

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

3300/44 LEVELS OF SMUT INFECTION

Catalogue: 1193
Object: To determine the effect on yield of different levels of smut infection.

This crop: Plant Age: 12,0 months (8.9.78 to 7.9.79)

Location: RSA Experiment Station, Kudu Block H6-9

Soil type: PE.1 sandy clay loam derived from gneiss

Design: Randomised blocks, 4 replications

Variety/Spacing: NCo 376 in 1,5 m rows

Fertiliser: (kg/ha) N P₂O₅ K₂O

		—		
		120	100	60

Rainfall: 707 mm Irrigation: 880 mm

Treatments: A range of 8 smut levels described in terms of percentage smut-infected seedcane at planting, viz. 0; 1; 5; 10; 20; 50; 75; 100% infected seedcane.

Conduct: (a) The defined smut levels were applied by planting inoculated seedcane and Bayleton (triadimefon) - treated seedcane in the prescribed ratios.
(b) Inoculated seedcane was dipped in a fresh smut spore suspension immediately before planting.
(c) Bayleton 25% E.C. was used at a concentration of 0,025% as a 1-minute cold water dip.
(d) Nett plots were separated by a smut-free barrier of three rows of N 52/219 (Immune to smut).

RESULTS:

Relevant data from the plant crop are shown in the table on Page 2.

The method used was successful in creating a wide range of smut infection levels, although there were only small differences in whip counts between the control and the 1% infection level, and also between the 75% and 100% levels of infection.

However, there were no significant yield or quality effects induced by the treatments, in spite of the differences in whip counts. Smut infection levels can be expected to increase considerably in the first ratoon, when yield differences are more likely to be measured

3300/44 LEVELS OF SMUT INFECTION

Treatment	Cane t/ha	ERC% cane	TERC per ha	Stalks/ ha x 10 ⁻³	Whips per ha	Smut rating
Control	162,73	11,76	19,16	157,3	778	5
1% infected seed	162,65	11,89	19,31	150,1	750	5
5% " "	158,14	11,92	18,82	154,0	2 028	6
10% " "	167,18	11,56	19,33	154,5	2 722	6
20% " "	158,96	12,25	19,50	154,5	3 778	6
50% " "	155,22	12,02	18,61	157,3	13 944	7
75% " "	152,72	11,87	18,00	155,8	33 750	9
100% " "	161,97	11,55	18,72	154,0	28 694	8
L.S.D. P=0,05	N.S.	N.S.	N.S.	-	-	-
P=0,01	N.S.	N.S.	N.S.	-	-	-
Trial: mean	159,95	11,85	18,93	154,7	10 801	-
S.E. plot \pm	8,35	0,71	0,89	-	-	-
S.E. mean \pm	4,18	0,36	0,45	-	-	-
C.V.%	5,22	6,02	4,71	-	-	-

12. Sept 10

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

3300/44 LEVELS OF SMUT INFECTION

- Catalogue: 1193
- Object: To determine the effect on yield of different levels of smut infection.
- This crop: First ratoon Age: 12,0 months (7.9.79 to 9.9.80)
- Location: ZSA Experiment Station, Kudu Block H6-9
- Soil type: PE,1 sandy clay loam derived from gneiss
- Design: Randomised blocks, 4 replications
- Variety/spacing: NCo 376 in 1,5m rows
- Fertiliser (kg/ha):
- | | <u>N</u> | <u>P₂O₅</u> | <u>K₂O</u> |
|----|----------|-----------------------------------|-----------------------|
| P | 120 | 100 | 60 |
| LR | 180 | 100 | 60 |
- Rainfall: 774 mm Irrigation: 968 mm
- Treatments: A range of 8 smut levels defined in terms of percentage smut infected seedcane at planting, viz. 0; 1; 5; 10; 20; 50; 75; 100% infected seedcane.
- Conduct:
- (a) The defined smut levels were applied by planting inoculated seedcane and Bayleton-treated seedcane in the prescribed ratios.
 - (b) Inoculated seedcane was dipped in a fresh smut spore suspension immediately before planting.
 - (c) Bayleton 25% E.C. was used at a concentration of 0,025% a.i. as a one-minute cold water dip.
 - (d) Nett plots were separated by a smut-free barrier of 3 rows of N 52/219 (immune to smut)

RESULTS

- (a) Smut incidence Records from the plant and first ratoon crops are shown in the following table (smut whips/ha):

2./ Table

Treatment	Smut whips/ha	
	P	LR
Control	778	27 583
1% inoculated seedoane	778	23 583
5% " "	2 056	34 889
10% " "	2 778	29 611
20% " "	3 972	34 472
50% " "	14 833	61 639
75% " "	33 972	91 111
100% " "	29 167	91 056
L.S.D. P=0,05 / P=0,01	6 527	26 883
	8 884	36 558
Trial mean	11 042	49 243
S.E. mean \pm	2 219	9 138
C.V.%	40,19	37,11

The method used was successful in creating a wide range of smut infection levels in the plant crop, but differences between treatments were less pronounced in the first ratoon.

Roguing was carried out in the control treatment only, and all others remained unrogued throughout the course of the trial; smut levels were thus considerably higher than would normally be experienced.

