeks expressed as a percentage of dry matter are presented in Tables 14 to 17.

(i) Foliar N%: In the sixth ratoon foliar N% values were all above the November threshold level of 1,60%. The values ranges from 2,14% to 2,19%. Mean foliar N values for the trial have increased with every crop from the second to the sixth ratoon.

(ii) Foliar K%: Mean foliar K values for all plots which received no stillage and also those which received 1:400 stillage but no nitrogen, were below the critical level of 1,05% in the sixth ratoon.

- (f) Soil analysis: Analytical data from soil samples taken after each of the crops harvested to date are shown in Tables 18 to 23.

(i) Soil sample depth 0 to 30 cm: Very highly significant ($P=0,01$) increases in exchangeable K and in saturated paste and saturated extract conductivities were obtained with increasing stillage concentrations. Similar significant trends were also obtained with soil pH ($P=0,05$) and exchangeable Na. All treatments which received stillage showed gains in exchangeable K and Na over the period P to ER with the largest % gain of +264,4% being recorded in the

most concentrated stillage treatment I4. Except for the 1:100 stillage dilution, slight losses in total cation (K+Ca+Mg+Na) levels occurred over the same period. Saturated extract conductivities increased significantly ($P=0,01$) with increasing applied N levels but the opposite trend was obtained with exchangeable K ($P=0,05$). (ii) Soil sample depth 30 to 60 cm: Highly significant increases in conductivity ($P=0,01$), exchangeable K ($P=0,01$) and exchangeable Na ($P=0,01$) occurred with increasing concentration of applied stillage. Trends were similar to those obtained in the 0 to 30 cm depth. All treatments showed gains in exchangeable K and Na over the period P to 6R with the highest % K gain (+457,9%) being obtained in the 1:50 stillage dilution treatment.

There were no significant differences between N treatments.

(iii) Soil sample depth 60 to 90 cm: There were highly significant ($P=0,01$) increases in saturated paste and saturated extract conductivities and in exchangeable K and Na levels with increasing concentration of applied stillage. Exchangeable K and Na trends were similar to those obtained in the 0-30 and 30-60 cm depths. The highest % K gain of +224,0% occurred in the 1:50 stillage treatment. All treatments ranging from the zero stillage to the 1:50 dilution rate showed losses in total cation concentration over the period P to 6R. This also occurred in the 30 to 60 cm depth. There were no significant differences associated with nitrogen treatments.

- (g) Smut infection levels: Smut roguing was conducted in the sixth ratoon at 9, 14, 19, 23, 28, 33 and 36 weeks after the fifth ratoon harvest. Smut whip data are presented in Table 24. The beneficial effect of stillage in suppressing smut incidence was more pronounced in plots receiving relatively high N applications of 120 kg N/ha and 180 kg N/ha than in those which received up to 60 kg N/ha.

DISCUSSION

Applications of stillage significantly boosted cane, ERC and ERF yields. The responses were more marked in the sixth ratoon than in all previous crops. The cane yield in the absence of applied nitrogen increased from 48,84 t/ha in the I0 treatment to 109,77 t/ha in the I4 treatment, in the sixth ratoon; while in the absence of applied stillage, it rose from 48,84 t/ha in the zero N treatment to 116,67 t/ha in the 120 kg N/ha treatment. Thus, in this crop the highest stillage application rate provided a benefit equivalent to almost 120 kg N/ha, i.e. double the benefit recorded in the fifth ratoon.

The increase in positive yield responses to applied stillage and in foliar N with advancing ratoons may indicate a build-up of soil organic matter and soil nitrogen in the high stillage treatments over the years, resulting in increasing levels of nitrogen being available to the crop from microbial degradation of the organic matter.

In the 0 to 30 cm and 30 to 60 cm soil depths; lower soil K levels tended to be associated with increasing levels of applied N because of good growth and therefore greater nutrient uptake resulting from a good supply of nitrogen. An interesting trend found in this crop was that high N applications (of 180 kg N/ha) combined with high stillage applications of 1:100 or 1:50 seem to depress flowering thus boosting ERC and ERF yields.

7610/1 STILLAGE TRIAL - 1R to 6R

Table 1 : Cane yield data

TREATMENTS	CANE YIELD (t/ha)						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0 - Control, no nitrogen	148,69	121,91	113,48	114,04	91,13	97,02	114,38
I1 - Stillage diluted 1:400	137,84	113,91	113,28	116,31	95,02	108,73	114,18
I2 - Stillage diluted 1:200	149,28	123,59	116,06	119,18	101,83	117,21	121,19
I3 - Stillage diluted 1:100	146,92	125,03	117,10	124,22	101,53	129,04	123,97
I4 - Stillage diluted 1:50	131,49	134,10	127,98	142,00	115,85	137,90	131,55
Significance	N.S.	N.S.	N.S.	*	*	***	-
L.S.D. P = 0,05	-	-	-	15,65	12,59	11,96	-
P = 0,01	-	-	-	-	-	16,77	-
S.E. single plot ±	26,37	16,75	14,40	20,31	16,34	15,53	-
S.E. treatment mean ±	6,59	4,19	3,60	5,08	4,08	3,88	-
C.V.%	18,46	13,54	12,24	16,49	16,16	13,16	-
<u>Split-plots</u>							
N0 - Control, no nitrogen	110,88	78,91	70,39	74,97	61,50	75,49	78,69
N1 - 50 kg N/ha	143,06	111,92	108,78	119,22	92,17	109,63	114,13
N2 - 120 kg N/ha	158,66	149,93	142,75	144,21	118,17	138,31	142,01
N3 - 180 kg N/ha	158,75	156,06	148,40	155,21	132,35	148,50	149,88
Linear effect	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	-
L.S.D. P = 0,05	8,78	11,27	10,02	6,80	6,55	6,54	-
P = 0,01	11,72	15,05	13,38	9,09	8,73	8,74	-
S.E. single plot ±	13,78	17,69	15,73	10,67	10,27	10,27	-
S.E. treatment mean ±	3,08	3,06	3,52	2,39	2,30	2,30	-
C.V.%	9,65	14,20	13,38	8,67	10,16	8,71	-
Interactions	IN** IN'*	IN** -	- -	IN'*** -	IN** -	IN'*** -	- -
Trial mean	142,84	123,71	117,58	123,15	101,07	117,98	121,06

7610/1 STILLAGE TRIAL - 1R to 6R

Table 2 : ERC% cane data

TREATMENTS	ERC % CANE						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0 - Control, no stillage	12,47	12,77	13,14	13,05	13,60	12,63	12,94
I1 - Stillage diluted 1:400	12,42	12,81	13,25	13,08	13,30	11,82	12,78
I2 - Stillage diluted 1:200	12,69	12,65	13,08	12,85	13,25	11,81	12,72
I3 - Stillage diluted 1:100	13,09	12,63	12,98	12,88	12,98	11,71	12,71
I4 - Stillage diluted 1:50	13,44	12,57	13,00	12,34	11,88	11,06	12,38
Significance	N.S.	N.S.	N.S.	*	*	*	-
L.S.D. P = 0,05	-	-	-	0,49	1,08	0,74	-
P = 0,01	-	-	-	-	-	-	-
S.E. single plot ±	1,26	0,95	0,64	0,64	1,40	0,96	-
S.E. treatment mean ±	0,31	0,24	0,16	0,16	0,35	0,24	-
C.V.%	9,79	7,52	4,91	4,97	10,79	8,15	-
<u>Split-plots:</u>							
No - Control, no nitrogen	13,67	13,10	13,10	12,63	13,23	12,28	13,00
N1 - 60 kg N/ha	12,89	12,96	13,42	13,08	13,40	12,20	12,99
N2 - 120 kg N/ha	12,40	12,57	13,04	12,76	13,17	11,59	12,59
N3 - 180 kg N/ha	12,33	12,12	12,81	12,87	12,20	11,14	12,25
Linear effect	***	***	*	N.S.	***	***	-
Quadratic effect	N.S.	N.S.	*	N.S.	**	N.S.	-
L.S.D. P = 0,05	0,58	0,38	0,33	0,36	0,54	0,53	-
P = 0,01	0,77	0,50	-	-	0,71	0,70	-
S.E. single plot ±	0,91	0,59	0,52	0,57	0,84	0,83	-
S.E. treatment mean ±	0,21	0,13	0,12	0,13	0,19	0,18	-
C.V.%	7,08	4,67	3,99	4,44	6,49	7,00	-
Interactions	IN**	-	-	-	-	IN**	-
	-	-	-	-	-	-	-
Trial mean	12,82	12,69	13,09	12,84	13,00	11,81	12,71

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Table 3 : ERC Yield data

TREATMENTS	ERC YIELD (t/ha)						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0 - Control; no stillage	18,40	15,48	14,83	14,86	12,38	12,12	14,68
I1 - Stillage diluted 1:400	16,96	14,42	14,98	15,19	12,54	12,64	14,46
I2 - Stillage diluted 1:200	18,85	15,47	15,12	15,31	13,28	13,52	15,26
I3 - Stillage diluted 1:100	19,14	15,70	15,21	16,02	13,03	15,00	15,68
I4 - Stillage diluted 1:50	17,60	16,78	16,59	17,49	13,57	15,19	16,20
Significance	N.S.	N.S.	N.S.	*	N.S.	***	-
L.S.D. P = 0,05	-	-	-	1,69	-	1,22	-
P = 0,01	-	-	-	-	-	1,72	-
S.E. single plot ±	3,80	2,13	1,79	2,20	1,60	1,59	-
S.E. treatment mean ±	0,95	0,53	0,45	0,55	0,40	0,40	-
C.V.%	20,91	13,65	11,63	13,93	12,35	11,61	-
<u>Split-plots:</u>							
N0 - Control, no nitrogen	15,17	10,29	9,22	9,36	7,99	9,03	10,18
N1 - 60 kg N/ha	18,34	14,47	14,57	15,43	12,26	13,26	14,72
N2 - 120 kg N/ha	19,64	18,82	18,59	18,38	15,53	15,96	17,82
N3 - 180 kg N/ha	19,62	18,70	19,00	19,93	16,07	16,52	18,31
Linear effect	***	***	***	***	***	***	-
Quadratic effect	**	***	***	***	***	***	-
L.S.D. P = 0,05	1,62	1,49	1,31	0,80	0,93	0,98	-
P = 0,01	2,77	2,00	1,76	1,07	1,24	1,31	-
S.E. single plot ±	2,55	2,35	2,06	1,26	1,46	1,54	-
S.E. treatment mean ±	0,57	0,52	0,46	0,28	0,33	0,34	-
C.V.%	14,02	15,48	13,43	7,99	11,25	11,22	-
Interactions	IN*	IN*	-	IN***	IN**	IN*	-
	-	-	-	-	-	-	-
Trial mean	18,19	15,57	15,35	15,77	12,96	13,69	15,26

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Table 4 : ERF% cane data

TREATMENTS	ERF. % CANE						
	1R	2R	3R	4R	5R	6R	MEAN
Main plots:							
I0 - Control, no stillage	14,58	14,21	14,35	14,23	15,12	14,42	14,49
I1 - Stillage diluted 1:400	14,77	14,38	14,42	14,20	15,09	13,73	14,43
I2 - Stillage diluted 1:200	14,98	14,16	14,30	14,08	15,03	13,78	14,39
I3 - Stillage diluted 1:100	15,04	14,16	14,14	14,11	14,80	13,68	14,32
I4 - Stillage diluted 1:50	15,12	13,94	14,27	13,64	14,30	13,37	14,11
Significance	N.S.	N.S.	N.S.	*	*	*	-
L.S.D. P = 0,05	-	-	-	0,40	0,49	0,57	-
P = 0,01	-	-	-	-	-	-	-
S.E. single plots	0,77	0,66	0,89	0,51	0,63	0,73	-
S.E. treatment mean ±	0,19	0,16	0,22	0,13	0,16	0,18	-
C.V.%	5,35	4,63	6,25	3,66	4,25	5,33	-
Split-plots:							
N0 - Control, no nitrogen	15,17	14,18	14,06	13,72	14,58	14,00	14,29
N1 - 60 kg N/ha	15,01	14,27	14,47	14,21	15,03	14,07	14,51
N2 - 120 kg N/ha	14,63	14,22	14,37	14,10	15,07	13,59	14,33
N3 - 180 kg N/ha	14,77	14,01	14,29	14,18	14,78	13,52	14,26
Linear effect	*	N.S.	N.S.	**	N.S.	**	-
Quadratic effect	N.S.	N.S.	**	*	**	N.S.	-
L.S.D. P = 0,05	0,53	-	0,34	0,31	0,35	0,86	-
P = 0,01	-	-	0,40	0,42	0,46	1,15	-
S.E. single plot ±	0,83	0,40	0,48	0,49	0,55	0,60	-
S.E. treatment mean ±	0,19	0,09	0,11	0,11	0,12	0,14	-
C.V.%	5,60	2,80	3,33	3,51	3,67	4,38	-
Interactions	-	-	-	-	-	-	-
Trial mean	14,90	14,17	14,30	14,05	14,87	13,80	14,35

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Table 5 : ERF yield data

TREATMENTS	ERF YIELD (t/ha)						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0 - Control, no stillage	21,63	17,31	16,28	16,24	13,89	13,94	16,55
I1 - Stillage diluted 1:400	20,29	16,31	16,37	16,53	14,38	14,82	16,45
I2 - Stillage diluted 1:200	22,30	17,46	16,62	16,83	15,25	15,96	17,40
I3 - Stillage diluted 1:100	22,09	17,71	16,62	17,59	15,04	17,61	17,78
I4 - Stillage diluted 1:50	19,87	18,66	18,24	19,37	16,51	18,39	18,51
Significance	N.S.	N.S.	N.S.	*	*	***	-
L.S.D. P = 0,05	-	-	-	2,05	1,66	1,60	-
P = 0,01	-	-	-	-	-	2,24	-
S.E. single plot ±	4,33	2,34	2,28	2,66	2,16	2,07	-
S.E. treatment mean ±	1,08	0,59	0,57	0,66	0,54	0,52	-
C.V.%	20,39	13,40	13,54	15,36	14,39	12,85	-
<u>Split-plots:</u>							
No - Control, no nitrogen	16,90	11,16	9,92	10,20	8,91	10,43	11,25
N1 - 60 kg N/ha	21,41	15,94	15,71	16,76	13,81	15,34	16,50
N2 - 120 kg N/ha	23,17	21,30	20,50	20,31	17,82	18,75	20,31
N3 - 180 kg N/ha	23,46	21,57	21,17	21,98	19,52	20,06	21,29
Linear effect	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	-
L.S.D. P = 0,05	1,53	1,54	1,43	0,85	0,96	0,94	-
P = 0,01	2,05	2,05	1,91	1,14	1,28	1,26	-
S.E. single plot ±	2,41	2,41	2,24	1,34	1,50	1,48	-
S.E. treatment mean ±	0,54	0,54	0,50	0,30	0,34	0,33	-
C.V.%	11,34	13,80	13,32	7,73	10,02	9,14	-
Interactions	IN**	IN**	-	IN***	IN**	IN***	-
			-				-
Trial mean	21,24	17,49	16,83	17,31	15,02	16,14	17,34

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Table 6 : Interaction Table (Cane yield and ERC% cane)

TREATMENTS	CANE YIELD (t/ha)					ERC % CANE				
	LEVELS OF NITROGEN (kgN/ha)				MEAN	LEVELS OF NITROGEN (kgN/ha)				MEAN
	0	60	120	180		0	60	120	180	
I0 - Control, no stillage	48,84	86,22	116,67	136,38	97,02	13,19	12,66	12,69	11,98	12,63
I1 - Stillage diluted 1:400	61,79	92,75	133,30	147,07	108,73	12,36	12,54	11,72	10,66	11,82
I2 - Stillage diluted 1:200	71,87	102,14	145,78	149,07	117,21	12,85	12,58	11,14	10,66	11,81
I3 - Stillage diluted 1:100	85,19	124,81	149,71	156,46	129,04	12,35	11,74	11,49	11,25	11,71
I4 - Stillage diluted 1:50	109,77	142,21	146,08	153,54	137,90	10,67	11,48	10,93	11,16	11,06
MEAN	75,49	109,63	138,31	148,50	117,98	12,28	12,20	11,59	11,14	11,81
Significant Interaction	IN'				***	IN'				*
L.S.D. P = 0,05 P = 0,01					14,63 19,54					1,18 -

Table 7 : Interaction Table (ERC and ERF yields)

TREATMENTS	ERC YIELD (t/ha)					ERF YIELD (t/ha)				
	LEVELS OF NITROGEN (kgN/ha)				MEAN	LEVELS OF NITROGEN (kgN/ha)				MEAN
	0	60	120	180		0	60	120	180	
I0 - Control, no stillage	6,42	10,91	14,82	16,33	12,12	7,10	12,46	16,80	19,39	13,94
I1 - Stillage diluted 1:400	7,61	11,58	15,67	15,70	12,64	8,58	13,26	18,27	19,19	14,82
I2 - Stillage diluted 1:200	9,20	12,84	16,22	15,80	13,52	10,29	14,64	19,05	19,86	15,96
I3 - Stillage diluted 1:100	10,49	14,65	17,18	17,69	15,00	11,90	16,83	20,56	21,16	17,61
I4 - Stillage diluted 1:50	11,42	16,30	15,93	17,09	15,19	14,27	19,49	19,10	20,70	18,39
MEAN	9,03	13,26	15,96	16,52	13,69	10,43	15,34	18,75	20,06	16,14
Significant Interaction	IN**					IN***				
L.S.D. P = 0,05 P = 0,01					2,19 -					2,10 2,81

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Table 8 : Stalk count data

TREATMENTS	STALK COUNTS/ha x 10 ⁻³						
	1R	2R	3R	4R	5R	6R	MEAN
Main plots:							
I0 - Control, no stillage	135,3	140,5	144,0	150,8	153,1	153,9	146,3
I1 - Stillage diluted 1:400	130,6	137,3	142,7	146,9	152,1	156,9	144,4
I2 - Stillage diluted 1:200	135,9	139,7	145,3	148,7	155,6	157,2	147,1
I3 - Stillage diluted 1:100	134,9	142,4	145,4	149,6	158,5	159,2	148,3
I4 - stillage diluted 1:50	125,5	146,2	150,1	152,5	157,3	157,7	148,2
Split-plots:							
No - Control, no nitrogen	117,5	127,9	132,3	139,5	145,6	151,0	135,6
N1 - 60 kg N/ha	133,0	139,7	146,7	153,7	158,3	160,8	148,7
N2 - 120 kg N/ha	138,6	147,9	151,2	153,3	158,4	158,3	151,3
N3 - 180 kg N/ha	140,6	149,5	151,6	152,2	158,9	157,8	151,8
MEAN	132,4	141,2	145,5	149,7	155,3	157,0	146,9

Table 9 : Stalk length data

TREATMENTS	STALK LENGTHS (m)						
	1R	2R	3R	4R	5R	6R	MEAN
Main Plots:							
I0 - Control, no stillage	2,78	2,44	2,30	2,33	2,06	2,46	2,40
I1 - Stillage diluted 1:400	2,66	2,35	2,35	2,42	2,20	2,59	2,43
I2 - Stillage diluted 1:200	2,80	2,54	2,40	2,47	2,26	2,76	2,54
I3 - Stillage diluted 1:100	2,67	2,44	2,32	2,41	2,13	2,82	2,47
I4 - Stillage diluted 1:50	2,60	2,48	2,54	2,70	2,32	3,05	2,62
Split-plots:							
No - Control, no nitrogen	2,35	1,89	1,83	1,86	1,93	2,15	2,00
N1 - 60 kg N/ha	2,69	2,29	2,24	2,29	2,09	2,64	2,37
N2 - 120 kg N/ha	2,92	2,82	2,70	2,79	2,42	3,05	2,78
N3 - 180 kg N/ha	2,84	2,80	2,75	2,93	2,39	3,11	2,80
MEAN	2,70	2,45	2,38	2,46	2,21	2,74	2,49

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Table 10 : Stalk lodging % data

TREATMENTS	LODGING %						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0	11	0	0	0	0	0	2
I1	11	2	6	19	3	6	8
I2	14	5	5	31	2	13	12
I3	7	2	3	29	3	17	10
I4	3	1	11	59	16	42	22
<u>Split-plots:</u>							
N0	0	0	0	5	3	1	2
N1	3	0	0	11	1	6	4
N2	13	5	7	34	1	17	13
N3	21	3	13	60	15	39	25
MEAN	9	2	5	27	5	15	11

Table 11 : Estimated Flowering % data

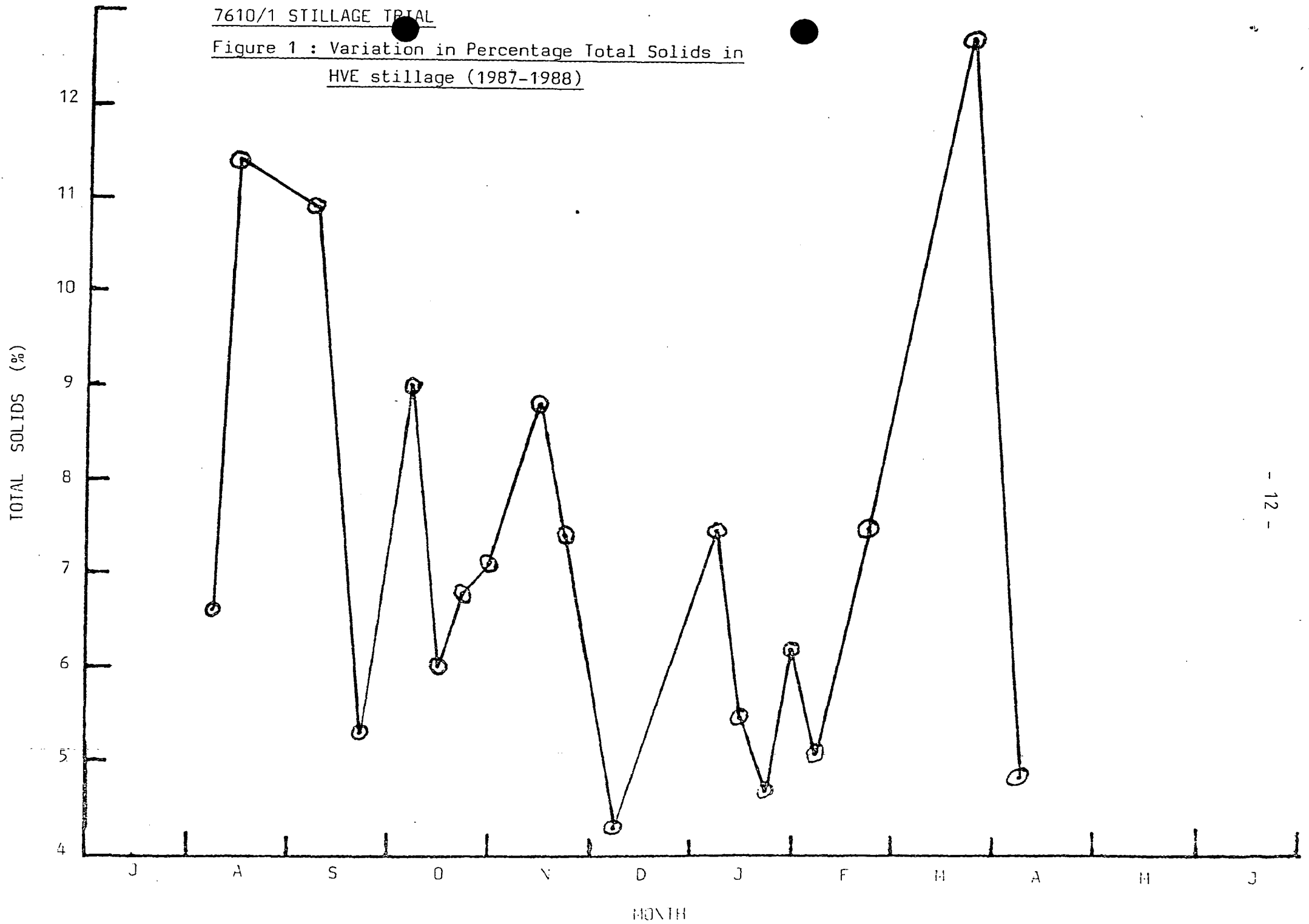
TREATMENTS	ESTIMATED FLOWERING %						
	1R	2R	3R	4R	5R	6R	MEAN
<u>Main plots:</u>							
I0	1	0	1	0	0	54	9
I1	0	0	0	0	0	56	9
I2	1	0	0	0	0	60	10
I3	1	0	0	0	0	59	10
I4	1	0	0	0	0	52	9
<u>Split-plots:</u>							
N0	1	0	0	0	0	40	7
N1	1	0	0	0	0	62	11
N2	0	0	0	0	0	65	11
N3	1	0	0	0	0	59	10
MEAN	1	0	0	0	0	56	10

Table 12 : Interaction Table (Estimated % flowering)

TREATMENTS	ESTIMATED FLOWERING %				
	LEVELS OF NITROGEN (kgN/ha) -				
	0	60	120	180	MEAN
I0 - Control, no stillage	22,50	42,50	72,50	80,00	54,38
I1 - Stillage diluted 1:400	22,50	62,50	72,50	65,00	55,63
I2 - Stillage diluted 1:200	42,50	65,00	65,00	67,50	60,00
I3 - Stillage diluted 1:100	57,50	62,50	72,50	45,00	59,38
I4 - Stillage diluted 1:50	52,50	77,50	42,50	35,00	51,88
MEAN	39,50	62,00	65,00	58,50	56,25
Significance	IN***				
L.S.D. P = 0,05	26,02				
P = 0,01	34,76				

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Figure 1 : Variation in Percentage Total Solids in
HVE stillage (1987-1988)



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Table 13 : Stillage data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K ₂ O (kg/ha)	NITROGEN AS N* (kg/ha)
I1 1:400 dilution	1R	1:330	3,9	1 553	229	-
	2R	1:370	1,6	1 313	183	-
	3R	1:384	1,9	1 553	212	-
	4R	1:406	1,6	1 414	207	-
	5R	1:336	3,1	1 747	250	49
	6R	1:350	2,0	1 452	198	55
	MEAN	1:363	2,4	1 505	213	52
I2 1:200 dilution	1R	1:200	6,4	2 459	337	-
	2R	1:184	4,2	2 429	362	-
	3R	1:195	3,7	3 140	418	-
	4R	1:207	3,1	2 779	413	-
	5R	1:179	6,3	3 311	491	102
	6R	1:177	4,0	2 611	370	107
	MEAN	1:190	4,6	2 788	407	105
I3 1:100 dilution	1R	1:108	11,8	4 695	707	-
	2R	1:99	6,7	4 938	709	-
	3R	1:91	8,3	6 487	913	-
	4R	1:98	6,5	5 670	871	-
	5R	1:90	12,5	6 492	997	230
	6R	1:96	7,9	5 200	709	221
	MEAN	1:97	9,0	5 580	818	226
I4 1:50 dilution	1R	1:54	23,6	9 669	1 457	-
	2R	1:59	12,5	9 555	1 366	-
	3R	1:54	15,5	12 561	1 744	-
	4R	1:57	12,6	11 265	1 660	-
	5R	1:49	24,9	13 794	1 962	408
	6R	1:51	16,4	11 164	1 601	658
	MEAN	1:54	17,6	11 335	1 632	433

* MEAN kg N/ha = 5R + 6R

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Table 14 : Foliar N% at 22 weeks

STILLAGE TREATMENTS	LEVELS OF N(kgN/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	2,15	2,14	2,17	2,15	2,15
I1 - 1:400 dilution	2,19	2,16	2,18	2,18	2,18
I2 - 1:200 dilution	2,19	2,19	2,17	2,18	2,18
I3 - 1:100 dilution	2,17	2,17	2,17	2,18	2,17
I4 - 1:50 dilution	2,18	2,19	2,17	2,17	2,18
MEAN	2,17	2,17	2,17	2,17	2,17

