SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

CODE: SMUT 1/85/Sw UBO
CAT. NO.: 1646

TERMINAL REPORT

TITLE: LEVELS OF SMUT ROGUING IN NCo376

1. PARTICULARS OF PROJECT

This crop	:	7th Ratoon
Site	:	Ubombo Ranches, Ngongoni 6
Region	:	Northern Irrigated (Swaziland)
Design	:	6 x 6 Latin Square
Soil Set	:	'S'
Variety	:	NCo376
Fertilizer (kg/ha)	:	N 161, P 30, K -
Dates	:	12/11/87 - 6/12/88
Age	:	12.8 months

2. OBJECTIVES

2.1 To determine the effects of different levels of roguing on the expression of smut in NCo376.

2.2 To assess the effects of roguing on yield.

3. TREATMENTS

Six levels of roguing were applied to the plots.

Treatment 1 : No roguing

Treatment 2 : One roguing at 6 weeks

Treatment 3 : Two roguings at 6 and 12 weeks

Treatment 4 : Four roguings at 6, 9, 12, and 15 weeks

Treatment 5 : Four roguings at 6, 12, 18, and 24 weeks

Treatment 6 : Eight roguings at 6, 9, 12, 15, 18, 21, 24 and 27 weeks

Notes on treatments

* The gross plot area was a 54 metre square area comprising 9 sprinkler plots each 18 metres square.

* The nett plot for measurement of smut incidence was the center 18 metre square plot.

* Measurement of smut incidence was carried out 2 days before the roguing treatments. No post-roguing measurement was carried out as the trial theme was to assess the effectiveness of commercial roguing practice.

* Measurement of smut incidence was assessed as whips (exposed and incipient) infected and stools infected.

* Total shoot counts were carried out at 6 week intervals.

* The first roguing was carried out at about knee height (six weeks) and was done by 'chipping out' infected plant material. Subsequent roguings were done by 'pulling' infected material away from the stool.

4. RESULTS (ROGUING)

4.1 Table 1. Levels of infected stools (%) between 6 and 27 weeks.

TREATMENT	JAN 8 6 wks	JAN 26 9 wks	FEB 16 12 wks	MAR 8 15 wks	MAR 29 18 wks	APR 19 21 wks	MAY 10 24 wks	MAY 31 27 wks
1	19.1	43.8	38.4	27.9	26.7	17.4	6.2	2.8
2	18.6	36.1	32.2	28.8	22.7	14.2	5.0	3.7
3	15.0	34.0	21.2	12.8	12.1	9.0	3.0	1.9
4	14.6	36.6	18.7	10.3	9.1	6.5	4.0	1.8
5	15.7	33.6	22.8	12.4	13.0	2.4	2.6	0.8
6	13.2	24.3	17.0	18.2	7.7	2.0	3.3	1.2
LSD(P=0.05)*	4.0	13.3	10.8	7.6	3.7	5.3	4.5	1.6
(P=0.01)**	5.5	18.2	14.8	10.3	5.0	7.2	6.1	2.2
SIGNIFICANCE	*	**	**	**	**	**	N.S	**
TRIAL MEAN	16.0	34.8	25.0	18.4	15.2	8.6	4.0	2.0
S E MEAN	1.4	4.5	3.7	2.6	2.4	1.8	1.5	0.5
CV %	20.9	31.8	35.9	34.2	39.0	51.2	93.6	64.7