Table 15 : Foliar K% at 22 weeks

STILLAGE TREATMENTS	LEVELS OF N(kgN/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	0,96	0,96	0,97	1,00	0,97
I1 - 1:400 dilution	1,00	1,08	1,12	1,20	1,10
I2 - 1:200 dilution	1,11	1,11	1,18	1,22	1,15
I3 - 1:100 dilution	1,11	1,14	1,13	1,26	1,16
I4 - 1:50 dilution	1,24	1,26	1,32	1,37	1,30
MEAN	1,08	1,11	1,14	1,21	1,14

Table 16 : Foliar N% Dry Matter at 22 weeks ±

TREATMENTS	FOLIAR N%						MEAN
	1R	2R	3R	4R	5R	6R	
Main plots:							
I0 - Control, no stillage	2,04	1,56	1,71	2,04	2,00	2,15	1,92
I1 - Stillage diluted 1:400	1,96	1,59	1,70	2,03	2,10	2,18	1,93
I2 - Stillage diluted 1:200	2,00	1,59	1,67	2,05	2,12	2,18	1,94
I3 - Stillage diluted 1:100	1,95	1,54	1,68	2,03	2,15	2,17	1,92
I4 - Stillage diluted 1:50	1,88	1,73	1,68	2,12	2,09	2,18	1,95
Split-plots:							
N0 - Control, no nitrogen	1,82	1,42	1,47	2,04	2,07	2,17	1,83
N1 - 60 kg N/ha	1,92	1,51	1,59	2,04	2,09	2,17	1,89
N2 - 120 kg N/ha	2,03	1,72	1,83	2,06	2,10	2,17	1,99
N3 - 180 kg N/ha	2,09	1,75	1,87	2,09	2,11	2,17	2,01
MEAN	1,97	1,60	1,69	2,05	2,09	2,17	1,93

Table 17 : Foliar K% Dry Matter

TREATMENTS	FOLIAR K%						MEAN
	1R	2R	3R	4R	5R	6R	
Main plots:							
I0 - Control, no stillage	1,13	1,04	0,92	0,93	1,20	0,97	1,03
I1 - Stillage diluted 1:400	1,16	1,14	0,98	1,04	1,25	1,10	1,11
I2 - Stillage diluted 1:200	1,20	1,27	1,02	1,06	1,23	1,15	1,16
I3 - Stillage diluted 1:100	1,20	1,15	1,03	1,09	1,38	1,16	1,17
I4 - Stillage diluted 1:50	1,22	1,09	1,09	1,29	1,43	1,30	1,24
Split-plots:							
N0 - Control, no nitrogen	1,12	1,07	0,95	1,04	1,26	1,08	1,09
N1 - 60 kg N/ha	1,15	1,13	0,99	1,04	1,29	1,11	1,12
N2 - 120 kg N/ha	1,21	1,14	1,04	1,11	1,33	1,14	1,16
N3 - 180 kg N/ha	1,25	1,24	1,06	1,14	1,32	1,21	1,20
MEAN	1,18	1,14	1,01	1,08	1,30	1,14	1,14

7610/1 : STILLAGE TRIAL 6R

Table 18 : Soil Analysis Data - Soil sample depth 0-30cm

TREATMENTS	COND.(microS/cm)		pH CaCl ₂	EXCHANGEABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
<u>Main plots:</u>								
I0 - Control	188	219	5,54	0,32	9,9	3,2	0,70	14,2
I1 - Stillage diluted 1:400	244	301	6,03	0,85	10,1	3,1	0,80	14,9
I2 - Stillage diluted 1:200	234	329	5,72	0,83	7,7	3,0	1,19	12,7
I3 - Stillage diluted 1:100	301	443	5,97	1,26	8,5	3,6	1,18	14,5
I4 - stillage diluted 1:50	393	542	6,16	1,64	8,6	3,6	0,90	14,7
Significance	***	***	*	***	N.S.	N.S.	**	N.S.
L.S.D. P = 0,05	54	118	0,36	0,27	-	-	0,29	-
P = 0,01	76	155	-	0,38	-	-	0,40	-
S.E. single plot ±	70	153	0,47	0,35	3,3	1,1	0,37	3,9
S.E. treatment mean ±	18	38	0,12	0,09	0,8	0,3	0,09	1,0
C.V.%	25,80	41,67	7,95	35,64	36,61	31,68	38,91	27,30
<u>Split-plots:</u>								
N0 - Control, no nitrogen	242	276	6,01	1,06	8,6	3,4	0,93	14,0
N1 - 60 kg N/ha	273	355	5,92	1,02	9,3	3,3	0,98	14,6
N2 - 120 kg N/ha	290	437	5,83	0,89	8,9	3,3	0,95	14,1
N3 - 180 kg N/ha	284	400	5,78	0,94	8,9	3,4	0,96	14,2
Linear effect	*	***	N.S.	*	N.S.	N.S.	N.S.	N.S.
Quadratic effect	-	*	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	43	65	-	0,16	-	-	-	-
P = 0,01	-	86	-	-	-	-	-	-
S.E. single plot ±	57	102	0,45	0,24	3,01	0,5	0,06	3,22
S.E. treatment mean ±	15	23	0,10	0,05	0,67	0,1	0,01	0,72
C.V.%	24,8	27,67	7,57	24,97	33,64	13,80	6,40	22,64

7610/1 : STILLAGE TRIAL 6R

Table 19 : Soil Analysis Data - Soil sample depth 30-60 cm

TREATMENTS	COND. (microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
Main plots:								
IO - Control, no stillage	203	206	5,67	0,23	10,0	3,6	0,76	14,6
I1 - Stillage diluted 1:400	216	238	5,82	0,45	8,8	3,5	0,82	13,6
I2 - Stillage diluted 1:200	284	341	5,83	0,46	7,6	3,3	1,26	12,6
I3 - Stillage diluted 1:100	311	356	6,00	0,77	9,1	4,1	1,15	15,1
I 4 - Stillage diluted 1:50	390	485	6,27	1,06	10,5	3,7	0,92	16,2
Significance	**	**	N.S.	***	N.S.	N.S.	**	N.S.
L.S.D. P = 0,05	89	125	-	0,28	-	-	0,25	-
P = 0,01	125	175	-	0,40	-	-	0,35	-
S.E. single plot ±	116	162	0,53	0,37	4,55	1,8	0,33	5,5
S.E. treatment mean ±	29	41	0,13	0,09	1,14	0,5	0,08	1,4
C.V.%	41,26	49,88	8,97	61,76	49,49	50,60	53,21	38,05
Split-plots:								
NO - Control, no nitrogen	264	306	5,87	0,64	8,8	3,6	0,96	14,0
N1 - 60 kg N/ha	274	328	5,99	0,67	10,2	3,5	1,01	15,3
N2 - 120 kg N/ha	266	302	5,97	0,52	9,4	3,7	0,98	14,6
N3 - 180 kg N/ha	321	365	5,85	0,55	8,4	3,7	0,98	13,7
Linear effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	-	-	-	-	-	-	-	-
P = 0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	103	122	0,39	0,24	3,17	0,63	0,08	3,5
S.E. treatment mean ±	23	27	0,09	0,05	0,71	0,14	0,02	0,8
C.V.%	36,65	37,64	6,63	41,10	34,53	17,38	8,14	24,18
Interactions	-	-	-	-	IN***	-	-	IN***

7610/1 : STILLAGE TRIAL 6R

Table 2) : Soil Analysis Data - Soil sample depth 60-90cm

TREATMENTS	COND. (microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
<u>Main plots:</u>								
I0 - Control, no stillage	206	198	5,68	0,19	9,5	3,7	0,72	14,1
I1 - Stillage diluted 1:400	249	266	6,08	0,31	9,8	3,7	0,84	14,6
I2 - Stillage diluted 1:200	234	279	5,76	0,31	7,4	3,6	1,25	12,6
I3 - Stillage diluted 1:100	325	331	6,02	0,52	10,7	4,6	1,13	17,0
I4 - Stillage diluted 1:50	408	494	6,29	0,81	10,9	3,8	0,97	16,5
Significance	**	**	N.S.	**	N.S.	N.S.	**	N.S.
L.S.D. P = 0,05	85	138	-	0,27	-	-	0,27	-
P = 0,01	119	193	-	0,38	-	-	0,37	-
S.E. single plot ±	110	179	0,68	0,35	5,5	2,0	0,34	7,2
S.E. treatment plot ±	27	45	0,17	0,09	1,4	0,5	0,09	1,8
C.V.%	38,69	56,93	11,32	82,41	57,35	50,91	34,92	47,96
<u>Split-plots:</u>								
N0 - Control, no nitrogen	280	297	5,92	0,40	9,6	3,8	0,99	14,8
N1 - 60 kg N/ha	295	344	6,04	0,48	9,5	3,8	1,02	14,8
N2 - 120 kg N/ha	287	313	5,93	0,39	9,7	4,1	0,97	15,1
N3 - 180 kg N/ha	275	301	5,96	0,45	9,8	3,9	0,97	15,1
Linear effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	-	-	-	-	-	-	-	-
P = 0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	95	122	0,43	0,23	3,9	1,1	0,10	4,5
S.E. treatment mean ±	21	27	0,10	0,05	0,9	0,3	0,02	1,0
C.V.%	33,44	38,84	7,29	54,44	40,49	29,02	10,0	30,12

7610/1 : STILLAGE TRIAL 1R to 6R

Table 21 : Soil Analysis Data - Soil sample depth 0-30cm

TREATMENTS	RATOCN	COND(microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		Sat. Paste	Sat. Extract		K	Ca	Mg	Na	Total
I0 Control No stillage	P	270	-	5,82	0,54	10,2	3,5	0,71	15,0
	1R	180	219	5,86	0,39	8,8	3,2	0,42	12,8
	2R	208	108	5,67	0,33	8,9	3,8	0,61	13,6
	3R	168	185	5,68	0,21	14,5	3,9	0,89	19,5
	4R	242	316	5,81	0,23	9,8	3,2	0,48	13,7
	5R	245	386	5,94	0,39	8,5	3,4	0,63	12,9
	6R	188	219	5,54	0,32	9,9	3,2	0,70	14,2
	%D-P-6R	-30,4	0,0	-4,8	-40,7	-2,9	-8,6	-1,4	-5,3
I1 1:400 dilution	P	310	-	6,13	0,46	12,3	3,1	0,72	16,6
	1R	230	300	6,41	0,48	12,7	2,6	0,39	16,2
	2R	214	380	6,31	0,40	12,8	3,4	0,76	17,4
	3R	348	533	6,23	0,48	14,7	2,9	0,68	18,8
	4R	239	301	6,17	0,45	13,0	2,9	0,64	17,0
	5R	226	346	6,21	0,66	9,9	3,2	0,55	14,3
	6R	244	301	6,03	0,85	10,1	3,1	0,80	14,9
	%D-P-6R	-21,3	+0,3	-1,6	+84,8	-17,9	0,0	+11,1	-10,2
I2 1:200 dilution	P	275	-	5,81	0,55	9,5	3,3	0,57	13,9
	1R	210	315	6,50	0,58	9,3	3,1	0,41	13,4
	2R	175	203	6,23	0,46	8,8	3,5	0,54	13,3
	3R	243	334	5,80	0,61	11,4	2,5	0,72	15,2
	4R	247	289	6,33	0,49	9,9	2,8	0,51	13,7
	5R	265	452	6,35	0,75	8,5	3,2	0,68	13,1
	6R	234	329	5,72	0,83	7,7	3,0	1,19	12,7
	%D-P-6R	-14,9	+4,4	-1,5	+50,9	-18,9	-9,1	+108,8	-8,6
I3 1:100 dilution	P	260	-	5,55	0,51	9,0	3,5	0,59	13,6
	1R	210	295	5,65	0,75	8,4	3,4	0,49	13,0
	2R	219	206	5,85	0,68	7,9	3,5	0,54	12,6
	3R	275	298	5,94	0,70	10,9	3,8	0,79	16,2
	4R	235	245	6,46	0,81	9,7	3,4	0,68	14,6
	5R	238	380	6,30	1,12	8,6	3,6	0,71	14,0
	6R	301	443	5,97	1,26	8,5	3,6	1,18	14,5
	%D-P-6R	+15,8	+50,2	+7,6	+147,1	-5,6	+2,9	+100,0	+6,6
I4 1:50 dilution	P	310	-	6,39	0,45	12,0	3,5	0,66	16,6
	1R	235	338	6,13	0,79	10,3	2,7	0,51	14,3
	2R	265	355	6,61	1,03	10,3	4,1	0,58	16,0
	3R	394	481	6,09	0,80	14,6	3,6	0,82	19,8
	4R	269	314	6,78	1,22	12,5	3,3	0,71	17,7
	5R	302	464	6,80	1,34	11,4	3,9	0,60	17,2
	6R	393	542	6,16	1,64	8,6	3,6	0,90	14,7
	%D-P-6R	+26,8	+60,4	-3,6	+264,4	-28,3	+2,9	+36,4	-11,4

* %D = 1R to 6R

7610/1 : STILLAGE TRIAL 1R to 6R

Table 22 : Soil Analysis Data - Soil sample depth 30-60cm

TREATMENTS	RATONN	COND(microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		Sat. Paste	Sat. Extract		K	Ca	Mg	Na	Total
I0 Control No stillage	P	320	-	6,31	0,22	15,6	4,0	0,74	20,6
	1R	220	219	6,14	0,19	10,6	4,0	0,46	15,3
	2R	173	220	5,78	0,22	9,3	4,2	0,62	14,3
	3R	178	189	5,97	0,20	16,2	4,3	1,00	21,7
	4R	283	326	5,85	0,16	11,8	3,7	0,46	16,1
	5R	261	307	6,19	0,28	10,3	4,0	0,61	15,2
	6R	203	206	5,67	0,23	10,0	3,6	0,76	14,6
	%CHP-6R	-36,6	-5,9	-10,1	+4,5	-35,9	-10,0	+2,7	-29,1
I1 1:400 dilution	P	335	-	6,52	0,23	18,9	4,2	0,78	24,1
	1R	245	281	6,48	0,21	15,3	3,8	0,49	19,8
	2R	259	360	6,48	0,24	16,6	3,9	0,69	21,4
	3R	408	483	6,38	0,25	16,1	3,9	0,77	21,0
	4R	292	361	6,39	0,26	14,8	3,6	0,63	19,3
	5R	271	282	6,46	0,40	11,4	3,7	0,65	16,2
	6R	216	238	5,82	0,45	8,8	3,5	0,82	13,6
	%CHP-6R	-35,5	-15,3	-10,7	+95,7	-53,4	-16,7	+5,1	-43,6
I2 1:200 dilution	P	220	-	5,84	0,22	8,7	3,4	0,78	13,1
	1R	220	290	6,30	0,15	12,0	3,2	0,59	15,9
	2R	180	214	6,30	0,30	9,9	3,7	0,72	14,6
	3R	254	364	5,69	0,35	10,1	3,4	0,77	14,6
	4R	181	316	6,34	0,30	10,8	3,2	0,56	14,9
	5R	267	360	6,45	0,43	9,1	3,6	0,68	13,8
	6R	284	341	5,83	0,46	7,6	3,3	1,26	12,6
	%CHP-6R	+29,1	+17,6	-0,2	+109,1	-12,6	-2,9	+61,5	-3,8
I3 1:100 dilution	P	290	-	5,79	0,24	11,7	4,3	0,92	17,2
	1R	230	303	5,95	0,26	10,6	4,5	0,61	16,0
	2R	195	155	5,89	0,35	8,7	4,7	0,59	14,3
	3R	354	388	6,34	0,49	13,9	4,4	0,82	19,6
	4R	248	250	6,54	0,41	10,8	4,1	0,69	16,0
	5R	271	326	6,50	0,79	10,6	4,2	0,73	16,3
	6R	311	356	6,00	0,77	9,1	4,1	1,15	15,1
	%CHP-6R	+7,2	+17,5	+3,6	+220,8	-22,2	-4,7	+25,0	-12,2
I4 1:50 dilution	P	306	-	6,32	0,19	16,1	4,1	0,75	21,1
	1R	300	340	6,44	0,26	14,6	3,1	0,45	18,4
	2R	297	286	6,64	0,52	10,8	4,5	0,62	16,4
	3R	424	451	6,26	0,53	16,1	4,5	0,93	22,1
	4R	293	291	6,95	0,60	14,8	3,6	0,72	19,7
	5R	326	388	6,86	0,90	12,9	3,9	0,80	18,5
	6R	390	485	6,27	1,06	10,6	3,7	0,92	16,2
	%CHP-6R	+27,5	+42,6	-0,8	+457,9	-34,2	-9,8	+22,7	-23,2

* = %CH 1R - 6R

Table 23 : Soil Analysis Data - Soil sample depth 60-90cm

TREATMENTS	RATOON	COND(microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		Sat. Paste	Sat. Extract		K	Ca	Mg	Na	Total
I0 Control No stillage	P	330	-	6,28	0,20	16,3	4,9	0,87	22,3
	1R	268	295	6,01	0,16	13,5	4,1	0,42	18,2
	2R	210	238	6,13	0,20	10,5	4,8	0,65	16,2
	3R	208	263	6,24	0,18	14,7	3,8	0,85	19,5
	4R	296	337	6,08	0,13	12,4	4,4	0,56	17,5
	5R	259	284	6,24	0,27	9,3	4,2	0,59	14,4
	6R	205	198	5,68	0,19	9,5	3,7	0,72	14,1
	%CH-6R	-37,9	-32,9	-9,6	-5,0	-41,7	-24,5	-17,2	-36,8
I1 1:400 dilution	P	385	-	6,35	0,24	17,8	3,9	0,84	22,8
	1R	245	255	5,85	0,20	15,7	4,0	0,54	20,4
	2R	279	305	6,51	0,22	17,5	4,7	0,88	23,3
	3R	413	511	6,47	0,23	15,5	4,1	0,74	20,6
	4R	313	309	6,38	0,26	15,7	3,8	0,64	20,4
	5R	277	312	6,39	0,35	12,1	4,1	0,62	17,2
	6R	249	266	6,08	0,31	9,8	3,7	0,84	14,6
	%CH-6R	-35,3	+4,3	-4,3	+29,2	-44,9	-5,1	0,0	-36,0
I2 1:200 dilution	P	254	-	5,96	0,23	9,6	4,3	0,91	15,0
	1R	224	251	4,69	0,23	10,6	3,5	0,50	14,8
	2R	201	194	6,45	0,23	8,4	4,6	0,77	14,0
	3R	243	249	5,77	0,22	9,7	3,2	0,80	13,9
	4R	202	277	6,39	0,19	11,0	3,5	0,60	15,3
	5R	299	371	6,25	0,33	9,0	4,1	0,79	14,2
	6R	234	279	5,76	0,31	7,4	3,6	1,25	12,6
	%CH-6R	-7,9	+11,2	-3,4	+34,8	-22,9	-16,3	+37,4	-16,0
I3 1:100 dilution	P	298	-	6,24	0,21	13,3	4,7	0,84	19,1
	1R	259	295	5,84	0,21	12,9	4,8	0,66	18,6
	2R	231	198	6,15	0,27	11,1	5,2	0,62	17,2
	3R	366	321	6,30	0,33	18,5	4,9	0,79	24,5
	4R	237	290	6,66	0,29	11,1	4,2	0,67	16,3
	5R	336	342	6,50	0,61	11,6	4,3	0,73	17,2
	6R	325	331	6,02	0,52	10,7	4,6	1,13	17,0
	%CH-6R	+9,1	+12,2	-3,5	+147,6	-19,5	-2,1	+34,5	-11,0
I4 1:50 dilution	P	377	-	6,66	0,25	19,1	4,7	0,83	24,9
	1R	305	348	6,51	0,23	15,3	3,7	0,49	19,7
	2R	316	304	6,73	0,41	12,7	4,9	0,60	18,6
	3R	475	510	6,47	0,39	18,9	4,6	0,89	24,8
	4R	306	312	6,87	0,49	16,1	3,9	0,72	21,2
	5R	363	404	6,75	0,63	13,6	4,2	0,60	19,0
	6R	408	494	6,29	0,81	10,9	3,8	0,97	16,5
	%CH-6R	+0,2	+42,0	-5,6	+224,0	-42,9	-19,2	+16,9	-33,7

* %CH = 1R to 6R

7610/1 STILLAGE TRIAL - SIXTH RATOON

Table 24 : Smut whips/ha x 10⁻³

STILLAGE TREATMENTS	LEVELS OF N(kg N/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	2,25	2,18	2,00	1,96	2,10
I1 - 1:400 stillage dilution	1,88	2,69	2,65	2,03	2,31
I2 - 1:200 stillage dilution	1,47	1,72	1,78	1,29	1,57
I3 - 1:100 stillage dilution	1,51	2,17	1,32	1,67	1,67
I4 - 1:50 stillage dilution	2,35	1,82	1,13	1,28	1,64
MEAN	1,89	2,12	1,78	1,64	1,86

AGRONOMISTS' ASSOCIATION

Cat.No.: 1426

7610/1 STILLAGE TRIAL

Object: To measure the long-term effects on the soil of irrigation with distillery effluent at various dilutions and to determine the nitrogenous fertiliser value of the applied effluent.

This crop: Seventh ratoon Age: 11,7 months (23.6.88 to 15.6.89)

Location: Hippo Valley Estates, Section 9, Field 10B.

Variety/Spacing: NCo376 in 1,5m rows.

Fertilizer:

- (1) Nitrogen : see treatments.
- (2) Phosphate : 100kg/ha P_2O_5 as single superphosphate applied at 4 weeks.
- (3) Potash : 60kg/ha K_2O as muriate of potash applied at 4 weeks.

Treatments:

- (a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):
 - I0:Control, no stillage
 - I1:Stillage diluted 1:400
 - I2:Stillage diluted 1:200
 - I3:Stillage diluted 1:100
 - I4:Stillage diluted 1:50
- (b) Split plot treatments consisted of four nitrogen levels:
 - NO:Control, no nitrogen
 - N1:60 kg/ha N
 - N2:120 kg/ha N
 - N3:180 kg/ha N
 The nitrogen was applied as ammonium nitrate in two dressings, half at 4 weeks and half at 8 weeks.

Rainfall: 388,0mm Irrigation: 1576,0mm

RESULTS

- (a) Yield data: The cane yield, ERC% cane, ERF% cane, ERC yield and ERF yield data for the first to the seventh ratoon crops are shown in Tables 1 to 5.
- (i) Stillage: In the seventh ratoon, there were significant ($P=0,05$) increases in cane and ERF yield with increasing levels of applied stillage. Although trends were not significant, ERC% cane and ERF% cane values were depressed at higher levels of applied stillage.
 - (ii) Nitrogen treatments: As in previous crops, highly significant ($P=0,01$) quadratic responses in cane, ERC and ERF yields were obtained in the seventh ratoon. There were also significant ($P=0,05$) quadratic ERC% cane and ERF% cane responses to nitrogen with values dropping as the level of applied nitrogen increased.
 - (iii) Stillage dilution x nitrogen interaction (Tables 6,7 and 8): Cane, ERC and ERF yield interactions were similar in the fourth, fifth, sixth and seventh ratoons. For applied N levels of up to 60 kg/ha N there were increases in cane, ERC and ERF yields with increasing concentration of applied stillage but this trend was not maintained at rates of applied nitrogen exceeding 60 kg/ha N. For all stillage treatments except the 1 in 50 stillage dilution, there was a linear increase in cane, ERC and ERF yields with increasing levels of applied nitrogen. Significant interactions were also obtained with ERC% cane and ERF% cane data although at each level of applied nitrogen, there was

a general trend towards depressed quality with increasing stillage concentration. At each stillage concentration, maximal levels of quality were obtained in the 60 or 120 kg/ha N treatment except for ERF% cane, when the maximum occurred in the treatment receiving no nitrogen and 1:50 stillage dilution.

- (b) Stalk data (Tables 8,9 and 10): In the sixth and seventh ratoons, stalk populations were slightly depressed in the absence of stillage and they increased with increasing stillage concentration up to the 1:100 stillage treatment. Stalk lengths and stalk diameters increased with both increasing nitrogen applications and increasing stillage concentration. As in previous ratoons, high lodging % rates were generally associated with high nitrogen and high stillage applications.
- (c) Flowering (Tables 12,13 and 17): Flowering was not as prolific as in the sixth ratoon. There was a significant interaction. Thus, at levels of zero and 60 kg/ha N more flowering was recorded at higher stillage concentrations of 1:100 and 1:50 than at lower concentrations while the opposite trend was obtained at 180 kg/ha N. Higher flowering rates occurred in the plots receiving 180 kg/ha N and either no stillage or low concentrations of stillage of 1:400 or 1:200.
- (d) Stillage data:
- (i) Total solids (Figure 1): Total solids ranged from 4,17% to 11,48% in the seventh ratoon.
- (ii) Stillage irrigations: The trial received 23 stillage irrigations out of a total of 26 irrigations in the seventh ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied in all crops to date are shown in Table 14. The mean annual application of potassium as K_2O to date was 1,8 t/ha in the highest stillage treatment, I4. The total nitrogen application in the seventh ratoon was 321 kg/ha N in the I4 treatment.
- (e) Foliar analysis: Foliar samples were taken from the trial at 14, 18, 22, 26 and 30 weeks after the sixth ratoon harvest. Foliar N and foliar K at 22 weeks expressed as a percentage of dry matter are presented in Tables 15, 16, 18 and 19.
- (i) Foliar N%: Seventh ratoon foliar N values were all above the November critical level of 1,60%. The values ranged from 1,71% to 1,86%.
- (ii) Foliar K%: Mean values for all treatments were below the critical level of 1,10% in the seventh ratoon.
- (f) Soil analysis: Analytical data from soil samples taken after harvest are shown in Tables 20 to 32.
- (i) Soil sample depth 0 to 30 cm: Very highly significant ($P=0,01$) increases in IM ammonium acetate extractable K and in saturated paste and saturated extract conductivities were obtained with increasing stillage concentrations. All the treatments which received stillage showed gains in extractable K and saturated extract conductivity over the period P to 7R. The magnitude of the gains increased with stillage concentration. Over the same period losses were recorded in the levels of total extractable cations analysed for (i.e. $K+Ca+Mg+Na$)
- (ii) Soil sample depth 30 - 60 cm: Data trends were similar to those obtained in the 0 - 30 cm depth.
- (iii) Soil sample depth 60 to 90 cm: General trends were similar to those in 0 - 30 cm profile.
- (iv) Total and mineral N, organic matter and C:E:C: To ascertain whether the observed decrease in total IM ammonium acetate extractable K, Na, Ca and Mg in stillage treatments had been accompanied by an increase in the mineral nitrogen in the NH_4^+ form, analyses of the samples still available from recent ratoons were done. NH_4^+ N decreased over the period 4R to 7R in all stillage treatments. Therefore the possibility of the decrease in extractable K, Na, Ca and Mg having been compensated for by a corresponding increase in NH_4^+ N did not occur. However, since only the extractable cations were determined rather than the exchangeable levels, due to insufficient sample material, the actual trend on the exchange complex cannot be ascertained from these data.

In treatments receiving stillage, NO_3^- N generally increased from 4R to 7R with the increments tending to be higher in the more concentrated stillage treatments. Determinations of C.E.C., total nitrogen and organic matter, were also done on the same samples. C.E.C. data were variable and no discernible trends emerged. Total soil nitrogen and organic matter do not appear to be increasing with increasing ratoons.

- (g) Smut infection levels: Smut roguing was conducted in the seventh ratoon at 9, 13, 17, 20, 23, 29, 33 and 37 weeks after sixth ratoon harvest. Smut whip data are presented in Table 33. The beneficial effect of stillage in suppressing smut which was observed in some of the previous crops was not evident in this crop.
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DISCUSSION

Application of stillage significantly boosted cane and ERF yield in the seventh ratoon but no significant increase was obtained in ERC yield. In the absence of applied N the highest stillage application rate I4 gave 93,43 t/ha while in the absence of stillage the treatments receiving 120 kg/ha N gave 90,70 t/ha. Thus in this crop, as in the sixth ratoon, the I4 treatment provided a benefit of about 120 kg/ha N.

Analytical data have shown that soil organic matter and total soil nitrogen have not built up over the years. However, in the high stillage treatments of I3 and I4, a build up in NO_3^- N and total mineral N ($\text{NH}_4^+ + \text{NO}_3^-$) occurred in the 0 to 30 cm and the 30 to 60 cm profiles over the period 4R to 7R. This increase in levels of mineral N available to the crop is probably responsible for the observed increase in positive cane yield responses to increasing levels of applied stillage in the later ratoons.

BM/May '90
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7610/1 STILLAGE TRIAL - 1R to 7R

Table 1: Cane yield data

TREATMENTS	CANE YIELD (t/ha)							
	1R	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
IO - Control, no stillage	148,69	121,91	113,48	114,04	91,13	97,02	78,54	109,26
I1 - Stillage diluted 1:400	137,84	113,91	113,28	116,31	95,02	108,73	93,34	111,20
I2 - Stillage diluted 1:200	149,28	123,59	116,06	119,18	101,83	117,21	95,64	117,54
I3 - Stillage diluted 1:100	146,92	125,03	117,10	124,22	101,53	129,04	97,52	120,19
I4 - Stillage diluted 1:50	131,49	134,10	127,98	142,00	115,85	137,90	107,60	128,13
Significance	N.S.	N.S.	N.S.	*	*	***	*	
L.S.D. P = 0,05	-	-	-	15,65	12,59	11,96	13,88	-
P = 0,01	-	-	-	-	-	16,77	-	-
S.E. single plot ±	26,37	16,75	14,40	20,31	16,34	15,53	18,01	-
S.E. treatment mean ±	6,59	4,19	3,60	5,08	4,08	3,88	4,50	-
C.V.%	18,46	13,54	12,24	16,49	16,16	13,16	19,06	-
Split-plots:								
NO - Control, no nitrogen	110,88	78,91	70,39	74,97	61,50	75,49	68,45	77,23
N1 - 60 kg/ha N	143,08	111,92	108,78	119,22	92,17	109,63	91,51	110,90
N2 - 120 kg/ha N	158,66	149,93	142,75	144,21	118,17	138,31	102,18	136,32
N3 - 180 kg/ha N	158,75	156,06	148,40	155,21	132,35	148,50	115,97	145,03
Linear effect	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	-
L.S.D. P = 0,05	8,78	11,27	10,02	6,80	6,55	6,54	2,82	-
P = 0,01	11,72	15,05	13,38	9,09	8,73	8,74	3,77	-
S.E. single plot ±	13,78	17,69	15,73	10,67	10,27	10,27	4,43	-
S.E. treatment mean ±	3,08	3,06	3,52	2,39	2,30	2,30	0,99	-
C.V.%	9,65	14,20	13,38	8,67	10,16	8,71	4,69	-
Interactions	IN** IN'*	IN**	-	IN***	IN**	IN***	IN*** IN'*	-
Trial mean	142,84	123,71	117,58	123,15	101,07	117,98	94,53	117,27

7610/1 STILLAGE TRIAL - IR to 7R

Table 2 : ERC% cane data

TREATMENTS	ERC% CANE							
	IR	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
T0 - Control, no stillage	12,47	12,77	13,14	13,05	13,60	12,63	12,57	12,89
T1 - Stillage diluted 1:400	12,42	12,81	13,25	13,08	13,30	11,82	12,51	12,74
T2 - Stillage diluted 1:200	12,69	12,65	13,08	12,85	13,25	11,81	12,50	12,69
T3 - Stillage diluted 1:100	13,09	12,63	12,98	12,88	12,98	11,71	12,29	12,65
T4 - stillage diluted 1:50	13,44	12,57	13,00	12,34	11,88	11,06	11,24	12,32
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	-
L.S.D. $P = 0,05$ $P = 0,01$	-	-	-	0,49	1,08	0,74	-	-
S.E. single plots \pm	1,26	0,95	0,64	0,64	1,40	0,96	1,33	-
S.E. treatment mean \pm	0,31	0,24	0,16	0,16	0,35	0,24	0,33	-
C.V.%	9,79	7,52	4,91	4,97	10,79	8,15	10,90	-
Split plots:								
T0 - Control, no nitrogen	13,67	13,10	13,10	12,63	13,23	12,23	12,18	12,88
T1 - 60kg/ha N	12,89	12,96	13,42	13,08	13,40	12,26	12,42	12,91
T2 - 120kg/ha N	12,43	12,57	13,04	12,76	13,17	11,59	12,30	12,55
T3 - 180kg/ha N	12,33	12,12	12,81	12,87	12,20	11,14	11,99	12,21
Linear effect	***	***	*	N.S.	***	***	N.S.	-
Quadratic effect	N.S.	N.S.	*	N.S.	**	N.S.	*	-
L.S.D. $P = 0,05$ $P = 0,01$	0,58 0,77	0,38 0,50	0,33 -	0,36 -	0,54 0,71	0,53 0,70	0,35 -	- -
S.E. single plot \pm	0,91	0,59	0,52	0,57	0,84	0,83	0,55	-
S.E. treatment mean \pm	0,21	0,13	0,12	0,13	0,19	0,18	0,12	-
C.V.%	7,08	4,67	3,99	4,44	6,49	7,00	4,53	-
Interactions	IN**	-	-	-	-	IN**	IN***	-
Trial mean	12,82	12,69	13,09	12,84	13,00	11,81	12,22	12,64

7610/1 STILLAGE TRIAL - 1R to 7R

Table 3: ERC yield data

TREATMENTS	ERC YIELD (t/ha)							
	1R	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
E0 - Control, no stillage	18,40	15,48	14,83	14,86	12,38	12,12	9,89	13,99
I1 - Stillage diluted 1:400	16,96	14,42	14,98	15,19	12,54	12,64	11,66	14,06
I2 - Stillage diluted 1:200	18,85	15,47	15,12	15,31	13,28	13,52	11,95	14,79
I3 - Stillage diluted 1:100	19,14	15,70	15,21	16,02	13,03	15,00	11,97	15,15
I4 - Stillage diluted 1:50	17,60	16,78	16,59	17,49	13,57	15,19	11,94	15,59
Significance	N.S.	N.S.	N.S.	*	N.S.	***	N.S.	-
L.S.D. P=0,05	-	-	-	1,69	-	1,22	-	-
P=0,01	-	-	-	-	-	1,72	-	-
S.E. Single plot \pm	3,50	2,13	1,79	2,20	1,60	1,59	2,08	-
S.E. treatment mean \pm	0,95	0,53	0,45	0,55	0,40	0,40	0,52	-
C.V.%	20,81	13,65	11,63	13,93	12,35	11,61	18,11	-
Split plots:								
N0 - Control, no nitrogen	15,17	10,29	9,22	9,36	7,99	9,03	8,27	9,90
N1 - 60 kg/ha N	18,34	14,47	14,57	15,43	12,26	13,26	11,27	14,23
N2 - 120 kg/ha N	19,64	16,82	18,59	18,38	15,53	15,96	12,53	17,06
N3 - 180 kg/ha N	19,62	18,70	19,00	19,93	16,07	16,52	13,86	17,67
Linear effect	***	***	***	***	***	***	***	-
Quadratic effect	**	***	***	***	***	***	***	-
L.S.D. P=0,05	1,82	1,49	1,31	0,80	0,93	0,98	0,37	-
P=0,01	2,77	2,00	1,76	1,07	1,24	1,31	0,50	-
S.E. single plot \pm	2,55	2,35	2,06	1,26	1,46	1,54	0,59	-
S.E. treatment mean \pm	0,57	0,52	0,46	0,28	0,33	0,34	0,13	-
C.V.%	14,82	15,48	13,43	7,99	11,25	11,22	5,10	-
Interactions	IN**	IN**	-	IN***	IN**	IN*	IN***	-
			-				IN***	-
Trial mean	18,19	15,57	15,35	15,77	12,96	13,69	11,48	14,72

7610/1 STYLLAGE TRIAL - 1R to 7R

Table 4 : ERF% cane data

TREATMENTS	ERF% CANE							
	1R	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
I0 - Control, no stillage	14,58	14,21	14,35	14,23	15,12	14,42	13,67	14,37
I1 - Stillage diluted 1:400	14,77	14,38	14,42	14,20	15,09	13,73	13,67	14,32
I2 - Stillage diluted 1:200	14,98	14,16	14,30	14,08	15,03	13,78	13,64	14,28
I3 - Stillage diluted 1:100	15,04	14,16	14,14	14,11	14,80	13,68	13,54	14,21
I4 - Stillage diluted 1:50	15,12	13,94	14,27	13,64	14,30	13,37	12,76	13,91
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	-
L.S.D. P=0,05	-	-	-	0,40	0,49	0,57	-	-
P=0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	0,77	0,66	0,89	0,51	0,63	0,73	1,12	-
S.E. treatment mean ±	0,19	0,16	0,22	0,13	0,16	0,18	0,28	-
C.V.%	5,15	4,63	6,25	3,66	4,25	5,33	8,33	-
Split plots:								
N0 - Control, no nitrogen	15,17	14,18	14,06	13,72	14,58	14,00	13,28	14,14
N1 - 60 kg/ha N	15,01	14,27	14,47	14,21	15,03	14,07	13,64	14,39
N2 - 120kg/ha N	14,63	14,22	14,37	14,10	15,07	13,59	13,53	14,22
N3 - 180 kg/ha N	14,77	14,01	14,29	14,18	14,78	13,52	13,37	14,13
Linear effect	**	N.S.	N.S.	**	N.S.	**	N.S.	-
Quadratic effect	N.S.	N.S.	**	*	**	N.S.	*	-
L.S.D. P=0,05	0,53	-	0,34	0,31	0,35	0,86	0,31	-
P=0,01	-	-	0,40	0,42	0,46	1,15	-	-
S.E. single plot ±	0,83	0,40	0,48	0,49	0,55	0,60	0,49	-
S.E. treatment mean ±	0,19	0,09	0,11	0,11	0,12	0,14	0,11	-
C.V.%	5,60	2,80	3,33	3,51	3,67	4,38	3,66	-
Interactions	=	=	=	=	=	=	IN	=
Grand Mean	14,90	14,17	14,30	14,05	14,87	13,80	13,46	14,22

Table 5: ERF yield data

TREATMENTS	ERF YIELD (t/ha)							
	1R	2R	3R	4R	5R	6R	7R	MEAN
<u>Main plots</u>								
I0 - Control, no stillage	21,63	17,31	16,28	16,24	13,89	13,94	10,78	15,72
I1 - Stillage diluted 1:400	20,29	16,31	16,37	16,53	14,38	14,82	12,78	15,93
I2 - Stillage diluted 1:200	22,30	17,46	16,62	16,83	15,25	15,96	13,06	16,78
I3 - Stillage diluted 1:100	22,09	17,71	16,62	17,59	15,04	17,61	13,21	17,12
I4 - Stillage diluted 1:50	19,87	18,66	18,24	19,37	16,51	18,39	13,61	17,81
Significance	N.S.	N.S.	N.S.	*	*	***	*	-
L.S.D. P=0,05	-	-	-	2,05	1,66	1,60	1,79	-
P=0,01	-	-	-	-	-	2,24	-	-
S.E. single plot ±	4,33	2,34	2,28	2,66	2,16	2,07	2,33	-
S.E. treatment mean ±	1,08	0,59	0,57	0,66	0,54	0,52	0,58	-
C.V.%	20,39	13,40	13,54	15,36	14,39	12,85	18,36	-
<u>Split plots</u>								
N0 - Control, no nitrogen	16,90	11,16	9,92	10,20	8,91	10,43	9,06	10,94
N1 - 60kg/ha N	21,41	15,94	15,71	16,76	13,81	15,34	12,42	15,91
N2 - 120 kg/ha N	23,17	21,30	20,50	20,31	17,82	18,75	13,80	19,38
N3 - 180 kg/ha N	23,46	21,57	21,17	21,98	19,52	20,06	15,47	20,46
Linear effect	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	-
L.S.D. P=0,05	1,53	1,54	1,43	0,85	0,96	0,94	0,41	-
P=0,01	2,05	2,05	1,91	1,14	1,28	1,26	0,54	-
S.E. single plots ±	2,41	2,41	2,24	1,34	1,50	1,48	0,64	-
S.E. treatment mean ±	0,54	0,54	0,50	0,30	0,34	0,33	0,14	-
C.V.%	11,34	13,80	13,32	7,73	10,02	9,14	5,02	-
Interactions	IN*	IN**	-	IN***	IN**	IN***	IN***	-
Trial mean	21,24	17,49	16,83	17,31	15,02	16,14	12,69	16,67

Table 6 : Interaction Table (Cane yield and ERC% cane)

TREATMENTS	CANE YIELD (t/ha)					ERC% CANE				
	LEVELS OF NITROGEN (kg/ha N)				MEAN	LEVELS OF NITROGEN (kg/ha N)				MEAN
	0	60	120	180		0	60	120	180	
I0 - Control, no stillage	41,66	75,16	90,70	106,65	78,54	12,35	12,96	12,37	12,60	12,57
I1 - Stillage diluted 1:400	60,30	84,07	103,31	125,66	93,34	12,34	12,62	12,85	12,25	12,51
I2 - Stillage diluted 1:200	67,60	85,95	105,97	123,05	95,64	12,37	12,62	12,70	12,31	12,50
I3 - Stillage diluted 1:100	79,28	98,58	104,67	107,55	97,52	12,21	12,76	11,90	12,28	12,29
I4 - Stillage diluted 1:50	93,43	113,78	106,26	116,92	107,60	11,62	11,15	11,68	10,51	11,24
Mean	68,45	91,51	102,18	115,97	94,53	12,18	12,42	12,30	11,99	12,22
Significant Interaction	IN***				IN**	IN***				
L.S.D. P = 0,05	8				6,32 8,43	0,79				

Table 7 : Interaction Table (ERF% cane and ERF yield)

TREATMENTS	ERF% CANE					ERC YIELD (t/ha)				
	LEVELS OF NITROGEN (kg/ha N)				MEAN	LEVELS OF NITROGEN (kg/ha N)				MEAN
	0	60	120	180		0	60	120	180	
I0 - Control, no stillage	13,26	13,99	13,56	13,85	13,67	5,11	9,75	11,25	13,44	9,89
I1 - Stillage diluted 1:400	13,33	13,76	14,02	13,58	13,67	7,46	10,61	13,27	15,30	11,66
I2 - Stillage diluted 1:200	13,38	13,75	13,79	13,63	13,64	8,37	10,84	13,45	15,16	11,95
I3 - Stillage diluted 1:100	13,33	13,97	13,21	13,64	13,54	9,68	12,53	12,48	13,21	11,97
I4 - Stillage diluted 1:50	13,08	12,73	13,06	12,16	12,76	10,72	12,64	12,20	12,20	11,94
Mean	13,28	13,64	13,53	13,37	13,46	8,27	11,27	12,53	13,86	11,48
Significant Interaction	IN***					IN***				
L.S.D. P = 0,05	0,70					0,83				

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Table 8 : Interaction Table (ERF yield)

TREATMENTS	ERF YIELD (t/ha)				MEAN
	LEVELS OF NITROGEN (kg/ha N)				
	0	60	120	180	
I0 - Control, no stillage	5,50	10,53	12,33	14,78	10,78
I1 - Stillage diluted 1:400	8,06	11,58	14,49	16,98	12,78
I2 - Stillage diluted 1:200	9,05	11,81	14,61	16,77	13,06
I3 - Stillage diluted 1:100	10,57	13,76	13,86	14,67	13,21
I4 - Stillage diluted 1:50	12,11	14,44	13,72	14,17	13,61
MEAN	9,06	12,42	13,80	15,47	12,69
Significant Interaction	IN*** IN***				
L.S.D. P = 0,05					0,91
P = 0,01					1,21

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Table 9 : Stalk count data 1R to 7R

TREATMENTS	STALK COUNTS/ha x 10 ⁻³							
	1R	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
I0 : Control, no stillage	135,3	140,5	144,0	150,8	153,1	153,9	154,7	147,5
I1 : Stillage diluted 1:400	103,6	137,3	142,7	146,9	152,1	156,9	155,6	146,0
I2 : Stillage diluted 1:200	135,9	139,7	145,3	148,7	155,6	157,2	157,4	148,5
I3 : Stillage diluted 1:100	134,9	142,4	145,4	149,6	158,5	159,2	157,6	149,7
I4 : Stillage diluted 1:50	125,5	146,2	150,1	152,5	157,3	157,7	157,2	149,5
Split plots:								
N0 : Control, no nitrogen	117,5	127,9	132,3	139,5	145,6	151,0	157,3	138,7
N1 : 60 kg/ha N	133,0	139,7	146,7	153,7	158,3	160,8	161,7	150,6
N2 : 120 kg/ha N	138,6	147,9	151,2	153,3	158,4	158,3	155,5	151,9
N3 : 180 kg/ha N	140,6	149,5	151,6	152,2	158,9	157,8	151,5	151,7
MEAN	132,4	141,2	145,5	149,7	155,3	157,0	156,5	148,2

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Table 10 : Stalk length data 1R to 7R

TREATMENTS	STALK LENGTHS (m)							
	1R	2R	3R	4R	5R	6R	7R	MEAN
Main plots:								
I0 - Control, no stillage	2,78	2,44	2,30	2,33	2,06	2,46	1,85	2,32
I1 - Stillage diluted 1:400	2,66	2,35	2,35	2,42	2,20	2,59	2,06	2,38
I2 - Stillage diluted 1:200	2,80	2,54	2,40	2,47	2,26	2,76	2,16	2,48
I3 - Stillage diluted 1:100	2,67	2,44	2,32	2,41	2,13	2,82	2,15	2,42
I4 - Stillage diluted 1:50	2,60	2,48	2,54	2,70	2,32	3,05	2,28	2,57
Split plots:								
N0 - Control, no nitrogen	2,35	1,89	1,83	1,86	1,93	2,15	1,73	1,96
N1 - 60 kg/ha N	2,69	2,29	2,24	2,29	2,09	2,64	2,04	2,33
N2 - 120 kg/ha N	2,92	2,82	2,70	2,79	2,42	3,05	2,18	2,70
N3 - 180 kg/ha N	2,84	2,80	2,75	2,93	2,39	3,11	2,47	2,76
MEAN	2,70	2,45	2,38	2,46	2,21	2,74	2,10	2,43

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Table 11 : Stalk diameter data 1R to 7R

TREATMENTS	STALK DIAMETERS (cm)							
	1R	2R	3R	4R	5R	6R	7R	MEAN
<u>Main plots:</u>								
I0 - Control, no stillage	2,32	2,29	2,26	2,23	2,02	1,93	1,93	2,14
I1 - Stillage diluted 1:400	2,39	2,30	2,28	2,30	2,02	1,99	1,98	2,18
I2 - Stillage diluted 1:200	2,36	2,30	2,26	2,22	2,01	2,00	1,96	2,16
I3 - Stillage diluted 1:100	2,35	2,27	2,27	2,28	2,03	2,03	2,01	2,18
I4 - Stillage diluted 1:50	2,37	2,29	2,33	2,32	2,08	2,10	2,06	2,22
<u>Split plots:</u>								
N0 - Control, no nitrogen	2,36	2,27	2,18	2,14	1,98	1,89	1,91	2,10
N1 - 60 kg/ha N	2,35	2,28	2,26	2,26	1,98	1,97	1,92	2,15
N2 - 120 kg/ha N	2,35	2,31	2,32	2,32	2,05	2,09	2,04	2,21
N3 - 180 kg/ha N	2,36	2,30	2,36	2,36	2,11	2,10	2,08	2,24
MEAN	2,36	2,29	2,28	2,27	2,03	2,01	1,99	2,18

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Table 12 : Stalk lodging % data 1R to 7R

TREATMENTS	LODGING %							
	1R	2R	3R	4R	5R	6R	7R	MEAN
<u>Main plots:</u>								
I0	11	0	0	0	0	0	2	2
I1	11	2	6	19	3	6	8	8
I2	14	5	5	31	2	13	9	11
I3	7	2	3	29	3	17	5	9
I4	3	1	11	59	16	42	33	24
<u>Split plots:</u>								
N0	0	0	0	5	3	1	1	1
N1	3	0	0	11	1	6	10	4
N2	13	5	7	34	1	17	13	13
N3	21	3	13	60	15	39	22	25
MEAN	9	2	5	27	5	15	11	11

Table 13 : Estimated flowering % data 1R to 7R

TREATMENTS	ESTIMATED FLOWERING %							
	1R	2R	3R	4R	5R	6R	7R	MEAN
<u>Main plots:</u>								
I0	1	0	0	0	0	54	14	10
I1	0	0	0	0	0	56	25	12
I2	1	0	0	0	0	60	17	11
I3	1	0	0	0	0	59	16	11
I4	1	0	0	0	0	52	12	9
<u>Split plots:</u>								
N0	1	0	0	0	0	40	1	6
N1	1	0	0	0	0	62	8	10
N2	0	0	0	0	0	65	19	12
N3	1	0	0	0	0	69	39	16
MEAN	1	0	0	0	0	59	17	11

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Table 14 : Stillage data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K ₂ O (kg/ha)	NITROGEN AS N (kg/ha)
I1 1:400 dilution	1R	1:330	3,9	1 553	229	-
	2R	1:370	1,6	1 313	183	-
	3R	1:384	1,9	1 553	212	-
	4R	1:406	1,6	1 414	207	-
	5R	1:336	3,1	1 747	250	49
	6R	1:350	2,0	1 452	198	55
	7R	1:213	5,7	3 500	452	58
	MEAN	1:341	2,8	1 790	247	54
I2 1:200 dilution	1R	1:200	6,4	2 459	387	-
	2R	1:184	4,2	2 429	362	-
	3R	1:195	3,7	3 140	418	-
	4R	1:207	3,1	2 779	413	-
	5R	1:179	6,3	3 311	491	102
	6R	1:177	4,0	2 611	370	107
	7R	1:139	9,0	6 062	769	96
	MEAN	1:183	5,2	3 256	459	102
I3 1:100 dilution	1R	1:108	11,8	4 695	707	-
	2R	1:99	6,7	4 938	709	-
	3R	1:90	8,3	6 487	913	-
	4R	1:98	6,5	5 670	871	-
	5R	1:90	12,5	6 492	997	230
	6R	1:96	7,9	5 200	709	221
	7R	1:84	15,3	11 113	1 392	170
	MEAN	1:95	9,9	6 371	900	207
I4 1:50 dilution	1R	1:54	23,6	9 669	1 457	-
	2R	1:59	12,5	9 555	1 366	-
	3R	1:54	15,5	12 561	1 744	-
	4R	1:57	12,6	11 265	1 660	-
	5R	1:49	24,9	13 794	1 962	408
	6R	1:51	16,4	11 164	1 601	458
	7R	1:51	26,9	22 038	2 629	321
	MEAN	1:54	18,9	12 864	1 774	396

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Table 15 : Foliar N% dry matter at 22 weeks

STILLAGE TREATMENTS	LEVELS OF N(kg/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	1,71	1,74	1,72	1,76	1,73
I1 - Stillage diluted 1:400	1,80	1,80	1,77	1,77	1,78
I2 - Stillage diluted 1:200	1,76	1,77	1,78	1,79	1,77
I3 - Stillage diluted 1:100	1,78	1,81	1,79	1,81	1,80
I4 - Stillage diluted 1:50	1,82	1,82	1,86	1,83	1,83
MEAN	1,77	1,79	1,78	1,79	1,78

Table 16 : Foliar K% dry matter at 22 weeks

STILLAGE TREATMENTS	LEVELS OF N(kg/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	0,90	0,89	0,85	0,81	0,86
I1 - Stillage diluted 1:400	0,96	0,97	1,04	1,06	1,00
I2 - Stillage diluted 1:200	0,68	0,99	1,03	1,04	0,93
I3 - Stillage diluted 1:100	0,96	0,93	1,00	1,00	0,97
I4 - Stillage diluted 1:50	1,06	0,96	0,97	0,98	0,99
MEAN	0,91	0,95	0,98	0,97	0,95

Table 17 : Interaction Table Estimated % Flowering

TREATMENTS	ESTIMATED FLOWERING %				
	LEVELS OF N(kg/ha)				MEAN
	0	60	120	180	
I0 - Control, no stillage	0,00	0,00	5,00	50,00	13,75
I1 - Stillage diluted 1:400	0,00	17,50	37,50	45,00	25,00
I2 - Stillage diluted 1:200	0,00	2,50	13,75	50,00	16,56
I3 - Stillage diluted 1:100	3,75	5,00	30,00	25,00	15,94
I4 - Stillage diluted 1:50	2,50	12,50	8,75	22,50	11,56
MEAN	1,25	7,5	19,00	38,50	16,56
Significance	IN**				
L.S.D. P = 0,05	19,98				

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Table 18 : Foliar N% Dry Matter at 22 weeks

TREATMENTS	FOLIAR N%							
Main plots:	1R	2R	3R	4R	5R	6R	7R	MEAN
I0	2,04	1,56	1,71	2,04	2,00	2,15	1,76	1,89
I1	1,96	1,59	1,70	2,03	2,10	2,18	1,77	1,90
I2	2,00	1,59	1,67	2,05	2,12	2,18	1,79	1,91
I3	1,95	1,54	1,68	2,03	2,15	2,17	1,81	1,90
I4	1,88	1,73	1,68	2,12	2,09	2,18	1,83	1,93
Split plots:								
N0	1,82	1,42	1,47	2,04	2,07	2,17	1,77	1,82
N1	1,92	1,51	1,59	2,04	2,09	2,17	1,79	1,87
N2	2,03	1,72	1,83	2,06	2,10	2,17	1,78	1,96
N3	2,09	1,75	1,87	2,09	2,11	2,17	1,79	1,98
MEAN	1,97	1,60	1,69	2,05	2,09	2,17	1,79	1,91

Table 19 : Foliar K% Dry Matter at 22 weeks

TREATMENTS	FOLIAR K%							
Main plots:	1R	2R	3R	4R	5R	6R	7R	MEAN
I0	1,13	1,04	0,92	0,93	1,20	0,97	0,81	1,00
I1	1,16	1,14	0,98	1,04	1,25	1,10	1,06	1,10
I2	1,20	1,27	1,02	1,06	1,23	1,15	1,04	1,14
I3	1,20	1,15	1,03	1,09	1,38	1,16	1,00	1,14
I4	1,22	1,09	1,09	1,29	1,43	1,30	0,98	1,20
Split plots:								
N0	1,12	1,07	0,95	1,04	1,26	1,08	0,91	1,06
N1	1,15	1,13	0,99	1,04	1,29	1,11	0,95	1,09
N2	1,21	1,14	1,04	1,11	1,33	1,14	0,98	1,14
N3	1,25	1,24	1,06	1,14	1,32	1,21	0,97	1,17
MEAN	1,18	1,14	1,01	1,08	1,30	1,14	0,97	1,12

Table 20: Soil Analysis Data - Soil sample depth 0-30 cm

TREATMENTS	COND. (microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
<u>Main plots:</u>								
I0 - Control, no stillage	234	371	5,78	0,32	9,1	3,5	0,40	12,4
I1 - Stillage diluted 1:400	274	395	6,16	0,96	9,4	3,6	0,49	13,8
I2 - Stillage diluted 1:200	344	658	5,95	1,32	7,5	3,6	0,32	12,7
I3 - Stillage diluted 1:100	435	919	5,92	1,91	7,0	4,2	0,29	13,4
I4 - Stillage diluted 1:50	529	813	6,22	2,07	7,8	4,0	0,32	14,3
Significance	***	***	N.S.	***	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	98	244	-	0,52	-	-	-	-
P = 0,01	138	341	-	0,72	-	-	-	-
S.E. single plot ±	127	316	0,57	0,67	3,6	0,9	0,22	4,4
S.E. treatment mean ±	32	79	0,14	0,17	0,9	0,2	0,06	1,1
C.V.%	35,05	51,74	9,54	50,90	43,52	22,94	61,44	32,76
<u>Split-plots:</u>								
N0 - Control, no nitrogen	345	564	6,31	1,48	7,9	3,8	0,34	13,5
N1 - 60 kg/ha N	355	617	6,07	1,27	8,1	3,7	0,37	13,5
N2 - 120 kg/ha N	360	632	5,92	1,16	8,0	3,9	0,36	13,4
N3 - 180 kg/ha N	394	631	5,90	1,35	8,8	3,7	0,39	12,9
Linear effect	N.S.	N.S.	*	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	*	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	-	-	0,24	0,24	-	-	-	-
P = 0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	79	158	0,37	0,37	2,6	0,5	0,09	3,9
S.E. treatment mean ±	18	35	0,08	0,08	0,6	0,1	0,02	0,9
C.V.%	21,71	25,83	6,24	28,11	32,36	12,97	25,54	28,96