4.2 Table 2 Levels of infected whips (%) between 6 and 27 weeks (based on 155 000 millable stalks/ha)

TREATMENT	JAN 8 6 wks	JAN 26 9 wks	FEB 16 12 wks	MAR 8 15wks	MAR 29 18 wks	APR 19 21 wks	MAY 10 24 wks	MAY 31 27 wks
1	4.5	8.5	14.0	8.9	8.2	3.6	1.0	0.3
2	4.3	6.5	8.3	6.7	5.7	2.9	0.7	0.5
3	4.1	5.6	4.9	2.3	1.6	1.3	0.3	0.2
4	3.6	6.1	3.5	1.7	1.1	0.8	0.4	0.2
5	3.9	6.3	4.7	2.3	1.7	0.2	0.3	0.1
6	2.6	4.7	3.9	3.4	0.9	0.2	0.4	0.1
LSD(P=0.05)*	1.5	2.1	5.2	2.9	3.7	1.2	0.8	0.2
LSD(P=0.01)**	2.1	2.8	7.1	3.9	5.0	1.6	1.1	0.3
SIGNIFICANCE	*	**	**	**	**	**	N.S	**
TRIAL MEAN	3.8	6.3	6.6	4.2	3.2	1.5	0.5	0.2
S E MEAN	0.5	0.7	1.8	1.0	1.2	0.4	0.3	0.1
CV %	33.0	27.5	66.3	56.2	95.1	62.7	132.33	86.4

4.3 TABLE 3 Shoot (stalk) counts (x 1000/ha) at 6, 12, 18 and 24 weeks.

TREATMENT	JAN 8 6 wks	FEB 16 12 wks	MAR 29 18 wks	MAY 10 24 wks	DEC 6 Harvest
1	477	351	279	220	160
2	453	366	320	241	163
3	443	354	296	217	160
4	426	362	277	215	174
5	469	335	277	232	165
6	484	348	267	223	176
MEAN	459	352	286	224	166

5. RESULTS (HARVEST)

5.1 Table 4. Cane yield, sucrose % cane and sucrose yield.

TREATMENT	TONNES CANE/HA	SUCROSE % CANE	TONNES SUCROSE/HA
1	93.6	15.6	14.6
2	96.9	15.2	14.8
3	102.2	15.2	15.5
4	97.1	15.3	14.9
5	99.5	15.4	15.4
6	100.5	15.3	15.4
LSD (P=0.05)*	11.8	0.6	2.0
(P=0.01)**	16.0	0.8	2.7
SIGNIFICANCE	N.S	N.S	N.S
TRIAL MEAN	98.3	15.3	15.1
S E MEAN	4.0	0.2	0.7
CV %	10.0	3.2	11.0

6. COMMENT

6.1 Roguing Period

* Roguing was carried out by estate personnel to determine treatment differences resulting from standard, commercial cane, disease control practices.

* The CVs continued to be high. A marked increase was noticeable with the onset of lodging in early May.

* The variability in shoot (stalk) counts conducted at 6, 12 and 24 weeks were variable due to the procedure of random selection of 2 x 5 metre sampling sites at each sampling date.

* The first inspection before roguing commenced at 6 weeks showed a slight non-significant trend indicating a residual influence occurring from the previous season.

* There are indications that the first roguing was not as affective as in the previous 2 seasons and could be attributed to the difficulty of recognition of incipient whips when the crop is still below knee height.

* See Tables 1 and 2 for the effects of roguing treatment on the expression of smut.

  - Treatment 1 (Control) indicated that the natural infection level exceeded 40% stool infection this season.

- Treatment 2, differed little from the control and reflected the inaffective 1st roguing.

- Treatment 3, improved considerably after the 2nd roguing at 12 weeks.

- Treatment 4, differed little from the previous treatment except in sustaining a somewhat lower level of smut inspection.

- Treatment 5, achieved better long term control than treatment 3 and 4 but was somewhat less effective in reducing levels during the early period of growth.

- Treatment 6, less effective in lowering smut levels compared to the previous 2 crops and this may be due to the overall increase in the latent smut levels in the field as a whole.

* In a comparison of sample data between % stool and % whip infection there is close correlation which is as follows:

Linear $Y = 0.32X-1.68$ $(r = 0.87)$

Power $Y = 0.072X^{1.32}$ $(r = 0.97)$

Where X = % stools infected
Y = % whips infected

6.2 Harvest Results

* The CVs were improved and acceptable for a trial spread over 11 hectares.

* There were no significant cane yield differences although there was an apparent trend towards increasing cane yield with higher frequency of roguing.

* There were no cane quality differences.

* Sucrose yield reflected the trend in cane yield and was not significant.

* Stalk counts at harvest indicated an improving trend with more frequent roguings.