Table 21 : Soil Analysis Data - Soil sample depth 30-60 cm

TREATMENTS	COND. (microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
Main plots:								
I0 - Control, no stillage	258	291	5,93	0,22	9,5	4,0	0,40	14,1
I1 - Stillage diluted 1:400	256	284	6,01	0,59	9,5	4,1	0,59	13,1
I2 - Stillage diluted 1:200	319	406	5,97	0,76	8,1	4,2	0,43	13,5
I3 - Stillage diluted 1:100	436	581	6,09	1,21	7,9	4,8	0,32	14,2
I4 - Stillage diluted 1:50	450	544	6,38	1,47	8,8	4,3	0,29	14,8
Significance	***	***	N.S.	**	N.S.	N.S.	*	N.S.
L.S.D. P = 0,05	83	95	-	0,60	-	-	0,20	-
P = 0,01	117	133	-	0,85	-	-	-	-
S.E. single plot ±	108	123	0,61	0,78	3,7	1,4	0,26	5,1
S.E. treatment mean ±	27	31	0,15	0,20	0,9	0,4	0,07	1,3
C.V.%	31,17	29,22	9,96	92,17	42,36	33,09	64,11	36,80
Split plots:								
N0 - Control, no nitrogen	335	420	6,00	0,92	8,3	4,3	0,41	13,9
N1 - 60 kg/ha N	320	401	6,09	0,78	8,5	4,1	0,39	13,7
N2 - 120 kg/ha N	345	419	5,99	0,74	8,5	4,5	0,43	13,4
N3 - 180 kg/ha N	375	446	6,22	0,96	9,7	4,2	0,39	14,7
Linear effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	-	-	-	-	-	-	-	-
P = 0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	96	138	0,39	0,43	2,9	0,8	0,13	3,8
S.E. treatment mean ±	21	31	0,09	0,10	0,7	0,2	0,03	0,8
C.V.%	27,89	32,71	6,46	50,13	33,05	18,49	31,96	26,91

Table 22 : Soil Analysis Data -- Soil sample depth 60-90cm

TREATMENTS	COND. (microS/cm)		pH (CaCl ₂)	EXCHANGEABLE CATIONS (m. e. %)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
Main plots:								
I0 - Control, no stillage	292	356	6,11	0,18	9,7	4,3	0,39	14,5
I1 - Stillage diluted 1:400	296	297	6,12	0,48	11,2	4,7	0,56	15,2
I2 - Stillage diluted 1:200	324	367	6,02	0,52	8,3	4,6	0,48	13,8
I3 - Stillage diluted 1:100	423	523	5,99	0,85	8,2	5,0	0,33	14,4
I4 - Stillage diluted 1:50	463	534	6,36	1,19	9,5	4,3	0,28	15,3
Significance	**	**	N.S.	**	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	80	120	-	0,51	-	-	-	-
P = 0,01	112	160	-	0,72	-	-	-	-
S.E. single plot ±	104	156	0,64	0,66	4,5	1,4	0,26	6,4
S.E. treatment mean ±	26	39	0,16	0,17	1,1	0,4	0,07	1,6
C.V.%	28,92	37,47	10,45	102,88	47,40	31,40	64,49	43,39
Split plots:								
N0 - Control, no nitrogen	359	418	5,97	0,61	8,8	4,6	0,36	14,4
N1 - 60 kh/ha N	343	400	6,21	0,67	9,8	4,2	0,45	15,1
N2 - 120 kg/ha N	354	411	6,02	0,66	8,8	4,7	0,41	13,8
N3 - 180 kg/ha N	383	436	6,27	0,64	10,2	4,8	0,42	15,4
Linear effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0,05	-	-	-	-	-	-	-	-
P = 0,01	-	-	-	-	-	-	-	-
S.E. single plot ±	109	148	0,39	0,21	3,1	1,0	0,19	3,7
S.E. treatment mean ±	24	33	0,09	0,05	0,7	0,2	0,04	0,8
C.V.%	30,32	35,61	6,40	33,02	33,00	20,85	47,08	25,39

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Table 23 : Soil Analysis Data For Treatment IO

Sample Depth (cm)	TREATMENT	COND(microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
IO 0-30cm	P	270	-	5,82	0,54	10,2	3,5	0,71	15,0
	1R	180	279	5,86	0,39	8,8	3,2	0,42	12,8
	2R	208	188	5,67	0,33	8,9	3,8	0,61	13,6
	3R	168	185	5,68	0,21	14,5	3,9	0,89	19,5
	4R	242	316	5,81	0,23	9,8	3,2	0,48	13,7
	5R	245	386	5,94	0,39	8,5	3,4	0,63	12,9
	6R	188	219	5,54	0,32	9,9	3,2	0,70	14,2
	7R	235	323	5,78	0,32	9,1	3,5	0,40	12,4
	%CHP-7R	-13,0	+47,5	-0,7	-40,7	0,93	0,0	-43,7	-17,3
IO 30-60cm	P	320	-	6,31	0,22	15,6	4,0	0,74	20,6
	1R	220	219	6,14	0,19	10,6	4,0	0,46	15,3
	2R	173	220	5,78	0,22	9,3	4,2	0,62	14,3
	3R	178	189	5,97	0,20	16,2	4,3	1,00	21,7
	4R	283	326	5,85	0,16	11,8	3,7	0,46	16,1
	5R	261	307	6,19	0,28	10,3	4,0	0,61	15,2
	6R	203	206	5,67	0,23	10,0	3,6	0,76	14,6
	7R	258	291	5,93	0,22	9,5	4,0	0,40	14,1
	%CHP-7R	-19,4	+32,9	-6,0	-0,0	-39,1	0,0	-45,9	-31,6
IO 60-90cm	P	330	-	6,28	0,20	16,3	4,9	0,87	22,3
	1R	268	295	6,01	0,16	13,5	4,1	0,42	18,2
	2R	210	238	6,13	0,20	10,5	4,8	0,65	16,2
	3R	208	263	6,24	0,18	14,7	3,8	0,85	19,5
	4R	296	327	6,08	0,13	12,4	4,4	0,56	17,5
	5R	259	284	6,24	0,27	9,3	4,2	0,59	14,4
	6R	205	198	5,68	0,19	9,5	3,7	0,72	14,1
	7R	292	356	6,11	0,18	9,7	4,3	0,39	14,5
	%CHP-7R	-11,5	+20,7	-2,7	-10,0	-40,5	-12,2	-55,2	-35,0

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Table 24 : Soil Analysis Data For Treatment II

SAMPLE DEPTH (cm)	RATCON	COND. (microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.c.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
II 0-30cm	P	310	-	6,13	0,46	12,3	3,1	0,72	16,6
	1R	230	300	6,41	0,48	12,7	2,6	0,39	16,2
	2R	214	380	6,31	0,40	12,8	3,4	0,76	17,4
	3R	348	533	6,23	0,48	14,7	2,9	0,68	18,8
	4R	239	301	6,17	0,45	13,0	2,9	0,64	17,0
	5R	226	346	6,21	0,66	9,9	3,2	0,55	14,3
	6R	244	301	6,03	0,85	10,1	3,1	0,80	14,9
	7R	274	430	6,16	0,96	9,4	3,6	0,49	13,8
	%CHP-7R	-11,6	+43,3	+0,5	+108,7	-23,6	-16,1	-31,9	-16,9
II 30-60cm	P	335	-	6,52	0,23	18,9	4,2	0,78	24,1
	1R	245	281	6,48	0,21	15,3	3,8	0,49	19,8
	2R	259	360	6,48	0,24	16,6	3,9	0,69	21,4
	3R	408	483	6,38	0,25	16,1	3,9	0,77	21,0
	4R	292	361	6,39	0,26	14,8	3,6	0,63	19,3
	5R	271	282	6,46	0,40	11,4	3,7	0,65	16,2
	6R	216	238	5,82	0,45	8,8	3,5	0,82	13,6
	7R	256	284	6,01	0,59	9,5	4,1	0,59	13,1
	%CHP-7R	-23,6	+1,1	-7,8	+156,5	+49,7	-2,4	-24,4	-45,6
II 60-90cm	P	385	-	6,35	0,24	17,8	3,9	0,84	22,8
	1R	245	255	5,85	0,20	15,7	4,0	0,54	20,4
	2R	279	305	6,51	0,22	17,5	4,7	0,88	23,3
	3R	413	511	6,47	0,23	15,5	4,1	0,74	20,6
	4R	313	309	6,38	0,26	15,7	3,8	0,64	20,4
	5R	277	312	6,39	0,35	12,1	4,1	0,62	17,2
	6R	249	266	6,08	0,31	9,8	3,7	0,84	14,6
	7R	296	297	6,12	0,48	11,2	4,7	0,56	15,2
	%CHP-7R	-23,1	+16,5	-3,6	+100,0	-37,2	+20,5	-33,3	-33,3

7610/1 STALLAGE TRIAL IR to 7R

Table 25 : Soil Analysis Data For Treatment I2

Sample Depth (cm)	RATCON	COND. (microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I2 0-30cm	P	275	-	5,81	0,55	9,5	3,3	0,57	13,9
	1R	210	315	6,50	0,58	9,3	3,1	0,41	13,4
	2R	175	203	6,23	0,46	8,8	3,5	0,54	13,3
	3R	243	334	5,80	0,61	11,4	2,5	0,72	15,2
	4R	247	289	6,33	0,49	9,9	2,6	0,51	13,7
	5R	265	452	6,35	0,75	8,5	3,2	0,68	13,1
	6R	234	329	5,72	0,83	7,7	3,0	1,19	12,7
	7R	344	591	5,95	1,32	7,5	3,6	0,32	12,7
	%CHP-7R	+25,1	+87,6	+2,4	+140,0	-21,1	+9,1	-43,9	-8,6
I2 30-60cm	P	220	-	5,84	0,22	8,7	3,4	0,78	13,1
	1R	220	290	6,30	0,15	12,0	3,2	0,59	15,9
	2R	180	214	6,30	0,30	9,9	3,7	0,72	14,6
	3R	254	364	5,69	0,35	10,1	3,4	0,77	14,6
	4R	181	316	6,34	0,30	10,8	3,2	0,56	14,9
	5R	267	360	6,45	0,43	9,1	3,6	0,68	13,8
	6R	284	341	5,83	0,46	7,6	3,3	1,26	12,6
	7R	319	406	5,97	0,76	8,1	4,2	0,43	13,5
	%CHP-7R	+45,0	+40,0	+2,2	+245,5	-6,9	+23,5	-44,9	+3,1
I2 60-90cm	P	254	-	5,96	0,23	9,6	4,3	0,91	15,0
	1R	224	251	4,69	0,23	10,6	3,5	0,50	14,8
	2R	201	194	6,45	0,23	8,4	4,6	0,77	14,0
	3R	243	249	5,77	0,22	9,7	3,2	0,80	13,9
	4R	202	277	6,39	0,19	11,0	3,5	0,60	15,3
	5R	299	371	6,25	0,33	9,0	4,1	0,79	14,2
	6R	234	279	5,76	0,31	7,4	3,6	1,25	12,6
	7R	324	367	6,02	0,52	8,3	4,6	0,48	13,8
	%CHP-7R	+27,6	+46,2	+1,0	+126,1	-13,5	+7,0	-47,3	-8,0

7610/1st STILLAGE TRIAL IR to 7R

Table 26 : Soil Analysis Data For Treatment I3

Sample Depth (cm)	RATIOON	COND. (microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I3 0-30cm	P	260	-	5,55	0,51	9,0	3,5	0,59	13,6
	1R	210	295	5,65	0,75	8,4	3,4	0,49	13,0
	2R	219	206	5,85	0,68	7,9	3,5	0,54	12,6
	3R	275	298	5,94	0,70	10,9	3,8	0,79	16,2
	4R	235	245	6,46	0,81	9,7	3,4	0,68	14,6
	5R	238	380	6,30	1,12	8,6	3,6	0,71	14,0
	6R	301	443	5,97	1,26	8,5	3,6	1,18	14,5
	7R	435	801	5,92	1,91	7,0	4,2	0,29	13,4
	%CIP-7R	+67,3	+171,5	+6,7	+274,5	-22,2	+20,0	-50,8	-1,5
I3 30-60cm	P	290	-	5,79	0,24	11,7	4,3	0,92	17,2
	1R	230	303	5,95	0,26	10,6	4,5	0,61	16,0
	2R	195	155	5,89	0,35	8,7	4,7	0,59	14,3
	3R	354	388	6,34	0,49	13,9	4,4	0,82	19,6
	4R	248	250	6,54	0,41	10,8	4,1	0,69	16,0
	5R	271	326	6,50	0,79	10,6	4,2	0,73	16,3
	6R	311	356	6,00	0,77	9,1	4,1	1,15	15,1
	7R	436	581	6,09	1,21	7,9	4,8	0,32	14,2
	%CIP-7R	+50,3	+91,7	+5,2	+404,2	-32,5	+11,6	-65,2	-17,4
I3 60-90cm	P	298	-	6,24	0,21	13,3	4,7	0,84	19,1
	1R	259	295	5,84	0,21	12,9	4,8	0,66	18,6
	2R	231	198	6,15	0,27	11,1	5,2	0,62	17,2
	3R	366	321	6,30	0,33	18,5	4,9	0,79	24,5
	4R	237	290	6,66	0,29	11,1	4,2	0,67	16,3
	5R	336	342	6,50	0,61	11,6	4,3	0,73	17,2
	6R	325	331	6,02	0,52	10,7	4,6	1,13	17,0
	7R	423	528	5,99	0,85	8,2	5,0	0,33	14,4
	%CIP-7R	+41,9	+79,0	-4,0	+304,8	-38,3	+6,4	-60,7	-24,6

7610/1 STILLAGE TRIAL IR to 7R

Table 27 : Soil Analysis Data For Treatment I4

Sample Depth (cm)	RATON	COND. (microS/cm)		pH (0,01M CaCl ₂)	EXCHANGEABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I4 0-30cm	P	310	-	6,39	0,45	12,0	3,5	0,66	16,6
	1R	235	338	6,13	0,79	10,3	2,7	0,51	14,3
	2R	265	365	6,61	1,03	10,3	4,1	0,58	16,0
	3R	394	481	6,09	0,80	14,6	3,6	0,82	19,8
	4R	269	314	6,78	1,22	12,5	3,3	0,71	17,7
	5R	302	464	6,80	1,34	11,4	3,9	0,60	17,2
	6R	393	542	6,16	1,64	8,6	3,6	0,90	14,7
	7R	529	910	6,22	2,07	7,8	4,0	0,32	14,3
	%CP-7R	+70,6	+169,2	-2,7	+360,0	-35,0	+14,3	-51,5	-13,9
I4 30-60cm	P	306	-	6,32	0,19	16,1	4,1	0,75	21,1
	1R	300	340	6,44	0,26	14,6	3,1	0,45	18,4
	2R	279	286	6,64	0,52	10,8	4,5	0,62	16,4
	3R	424	451	6,26	0,53	16,1	4,5	0,93	22,1
	4R	293	291	6,95	0,60	14,8	3,6	0,72	19,7
	5R	326	388	6,86	0,90	12,9	3,9	0,80	18,5
	6R	390	485	6,27	1,06	10,6	3,7	0,92	16,2
	7R	450	545	6,38	1,47	8,8	4,3	0,29	14,8
	%CP-7R	+47,1	+60,3	+0,9	+673,7	-45,3	+4,9	-61,3	-29,9
I4 60-90cm	P	377	-	6,66	0,25	19,1	4,7	0,83	24,9
	1R	305	348	6,51	0,23	15,3	3,7	0,49	19,7
	2R	316	304	6,73	0,41	12,7	4,9	0,60	18,6
	3R	475	510	6,47	0,39	18,9	4,6	0,89	24,8
	4R	306	312	6,87	0,49	16,1	3,9	0,72	21,2
	5R	363	404	6,75	0,63	13,6	4,2	0,60	19,0
	6R	408	494	6,29	0,81	10,9	3,8	0,97	16,5
	7R	463	534	6,36	1,19	9,5	4,3	0,28	15,3
	%CP-7R	+22,8	+53,4	-4,5	+376,0	-50,3	-3,5	-66,3	-38,6

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7610/1 STILLAGE TRIAL

Table 28 : Soil Analysis Data - Mineral Nitrogen By Irrigation Treatment
(4R to 7R)

TREATMENT	CROP	MINERAL NITROGEN (ppm N)								
		0-30cm			30-60cm			60-90cm		
		NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL	NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL	NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL
I0 Control No stillage	4R	8,2	2,0	10,3	7,3	2,7	10,0	7,3	1,8	9,0
	5R	3,9	2,8	6,7	2,7	1,9	4,6	2,2	1,7	3,9
	6R	2,8	2,4	5,2	2,5	1,9	4,3	1,6	2,9	4,5
	7R	4,8	1,3	6,0	2,5	2,5	4,9	2,3	2,9	5,2
	%CH 4R-7R	-41,5	-35,0	-41,7	-65,8	-7,4	-51,0	-68,5	-61,1	-42,2
I1 1:400 dilution	4R	9,6	5,7	15,3	12,4	3,6	16,0	11,3	4,1	15,4
	5R	2,9	0,7	3,6	1,9	0,8	2,7	1,4	0,9	2,3
	6R	2,5	4,5	7,0	1,6	1,5	3,0	2,5	1,0	3,5
	7R	2,4	7,1	9,4	2,6	1,3	3,9	2,7	2,3	5,0
	%CH 4R-7R	-75,0	+24,6	-38,6	-79,0	-63,9	-75,6	-76,1	-43,9	-67,5
I2 1:200 dilution	4R	9,8	2,5	12,3	9,0	3,1	12,1	8,6	4,2	12,8
	5R	3,0	1,5	4,4	2,5	1,1	3,6	2,6	0,7	3,3
	6R	2,5	5,8	8,3	2,3	2,9	5,1	1,8	2,9	4,7
	7R	3,8	9,0	12,8	2,3	3,7	6,0	1,7	2,4	4,1
	%CH 4R-7R	-61,2	+260,0	+4,1	-74,4	+19,4	-50,4	-80,2	-42,9	-68,0
I3 1:100 dilution	4R	9,0	5,9	14,9	9,4	4,9	14,3	9,3	5,6	15,1
	5R	3,3	2,8	6,1	2,2	2,1	4,3	2,2	1,6	3,7
	6R	2,3	9,8	12,0	1,9	3,7	5,6	1,8	3,6	5,4
	7R	3,8	14,5	18,3	2,9	6,2	9,1	1,9	5,3	7,2
	%CH 4R-7R	-57,8	+145,8	+22,8	-69,1	+26,5	-36,6	-71,6	-5,4	-52,9
I4 1:50 dilution	4R	8,8	2,5	11,3	7,8	1,9	9,7	9,0	2,2	11,2
	5R	4,3	4,1	8,4	2,2	2,7	4,9	3,1	1,5	4,5
	6R	4,8	13,9	18,7	2,6	8,4	10,9	1,3	6,8	8,0
	7R	4,4	26,0	30,4	3,0	10,3	13,3	3,1	9,1	12,2
	%CH 4R-7R	-50,0	+940,0	+169,0	-61,5	+442,1	+37,1	-65,6	+313,6	+8,9

7610/1 : STILLAGE TRIAL

Table 29 : Soil Analysis Data - Mineral Nitrogen By Nitrogen Treatments (5R to 7R)

TREATMENT (kg/ha N)	CROP	MINERAL NITROGEN (ppm N)								
		0 to 30cm			30 to 60cm			60 to 90cm		
		NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL	NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL	NH ₄ ⁺ N	NO ₃ ⁻ N	TOTAL
0	5R	3,1	2,4	5,5	2,1	2,2	4,3	2,1	1,2	3,3
	6R	2,8	4,2	7,0	2,3	2,3	4,6	1,6	2,3	3,9
	7R	4,5	8,4	12,9	2,6	4,1	6,7	2,0	3,4	5,4
	%CH 5R-7R	+45,2	+250,0	+134,5	+23,8	+86,4	-83,7	-4,8	+183,3	+63,6
60	5R	3,4	2,4	5,8	2,2	1,3	3,5	2,2	1,6	3,8
	6R	3,8	5,5	9,3	2,3	3,1	5,4	1,9	3,9	5,8
	7R	3,6	11,0	14,6	2,9	4,5	7,4	2,7	4,0	6,7
	%CH 5R-7R	+5,9	+358,3	+151,7	+31,8	+246,2	+111,4	+22,7	+150,0	+76,3
120	5R	3,6	2,2	6,0	2,3	1,6	4,0	2,2	1,5	3,3
	6R	2,4	10,5	12,9	1,9	3,4	5,3	2,2	2,8	5,0
	7R	2,8	14,5	17,2	2,4	4,7	7,1	2,6	4,6	7,2
	%CH 5R-7R	-22,2	+559,1	+185,7	+4,3	+193,8	+77,5	+18,2	+206,7	+118,2
180	5R	3,6	2,4	5,9	2,6	1,6	4,2	2,6	1,1	3,7
	6R	2,8	8,8	11,6	2,0	5,7	7,7	1,5	4,6	6,0
	7R	4,4	12,3	16,7	2,7	5,8	8,5	2,0	5,5	7,5
	%CH 5R-7R	+22,2	+412,5	+183,1	+3,8	+262,5	+102,4	-23,1	+400,0	+102,7

7610/1 : STILLAGE TRIAL

Table 30 : Soil Analysis Data - Total N and Organic Matter By Irrigation

Treatment (3R to 7R)

TREATMENT	CROP	TOTAL NITROGEN (N%)			ORGANIC MATTER (C%)		
		0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm
I0 Control No stillage	3R	-	-	-	1,3	0,7	0,5
	4R	-	-	-	1,9	1,1	0,6
	5R	0,07	0,06	0,05	1,0	0,6	0,4
	6R	0,07	0,06	0,04	1,6	0,9	0,6
	7R	0,07	0,06	0,04	1,4	0,8	0,5
	%CHANGE		0,0	0,0	-20,0	+7,7	+14,3
I1 1:400 dilution	3R	-	-	-	1,4	0,7	0,5
	4R	-	-	-	1,2	0,9	0,5
	5R	0,07	0,05	0,04	1,1	0,6	0,5
	6R	0,07	0,06	0,04	1,9	1,1	0,7
	7R	0,08	0,06	0,05	1,4	0,9	0,7
	%CHANGE		+14,3	+20,0	+25,0	0,0	+28,6
I2 1:200 dilution	3R	-	-	-	1,4	0,6	0,5
	4R	-	-	-	1,3	0,8	0,6
	5R	0,07	0,06	0,05	1,2	0,7	0,5
	6R	0,08	0,06	0,04	1,6	1,0	0,6
	7R	0,08	0,06	0,05	1,4	0,9	0,6
	%CHANGE		+14,3	0,0	0,0	0,0	+50,0
I3 1:100 dilution	3R	-	-	-	1,3	0,7	0,5
	4R	-	-	-	1,3	0,8	0,5
	5R	0,08	0,06	0,05	1,4	0,8	0,7
	6R	0,08	0,06	0,05	1,8	1,0	0,7
	7R	0,09	0,06	0,05	1,5	0,8	0,6
	%CHANGE		+12,5	0,0	0,0	+15,4	+14,3
I4 1:50 dilution	3R	-	-	-	1,5	0,8	0,8
	4R	-	-	-	1,7	1,1	0,9
	5R	0,08	0,06	0,05	1,1	0,7	0,4
	6R	0,09	0,06	0,04	1,8	1,1	0,7
	7R	0,10	0,06	0,50	1,6	0,8	0,5
	%CHANGE		+25,0	0,0	0,0	+6,7	0,0

7610/1 : STILLAGE TRIAL

Table 31 : Soil Analysis Data - Total Nitrogen and Organic Matter By Nitrogen Treatment (5R to 7R)

TREATMENT (kg/ha N)	CROP	TOTAL NITROGEN (N%)			ORGANIC MATTER (%)		
		0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm
0	5R	0,07	0,05	0,04	1,16	0,61	0,41
	6R	0,07	0,06	0,04	1,73	1,13	0,62
	7R	0,09	0,06	0,05	1,50	0,85	0,52
	%CH 5R-7R	+28,6	+20,0	+25,0	+29,3	+39,3	+26,8
60	5R	0,07	0,06	0,04	1,17	0,69	0,51
	6R	0,07	0,06	0,04	1,75	1,10	0,71
	7R	0,08	0,06	0,05	1,50	0,81	0,58
	%CH 5R-7R	+14,3	0,0	+25,0	+28,2	+17,4	+13,7
120	5R	0,07	0,06	0,05	1,16	0,81	0,52
	6R	0,08	0,06	0,04	1,77	1,00	0,64
	7R	0,08	0,06	0,05	1,45	0,86	0,65
	%CH 5R-7R	+14,3	0,0	0,0	+25,0	+6,2	+25,0
180	5R	0,08	0,06	0,05	1,14	0,69	0,49
	6R	0,08	0,06	0,04	1,66	0,87	0,63
	7R	0,08	0,06	0,04	1,36	0,83	0,52
	%CH 5R-7R	0,0	0,0	-20,0	+19,3	+20,3	+6,1

7610/1 : STILLAGE TRIAL

Table 32: Soil Analysis Data : Cation Exchange Capacity By Irrigation Treatment (Preplant to 7R)

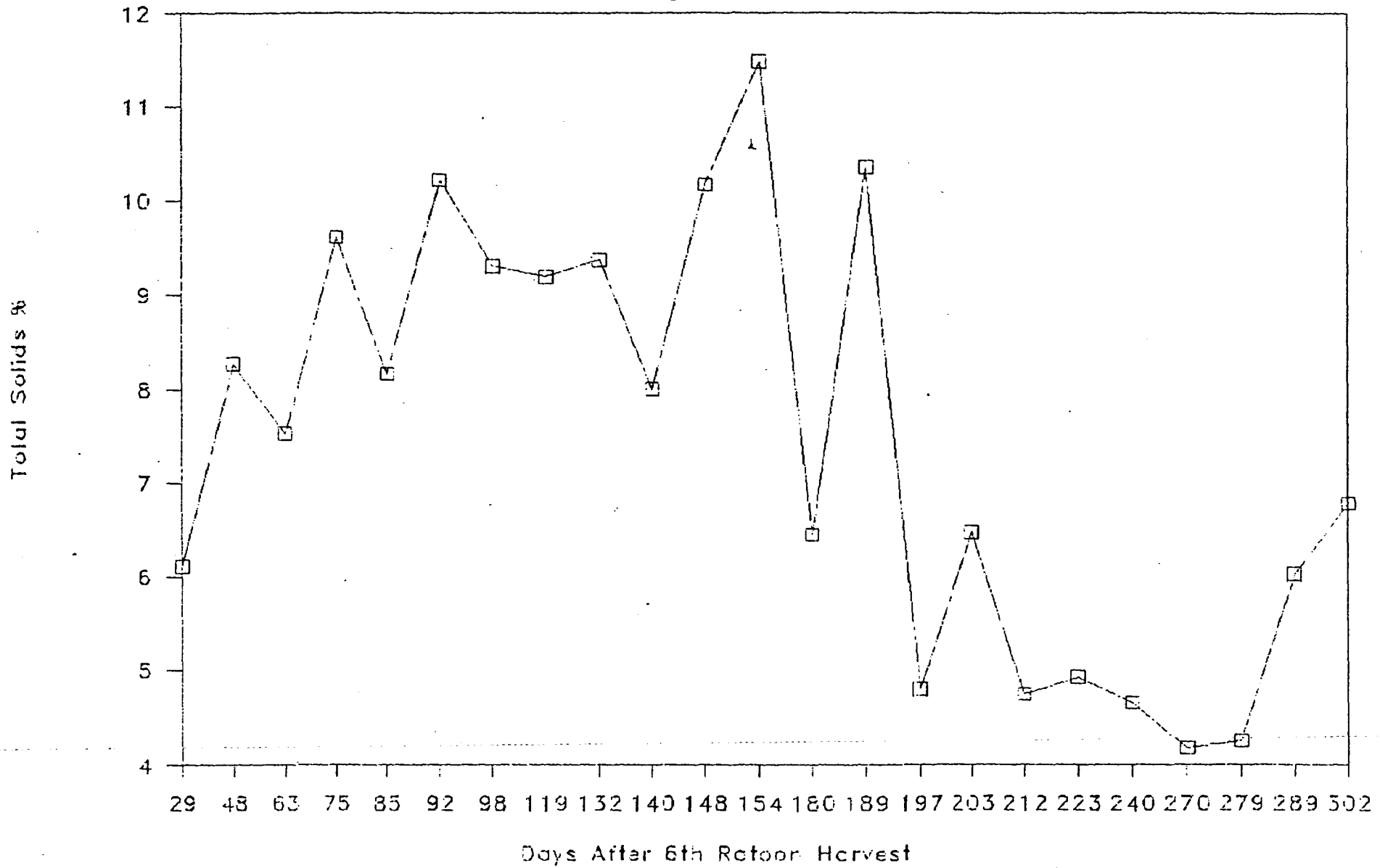
CROF	CATION EXCHANGE CAPACITY (m.e.%)						CATION EXCHANGE CAPACITY (m.e.%)								
	I0:Control, no stillage			I1:1 to 400 dilution			I2:1 to 200 dilution			I3:1 to 100 dilution			I4:1 to 50 dilution		
	0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm	0-30cm	30-60cm	60-90cm
PREPLANT	12,7	13,9	13,0	12,3	13,8	13,8	13,1	13,0	14,0	11,3	10,7	11,3	12,6	14,2	12,6
P	11,1	10,8	10,2	10,0	10,5	9,7	10,7	8,5	9,5	10,5	11,2	9,7	11,6	11,1	9,8
1R	9,5	9,7	11,1	9,6	10,5	10,5	9,6	9,6	9,8	11,4	11,5	13,8	10,5	13,1	14,0
2R	8,7	9,7	9,6	7,8	8,3	8,3	8,7	8,0	8,4	8,6	9,2	10,4	7,3	7,5	7,9
3R	20,7	20,8	18,5	12,5	13,6	12,4	13,4	13,3	14,0	21,1	23,6	24,1	22,5	25,1	24,3
4R	12,8	13,8	13,8	11,5	13,3	13,1	11,2	12,2	12,2	13,7	14,6	14,1	13,6	15,1	14,2
5R	11,7	13,8	13,1	11,7	13,3	12,3	10,7	12,5	12,6	12,5	13,1	13,8	13,2	13,9	13,9
6R	8,5	8,3	8,0	7,8	8,2	7,9	8,1	8,0	8,3	8,0	8,6	9,1	8,1	7,6	8,0
7R	11,5	12,4	12,7	12,4	11,6	13,1	11,8	13,0	13,4	11,9	14,2	14,2	14,0	14,9	16,0
%CHANGE PREPLANT TO 7R	-9,4	-10,8	-2,3	+0,8	-15,9	-5,1	-9,9	0,0	-4,3	+5,3	+32,7	+25,7	+11,1	+4,9	+27,0

7610/1 STILLAGE TRIAL - SEVENTH RATOON

Table 33 : Smut Whips /ha x 10⁻³

STILLAGE TREATMENTS	LEVELS OF N (kg/ha N)				MEAN
	0	60	120	180	
I0-Control, no stillage	1,67	1,46	1,50	1,10	1,43
I1-1:400 stillage dilution	1,96	1,42	1,65	1,89	1,73
I2-1:200 stillage dilution	1,56	1,85	1,61	1,03	1,51
I3-1:100 stillage dilution	1,67	1,13	0,38	0,79	0,99
I4-1:50 stillage dilution	1,00	1,47	0,83	1,44	1,19
MEAN	1,57	1,47	1,19	1,25	1,37

Fig.1: Variation in % Total Solids in
HVE Stillage (1988-1989).



SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

7610/1 STILLAGE TRIAL

Cat. No.: 1426

Object: To measure the long-term effects on the soil of irrigating with distillery effluent at various dilutions and to determine the nitrogenous fertilizer value of the applied effluent.

This crop: Eighth ratoon Age: 12,0 months (15.6.89 to 14.6.90)

Location: Hippo Valley Estates, Section 9, Field 10B.

Variety/Spacing: NCo376 in 1,5m rows.

Fertilizer:

- (1) Nitrogen: see treatments.
- (2) Phosphate: 100 kg P₂O₅/ha as single superphosphate applied at 4 weeks.
- (3) Potash: 60 kg K₂O/ha as muriate of potash applied at 4 weeks.

Treatments: (a) Whole plot treatments were five rates of dilution of distillery effluent (stillage):

I0 : Control, no stillage
I1 : Stillage diluted 1:400
I2 : Stillage diluted 1:200
I3 : Stillage diluted 1:100
I4 : Stillage diluted 1:50

(b) Split plot treatments consisted of four nitrogen levels:

N0 : Control, no nitrogen
N1 : 60 kg N/ha
N2 : 120 kg N/ha
N3 : 180 kg N/ha

The nitrogen was applied as ammonium nitrate in two dressings, half at 4 weeks and half at 8 weeks.

Rainfall: 543,5 mm Irrigation: 1 352,0mm

RESULTS

(a) Yield data: The yield and quality data for the eighth ratoon are shown in Tables 1 to 5. Mean data for first to eighth ratoon crops inclusive are also shown in the same tables.

(i) Stillage: IN the eighth ratoon, there were highly significant (P=0,01) increases in cane, ERC and ERF yields with increasing concentration of applied stillage. However, quality levels were depressed significantly as stillage concentration increased.

(ii) Nitrogen treatments: As in previous crops; highly significant (P=0,01) quadratic responses in cane, ERC and ERF yields were obtained in the eighth ratoon. There were also significant (P=0,01 and P=0,05 respectively) quadratic ERC% cane and ERF% cane responses to nitrogen - with quality deteriorating as the level of applied nitrogen increased. 6 (a) and 6 (b).

(iii) Stillage dilution X nitrogen interaction (Tables 6 (a) and 6 (b)): Cane, ERC and ERF yield interactions were similar in the fourth, to eighth ratoons inclusive. For applied N levels of up to 60 kg N per hectare; there were increases in cane, ERC and ERF yields with increasing quantities of applied stillage but this trend was not manifested at rates of applied N exceeding 50 kg N per hectare. For all stillage treatments except the 1 in 50 stillage dilution, there was a linear increase in cane, ERC and ERF yields with increasing levels of applied nitrogen. No significant interactions were obtained with ERC's cane and ERF's cane.

(b) Stalk data: In the eighth ratoon stalk populations and stalk lodging % were higher in plots receiving stillage than in those where stillage was not applied; they were also higher in plots receiving nitrogen than in plots with no applied N fertilizer. Similar trends were also obtained with stalk lengths and stalk diameters. Flowering was very low in the eighth ratoon and no trends were discernible. Relevant data are presented in the Table 7 to 10 and in Table 13.

(c) Stillage data:

(i) Total solids (Figure 1): Total solids ranged from 4.3% to 9.20% in the eighth ratoon.

(ii) Stillage irrigation: The trial received 21 stillage irrigations out of a total of 23 irrigations in the eighth ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied in this crop and trial means for all crops to date are shown in Table 17. The mean annual application of potassium as K_2O to date was 1.8 tonnes per hectare in the highest stillage treatment, I4; while in the same treatment 278 kg N per hectare was supplied in the stillage.

(d) Foliar analysis: Foliar samples were taken from the trial plots at 14, 18, 22, 26 and 30 weeks after the seventh ratoon harvest. Foliar N and K at 22 weeks expressed as a percentage of dry matter are presented in Tables 11, 12, 15 and 16.

(i) Foliar N%: Eighth ratoon foliar N values in the treatments receiving low nitrogen applications (up to 60 N) combined with low concentrations of stillage (up to 1:22 stillage dilutions) were all below the November critical level of 1.60%. Values ranged from 1.29% to 1.87%.

(ii) Foliar K%: All treatments receiving no stillage and receiving the lowest dilution rate of 1:400 recorded values below the critical level of 1.10% in the eighth ratoon. In general both foliar N and K tended to increase with increasing amounts of applied fertilizer N and amounts of applied stillage.

(e) Soil analysis: Analytical data from soil samples taken after harvest are shown in Tables 18 to 25.

(i) Soil sample depth 0 to 30cm: Highly significant ($P=0.01$) increases in extractable K and in saturated paste and saturated extract conductivities were obtained with increasing stillage concentrations. All the treatments which received stillage showed gains in extractable K over the period P to 8R and the magnitude of the gains increased with stillage concentration. Over the same period losses were recorded in levels of extractable Ca and Na and in levels of total (i.e. K + Ca + Mg + Na) extractable cations.

(ii) Soil sample depth 30-60cm: Data trends were similar to those obtained in the 0 to 30cm in depth.

(iii) Soil sample depth 60 to 90cm: In general, trends were similar to those in the upper profiles of the soil.

(f) Smut infection levels: Smut roguing was conducted in the eighth ratoon at 8, 12, 16, 20, 24, 28 and 32 weeks after seventh ratoon harvest. Smut whip data are presented in Table 14. Smut incidence in the trial as a whole was lower in this crop than in the seventh ratoon and in some cases by a factor of ten. As might be expected at these low rates of infection, the beneficial effect of stillage in

suppressing smut which was observed in some of the previous ratoons was not evident in this crop.

DISCUSSION

The cane yield, ERF% cane and ERF yield which had declined in recent ratoons have improved dramatically in this crop and the eighth ratoon trial means for each of these parameters are the second highest of all crops harvested to date. It will be interesting to see if these good yields can be maintained in subsequent crops. ERC yield has also improved but not as dramatically.

In the absence of applied N, the highest stillage application rate I4 yielded 121,88 tonnes cane per hectare while in the absence of stillage the treatment receiving 180 kg N/ha gave 125,30 tonnes cane per hectare. Therefore in this crop the I4 treatment provided an N benefit equivalent to almost 180 kg N/ha. The latter is the highest recorded to date.

BM/Dec '90
vdr

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 1 : Cane yield data

TREATMENTS	CANE YIELD (t/ha)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	148.69	121.91	113.48	114.04	91.13	97.02	78.54	91.37	107.02
I1 - Stillage diluted 1:400	137.84	113.91	113.28	116.31	95.02	108.73	93.34	125.29	112.97
I1 - Stillage diluted 1:200	149.28	123.59	116.06	119.18	101.83	117.21	95.64	128.03	118.85
I1 - Stillage diluted 1:100	146.92	125.03	117.10	124.22	101.53	129.04	97.52	132.31	121.71
I1 - Stillage diluted 1:50	131.49	134.10	127.98	142.00	115.85	137.90	107.60	146.66	130.45
Significance	N.S.	N.S.	N.S.	*	*	***	*	***	-
L.S.D. P=0.05	-	-	-	15.65	12.59	11.96	13.88	10.84	-
P=0.01	-	-	-	-	-	16.77	-	15.2	-
S.E. single plot ±	26.37	16.75	14.40	20.31	16.34	15.53	18.01	14.07	-
S.E. treatment mean ±	6.59	4.19	3.60	5.08	4.08	3.88	4.50	3.52	-
C.V. %	18.46	13.54	12.24	16.49	16.16	13.16	19.06	11.28	-
Split-plots :									
I0 - Control no nitrogen	110.88	78.91	70.39	74.97	61.50	75.49	68.45	90.61	78.90
I1 - 60 kg/ha N	143.08	111.92	108.78	119.22	92.17	109.63	91.51	122.56	112.36
I1 - 120 kg/ha N	158.66	149.93	142.75	144.21	118.17	138.31	102.18	136.52	136.34
I1 - 180 kg/ha N	158.75	156.06	148.40	155.21	132.85	148.50	115.97	149.23	145.62
Linear effect	***	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	***	-
L.S.D. P=0.05	8.78	11.27	10.02	6.80	6.55	6.54	2.82	7.57	-
P=0.01	11.72	15.05	13.38	9.09	8.73	8.74	3.77	10.11	-
S.E. single plot ±	13.78	17.69	15.73	10.67	10.27	10.27	4.43	11.88	-
S.E. treatment mean ±	3.08	3.06	3.52	2.39	2.30	2.3	0.99	2.66	-
C.V. %	9.65	14.20	13.38	8.67	10.16	8.71	4.69	9.52	-
Interactions	IN'± IN''±	IN'±	-	IN'***	IN'±±	IN'***	IN'*** IN'±±	IN'±±	-
Trial mean	142.84	123.71	117.58	123.15	101.07	117.98	94.53	124.73	118.20

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 2 : ERC % cane data

TREATMENTS	ERC % CANE								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	12.47	12.77	13.14	13.05	13.60	12.63	12.57	13.40	12.95
I1 - Stillage diluted 1:400	12.42	12.81	13.25	13.08	13.30	11.82	12.51	12.62	12.73
I1 - Stillage diluted 1:200	12.69	12.65	13.08	12.85	13.25	11.81	12.50	12.15	12.62
I1 - Stillage diluted 1:100	13.09	12.63	12.98	12.88	12.98	11.71	12.29	11.82	12.55
I1 - Stillage diluted 1:50	13.44	12.57	13.00	12.34	11.88	11.06	11.24	12.04	12.20
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	*	-
L.S.D. P=0.05	-	-	-	0.49	1.08	0.74	1.79	0.83	-
P=0.01	-	-	-	-	-	2.24	-	-	-
S.E. single plot ±	1.26	0.95	0.64	0.64	1.40	0.96	1.33	1.08	-
S.E. treatment mean ±	0.31	0.24	0.16	0.16	0.35	0.24	0.33	0.27	-
C.V. %	9.79	7.52	4.91	4.97	10.79	8.15	10.90	8.73	-
Split-plots :									
N0 - Control no nitrogen	13.67	11.10	13.10	12.63	13.23	12.28	12.18	12.99	12.90
N1 - 60 kg/ha N	12.85	12.96	13.42	13.08	13.40	12.20	12.42	12.72	12.88
N1 - 120 kg/ha N	12.40	12.57	13.04	12.76	13.17	11.59	12.30	12.13	12.50
N1 - 180 kg/ha N	12.33	12.12	12.81	12.87	12.20	11.14	11.99	11.79	12.16
Linear effect	***	***	*	N.S.	***	***	N.S.	***	-
Quadratic effect	N.S.	N.S.	*	N.S.	**	N.S.	*	N.S.	-
L.S.D. P=0.05	0.58	0.38	0.33	-	0.54	0.53	0.35	0.63	-
P=0.01	0.77	0.50	-	-	0.71	0.70	-	0.84	-
S.E. single plot ±	0.91	0.59	0.52	0.57	0.84	0.83	0.55	0.98	-
S.E. treatment mean ±	0.24	0.13	0.12	0.13	0.19	0.18	0.12	0.22	-
C.V. %	7.08	4.67	3.99	4.44	6.49	7.00	4.53	7.93	-
Interactions	IN*	-	-	-	-	IN*	IN***	-	-
Trial mean	12.82	12.69	13.09	12.84	13.00	11.81	12.22	12.41	12.61

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 3 : ERC yield data

TREATMENTS	ERC YIELD (t/ha)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
IO - Control , no stillage	18.40	15.48	14.83	14.86	12.38	12.12	9.89	12.20	13.77
I1 - Stillage diluted 1:400	16.96	14.42	14.98	15.19	12.54	12.64	11.66	15.58	14.25
I1 - Stillage diluted 1:200	18.85	15.47	15.12	15.31	13.28	13.52	11.95	15.41	14.86
I1 - Stillage diluted 1:100	19.14	15.70	15.21	16.02	13.03	15.00	11.97	15.47	15.19
I1 - Stillage diluted 1:50	17.60	16.78	16.59	17.49	13.57	15.19	11.94	17.57	15.84
Significance	N.S.	N.S.	N.S.	*	N.S.	***	N.S.	***	-
L.S.D. P=0.05	-	-	-	1.69	-	1.22	13.88	1.65	-
P=0.01	-	-	-	-	-	1.72	-	2.32	-
S.E. single plot ±	3.80	2.13	1.79	2.20	1.60	1.59	2.08	2.15	-
S.E. treatment mean ±	0.95	0.53	0.45	0.55	0.40	0.40	0.52	0.54	-
C.V. %	20.91	13.65	11.63	13.93	12.35	11.61	18.11	14.09	-
Split-plots :									
NO - Control no nitrogen	15.17	10.29	9.22	9.36	7.99	9.03	8.27	11.59	10.12
N1 - 60 kg/ha N	18.34	14.47	14.57	15.43	12.26	13.26	11.27	15.44	14.38
N1 - 120 kg/ha N	19.64	18.82	18.59	18.38	15.53	15.96	12.53	16.42	16.98
N1 - 180 kg/ha N	19.02	18.70	19.00	19.93	16.07	16.52	13.86	17.54	17.58
Linear effect	***	***	***	***	***	***	***	***	-
Quadratic effect	**	***	***	***	***	***	***	***	-
L.S.D. P=0.05	1.62	1.49	1.31	0.80	0.93	0.98	0.37	1.09	-
P=0.01	2.77	2.00	1.76	1.07	1.24	1.31	0.50	1.46	-
S.E. single plot ±	2.55	2.35	2.06	1.26	1.46	1.54	0.59	11.88	-
S.E. treatment mean ±	0.57	0.52	0.46	0.28	0.33	0.34	0.13	2.66	-
C.V. %	14.02	15.48	13.43	7.99	11.25	11.22	5.10	9.52	-
Interactions	IN**	IN**	-	IN***	IN**	IN*	IN***	IN**	-
	-	-	-	-	-	-	IN**	-	-
Trial mean	18.19	15.57	15.35	15.77	12.96	13.69	11.48	15.25	14.78

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 4 : ERF % cane data

TREATMENTS	ERF % CANE								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	14.58	14.21	14.35	14.23	15.12	14.42	13.67	15.15	14.47
I1 - Stillage diluted 1:400	14.77	14.38	14.42	14.20	15.09	13.73	13.67	14.70	14.37
I1 - Stillage diluted 1:200	14.98	14.16	14.30	14.08	15.03	13.78	13.64	14.32	14.29
I1 - Stillage diluted 1:100	15.04	14.16	14.14	14.11	14.80	13.68	13.54	14.17	14.21
I1 - Stillage diluted 1:50	15.12	13.94	14.27	13.64	14.30	13.37	12.76	14.24	13.96
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	**	-
L.S.D. P=0.05	-	-	-	0.40	0.49	0.57	-	0.45	-
P=0.01	-	-	-	-	-	-	-	0.63	-
S.E. single plot ±	0.77	0.66	0.89	0.51	0.63	0.73	1.12	0.59	-
S.E. treatment mean ±	0.19	0.16	0.22	0.13	0.16	0.18	0.28	0.15	-
C.V. %	5.15	4.63	6.25	3.66	4.25	5.33	8.33	4.04	-
Split-plots :									
N0 - Control no nitrogen	15.17	14.18	14.06	13.72	14.58	14.00	13.28	14.75	14.22
N1 - 60 kg/ha N	15.01	14.27	14.47	14.21	15.03	14.07	13.64	14.75	14.43
N1 - 120 kg/ha N	14.63	14.22	14.37	14.10	15.07	13.59	13.53	14.30	14.23
N1 - 180 kg/ha N	14.77	14.01	14.29	14.18	14.78	13.52	13.37	14.26	14.15
Linear effect	*	N.S.	N.S.	**	N.S.	**	N.S.	*	-
Quadratic effect	N.S.	N.S.	**	*	**	N.S.	*	N.S.	-
L.S.D. P=0.05	0.53	-	0.34	0.31	0.35	0.86	0.31	0.52	-
P=0.01	-	-	0.40	0.42	0.46	1.15	-	-	-
S.E. single plot ±	0.83	0.40	0.48	0.49	0.55	0.60	0.49	0.82	-
S.E. treatment mean ±	0.19	0.09	0.11	0.11	0.12	0.14	0.11	0.18	-
C.V. %	5.60	2.80	3.33	3.54	3.67	4.38	3.66	5.64	-
Interactions	-	-	-	-	-	-	IN***	-	-
Trial mean	14.90	14.17	14.30	14.05	14.87	13.80	13.46	14.52	14.26

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 5 : ERF yield data

TREATMENTS	ERF YIELD (t/ha)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
IO - Control , no stillage	21.63	17.31	16.28	16.24	13.89	13.94	10.78	13.87	15.49
I1 - Stillage diluted 1:400	20.29	16.31	16.37	16.53	14.38	14.82	12.78	18.28	16.22
I1 - Stillage diluted 1:200	22.30	17.46	16.62	16.83	15.25	15.96	13.06	18.26	16.97
I1 - Stillage diluted 1:100	22.09	17.71	16.62	17.59	15.04	17.61	13.21	18.66	17.32
I1 - Stillage diluted 1:50	19.87	18.66	18.24	19.37	16.51	18.39	13.61	20.84	18.19
Significance	N.S.	N.S.	N.S.	*	*	***	*	***	-
L.S.D. P=0.05	-	-	-	2.05	1.66	1.60	1.79	1.74	-
P=0.01	-	-	-	-	-	2.24	-	2.44	-
S.E. single plot †	4.33	2.34	2.28	2.66	2.16	2.07	2.33	2.26	-
S.E. treatment mean †	1.08	0.59	0.57	0.66	0.54	0.52	0.58	0.56	-
C.V. %	20.39	13.40	13.54	15.36	14.39	12.85	18.36	12.55	-
Split-plots :									
N0 - Control no nitrogen	16.90	11.16	9.92	10.20	8.91	10.43	9.06	13.25	11.23
N1 - 60 kg/ha N	21.41	15.94	15.71	16.76	13.81	15.34	12.42	17.99	15.17
N1 - 120 kg/ha N	23.17	21.30	20.50	20.31	17.82	18.75	13.80	19.45	19.39
N1 - 180 kg/ha N	23.46	21.57	21.17	21.98	19.52	20.06	15.47	21.25	20.56
Linear effect	***	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	***	-
L.S.D. P=0.05	1.53	1.54	1.43	0.85	0.96	0.94	0.41	1.22	-
P=0.01	2.05	2.05	1.91	1.14	1.28	1.26	0.54	1.63	-
S.E. single plot †	2.41	2.41	2.24	1.34	1.50	1.48	0.64	1.92	-
S.E. treatment mean †	0.54	0.54	0.50	0.30	0.34	0.33	0.14	0.43	-
C.V. %	11.34	13.80	13.32	7.73	10.02	9.14	5.02	10.66	-
Interactions	IN**	IN**	-	IN***	IN**	IN***	IN***	IN**	-
	-	-	-	-	-	-	IN***	-	-
Trial mean	21.24	17.49	16.83	17.31	15.02	16.14	12.69	17.98	16.84

7610/1 : STILLAGE TRIAL - 8R

Table 6(a) : Interaction Table : Cane and ERC yield :

TREATMENTS	CANE YIELD (t/ha)					ERC YIELD (t/ha)				
	LEVELS OF N (kg N/ha)					LEVELS OF N (kg N/ha)				
	0	60	120	180	MEAN	0	60	120	180	MEAN
I0 - Control , no stillage	48.05	88.72	103.40	125.30	91.37	6.49	12.16	14.45	15.69	12.20
I1 - Stillage diluted 1:400	88.82	117.67	140.34	154.35	125.29	12.07	15.51	17.20	17.53	15.58
I1 - Stillage diluted 1:200	91.98	123.24	146.69	150.22	128.03	12.01	15.62	16.57	17.44	15.41
I1 - Stillage diluted 1:100	102.30	126.45	146.21	154.26	132.31	13.07	15.09	16.16	17.58	15.47
I1 - Stillage diluted 1:50	121.88	156.73	145.97	162.05	146.66	14.29	18.80	17.75	19.46	17.57
Trial mean	90.61	122.56	136.52	149.23	124.73	11.59	15.44	16.42	17.54	15.25
Significance Interactions	IN' **					IN' *				
L.S.D. P=0.05	16.92					2.44				
P=0.01	-					-				

Table 6(b) : Interaction Table : ERF yield .

TREATMENTS	ERF YIELD (t/ha)				
	LEVELS OF N (kg N/ha)				
	0	60	120	180	MEAN
I0 - Control , no stillage	7.23	13.49	16.08	18.69	13.87
I1 - Stillage diluted 1:400	13.51	17.94	20.29	21.41	18.28
I1 - Stillage diluted 1:200	13.52	18.17	20.32	21.02	18.26
I1 - Stillage diluted 1:100	15.10	17.96	19.75	21.82	18.66
I1 - Stillage diluted 1:50	16.90	22.37	20.79	23.31	20.84
Trial mean	13.25	17.99	19.45	21.25	17.98
Significance Interactions	IN' *				
L.S.D. P=0.05	2.73				
P=0.01	-				

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Table 7 : Stalk count data

TREATMENTS	STALK COUNTS/ha X (1/1000)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	135.3	140.5	144.0	150.8	153.1	153.9	154.7	150.0	147.8
I1 - Stillage diluted 1:400	103.6	137.3	142.7	146.9	152.1	156.9	155.6	155.3	143.8
I1 - Stillage diluted 1:200	135.9	139.7	145.3	148.7	155.6	157.2	157.4	152.7	149.1
I1 - Stillage diluted 1:100	134.9	142.4	145.4	149.6	158.5	159.2	157.6	158.0	150.7
I1 - Stillage diluted 1:50	125.5	146.2	150.1	152.5	157.3	157.7	157.2	150.3	149.6
Split-plots :									
N0 - Control no nitrogen	117.5	127.9	132.3	139.5	145.6	151.0	157.3	150.7	140.2
N1 - 60 kg/ha N	133.0	139.7	146.7	153.7	158.3	160.8	161.7	153.5	150.9
N1 - 120 kg/ha N	138.6	147.9	151.2	153.3	158.4	158.3	155.5	153.9	152.1
N1 - 180 kg/ha N	140.6	149.5	151.6	152.2	158.9	157.8	151.5	155.1	152.2
Trial mean	132.4	141.2	145.5	149.7	155.3	157.0	156.5	153.3	148.9

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 8 : Stalk length data

TREATMENTS	STALK LENGTH (m)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	2.78	2.44	2.30	2.33	2.06	2.46	1.85	1.91	2.27
I1 - Stillage diluted 1:400	2.66	2.35	2.35	2.42	2.20	2.59	2.06	2.37	2.38
I1 - Stillage diluted 1:200	2.80	2.54	2.40	2.47	2.26	2.76	2.16	2.43	2.48
I1 - Stillage diluted 1:100	2.67	2.44	2.32	2.41	2.13	2.82	2.15	2.46	2.43
I1 - Stillage diluted 1:50	2.60	2.48	2.54	2.70	2.32	3.05	2.28	2.65	2.58
Split-plots :									
N0 - Control no nitrogen	2.35	1.89	1.83	1.86	1.93	2.15	1.73	1.89	1.95
N1 - 60 kg/ha N	2.69	2.29	2.24	2.29	2.09	2.64	2.04	2.31	2.32
N1 - 120 kg/ha N	2.92	2.82	2.70	2.79	2.42	3.05	2.18	2.64	2.69
N1 - 180 kg/ha N	2.84	2.80	2.75	2.93	2.39	3.11	2.47	2.62	2.74
Trial mean	2.70	2.45	2.38	2.46	2.21	2.74	2.20	2.37	2.44

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 9 : Stalk diameter data

TREATMENTS	STALK DIAMETERS (cm)								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	2.32	2.29	2.26	2.23	2.02	1.93	1.93	2.08	2.13
I1 - Stillage diluted 1:400	2.39	2.30	2.28	2.30	2.02	1.99	1.98	2.11	2.17
I1 - Stillage diluted 1:200	2.36	2.30	2.26	2.22	2.01	2.00	1.96	2.13	2.16
I1 - Stillage diluted 1:100	2.35	2.27	2.27	2.28	2.03	2.03	2.01	2.11	2.17
I1 - Stillage diluted 1:50	2.37	2.29	2.33	2.32	2.08	2.10	2.06	2.16	2.21
Split-plots :									
I0 - Control no nitrogen	2.36	2.27	2.18	2.14	1.98	1.89	1.91	2.04	2.10
I1 - 60 kg/ha N	2.35	2.28	2.26	2.26	1.98	1.97	1.92	2.13	2.14
I1 - 120 kg/ha N	2.35	2.32	2.32	2.32	2.05	2.09	2.04	2.13	2.20
I1 - 180 kg/ha N	2.36	2.31	2.36	2.36	2.11	2.10	2.08	2.18	2.23
Trial mean	2.36	2.30	2.28	2.27	2.01	2.01	1.99	2.12	2.17

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 10 : Stalk lodging % data

TREATMENTS	STALK LODGING %								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	11	0	0	0	0	0	2	1	2
I1 - Stillage diluted 1:400	11	2	6	19	3	6	8	38	12
I1 - Stillage diluted 1:200	14	5	5	31	2	14	9	54	17
I1 - Stillage diluted 1:100	7	2	3	29	3	17	5	52	15
I1 - Stillage diluted 1:50	3	1	11	59	16	42	33	79	31
Split-plots :									
I0 - Control no nitrogen	0	0	0	5	3	1	1	10	3
I1 - 60 kg/ha N	3	0	0	11	1	6	10	35	8
I1 - 120 kg/ha N	13	5	7	34	1	17	13	64	19
I1 - 180 kg/ha N	21	3	13	60	15	39	22	71	31
Trial mean	9	2	5	27	5	15	11	45	15

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 11 : Foliar N% Dry Matter at 22 weeks .