7. SUMMARY

7.1 Roguing

* The expected drop in smut infection levels after the first roguing at 6 weeks was not strongly evident and this could be attributed to poor identification of incipient smut by the roguing personnel. This is important as early sustained roguing is necessary to reduce smut expression in fields with high latent levels of infection.

7.2 Harvest

* The trend towards an increasing yield of cane from consistent roguing was evident and appeared to be reflected in stalk counts at harvest.

8. 3 SEASON SUMMARY

8.1 Roguing Period

* The results in Table 5 clearly show that varying roguing treatments have no effect on the initial expression of smut on the subsequent crop.

* The results in Table 6 show the smut levels at 18 weeks (after 12 weeks of roguing treatment). There is a positive improvement in smut levels particularly with the more intensive treatments 4 and 6.

* The correlation between % stool and % whip infection is very good and will allow for comparisons to be made against other industries level of smut in NCo376.

8.2 Harvest results

* Although in this trial stalk counts were not taken at each harvest the final harvest result showed no difference in millable stalks between treatments.

* There appeared to be a slight indication of a trend towards improved cane yields in the intensively rogued plots but this was not significant in any of the 3 harvests.

Table 5 Initial levels of smut expression prior to the commencement of roguing treatments at 6 weeks.

	% STOOL INFECTION				% WHIP INFECTION			
TREATMENT	85/86	86/87	87/88	MEAN	85/86	86/87	87/88	MEAN
1	17.4	16.4	19.1	17.6	2.7	4.4	4.5	3.9
2	18.2	19.1	18.6	18.6	2.8	5.2	4.3	4.1
3	14.7	13.9	15.0	14.5	2.6	3.4	4.1	3.4
4	17.5	14.7	14.6	15.6	3.1	4.2	3.6	3.6
5	17.9	15.2	15.7	16.3	2.9	4.3	3.9	3.7
6	18.6	11.3	13.2	14.4	2.9	2.7	2.6	2.7

Table 6 Levels of smut expression at 18 weeks (following 12 weeks of roguing treatments)

	% STOOL INFECTION				% WHIP INFECTION			
TREATMENT	85/86	86/87	87/88	MEAN	85/86	86/87	87/88	MEAN
1	32.6	20.1	26.7	26.5	10.3	5.9	8.2	8.1
2	26.0	13.7	22.7	20.8	6.3	2.7	5.7	4.9
3	10.7	9.6	12.1	10.8	1.5	1.2	1.6	1.4
4	9.1	6.0	9.1	8.1	1.1	0.7	1.1	1.0
5	7.8	8.6	13.0	9.8	1.0	1.2	1.7	1.3
6	8.1	7.5	7.7	7.8	1.0	1.0	0.9	1.0

Table 7 Correlation and regression between % stool and % whip infection (Linear - $Y = a + bX$ and Power - $Y = aX^b$)

	LINEAR RELATIONSHIP				POWER RELATIONSHIP			
TREATMENT	1986	1987	1988	MEAN	1987	1987	1988	MEAN
a	-2.22	-1.56	-1.68	-1.82	0.043	0.072	0.062	0.059
b	0.36	0.34	0.32	0.34	1.53	1.32	1.43	1.43
r	0.94	0.91	0.87	0.91	0.97	0.97	0.96	0.93

Table 8 Stalk populations (1000/ha) at harvest

TREATMENT	85/86	86/87	87/88	MEAN
1	-	-	160	160
2	-	-	163	163
3	-	-	160	160
4	-	-	174	174
5	-	-	165	165
6	-	-	176	176
MEAN	-	-	166	166

Table 9 Yield at harvest (Tons cane per hectare)

TREATMENT	1986	1987	1988	MEAN
1	112.0	94.3	93.6	100.0
2	115.5	97.1	96.9	103.2
3	125.4	102.0	102.2	109.9
4	112.9	98.9	97.1	103.0
5	122.8	103.0	99.5	108.4
6	120.4	101.3	100.5	107.4
MEAN	118.2	99.4	98.3	105.3

TLP/cg
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