TREATMENTS	FOLIAR N% DRY MATTER AT 22 WEEKS								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	2.04	1.56	1.71	2.04	2.00	2.15	1.76	1.49	1.84
I1 - Stillage diluted 1:400	1.96	1.59	1.70	2.03	2.10	2.18	1.77	1.63	1.87
I1 - Stillage diluted 1:200	2.00	1.59	1.67	2.05	2.12	2.18	1.79	1.67	1.88
I1 - Stillage diluted 1:100	1.95	1.54	1.68	2.03	2.15	2.17	1.81	1.71	1.88
I1 - Stillage diluted 1:50	1.88	1.73	1.68	2.12	2.09	2.18	1.83	1.81	1.92
Split-plots :									
N0 - Control no nitrogen	1.82	1.42	1.47	2.04	2.07	2.17	1.77	1.53	1.79
N1 - 60 kg/ha N	1.92	1.51	1.59	2.04	2.09	2.17	1.79	1.63	1.84
N1 - 120 kg/ha N	2.03	1.72	1.83	2.06	2.10	2.17	1.78	1.70	1.92
N1 - 180 kg/ha N	2.09	1.75	1.87	2.09	2.11	2.17	1.79	1.78	1.96
Trial mean	1.97	1.60	1.69	2.05	2.09	2.17	1.79	1.66	1.88

Table 12 : Foliar K% Dry Matter at 22 weeks .

TREATMENTS	FOLIAR K% DRY MATTER AT 22 WEEKS								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	1.13	1.04	0.92	0.93	1.20	0.97	0.81	0.78	0.97
I1 - Stillage diluted 1:400	1.16	1.14	0.98	1.04	1.25	1.10	1.06	1.03	1.10
I1 - Stillage diluted 1:200	1.20	1.27	1.02	1.06	1.23	1.15	1.04	1.31	1.16
I1 - Stillage diluted 1:100	1.20	1.15	1.03	1.09	1.38	1.16	1.00	1.30	1.16
I1 - Stillage diluted 1:50	1.22	1.09	1.09	1.29	1.43	1.30	0.98	1.31	1.21
Split-plots :									
N0 - Control no nitrogen	1.12	1.07	0.95	1.04	1.26	1.08	0.91	1.09	1.07
N1 - 60 kg/ha N	1.15	1.13	0.99	1.04	1.29	1.11	0.95	1.15	1.10
N1 - 120 kg/ha N	1.21	1.14	1.04	1.11	1.33	1.14	0.98	1.13	1.14
N1 - 180 kg/ha N	1.25	1.24	1.06	1.14	1.32	1.21	0.97	1.21	1.18
Trial mean	1.18	1.14	1.01	1.08	1.30	1.14	0.97	1.15	1.12

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Table 13 : Estimated flowering % data

TREATMENTS	ESTIMATED FLOWERING %								
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	MEAN
Main plots									
I0 - Control , no stillage	1	0	0	0	0	54	14	0	9
I1 - Stillage diluted 1:400	0	0	0	0	0	56	25	1	10
I1 - Stillage diluted 1:200	1	0	0	0	0	60	17	0	10
I1 - Stillage diluted 1:100	1	0	0	0	0	59	16	1	10
I1 - Stillage diluted 1:50	1	0	0	0	0	52	12	0	8
Split-plots :									
N0 - Control no nitrogen	1	0	0	0	0	40	1	0	5
N1 - 60 kg/ha N	1	0	0	0	0	62	8	0	9
N1 - 120 kg/ha N	0	0	0	0	0	65	19	1	11
N1 - 180 kg/ha N	1	0	0	0	0	69	39	1	14
Trial mean	1	0	0	0	0	59	17	0.5	10

7610/1 : STILLAGE TRIAL - 8R

Table 14 : Smut Whips/ha X 1/100 .

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	2.22	4.03	3.47	3.09	3.40
I1 - Stillage diluted 1:400	3.47	1.39	6.25	6.67	4.45
I1 - Stillage diluted 1:200	5.69	9.03	9.72	1.11	6.39
I1 - Stillage diluted 1:100	5.97	4.03	7.50	1.67	4.79
I1 - Stillage diluted 1:50	4.58	5.00	2.22	3.47	3.82
Trial mean	4.39	4.70	5.83	3.36	4.57

7610/1 : STILLAGE TRIAL - 8R

Table 15 :Foliar N% Dry Matter at 22 weeks .

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	1.29	1.44	1.54	1.70	1.49
I1 - Stillage diluted 1:400	1.52	1.59	1.65	1.75	1.63
I1 - Stillage diluted 1:200	1.54	1.59	1.76	1.79	1.67
I1 - Stillage diluted 1:100	1.60	1.70	1.73	1.82	1.71
I1 - Stillage diluted 1:50	1.72	1.82	1.82	1.87	1.81
Trial mean	1.53	1.63	1.70	1.78	1.66

Table 16 :Foliar K% Dry Matter at 22 weeks .

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	0.76	0.87	0.71	0.77	0.78
I1 - Stillage diluted 1:400	0.98	1.04	1.05	1.05	1.03
I1 - Stillage diluted 1:200	1.23	1.23	1.36	1.44	1.31
I1 - Stillage diluted 1:100	1.23	1.28	1.27	1.42	1.30
I1 - Stillage diluted 1:50	1.25	1.32	1.27	1.40	1.31
Trial mean	1.09	1.15	1.13	1.21	1.15

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Table 17 : Stillage data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K20 (kg/ha)	NITROGEN AS N (kg/ha)
I1 1:400 dilution	1R	1:330	3.9	1553	229	-
	2R	1:370	1.6	1313	183	-
	3R	1:384	1.9	1553	212	-
	4R	1:406	1.6	1414	207	-
	5R	1:336	3.1	1747	250	49
	6R	1:350	2.0	1452	198	55
	7R	1:213	5.7	3500	452	58
	8R	1:285	3.5	2132	245	41
		MEAN	1:334	2.9	1833	247
I2 1:200 dilution	1R	1:200	6.5	2459	387	-
	2R	1:184	4.2	2429	362	-
	3R	1:195	3.7	3140	418	-
	4R	1:207	3.1	2779	413	-
	5R	1:179	6.3	3311	491	102
	6R	1:177	4.0	2611	370	107
	7R	1:139	9.0	6062	769	96
	8R	1:165	6.5	4212	503	80
		MEAN	1:181	5.4	3375	464
I3 1:100 dilution	1R	1:108	11.8	4695	707	-
	2R	1:99	6.7	4938	709	-
	3R	1:91	8.3	6487	913	-
	4R	1:98	6.5	5670	871	-
	5R	1:90	12.5	6492	997	230
	6R	1:96	7.9	5200	709	221
	7R	1:84	15.3	11113	1392	170
	8R	1:90	11.9	8090	971	145
		MEAN	1:95	10.1	6586	909
I4 1:50 dilution	1R	1:54	23.6	9669	1457	-
	2R	1:59	12.5	9555	1366	-
	3R	1:54	15.5	12561	1744	-
	4R	1:57	12.6	11265	1660	-
	5R	1:49	24.9	13794	1962	408
	6R	1:51	16.4	11164	1601	458
	7R	1:51	26.9	22038	2629	321
	8R	1:50	23.3	15329	1805	278
		MEAN	1:53	19.5	13172	1778

7610/1 : STILLAGE TRIAL - 8R

Table 18 : Soil Analysis Data - Soil sample depth 0-30 cm.

TREATMENTS	COND(microS/cm)		PH (0.01M CaCl ₂)	EXTRACTABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I0	149	207	5.67	0.31	8.3	3.5	0.35	12.5
I1	191	260	6.21	1.04	8.7	3.3	0.42	13.5
I2	234	350	6.13	1.00	5.5	3.0	0.25	9.8
I3	285	444	6.05	1.18	5.8	2.9	0.30	10.2
I4	365	580	6.24	1.35	6.8	3.4	0.22	11.8
Significance	***	***	**	***	N. S.	N. S.	N. S.	N. S.
L.S.D. P = 0.05	77	101	0.28	0.31	-	-	-	-
P = 0.01	109	142	0.39	0.44	-	-	-	-
S. E. single plot ±	101	131	0.36	0.41	3.4	0.8	0.30	4.1
S. E. treatment mean ±	25	33	0.09	0.10	0.9	0.2	0.07	1.0
C. V. %	41.10	35.72	5.95	41.63	48.26	25.71	96.26	35.81
N0	227	329	6.14	1.03	7.3	3.3	0.32	12.0
N1	236	357	6.11	1.00	7.0	3.2	0.29	11.5
N2	245	386	5.98	0.92	6.7	3.1	0.36	11.1
N3	270	400	6.00	0.97	7.1	3.3	0.27	11.6
Linear effect	*	*	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
Quadratic effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
L.S.D. P = 0.05	35	61	-	-	-	-	-	-
P = 0.01	-	-	-	-	-	-	-	-
S.E. single plot ±	55	96	0.32	0.22	2.1	0.5	0.17	2.4
S. E. treatment mean ±	12	21	0.07	0.05	0.5	0.1	0.04	0.6
C. V. %	22.36	26.09	5.31	22.29	29.82	16.50	55.76	21.15

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Table 19 : Soil Analysis Data - Soil sample depth 30-60 cm.

TREATMENTS	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I0	148	158	5.81	0.22	8.3	3.8	0.44	12.8
I1	204	205	6.22	0.76	10.2	3.4	0.53	14.9
I2	223	276	6.05	0.65	5.6	3.3	0.25	9.8
I3	314	368	6.19	0.82	6.7	3.5	0.28	11.3
I4	387	464	6.48	1.12	8.0	3.7	0.20	13.0
Significance	***	***	N. S.	***	N. S.	N. S.	*	N. S.
L.S.D. P = 0.05	86	83	-	0.42	-	-	0.21	-
P = 0.01	121	117	-	0.59	-	-	-	-
S. E. single plot ±	112	108	0.55	0.55	4.7	1.6	0.27	5.5
S. E. treatment mean ±	28	27	0.14	0.14	1.2	0.4	0.07	1.4
C. V. %	43.82	36.78	8.87	76.86	60.69	44.22	79.45	44.51
N0	257	286	6.12	0.74	7.7	3.6	0.29	12.3
N1	264	311	6.22	0.71	7.9	3.4	0.35	12.4
N2	238	272	6.09	0.66	7.1	3.5	0.34	11.6
N3	261	309	6.16	0.76	8.4	3.6	0.39	13.2
Linear effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
Quadratic effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
S. E. single plot ±	74	87	0.39	0.25	3.60	0.9	0.15	3.9
S. E. treatment mean ±	17	20	0.09	0.06	0.80	0.2	0.03	0.9
C. V. %	28.94	29.64	6.33	35.17	46.50	25.50	43.33	31.55

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Table 20 : Soil Analysis Data - Soil sample depth 60-90 cm.

TREATMENTS	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
	SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
I0	166	180	5.90	0.18	8.9	4.1	0.50	13.7
I1	239	246	6.35	0.53	11.3	3.6	0.32	15.8
I2	235	243	6.01	0.44	5.3	3.6	0.42	9.8
I3	382	445	6.20	0.61	7.7	3.9	0.28	12.5
I4	429	468	6.49	0.99	9.1	4.1	0.25	14.4
Significance	**	***	N. S.	**	N. S.	N. S.	N. S.	N. S.
L.S.D. P = 0.05	128	119	-	0.37	-	-	-	-
P = 0.01	180	167	-	0.52	-	-	-	-
S. E. single plot ±	166	155	0.63	0.49	5.9	2.1	0.41	6.8
S. E. treatment mean ±	42	39	0.16	0.12	1.5	0.5	0.10	1.7
C. V. %	57.30	48.84	10.17	88.26	70.35	53.78	116.19	51.68
N0	280	296	6.16	0.56	8.9	3.6	0.35	13.4
N1	299	333	6.21	0.54	8.3	3.8	0.35	13.0
N2	280	296	6.19	0.52	8.0	4.1	0.34	13.0
N3	302	341	6.22	0.58	8.5	3.9	0.37	13.4
Linear effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
Quadratic effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
S. E. single plot ±	88	111	0.43	0.25	4.30	1.0	0.16	4.5
S. E. treatment mean ±	20	25	0.10	0.06	1.00	0.2	0.04	1.0
C. V. %	30.38	34.97	6.96	45.33	50.69	24.79	44.37	34.04

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Table 21 : Soil Analysis Data For Treatment IO

Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
IO	P	270	-	5.82	0.54	10.2	3.5	0.71	15.0
0-30	1R	180	219	5.86	0.39	8.8	3.2	0.42	12.8
	2R	208	188	5.67	0.33	8.9	3.8	0.61	13.6
	3R	168	185	5.68	0.21	14.5	3.9	0.89	19.5
	4R	242	316	5.81	0.23	9.8	3.2	0.48	13.7
	5R	245	386	5.94	0.39	8.5	3.4	0.63	12.9
	6R	188	219	5.54	0.32	9.9	3.2	0.70	14.1
	7R	235	323	5.78	0.32	9.1	3.5	0.40	13.3
	8R	149	207	5.67	0.31	8.3	3.5	0.35	12.5
% CHANGE P/1R TO 8R		-44.8	-5.5	-2.6	-42.6	-18.6	0.0	-50.7	-16.7
IO	P	320	-	6.31	0.22	15.6	4.0	0.74	20.6
30-60	1R	220	219	6.14	0.19	10.6	4.0	0.46	15.3
	2R	173	220	5.78	0.22	9.3	4.2	0.62	14.3
	3R	178	189	5.97	0.20	16.2	4.3	1.00	21.7
	4R	283	326	5.85	0.16	11.8	3.7	0.46	16.1
	5R	261	307	6.19	0.28	10.3	4.0	0.61	15.2
	6R	203	206	5.67	0.23	10.0	3.6	0.76	14.6
	7R	258	291	5.93	0.22	9.5	4.0	0.40	14.1
	8R	148	158	5.81	0.22	8.3	3.8	0.44	12.8
% CHANGE P/1R TO 8R		-53.8	-27.9	-7.9	0.0	-46.8	-5.0	-40.5	-37.9
IO	P	330	-	6.28	0.20	16.3	4.9	0.87	22.3
60-90	1R	268	295	6.01	0.16	13.5	4.1	0.42	18.2
	2R	210	238	6.13	0.20	10.5	4.8	0.65	16.2
	3R	208	263	6.24	0.18	14.7	3.8	0.85	19.5
	4R	296	337	6.08	0.13	12.4	4.4	0.56	17.5
	5R	259	284	6.24	0.27	9.3	4.2	0.59	14.4
	6R	205	198	5.68	0.19	9.5	3.7	0.72	14.1
	7R	292	356	6.11	0.18	9.7	4.4	0.39	14.7
	8R	166	180	5.90	0.18	8.9	4.1	0.50	13.7
MEAN		-49.7	-39.0	-6.1	-10.0	-45.4	-16.3	-42.5	-38.6

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 22 : Soil Analysis. Data For Treatment I1

Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I1 0-30	P	310	-	6.13	0.46	12.3	3.1	0.72	16.6
	1R	230	300	6.41	0.48	12.7	2.6	0.39	16.2
	2R	214	380	6.31	0.40	12.8	3.4	0.76	17.4
	3R	348	533	6.23	0.48	14.7	2.9	0.68	18.8
	4R	239	301	6.17	0.45	13.0	2.9	0.64	17.0
	5R	226	346	6.21	0.66	9.9	3.2	0.55	14.3
	6R	244	301	6.03	0.85	10.1	3.1	0.80	14.9
	7R	274	430	6.16	0.96	9.4	3.6	0.49	14.5
	8R	191	260	6.21	1.04	8.7	3.3	0.42	13.5
% CHANGE P/1R TO 8R		-38.4	-13.3	1.3	126.1	-29.3	6.5	-41.7	-18.8
I1 30-60	P	335	-	6.52	0.23	18.9	4.2	0.78	24.1
	1R	245	281	6.48	0.21	15.3	3.8	0.49	19.8
	2R	259	360	6.48	0.24	16.6	3.9	0.69	21.4
	3R	408	483	6.38	0.25	16.1	3.9	0.77	21.0
	4R	292	361	6.39	0.26	14.8	3.6	0.63	19.3
	5R	271	282	6.46	0.40	11.4	3.7	0.65	16.2
	6R	216	238	5.82	0.45	8.8	3.5	0.82	13.6
	7R	256	284	6.01	0.59	9.5	4.1	0.59	14.8
	8R	204	205	6.22	0.76	10.2	3.4	0.53	14.9
% CHANGE P/1R TO 8R		-39.1	-27.0	-4.6	230.4	-46.0	-19.0	-32.1	-38.2
I1 60-90	P	385	-	6.35	0.24	17.8	3.9	0.84	22.8
	1R	245	255	5.85	0.20	15.7	4.0	0.54	20.4
	2R	279	305	6.51	0.22	17.5	4.7	0.88	23.3
	3R	413	511	6.47	0.23	15.5	4.1	0.74	20.6
	4R	313	309	6.38	0.26	15.7	3.8	0.64	20.4
	5R	277	312	6.39	0.35	12.1	4.1	0.62	17.2
	6R	249	266	6.08	0.31	9.8	3.7	0.84	14.7
	7R	296	297	6.12	0.48	11.2	4.7	0.56	16.9
	8R	239	246	6.35	0.53	11.3	3.6	0.32	15.8
MEAN		-37.9	-3.5	0.0	120.8	-36.5	-7.7	-61.9	-30.9

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 23 : Soil Analysis Data For Treatment I2

Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I2 0-30	P	275	-	5.81	0.55	9.5	3.3	0.57	13.9
	1R	210	315	6.50	0.58	9.3	3.1	0.41	13.4
	2R	175	203	6.23	0.46	8.8	3.5	0.54	13.3
	3R	243	334	5.80	0.61	11.4	2.5	0.72	15.2
	4R	247	289	6.33	0.49	9.9	2.8	0.51	13.7
	5R	265	452	6.35	0.75	8.5	3.2	0.68	13.1
	6R	234	329	5.72	0.83	7.7	3.0	1.19	12.7
	7R	344	591	5.95	1.32	7.5	3.6	0.32	12.7
	8R	234	350	6.13	1.00	5.5	3.0	0.25	9.8
% CHANGE P/1R TO 8R		-14.9	11.1	5.5	81.8	-42.1	-9.1	-56.1	-30.0
I2 30-60	P	220	-	5.84	0.22	8.7	3.4	0.78	13.1
	1R	220	290	6.30	0.15	12.0	3.2	0.59	15.9
	2R	180	214	6.30	0.30	9.9	3.7	0.72	14.6
	3R	254	364	5.69	0.35	10.1	3.4	0.77	14.6
	4R	181	316	6.34	0.30	10.8	3.2	0.56	14.9
	5R	267	360	6.45	0.43	9.1	3.6	0.68	13.8
	6R	284	341	5.83	0.46	7.6	3.3	1.26	12.6
	7R	319	406	5.97	0.76	8.1	4.2	0.43	13.5
	8R	223	276	6.05	0.65	5.6	3.3	0.25	9.8
% CHANGE P/1R TO 8R		1.4	-4.8	3.6	195.5	-35.6	-2.9	-67.9	-25.2
I2 60-90	P	254	-	5.96	0.23	9.6	4.3	0.91	15.0
	1R	224	251	4.69	0.23	10.6	3.5	0.50	14.8
	2R	201	194	6.45	0.23	8.4	4.6	0.77	14.0
	3R	243	249	5.77	0.22	9.7	3.2	0.80	13.9
	4R	202	277	6.39	0.19	11.0	3.5	0.60	15.3
	5R	299	371	6.25	0.33	9.0	4.1	0.79	14.2
	6R	234	279	5.76	0.31	7.4	3.6	1.25	12.6
	7R	324	367	6.02	0.52	8.3	4.6	0.48	13.9
	8R	235	243	6.01	0.44	5.3	3.6	0.42	9.8
MEAN		-7.5	-3.2	0.8	91.3	-44.8	-16.3	-53.8	-35.1

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 24 : Soil Analysis Data For Treatment I3

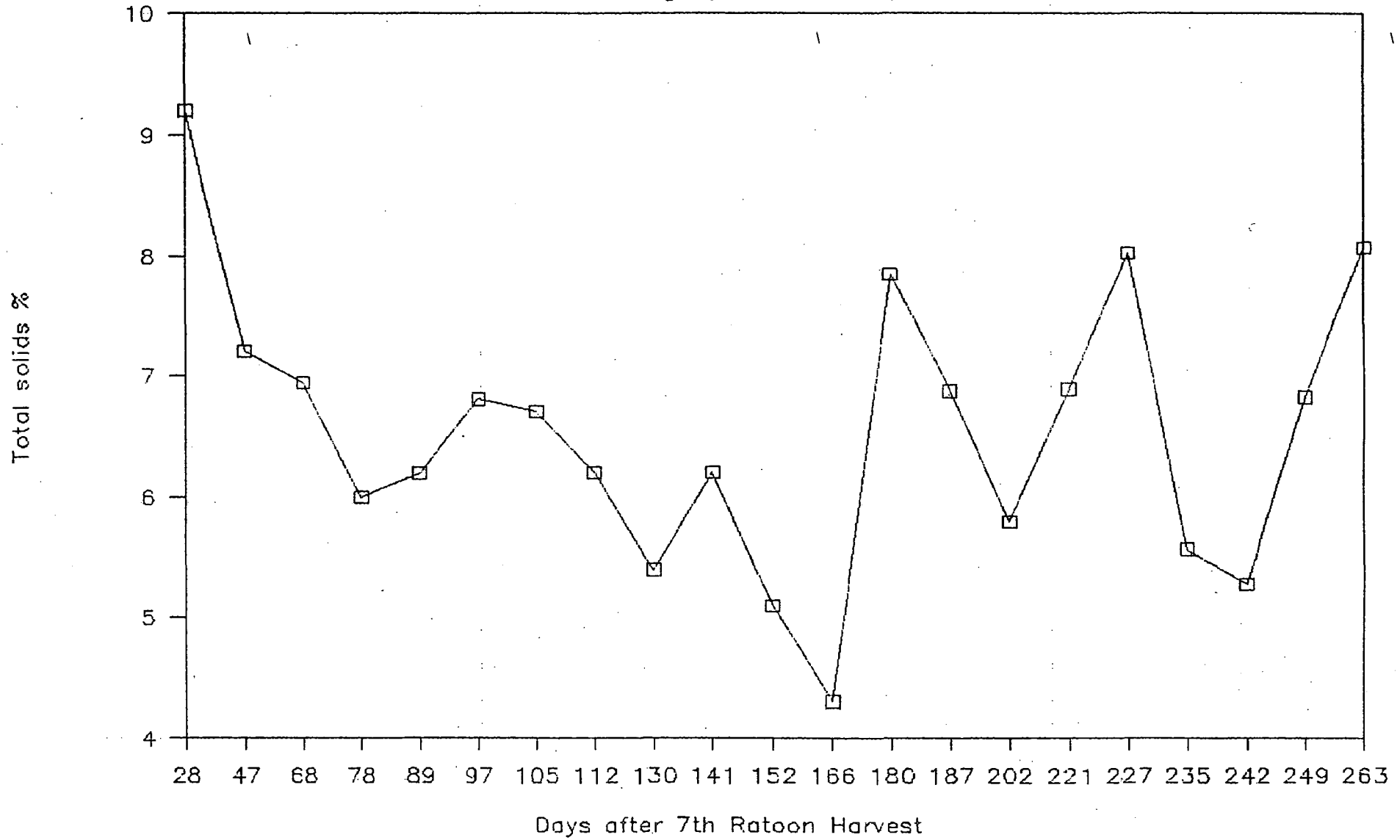
Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
I3 0-30	P	260	-	5.55	0.51	9.0	3.5	0.59	13.6
	1R	210	295	5.65	0.75	8.4	3.4	0.49	13.0
	2R	219	206	5.85	0.68	7.9	3.5	0.54	12.6
	3R	275	298	5.94	0.70	10.9	3.8	0.79	16.2
	4R	235	245	6.46	0.81	0.7	3.4	0.68	5.6
	5R	238	380	6.30	1.12	8.6	3.6	0.71	14.0
	6R	301	443	5.97	1.26	8.5	3.6	1.18	14.5
	7R	435	801	5.92	1.91	7.0	4.2	0.29	13.4
	8R	285	444	6.05	1.18	5.8	2.9	0.30	10.2
% CHANGE P/1R TO 8R		9.6	50.5	9.0	131.4	-35.6	-17.1	-49.2	-25.1
I3 30-60	P	290	-	5.79	0.24	11.7	4.3	0.92	17.2
	1R	230	303	5.95	0.26	10.6	4.5	0.61	16.0
	2R	195	155	5.89	0.35	8.7	4.7	0.59	14.3
	3R	354	388	6.34	0.49	13.9	4.4	0.82	19.6
	4R	248	250	6.54	0.41	10.8	4.1	0.69	16.0
	5R	271	326	6.50	0.79	10.6	4.2	0.73	16.3
	6R	311	356	6.00	0.77	9.1	4.1	1.15	15.1
	7R	436	581	6.09	1.21	7.9	4.8	0.32	14.2
	8R	314	368	6.19	0.82	6.7	3.5	0.28	11.3
% CHANGE P/1R TO 8R		8.3	21.5	6.9	241.7	-42.7	-18.6	-69.6	-34.1
I3 60-90	P	298	-	6.24	0.21	13.3	4.7	0.84	19.1
	1R	259	295	5.84	0.21	12.9	4.8	0.66	18.6
	2R	231	198	6.15	0.27	11.1	5.2	0.62	17.2
	3R	366	321	6.30	0.33	18.5	4.9	0.79	24.5
	4R	237	290	6.66	0.29	11.1	4.2	0.67	16.3
	5R	336	342	6.50	0.61	11.6	4.3	0.73	17.2
	6R	325	331	6.02	0.52	10.7	4.6	1.13	17.0
	7R	423	528	5.99	0.85	8.2	5.0	0.33	14.4
	8R	383	445	6.20	0.61	7.7	3.9	0.28	12.5
MEAN		28.5	50.8	-0.6	190.5	-42.1	-17.0	-66.7	-34.4

7610/1 : STILLAGE TRIAL - 1R to 8R

Table 25 : Soil Analysis Data For Treatment I4

Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
I4 0-30	P	310	-	6.39	0.45	12.0	3.5	0.66	16.6
	1R	235	338	6.13	0.79	10.3	2.7	0.51	14.3
	2R	265	365	6.61	1.03	10.3	4.1	0.58	16.0
	3R	394	481	6.09	0.80	14.6	3.6	0.82	19.8
	4R	269	314	6.78	1.22	12.5	3.3	0.71	17.7
	5R	302	464	6.80	1.34	11.4	3.9	0.60	17.2
	6R	393	542	6.16	1.64	8.6	3.6	0.90	14.7
	7R	529	910	6.22	2.07	7.8	4.0	0.32	14.2
	8R	365	580	6.24	1.35	6.8	3.4	0.22	11.8
% CHANGE P/1R TO 8R		17.7	71.6	-2.3	200.0	-43.3	-2.9	-66.7	-29.1
I4 30-60	P	306	-	6.32	0.19	16.1	4.1	0.75	21.1
	1R	300	340	6.44	0.26	14.6	3.1	0.45	18.4
	2R	279	286	6.64	0.52	10.8	4.5	0.62	16.4
	3R	424	451	6.26	0.53	16.1	4.5	0.93	22.1
	4R	293	291	6.95	0.60	14.8	3.6	0.72	19.7
	5R	326	388	6.86	0.90	12.9	3.9	0.80	18.5
	6R	390	485	6.27	1.06	10.6	3.7	0.92	16.3
	7R	450	545	6.38	1.47	8.8	4.3	0.29	14.9
	8R	387	464	6.48	1.12	8.0	3.7	0.20	13.0
% CHANGE P/1R TO 8R		26.5	36.5	2.5	489.5	-50.3	-9.8	-73.3	-38.4
I4 60-90	P	377	-	6.66	0.25	19.1	4.7	0.83	24.9
	1R	305	348	6.51	0.23	15.3	3.7	0.49	19.7
	2R	316	304	6.73	0.41	12.7	4.9	0.60	18.6
	3R	475	510	6.47	0.39	18.9	4.6	0.89	24.8
	4R	306	312	6.87	0.49	16.1	3.9	0.72	21.2
	5R	363	404	6.75	0.63	13.6	4.2	0.60	19.0
	6R	408	494	6.29	0.81	10.9	3.8	0.97	16.5
	7R	463	534	6.36	1.19	9.5	4.3	0.28	15.3
	8R	429	468	6.49	0.99	9.1	4.1	0.25	14.4
MEAN		13.8	34.5	-2.6	296.0	-52.4	-12.8	-69.9	-42.0

Fig 1: Variation in % Total Solids in
HVE Stillage (1989-1990).



7610/1/9R: STILLAGE TRIAL

Cat.No.: 1426

- Object: To measure long-term effects on the soil of irrigating with distillery effluent at various dilutions and to determine the nitrogenous fertilizer value of the applied effluent.
- This crop: Ninth ratoon Age: 12,0 months (14.6.90 to 13.6.91)
- Location: Hippo Valley Estates, Section 9, Field 10B
- Variety / Spacing: NCo376 in 1,5 m rows
- Fertilizer:
- (1) Nitrogen: see treatments
 - (2) Phosphate: 100 kg P_2O_5 /ha as single superphosphate applied at 4 weeks.
 - (3) Potash: 60 kg K_2O /ha as muriate of potash applied at 4 weeks.
- Treatments:
- (a) Whole plot treatments were five rates of dilution of stillage (distillery effluent):
 - I0: Control, no stillage
 - I1: Stillage diluted 1:400
 - I2: Stillage diluted 1:200
 - I3: Stillage diluted 1:100
 - I4: Stillage diluted 1: 50
 - (b) Split plot treatments consisted of four nitrogen levels:
 - N0: Control, no nitrogen
 - N1: 60 kg N/ha
 - N2: 120 kg N/ha
 - N3: 180 kg N/ha
- The nitrogen was applied as ammonium nitrate in two dressings, half at 4 weeks and half at 8 weeks.
- Rainfall: 387,7 mm Irrigation: 1456,0 mm

RESULTS

(a) Yield data: The yield and quality data for the ninth ratoon are shown in Tables 1 to 5. Mean data for the first to nine ratoon crops are also shown.

(i) Stillage: Trends observed in this crop were similar to those recorded in the eighth ratoon. There were highly significant ($P = 0,01$) increases in cane, ERC and ERF yields with increasing concentration of applied stillage. Quality levels were significantly ($P = 0,01$) depressed as stillage concentration increased.

(ii) Nitrogen treatments: As in all previous crops, highly significant ($P = 0,01$) quadratic responses in cane, ERC and ERF yields were obtained in the ninth ratoon. Unlike results obtained in most crops to date (except fourth ratoon for ERC cane, and second ratoon for ERF cane); there were no significant quality responses to nitrogen although the general trend was as usual; i.e. deterioration of cane quality with increasing amounts of applied nitrogen.

(iii) Stillage dilution x nitrogen interaction: (Tables 6a and 6b): Cane, ERC and ERF yield interactions were similar in the fourth to ninth ratoons inclusive. For applied N levels up to 60 kg N per hectare; there were increases in ~~case~~ ERC and ERF yields with increasing quantities of applied stillage, but this trend was not manifested at higher rates of applied N. For lower stillage treatments (i.e. excepting the 1:50 and 1:100 dilutions) there was a higher increase in cane, ERC and ERF yields with increasing levels of applied N. As for effects on quality; significant ($P = 0,01$) interactions were obtained with ERF% cane with the latter increasing as levels of N increased in the I0 treatment receiving no N; but showing no definite trend in treatments receiving stillage.

(b) Stalk data: In the ninth ratoon, stalk populations, stalk lengths and stalk lodging % were higher in plots receiving stillage than in those where stillage was not applied; they also tended to be higher in plots receiving nitrogen than in plots with no applied N fertilizer. No flowering was recorded in the ninth ratoon. Relevant data are presented in Tables 7 to 10 and in Table 13.

(c) Foliar analysis: Foliar samples were taken from the trial plots at 14, 18, 22, 26 and 30 weeks after eighth ratoon harvest. Foliar N and K at 22 weeks expressed as a percentage of dry matter are presented in Tables 11, 12, 12 and 16.

(i) Foliar N%: Values tended to be generally higher and less variable than those recorded in the eighth ratoon. Thus ninth ratoon values ranged from 1,42 to 1,87% compared to 1,29 to 1,87% for the eighth ratoon.

(ii) Foliar K%: Results were similar to those of the eighth ratoon. Thus, all treatments receiving no stillage, and all except one of those receiving the lowest dilution rate of 1:400 stillage; recorded values below the critical level of 1,10% K in the ninth ratoon. In general both foliar N and K levels tended to increase with increasing amounts of applied fertilizer N and applied stillage.

(d) Smut infection levels: Smut roguing was conducted in the ninth ratoon at 8, 12, 16, 20, 24 and 30 weeks after harvest. Smut whip data are presented in Table 14. As in the eighth ratoon, smut incidence in the trial as a whole was lower than in the seventh ratoon. As might be expected at these low rates of infection the beneficial effect of stillage in suppressing smut, which observed in some of the earlier ratoons was not manifest in this crop.

(e) Stillage data:

(i) Total solids (Figure 1): Total solids ranged from 3,43% to 8,99% in the ninth ratoon.

(ii) Stillage irrigation: The trial received a total of 20 stillage irrigations in the ninth ratoon. The mean dilution rate, amount of stillage, total solids and potassium applied in this crop, and trial means for all crops to date, are shown in Table 17. The mean annual application of potassium as K_2O to date was 1,8 tonnes per hectare in the highest stillage treatment I4; while in the same treatment 262 kg N per hectare was supplied in the stillage in the ninth ratoon.

(f) Soil analysis: Analytical data from soil samples taken after ninth ratoon harvest are shown in Tables 18 to 25.

(i) Soil sample depth 0 to 30 cm: As in the eighth ratoon significant increases in available K and in saturated paste and saturated extract conductivities were obtained with increasing stillage concentrations. Also, all treatments which received stillage showed gains in available K over the period 8R to 9R, and as recorded in previous crops; the magnitude of the gains increased with stillage concentration. Over the same period losses were recorded in levels of Ca and total available cations in all treatments.

(ii) Soil sample depth 30 to 60 cm: Data trends were similar to those obtained in the 0 to 30 cm depth.

(iii) Soil sample depth 60 to 90 cm: Trends were similar to those in the upper profiles of the soil.

(g) Smut infection levels: Smut roguing was done in the ninth ratoon at 8, 12, 15, 20, 24 and 28 weeks after eighth ratoon harvest. Smut whip data are presented in Table 14. Results were similar to what was recorded in the eighth ratoon. At the low rates of infection found in the trial, the beneficial effect of stillage suppressing smut disease which was evident in some of the earlier crops was not observed in this crop.

DISCUSSION

The good cane, ERC and ERF yields obtained in the eighth ratoon were not maintained in this crop. Quality was also poor. This may be due to low quality stillage and the fact that lower than planned amounts of total solids; and therefore also of other beneficial constituents; were applied in the high stillage treatments of I3 and I4.

In this crop the highest stillage treatment I4 was equivalent to 60 to 120 kg N/ha which was lower than the highest N benefit of 180 kg N/ha recorded in the eighth ratoon.

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7610/1 : STILLAGE TRIAL - 1R to 9R

Table 1 : Cane yield data

TREATMENTS	CANE YIELD (t/ha)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control, no stillage	148.69	121.91	113.48	114.04	91.13	97.02	78.54	91.37	89.07	105.03
I1 - Stillage diluted 1:400	137.84	113.91	113.28	116.31	95.02	108.73	93.34	125.29	111.84	112.84
I1 - Stillage diluted 1:200	149.28	123.59	116.06	119.18	101.83	117.21	95.64	128.03	120.06	118.99
I1 - Stillage diluted 1:100	146.92	125.03	117.10	124.22	101.53	129.04	97.52	132.31	128.37	122.45
I1 - Stillage diluted 1:50	131.49	134.10	127.98	142.00	115.85	137.90	107.60	146.66	130.62	130.47
Significance	N.S.	N.S.	N.S.	*	*	***	*	***	***	-
L.S.D. P=0.05	-	-	-	15.65	12.59	11.96	13.98	10.84	10.87	-
P=0.01	-	-	-	-	-	16.77	-	15.2	15.24	-
S.E. single plot ±	26.37	16.75	14.40	20.31	16.34	15.53	16.01	14.07	14.11	-
S.E. treatment mean ±	6.59	4.19	3.60	5.06	4.08	3.88	4.50	3.52	3.53	-
C.V. %	18.46	13.54	12.24	16.49	16.16	13.16	19.06	11.23	12.16	-
Split-plots :										
I0 - Control no nitrogen	110.88	78.91	70.39	74.97	61.50	75.49	68.45	90.61	88.29	79.94
I1 - 60 kg/ha N	143.08	111.92	108.78	119.22	92.17	109.63	91.51	122.56	115.12	112.67
I1 - 120 kg/ha N	158.66	149.93	142.75	144.21	118.17	136.31	102.18	136.52	126.19	135.21
I1 - 180 kg/ha N	158.75	156.06	148.40	155.21	132.85	148.50	115.97	149.23	134.37	144.37
Linear effect	***	***	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	***	***	-
L.S.D. P=0.05	8.78	11.27	10.02	6.80	6.55	6.54	2.82	7.57	7.49	-
P=0.01	11.72	15.05	13.38	9.09	8.73	8.74	3.77	10.11	10.00	-
S.E. single plot ±	13.78	17.69	15.73	10.67	10.27	10.27	4.43	11.88	11.76	-
S.E. treatment mean ±	3.08	3.06	3.52	2.39	2.30	2.3	0.99	2.66	2.63	-
C.V. %	9.65	14.20	13.38	8.67	10.16	8.71	4.69	9.52	10.13	-
Interactions	IN** IN**	IN**	-	IN***	IN**	IN***	IN*** IN** IN***	IN**	IN***	-
Trial mean	142.84	123.71	117.58	123.15	101.07	117.98	94.53	124.73	115.99	117.95

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Table 2 : ERC % cane data

TREATMENTS	ERC % CANE									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
IO - Control , no stillage	12.47	12.77	13.14	13.05	13.60	12.63	12.57	13.40	13.04	12.96
II - Stillage diluted 1:400	12.42	12.81	13.25	13.08	13.30	11.82	12.51	12.62	12.30	12.68
II - Stillage diluted 1:200	12.69	12.65	13.08	12.85	13.25	11.81	12.50	12.15	12.20	12.58
II - Stillage diluted 1:100	13.09	12.63	12.98	12.82	12.98	11.71	12.29	11.82	11.76	12.46
II - Stillage diluted 1:50	13.44	12.57	13.00	12.34	11.88	11.06	11.24	12.04	11.35	12.10
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	*	**	-
L.S.D. P=0.05	-	-	-	0.49	1.08	0.74	1.79	0.83	0.75	-
P=0.01	-	-	-	-	-	2.24	-	-	1.05	-
S.E. single plot ±	1.26	0.95	0.64	0.64	1.40	0.96	1.33	1.08	0.98	-
S.E. treatment mean ±	0.31	0.24	0.16	0.16	0.35	0.24	0.33	0.27	0.24	-
C.V. %	9.79	7.52	4.91	4.97	10.79	8.15	10.90	8.73	8.08	-
Split-plots :										
NO - Control no nitrogen	13.67	13.10	13.10	12.63	13.23	12.28	12.18	12.99	12.35	12.84
N1 - 60 kg/ha N	12.85	12.96	13.42	13.08	13.40	12.20	12.42	12.72	12.16	12.80
N1 - 120 kg/ha N	12.40	12.57	13.04	12.76	13.17	11.59	12.30	12.13	12.05	12.45
N1 - 180 kg/ha N	12.33	12.12	12.81	12.87	12.20	11.14	11.99	11.79	11.97	12.14
Linear effect	***	***	*	N.S.	***	***	N.S.	***	N.S.	-
Quadratic effect	N.S.	N.S.	*	N.S.	**	N.S.	*	N.S.	N.S.	-
L.S.D. P=0.05	0.58	0.38	0.33	-	0.54	0.53	0.35	0.63	-	-
P=0.01	0.77	0.50	-	-	0.71	0.70	-	0.84	-	-
S.E. single plot ±	0.91	0.59	0.52	0.57	0.84	0.83	0.55	0.98	0.68	-
S.E. treatment mean ±	0.24	0.13	0.12	0.13	0.19	0.18	0.12	0.22	0.15	-
C.V. %	7.08	4.67	3.99	4.44	6.49	7.00	4.53	7.93	5.60	-
Interactions	IN**	-	-	-	-	IN*	IN***	-	-	-
Trial mean	12.82	12.69	13.09	12.84	13.00	11.81	12.22	12.41	12.13	12.56

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Table 3 : ERC yield data

TREATMENTS	ERC YIELD (t/ha)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control, no stillage	18.40	15.48	14.83	14.86	12.38	12.12	9.89	12.20	11.67	13.54
I1 - Stillage diluted 1:400	16.96	14.42	14.98	15.19	12.54	12.64	11.66	15.58	13.76	14.19
I1 - Stillage diluted 1:200	18.55	15.47	15.12	15.31	13.28	13.52	11.95	15.41	14.57	14.63
I1 - Stillage diluted 1:100	19.14	15.70	15.21	16.02	13.03	15.00	11.97	15.47	15.10	15.18
I1 - Stillage diluted 1:50	17.60	16.76	16.59	17.49	13.57	15.19	11.94	17.57	14.79	15.72
Significance	N.S.	N.S.	N.S.	*	N.S.	***	N.S.	***	**	-
L.S.D. P=0.05	-	-	-	1.69	-	1.22	13.88	1.65	1.75	-
P=0.01	-	-	-	-	-	1.72	-	2.32	2.46	-
S.E. single plot ±	3.80	2.13	1.79	2.20	1.60	1.59	2.08	2.15	2.28	-
S.E. treatment mean ±	0.95	0.53	0.45	0.55	0.40	0.40	0.52	0.54	0.57	-
C.V. %	20.91	13.55	11.63	13.93	12.35	11.61	13.11	14.09	16.28	-
Split-plots :										
N0 - Control no nitrogen	15.17	10.29	9.22	9.36	7.99	9.03	8.27	11.59	10.79	10.19
N1 - 60 kg/ha N	16.34	14.47	14.57	15.43	12.26	13.26	11.27	15.44	13.88	14.32
N1 - 120 kg/ha N	19.64	18.82	18.59	18.38	15.53	15.96	12.53	16.42	15.21	16.79
N1 - 180 kg/ha N	19.02	18.70	19.00	19.93	15.07	16.52	13.86	17.54	16.03	17.41
Linear effect	***	***	***	***	***	***	***	***	***	-
Quadratic effect	**	***	***	***	***	***	***	***	**	-
L.S.D. P=0.05	1.62	1.49	1.31	0.80	0.93	0.98	0.37	1.09	1.14	-
P=0.01	2.77	2.00	1.76	1.07	1.24	1.31	0.50	1.46	1.52	-
S.E. single plot ±	2.55	2.35	2.06	1.26	1.46	1.54	0.59	11.88	1.78	-
S.E. treatment mean ±	0.57	0.52	0.46	0.28	0.33	0.34	0.13	2.66	0.40	-
C.V. %	14.02	15.48	13.43	7.99	11.25	11.22	5.10	9.52	12.75	-
Interactions	IN**	IN*	-	IN***	IN**	IN*	IN***	IN*	IN***	-
	-	-	-	-	-	-	IN**	-	-	-
Trial mean	18.19	15.57	15.35	15.77	12.96	13.69	11.48	15.25	13.98	14.69

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Table 4 : ERF % cane data

TREATMENTS	ERF % CANE									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control , no stillage	14.58	14.21	14.35	14.23	15.12	14.42	13.67	15.15	14.42	14.46
I1 - Stillage diluted 1:400	14.77	14.38	14.42	14.20	15.09	13.73	13.67	14.70	13.93	14.32
I1 - Stillage diluted 1:200	14.98	14.16	14.30	14.08	15.03	13.78	13.64	14.32	13.72	14.22
I1 - Stillage diluted 1:100	15.04	14.16	14.14	14.11	14.80	13.68	13.54	14.17	13.36	14.11
I1 - Stillage diluted 1:50	15.12	13.94	14.27	13.64	14.30	13.37	12.76	14.24	13.11	13.86
Significance	N.S.	N.S.	N.S.	*	*	*	N.S.	**	***	-
L.S.D. P=0.05	-	-	-	0.40	0.49	0.57	-	0.45	0.49	-
P=0.01	-	-	-	-	-	-	-	0.63	0.68	-
S.E. single plot ±	0.77	0.66	0.89	0.51	0.63	0.73	1.12	0.59	0.63	-
S.E. treatment mean ±	0.19	0.16	0.22	0.13	0.16	0.18	0.28	0.15	0.16	-
C.V. %	5.15	4.63	6.25	3.66	4.25	5.33	8.33	4.04	4.61	-
Split-plots :										
M0 - Control no nitrogen	15.17	14.18	14.06	13.72	14.58	14.00	13.28	14.75	13.75	14.17
M1 - 60 kg/ha N	15.01	14.27	14.47	14.21	15.03	14.07	13.64	14.75	13.76	14.36
M1 - 120 kg/ha N	14.63	14.22	14.37	14.10	15.07	13.59	13.53	14.30	13.67	14.16
M1 - 180 kg/ha N	14.77	14.01	14.29	14.18	14.78	13.52	13.37	14.26	13.65	14.09
Linear effect	*	N.S.	N.S.	**	N.S.	**	N.S.	*	N.S.	-
Quadratic effect	N.S.	N.S.	**	*	**	N.S.	*	N.S.	N.S.	-
L.S.D. P=0.05	0.53	-	0.34	0.31	0.35	0.86	0.31	0.52	-	-
P=0.01	-	-	0.40	0.42	0.46	1.15	-	-	-	-
S.E. single plot ±	0.83	0.40	0.48	0.49	0.55	0.60	0.49	0.82	0.51	-
S.E. treatment mean ±	0.19	0.09	0.11	0.11	0.12	0.14	0.11	0.18	0.11	-
C.V. %	5.60	2.80	3.33	3.54	3.67	4.38	3.66	5.64	3.71	-
Interactions	-	-	-	-	-	-	IN***	-	IN**	-
Trial mean	14.90	14.17	14.30	14.05	14.87	13.80	13.46	14.52	13.71	14.20

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Table 5 : ERF yield data

TREATMENTS	ERF YIELD (t/ha)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control, no stillage	21.63	17.31	16.23	16.24	13.89	13.94	10.78	13.87	12.96	15.21
I1 - Stillage diluted 1:400	20.29	16.31	16.37	16.53	14.38	14.82	12.78	18.29	15.59	16.15
I1 - Stillage diluted 1:200	22.30	17.46	16.62	16.83	15.25	15.96	13.06	18.26	16.42	16.91
I1 - Stillage diluted 1:100	22.09	17.71	16.62	17.59	15.04	17.61	13.21	18.66	17.16	17.30
I1 - Stillage diluted 1:50	19.87	18.66	18.24	19.37	16.51	18.39	13.61	20.84	17.12	18.07
Significance	N.S.	N.S.	N.S.	*	*	***	*	***	**	-
L.S.D. P=0.05	-	-	-	2.05	1.66	1.60	1.79	1.74	1.79	-
P=0.01	-	-	-	-	-	2.24	-	2.44	2.52	-
S.E. single plot ±	4.33	2.34	2.28	2.66	2.16	2.07	2.33	2.26	2.33	-
S.E. treatment mean ±	1.08	0.59	0.57	0.66	0.54	0.52	0.58	0.56	0.58	-
C.V. %	20.39	13.40	13.54	15.36	14.39	12.85	12.36	12.55	14.70	-
Split-plots :										
N0 - Control no nitrogen	16.90	11.16	9.92	10.20	8.91	10.43	9.06	13.25	12.09	11.32
N1 - 60 kg/ha N	21.41	15.94	15.71	16.76	13.91	15.34	12.42	17.99	15.77	16.13
N1 - 120 kg/ha N	23.17	21.30	20.50	20.31	17.82	18.75	13.80	19.45	17.23	18.15
N1 - 180 kg/ha N	23.46	21.57	21.17	21.98	19.52	20.06	15.47	21.25	18.30	20.31
Linear effect	***	***	***	***	***	***	***	***	***	-
Quadratic effect	***	***	***	***	***	***	***	***	**	-
L.S.D. P=0.05	1.53	1.54	1.43	0.85	0.96	0.94	0.41	1.22	1.16	-
P=0.01	2.05	2.05	1.91	1.14	1.28	1.26	0.54	1.63	1.54	-
S.E. single plot ±	2.41	2.41	2.24	1.34	1.50	1.48	0.64	1.92	1.82	-
S.E. treatment mean ±	0.54	0.54	0.50	0.30	0.34	0.33	0.14	0.43	0.41	-
C.V. %	11.34	13.80	13.32	7.73	10.02	9.14	5.02	10.66	11.46	-
Interactions	IN**	IN**	-	IN***	IN**	IN***	IN***	IN**	IN***	-
	-	-	-	-	-	-	IN***	-	-	-
Trial mean	21.24	17.49	16.83	17.31	15.02	16.14	12.69	17.98	15.85	16.73

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Table 6(a) : Interaction Table : Cane and ERC yield .

TREATMENTS	CANE YIELD (t/ha)					ERC YIELD (t/ha)				
	LEVELS OF N (kg N/ha)					LEVELS OF N (kg N/ha)				
	0	60	120	180	MEAN	0	60	120	180	MEAN
I0 - Control, no stillage	46.61	80.25	108.90	120.54	89.07	5.96	10.42	14.47	15.85	11.67
I1 - Stillage diluted 1:400	79.58	111.95	121.12	134.73	111.84	10.17	14.06	14.20	16.60	13.76
I2 - Stillage diluted 1:200	91.89	114.40	133.56	140.42	120.06	11.59	14.06	16.29	16.35	14.57
I3 - Stillage diluted 1:100	111.39	129.12	139.12	133.85	128.37	13.15	15.51	16.46	15.20	15.10
I4 - Stillage diluted 1:50	111.99	139.88	128.27	142.33	130.62	13.07	15.24	14.66	16.17	14.79
Trial mean	88.29	115.12	126.19	134.37	115.99	10.79	13.88	15.21	16.03	13.98
Significance Interactions	IN' ***					IN' ***				
L.S.D. P=0.05	16.74					2.54				
P=0.01	22.36					3.39				

Table 6(b) : Interaction Table : ERF % cane and ERF yield .

TREATMENTS	ERF % CANE					ERF YIELD (t/ha)				
	LEVELS OF N (kg N/ha)					LEVELS OF N (kg N/ha)				
	0	60	120	180	MEAN	0	60	120	180	MEAN
I0 - Control, no stillage	13.92	14.21	14.70	14.86	14.42	6.48	11.43	16.00	17.90	12.96
I1 - Stillage diluted 1:400	14.06	14.20	13.58	13.89	13.93	11.19	15.88	16.57	18.71	15.59
I2 - Stillage diluted 1:200	14.04	13.89	13.77	13.19	13.72	12.88	15.87	18.41	18.50	16.42
I3 - Stillage diluted 1:100	13.35	13.72	13.19	13.12	13.36	14.94	17.74	18.35	17.59	17.15
I4 - Stillage diluted 1:50	13.34	12.80	13.09	13.22	13.11	14.93	17.92	16.81	18.30	17.12
Trial mean	13.75	13.76	13.67	13.65	13.71	12.09	15.77	17.23	18.30	15.85
Significance Interactions	IN' **					IN' ***				
L.S.D. P=0.05	0.72					2.59				
P=0.01	0.97					3.45				

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Table 7 : Stalk count data

TREATMENTS	STALK COUNTS/ha X (1/1000)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control, no stillage	135.3	140.5	144.0	150.8	153.1	153.9	154.7	150.0	160.6	149.2
II - Stillage diluted 1:400	103.6	137.3	142.7	146.9	152.1	156.9	155.6	155.3	160.1	145.6
II - Stillage diluted 1:200	135.9	139.7	145.3	148.7	155.6	157.2	157.4	152.7	158.3	150.1
II - Stillage diluted 1:100	134.9	142.4	145.4	149.6	158.5	159.2	157.6	158.0	158.9	151.6
II - Stillage diluted 1:50	125.5	146.2	150.1	152.5	157.3	157.7	157.2	150.3	153.1	150.0
Split-plots :										
I0 - Control no nitrogen	117.5	127.9	132.3	139.5	145.6	151.0	157.3	150.7	156.4	142.0
NI - 60 kg/ha N	133.0	139.7	146.7	153.7	158.3	160.8	161.7	153.5	160.2	152.0
NI - 120 kg/ha N	138.6	147.9	151.2	153.3	158.4	158.3	155.5	153.9	160.4	153.1
NI - 180 kg/ha N	140.6	149.5	151.6	152.2	158.9	157.8	151.5	155.1	156.0	152.6
Trial mean	132.4	141.2	145.5	149.7	155.3	157.0	156.5	153.3	158.2	149.9

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Table 8 : Stalk length data

TREATMENTS	STALK LENGTH (m)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control, no stillage	2.78	2.44	2.30	2.33	2.06	2.46	1.85	1.91	1.87	2.22
II - Stillage diluted 1:400	2.66	2.35	2.35	2.42	2.20	2.59	2.06	2.37	2.31	2.37
II - Stillage diluted 1:200	2.80	2.54	2.40	2.47	2.26	2.76	2.16	2.43	2.41	2.47
II - Stillage diluted 1:100	2.67	2.44	2.32	2.41	2.13	2.82	2.15	2.46	2.44	2.43
II - Stillage diluted 1:50	2.60	2.48	2.54	2.70	2.32	3.05	2.28	2.65	2.56	2.58
Split-plots :										
I0 - Control no nitrogen	2.35	1.89	1.83	1.86	1.93	2.15	1.73	1.89	1.93	1.95
NI - 60 kg/ha N	2.69	2.29	2.24	2.29	2.09	2.64	2.04	2.31	2.23	2.31
NI - 120 kg/ha N	2.92	2.82	2.70	2.79	2.42	3.05	2.18	2.64	2.45	2.66
NI - 180 kg/ha N	2.84	2.80	2.75	2.93	2.39	3.11	2.47	2.62	2.66	2.73
Trial mean	2.70	2.45	2.38	2.46	2.21	2.74	2.20	2.37	2.32	2.43

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Table 9 : Stalk diameter data

TREATMENTS	STALK DIAMETERS (cm)									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control , no stillage	2.32	2.29	2.26	2.23	2.02	1.93	1.93	2.08	1.94	2.11
II - Stillage diluted 1:400	2.39	2.30	2.28	2.30	2.02	1.99	1.98	2.11	2.04	2.16
II - Stillage diluted 1:200	2.36	2.30	2.26	2.22	2.01	2.00	1.96	2.13	2.05	2.14
II - Stillage diluted 1:100	2.35	2.27	2.27	2.28	2.03	2.03	2.01	2.11	2.13	2.16
II - Stillage diluted 1:50	2.37	2.29	2.33	2.32	2.08	2.10	2.06	2.16	2.13	2.20
Split-plots :										
M0 - Control no nitrogen	2.36	2.27	2.18	2.14	1.98	1.89	1.91	2.04	2.00	2.09
M1 - 60 kg/ha N	2.35	2.28	2.26	2.26	1.98	1.97	1.92	2.13	2.03	2.13
M1 - 120 kg/ha N	2.35	2.32	2.32	2.32	2.05	2.05	2.04	2.13	2.09	2.19
M1 - 180 kg/ha N	2.36	2.31	2.36	2.36	2.11	2.10	2.08	2.18	2.11	2.22
Trial mean	2.36	2.30	2.28	2.27	2.01	2.01	1.99	2.12	2.06	2.16

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Table 10 : Stalk lodging % data

TREATMENTS	STALK LODGING %									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R		MEAN
Main plots										
I0 - Control , no stillage	11	0	0	0	0	0	2	1	3	2
II - Stillage diluted 1:400	11	2	6	19	3	6	8	38	36	14
II - Stillage diluted 1:200	14	5	5	31	2	14	9	54	48	20
II - Stillage diluted 1:100	7	2	3	29	3	17	5	52	51	19
II - Stillage diluted 1:50	3	1	11	59	16	42	33	79	68	35
Split-plots :										
M0 - Control no nitrogen	0	0	0	5	3	1	1	10	17	4
M1 - 60 kg/ha N	3	0	0	11	1	6	10	35	27	10
M1 - 120 kg/ha N	13	5	7	34	1	17	13	64	61	24
M1 - 180 kg/ha N	21	3	13	60	15	39	22	71	61	34
Trial mean	9	2	5	27	5	15	11	49	41	18

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 11 : Foliar N% Dry Matter at 22 weeks .

TREATMENTS	FOLIAR N% DRY MATTER AT 22 WEEKS									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control , no stillage	2.04	1.56	1.71	2.04	2.00	2.15	1.76	1.49	1.54	1.81
I1 - Stillage diluted 1:400	1.96	1.59	1.70	2.03	2.10	2.18	1.77	1.63	1.68	1.85
I1 - Stillage diluted 1:200	2.00	1.59	1.67	2.05	2.12	2.18	1.79	1.67	1.65	1.86
I1 - Stillage diluted 1:100	1.95	1.54	1.68	2.03	2.15	2.17	1.81	1.71	1.72	1.86
I1 - Stillage diluted 1:50	1.88	1.73	1.68	2.12	2.09	2.18	1.83	1.81	1.78	1.90
Split-plots :										
N0 - Control no nitrogen	1.82	1.42	1.47	2.04	2.07	2.17	1.77	1.53	1.56	1.76
N1 - 60 kg/ha N	1.92	1.51	1.59	2.04	2.09	2.17	1.79	1.63	1.63	1.82
N1 - 120 kg/ha N	2.03	1.72	1.83	2.06	2.10	2.17	1.78	1.70	1.71	1.90
N1 - 180 kg/ha N	2.09	1.75	1.87	2.09	2.11	2.17	1.79	1.78	1.77	1.94
Trial mean	1.97	1.60	1.69	2.05	2.09	2.17	1.79	1.66	1.67	1.85

Table 12 : Foliar K% Dry Matter at 22 weeks .

TREATMENTS	FOLIAR K% DRY MATTER AT 22 WEEKS									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control , no stillage	1.13	1.04	0.92	0.93	1.20	0.97	0.81	0.78	0.82	0.96
I1 - Stillage diluted 1:400	1.16	1.14	0.98	1.04	1.25	1.10	1.06	1.03	1.07	1.09
I1 - Stillage diluted 1:200	1.20	1.27	1.02	1.06	1.23	1.15	1.04	1.31	1.13	1.16
I1 - Stillage diluted 1:100	1.20	1.15	1.03	1.09	1.38	1.16	1.00	1.30	1.16	1.16
I1 - Stillage diluted 1:50	1.22	1.09	1.02	1.29	1.43	1.30	0.98	1.31	1.23	1.22
Split-plots :										
N0 - Control no nitrogen	1.12	1.07	0.95	1.04	1.26	1.08	0.91	1.09	1.02	1.06
N1 - 60 kg/ha N	1.15	1.13	0.99	1.04	1.29	1.11	0.95	1.15	1.10	1.10
N1 - 120 kg/ha N	1.21	1.14	1.04	1.11	1.33	1.14	0.98	1.13	1.09	1.13
N1 - 180 kg/ha N	1.25	1.24	1.06	1.14	1.32	1.21	0.97	1.21	1.11	1.17
Trial mean	1.18	1.14	1.01	1.08	1.30	1.14	0.97	1.15	1.08	1.12

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 13 : Estimated flowering % data

TREATMENTS	ESTIMATED FLOWERING %									
	1 R	2 R	3 R	4 R	5 R	6 R	7 R	8 R	9R	MEAN
Main plots										
I0 - Control , no stillage	1	0	0	0	0	54	14	0	0	8
II - Stillage diluted 1:400	0	0	0	0	0	56	25	1	0	9
II - Stillage diluted 1:200	1	0	0	0	0	60	17	0	0	9
II - Stillage diluted 1:100	1	0	0	0	0	59	16	1	0	9
II - Stillage diluted 1:50	1	0	0	0	0	52	12	0	0	7
Split-plots :										
N0 - Control no nitrogen	1	0	0	0	0	40	1	0	0	5
N1 - 60 kg/ha N	1	0	0	0	0	62	8	0	0	8
N1 - 120 kg/ha N	0	0	0	0	0	65	19	1	0	9
N1 - 180 kg/ha N	1	0	0	0	0	69	39	1	0	12
Trial mean	1	0	0	0	0	59	17	0.5	0	9

7610/1 : STILLAGE TRIAL - 9R

Table 14 : Smut Whips/ha X 1/100

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	7.92	3.33	7.92	6.67	6.46
II - Stillage diluted 1:400	5.28	3.19	1.67	4.58	3.68
II - Stillage diluted 1:200	9.31	7.92	3.19	1.94	5.59
II - Stillage diluted 1:100	6.81	8.61	4.58	1.67	5.42
II - Stillage diluted 1:50	12.36	7.50	3.47	4.03	6.84
Trial mean	8.34	6.11	4.17	3.78	5.60

7610/1 : STILLAGE TRIAL - 9R

Table 15 :Foliar N% Dry Matter at 22 weeks .

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	1.42	1.50	1.58	1.65	1.54
II - Stillage diluted 1:400	1.58	1.69	1.70	1.77	1.68
II - Stillage diluted 1:200	1.54	1.54	1.75	1.76	1.65
II - Stillage diluted 1:100	1.68	1.65	1.74	1.82	1.72
II - Stillage diluted 1:50	1.72	1.77	1.76	1.87	1.78
Trial mean	1.58	1.63	1.71	1.77	1.67

Table 16 :Foliar K% Dry Matter at 22 weeks .

TREATMENTS	LEVELS OF N (kg N/ha)				MEAN
	0	60	120	180	
I0 - Control , no stillage	0.86	0.85	0.78	0.79	0.82
II - Stillage diluted 1:400	1.00	1.07	1.06	1.15	1.07
II - Stillage diluted 1:200	1.02	1.05	1.25	1.20	1.13
II - Stillage diluted 1:100	1.07	1.27	1.16	1.12	1.16
II - Stillage diluted 1:50	1.16	1.25	1.22	1.29	1.23
Trial mean	1.02	1.10	1.09	1.11	1.08

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 17 : Stillage data

TREATMENTS	RATOON	MEAN DILUTION	STILLAGE APPLIED (mm)	TOTAL SOLIDS (kg/ha)	POTASSIUM AS K ₂ O (kg/ha)	NITROGEN AS N (kg/ha)
I1 1:400 dilution	1R	1:330	3.9	1553	229	-
	2R	1:370	1.6	1313	183	-
	3R	1:384	1.9	1551	212	-
	4R	1:406	1.6	1414	207	-
	5R	1:336	3.1	1747	250	49
	6R	1:350	2.0	1452	198	55
	7R	1:213	5.7	3500	452	58
	8R	1:285	3.5	2132	245	41
	9R	1:338	3.3	2243	261	39
	MEAN	1:335	3.0	1879	249	48
I2 1:200 dilution	1R	1:200	6.5	2459	387	-
	2R	1:184	4.2	2429	362	-
	3R	1:195	3.7	3140	418	-
	4R	1:207	3.1	2779	413	-
	5R	1:179	6.3	3311	491	102
	6R	1:177	4.0	2611	370	107
	7R	1:139	9.0	6062	769	96
	8R	1:165	6.5	4212	503	80
	9R	1:184	6.3	4540	450	74
	MEAN	1:181	5.5	3505	463	92
I3 1:100 dilution	1R	1:108	11.6	4695	707	-
	2R	1:99	6.7	4938	709	-
	3R	1:91	8.3	6427	913	-
	4R	1:98	6.5	5670	871	-
	5R	1:90	12.5	6492	997	230
	6R	1:96	7.9	5200	709	221
	7R	1:84	15.3	11113	1392	170
	8R	1:90	11.9	8090	971	145
	9R	1:102	11.6	5757	811	143
	MEAN	1:95	10.3	6494	898	182
I4 1:50 dilution	1R	1:54	23.6	9669	1457	-
	2R	1:59	12.5	9555	1366	-
	3R	1:54	15.5	12561	1744	-
	4R	1:57	12.6	11265	1660	-
	5R	1:49	24.9	13794	1962	408
	6R	1:51	16.4	11164	1601	458
	7R	1:51	26.9	22038	2629	321
	8R	1:50	23.3	15329	1805	278
	9R	1:60	20.4	13198	1591	262
	MEAN	1:54	19.6	13175	1757	158

7610/1 : STILLAGE TRIAL - 9R

Table 18 : Soil Analysis Data - Soil sample depth 0-30 cm.

TREATMENTS	COND(microS/cm)		PH (0.01M CaCl ₂)	EXTRACTABLE CATIONS (m.e.%)				
	SAT. PASTE	SAT. EXTRACT		K	Ca	Mg	Na	TOTAL
I0	166	205	5.61	0.27	9.3	3.3	0.82	13.7
I1	227	320	6.08	0.94	8.5	3.2	0.75	13.4
I2	202	281	6.12	1.0 ^A	7.9	3.3	0.63	12.9
I3	265	406	6.02	1.28	7.9	3.7	0.61	13.5
I4	316	428	6.25	1.37	9.6	3.9	0.55	15.4
Significance	**	**	**	***	N. S.	N. S.	*	N. S.
L.S.D. P = 0.05	70	107	0.29	0.16	-	-	0.15	-
P = 0.01	99	150	0.41	0.22	-	-	0.21	-
S. E. single plot +/-	91	139	0.38	0.20	3.1	1.0	0.19	4.0
S. E. treatment mean +/-	23	35	0.10	0.05	0.8	0.3	0.05	1.0
C. V. %	38.92	42.00	6.36	20.57	35.37	29.38	28.99	28.80
M0	224	306	6.24	1.04	9.0	3.5	0.68	14.2
M1	242	349	6.04	1.01	8.3	3.4	0.65	13.4
M2	221	299	5.87	0.91	8.0	3.4	0.67	13.0
M3	254	359	5.92	0.96	9.2	3.6	0.69	14.5
Linear effect	N. S.	N. S.	**	N. S.	N. S.	N. S.	N. S.	N. S.
Quadratic effect	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.	N. S.
L.S.D. P = 0.05	-	-	0.22	-	-	-	-	-
P = 0.01	-	-	0.29	-	-	-	-	-
S. E. single plot +/-	62	108	0.34	0.19	2.8	0.5	0.06	3.2
S. E. treatment mean +/-	14	24	0.08	0.04	0.6	0.1	0.01	0.7
C. V. %	26.41	32.92	5.63	19.65	32.46	14.83	8.93	23.24

7610/1 : STILLAGE TRIAL - 9R

Table 19 : Soil Analysis Data - Soil sample depth 30-60 cm.

TREATMENTS	COND(microS/cm)		PH	EXTRACTABLE CATIONS (m.e.%)					
	SAT. PASTE	SAT. EXTRACT	(0.01N CaCl ₂)	K	T	Ca	Mg	Na	TOTAL
I0	188	184	5.68	0.21		9.8	3.9	0.84	14.8
I1	213	209	6.03	0.66		10.6	3.3	0.75	15.3
I2	206	233	6.10	0.69		8.0	3.4	0.65	12.7
I3	283	322	6.02	0.93		8.7	4.3	0.62	14.5
I4	333	371	6.37	1.06		11.5	3.8	0.57	16.9
Significance	**	***	*	***		N. S.	N. S.	*	N. S.
L.S.D. P = 0.05	63	78	0.29	0.23		-	-	0.15	-
P = 0.01	88	109	-	0.32		-	-	-	-
S. E. single plot +/-	82	101	0.51	0.30		5.6	1.7	0.20	6.4
S. E. treatment mean +/-	20	25	0.13	0.07		1.4	0.4	0.05	1.6
C. V. %	33.40	38.22	8.41	42.15		57.14	44.84	29.30	43.13
N0	238	250	6.02	0.76		9.5	3.8	0.69	14.8
N1	238	268	6.18	0.69		10.3	3.5	0.70	15.2
N2	241	252	5.93	0.66		8.6	3.8	0.64	13.7
N3	262	285	6.02	0.73		10.5	3.8	0.70	15.7
Linear effect	N. S.	N. S.	N. S.	N. S.		N. S.	N. S.	N. S.	N. S.
Quadratic effect	N. S.	N. S.	N. S.	N. S.		N. S.	N. S.	N. S.	N. S.
L.S.D. P = 0.05	-	-	-	-		-	-	-	-
P = 0.01	-	-	-	-		-	-	-	-
S. E. single plot +/-	67	79	0.37	0.23		4.9	0.7	0.09	5.2
S. E. treatment mean +/-	15	18	0.08	0.05		1.1	0.2	0.02	1.2
C. V. %	27.56	30.03	6.07	32.76		50.77	17.94	12.82	35.03

7610/1 : STILLAGE TRIAL - 9R

Table 20 : Soil Analysis Data - Soil sample depth 60-90 cm.

TREATMENTS	COND(microS/cm)		PH (0.01M CaCl ₂)	EXTRACTABLE CATIONS (m.e.%)				
	SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
I0	219	195	5.75	0.19	10.8	4.0	0.87	15.9
I1	224	202	6.18	0.44	12.1	3.4	0.80	16.7
I2	205	219	6.05	0.46	7.6	4.0	0.61	12.7
I3	291	270	6.06	0.63	10.0	4.9	0.69	16.2
I4	337	342	6.35	0.92	11.8	3.8	0.47	16.9
Significance	*	**	N.S.	**	N.S.	N.S.	***	N.S.
L.S.D. P = 0.05	87	68	-	0.25	-	-	0.12	-
P = 0.01	-	96	-	0.36	-	-	0.17	-
S. E. single plot +/-	113	89	0.52	0.33	8.1	1.8	0.16	9.1
S. E. treatment mean +/-	23	22	0.13	0.08	2.0	0.4	0.04	2.3
C. V. %	44.29	36.08	8.55	64.99	77.45	43.92	23.01	57.89
N0	268	267	6.09	0.51	11.1	4.1	0.70	16.4
N1	246	245	6.16	0.48	11.1	3.7	0.69	16.0
N2	239	225	6.02	0.53	8.7	4.1	0.68	14.0
N3	267	245	6.04	0.51	11.0	4.3	0.68	16.5
Linear effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
Quadratic effect	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
L.S.D. P = 0.05	-	-	-	-	-	-	-	-
P = 0.01	-	-	-	-	-	-	-	-
S. E. single plot +/-	84	78	0.37	0.24	6.1	0.9	0.07	6.3
S. E. treatment mean +/-	19	17	0.08	0.05	1.4	0.2	0.02	1.4
C. V. %	32.87	31.82	6.16	46.44	57.81	21.62	10.41	39.96

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 2i : Soil Analysis Data For Treatment 10

Sample Depth (cm)	TREATMENT	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
10	P	270	-	5.82	0.54	10.2	3.5	0.71	15.0
0-30	1R	180	219	5.86	0.39	8.8	3.2	0.42	12.8
	2R	208	189	5.67	0.33	8.9	3.8	0.61	13.6
	3R	168	185	5.68	0.21	14.5	3.9	0.89	19.5
	4R	242	316	5.91	0.23	9.8	3.2	0.48	13.7
	5R	245	385	5.94	0.39	8.5	3.4	0.63	12.9
	6R	188	219	5.54	0.32	9.9	3.2	0.70	14.1
	7R	235	323	5.78	0.32	9.1	3.5	0.40	13.3
	8R	149	207	5.67	0.31	8.3	3.5	0.35	12.5
	9R	166	205	5.61	0.27	9.3	3.3	0.82	13.7
% CHANGE P/1R TO 9R		-38.5	-6.4	-3.6	-50.0	-8.8	-5.7	15.5	-8.4
10	P	320	-	6.31	0.22	15.6	4.0	0.74	20.6
30-60	1R	220	219	6.14	0.19	10.6	4.0	0.46	15.3
	2R	173	220	5.78	0.22	9.3	4.2	0.62	14.3
	3R	178	189	5.97	0.20	16.2	4.3	1.00	21.7
	4R	283	326	5.85	0.16	11.8	3.7	0.46	16.1
	5R	261	307	6.19	0.28	10.3	4.0	0.61	15.2
	6R	203	206	5.67	0.23	10.0	3.6	0.76	14.6
	7R	258	291	5.93	0.22	9.5	4.0	0.40	14.1
	8R	145	158	5.81	0.22	8.3	3.8	0.44	12.8
	9R	183	184	5.68	0.21	9.9	3.9	0.84	14.8
% CHANGE P/1R TO 9R		-41.3	-16.0	-10.0	-4.5	-37.2	-2.5	13.5	-28.0
10	P	330	-	6.26	0.20	15.3	4.9	0.87	22.3
60-90	1R	268	295	6.01	0.16	13.5	4.1	0.42	18.2
	2R	210	238	6.13	0.20	10.5	4.8	0.65	16.2
	3R	208	263	6.24	0.18	14.7	3.8	0.85	19.5
	4R	296	337	6.08	0.13	12.4	4.4	0.56	17.5
	5R	259	284	6.24	0.27	9.3	4.2	0.59	14.4
	6R	205	198	5.68	0.19	9.5	3.7	0.72	14.1
	7R	292	356	6.11	0.18	9.7	4.4	0.39	14.7
	8R	166	180	5.90	0.18	8.9	4.1	0.50	13.7
	9R	219	195	5.75	0.19	10.8	4.0	0.87	15.9
% CHANGE P/1R TO 9R		-33.6	-33.9	-8.4	-5.0	-33.7	-18.4	0.0	-28.6

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 22 : Soil Analysis Data For Treatment II

Sample Depth (cm)	RATOON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (e.e.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
11 0-30	P	310	-	6.13	0.46	12.3	3.1	0.72	16.6
	1R	230	300	6.41	0.48	12.7	2.6	0.39	16.2
	2R	214	380	6.31	0.40	12.6	3.4	0.76	17.4
	3R	348	533	6.23	0.49	14.7	2.9	0.68	18.8
	4R	239	301	6.17	0.45	13.0	2.9	0.64	17.0
	5R	226	345	6.21	0.66	9.9	3.2	0.55	14.3
	6R	244	301	6.03	0.85	10.1	3.1	0.80	14.9
	7R	274	430	6.16	0.96	9.4	3.6	0.49	14.5
	8R	191	260	6.21	1.04	8.7	3.3	0.42	13.5
	9R	227	320	6.08	0.94	8.5	3.2	0.75	13.4
% CHANGE P/1R TO 9R		-26.8	6.7	-0.8	104.3	-30.9	3.2	4.2	-19.2
11 30-60	P	335	-	6.52	0.23	16.9	4.2	0.78	24.1
	1R	245	281	6.48	0.21	15.3	3.8	0.49	19.9
	2R	259	360	6.48	0.24	16.6	3.9	0.69	21.4
	3R	408	483	6.38	0.25	16.1	3.9	0.77	21.0
	4R	292	361	6.39	0.26	14.8	3.6	0.63	19.3
	5R	271	282	6.46	0.40	11.4	3.7	0.65	16.2
	6R	216	238	5.82	0.45	8.8	3.5	0.82	13.6
	7R	256	284	6.01	0.59	9.5	4.1	0.59	14.8
	8R	204	205	6.22	0.76	10.2	3.4	0.53	14.9
	9R	213	209	6.03	0.66	10.6	3.3	0.75	15.3
% CHANGE P/1R TO 9R		-36.4	-25.6	-7.5	187.0	-43.9	-21.4	-3.8	-36.5
11 60-90	P	385	-	6.35	0.24	17.8	3.9	0.84	22.8
	1R	245	255	5.85	0.20	15.7	4.0	0.54	20.4
	2R	279	305	6.51	0.22	17.5	4.7	0.88	23.3
	3R	413	511	6.47	0.23	15.5	4.1	0.74	20.6
	4R	313	309	6.38	0.26	15.7	3.8	0.64	20.4
	5R	277	312	6.39	0.35	12.1	4.1	0.62	17.2
	6R	249	266	6.08	0.31	9.8	3.7	0.84	14.7
	7R	296	297	6.12	0.43	11.2	4.7	0.56	16.9
	8R	239	246	6.35	0.53	11.3	3.6	0.32	15.8
	9R	224	202	6.18	0.44	12.1	3.4	0.8	16.7
% CHANGE P/1R TO 9R		-41.8	-20.8	-2.7	83.3	-32.0	-12.8	-4.8	-26.7
MEAN		-41.8	-20.8	-2.7	83.3	-32.0	-12.8	-4.8	-26.7

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 23 : Soil Analysis Data For Treatment 12

Sample Depth (cm)	RATOON	COND(microS/cm)		DU (0.01M CaCl2)	EXTRACTABLE CATIONS (M.E.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
12	P	275	-	5.81	0.55	9.5	3.3	0.57	13.9
0-30	1R	210	315	6.50	0.58	9.3	3.1	0.41	13.4
	2R	175	203	6.23	0.46	8.8	3.5	0.54	13.3
	3R	243	334	5.80	0.61	11.4	2.5	0.72	15.2
	4R	247	289	6.33	0.49	9.9	2.8	0.51	13.7
	5R	265	452	6.35	0.75	8.5	3.2	0.68	13.1
	6R	234	329	5.72	0.83	7.7	3.0	1.19	12.7
	7R	344	591	5.95	1.32	7.5	3.6	0.32	12.7
	8R	234	350	6.13	1.00	5.5	3.0	0.25	9.8
	9R	202	281	6.12	1.04	7.9	3.3	0.63	12.9
% CHANGE P/1R TO 9R		-26.5	-10.8	5.3	89.1	-16.3	0.0	10.5	-7.3
12	P	220	-	5.84	0.22	8.7	3.4	0.78	13.1
30-60	1R	220	290	6.30	0.15	12.0	3.2	0.59	15.9
	2R	180	214	6.30	0.30	9.9	3.7	0.72	14.6
	3R	254	364	5.69	0.35	10.1	3.4	0.77	14.6
	4R	181	316	6.34	0.30	10.8	3.2	0.56	14.9
	5R	267	360	6.45	0.43	9.1	3.5	0.68	13.8
	6R	284	341	5.83	0.46	7.6	3.3	1.26	12.6
	7R	319	406	5.97	0.76	8.1	4.2	0.43	13.5
	8R	223	276	6.05	0.65	5.6	3.3	0.25	9.8
	9R	206	233	6.10	0.69	8.0	3.4	0.65	12.7
% CHANGE P/1R TO 9R		-6.4	-19.7	4.5	213.6	-8.0	0.0	-16.7	-3.1
12	P	254	-	5.96	0.23	9.6	4.3	0.91	15.0
60-90	1R	224	251	4.69	0.23	10.6	3.5	0.50	14.8
	2R	201	194	6.45	0.23	8.4	4.6	0.77	14.0
	3R	243	249	5.77	0.22	9.7	3.2	0.80	13.9
	4R	202	277	6.39	0.19	11.0	3.5	0.60	15.3
	5R	299	371	6.25	0.33	9.0	4.1	0.79	14.2
	6R	234	279	5.76	0.51	7.4	3.6	1.25	12.6
	7R	324	367	6.02	0.52	8.3	4.6	0.48	13.9
	8R	235	243	6.01	0.44	5.3	3.6	0.42	9.8
	9R	205	219	6.05	0.46	7.6	4.0	0.61	12.7
% CHANGE P/1R TO 9R		-19.3	-12.7	1.5	100.0	-20.8	-7.0	-33.0	-15.6

7610/1 : STILLAGE TRIAL - 1R to 9R

Table 24 : Soil Analysis Data For Treatment 13

Sample Depth (cm)	RATON	COND(microS/cm)		PH (0.01M CaCl2)	EXTRACTABLE CATIONS (m.e.%)				
		SAT.PASTE	SAT.EXTRACT		K	Ca	Mg	Na	TOTAL
13 0-30	P	260	-	5.55	0.51	9.0	3.5	0.59	13.6
	1R	210	295	5.65	0.75	8.4	3.4	0.49	13.0
	2R	219	206	5.85	0.68	7.9	3.5	0.54	12.6
	3R	275	298	5.94	0.70	10.9	3.8	0.79	16.2
	4R	235	245	6.46	0.81	0.7	3.4	0.68	5.6
	5R	238	380	6.30	1.12	8.6	3.6	0.71	14.0
	6R	301	443	5.97	1.26	8.5	3.6	1.18	14.5
	7R	435	801	5.92	1.91	7.0	4.2	0.29	13.4
	8R	285	444	6.05	1.18	5.8	2.9	0.30	10.2
	9R	265	406	6.02	1.28	7.9	3.7	0.61	13.5
% CHANGE P/1R TO 9R		1.9	37.6	8.5	151.0	-12.2	5.7	3.4	-0.7
13 30-60	P	290	-	5.79	0.24	11.7	4.3	0.92	17.2
	1R	230	303	5.95	0.26	10.6	4.5	0.61	16.0
	2R	195	155	5.89	0.35	8.7	4.7	0.59	14.3
	3R	354	358	6.34	0.49	13.9	4.4	0.82	19.6
	4R	248	250	6.54	0.41	10.8	4.1	0.69	16.0
	5R	271	326	6.50	0.79	10.5	4.2	0.73	16.3
	6R	311	356	6.00	0.77	9.1	4.1	1.15	15.1
	7R	436	581	6.09	1.21	7.9	4.8	0.32	14.2
	8R	314	368	6.19	0.82	6.7	3.5	0.28	11.3
	9R	283	322	6.02	0.93	8.7	4.3	0.62	14.5
% CHANGE P/1R TO 9R		-2.4	6.3	4.0	287.5	-25.6	0.0	-32.6	-15.5
13 60-90	P	298	-	6.24	0.21	13.3	4.7	0.84	19.1
	1R	259	295	5.84	0.21	12.9	4.8	0.66	18.6
	2R	231	198	6.15	0.27	11.1	5.2	0.62	17.2
	3R	366	321	6.30	0.33	18.5	4.9	0.79	24.5
	4R	237	290	6.66	0.29	11.1	4.2	0.67	16.3
	5R	336	342	6.50	0.61	11.6	4.3	0.73	17.2
	6R	325	331	6.02	0.52	10.7	4.6	1.13	17.0
	7R	423	528	5.99	0.85	8.2	5.0	0.33	14.4
	8R	383	445	6.20	0.61	7.7	3.9	0.28	12.5
	9R	291	270	6.06	0.63	10.0	4.9	0.69	16.2
% CHANGE P/1R TO 9R		-2.3	-8.5	-2.9	200.0	-24.8	4.3	-17.9	-15.0

Fig.1: Variation in % Total Solids in

HVE Stillage (1990-1991).