(b) Yields and quality. Relevant yield data were as follows:--

Treatment	Yield t/ha		ERC % cane		TERC/ha	
	P	LR	P	LR	P	LR
Control	162,73	166,75	11,76	12,93	19,16	21,56
1% inoculated seedoane	162,65	160,50	11,89	13,28	19,31	21,31
5% " "	158,14	163,08	11,92	13,22	18,82	21,54
10% " "	167,18	153,53	11,56	12,88	19,33	19,77
20% " "	158,96	161,12	12,25	13,47	19,50	21,68
50% " "	155,22	152,65	12,02	13,03	18,61	19,90
75% " "	152,72	140,08	11,87	12,89	18,00	18,04
100% " "	161,97	132,65	11,55	13,08	18,72	17,31
L.S.D. P=0,05 P=0,01	N.S.	19,70	N.S.	N.S.	N.S.	2,43
	N.S.	26,82	N.S.	N.S.	N.S.	3,31
Trial mean	159,95	153,80	11,85	13,10	18,93	20,14
S.E. mean \pm	4,18	6,70	0,36	0,22	0,45	0,83
C.V. %	5,22	8,71	6,02	3,39	4,71	8,21

In spite of the differences in whip counts in the plant crop, there were no significant yield effects induced by the treatments. In the first ratoon a progressive decline was evident in those treatments with more than 35 000 whips/ha, i.e. the treatment established with 50% or more inoculated seedoane.

It was hoped that a low level of infection would be maintained in the control

3./ treatment

treatment to give a wider range of smut levels in the ratoon, and thus enable a smut/yield relationship to be established. This was not possible, however, due to the high levels of smut incidence in the ratoon crop.

KEC/Oct. '80.

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SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

Title: LEVELS OF SMUT INFECTION 3300/44

TERMINAL REPORT

Cat No.: 1193

Object : To determine the effect on yield of different levels of smut infection.

Planted : 8th September, 1978.

Terminated : 18th September, 1981, after the second ratoon crop.

<u>Harvest dates & ages</u> :	<u>Harvest</u>	<u>Age</u>
P	7.9.79	12,0 months
1R	9.9.80	12,1 "
2R	18.9.81	12,3 "

Location : ZSA Experiment Station, Kudu Block H6-9.

Soil Type : PE.1 sandy clay loam derived from gneiss.

Design : Randomised blocks, 4 replications

Variety/spacing : NCo 376 in 1,5m rows.

<u>Fertiliser</u> : (kg/ha)	<u>N</u>	<u>P₂O₅</u>	<u>K₂O</u>
P	120	100	60
1R	180	100	60
2R	180	100	60

<u>Irrigation & Rainfall</u> :	<u>Irrig. (mm)</u>	<u>Rain (mm)</u>
P	880	707
1R	968	774
2R	880	909

Treatment : A range of 8 smut levels defined in terms of percentage smut-infected seedcane at planting, viz. 0; 1; 5; 10; 20; 50; 75; and 100% infected seedcane.

Conduct :

- (a) The defined smut levels were applied by planting inoculated seedcane and Bayleton (triadimefon)-treated seedcane in the prescribed ratios.
- (b) Inoculated seedcane was dipped in a fresh smut spore immediately before planting.
- (c) Bayleton 25% E.C. was used at a concentration of 0,025% (250 ppm) a.i. as a one-minute cold-water dip.
- (d) Nett plots were separated by a smut-free barrier of three rows of N 52/219 (immune to smut).

RESULTS

(a) Smut incidence. Recorded whip counts in the three crops from plant to second ratoon inclusive were as follows:-

Treatment	Smut whips/ha		
	P	1R	2R
Control	778	27 583	39 444
1% inoculated seedcane	778	23 583	55 278
5% " "	2 056	34 889	56 944
10% " "	2 778	29 611	61 389
20% " "	3 972	34 472	63 972
50% " "	14 833	61 639	81 000
75% " "	33 972	90 611	113 417
100% " "	29 167	91 056	99 833
Trial mean	11 042	49 243	71 410

The method used was successful in creating a wide range of smut infection levels in the plant crop. Smut whips were rogued from the control treatment only, and the increase in infection in the ratoons was thus more pronounced than would normally be experienced. Treatment effects were still evident in the second ratoon, although differences were small between the four treatments from 1% to 20% infected seedcane inclusive.

(b) Yield and quality effects. Relevant data is given in the attached table.

In the plant crop there were no significant yield or quality effects induced by the treatments, in spite of the differences in whip counts. In the ratoons a progressive yield decline was evident in those treatments established with 50% or more inoculated seedcane. The yield drop was most marked in the first ratoon, with a loss of over 4 t/ha ERC, whereas in the second ratoon it was only 2 t/ha ERC and was not significant.

There was no direct relation between yield and whip counts, probably because the latter were terminated early in the plants cycle and they did not provide a true reflection of smut infection levels. In the first ratoon, for example, yields dropped in those treatments with more than 35 000 whips/ha, whereas in the second ratoon the yield drop only occurred when the whip counts reached 81 000/ha.

3./ (c)

(c) Stalk counts. Stalk population levels in the three crops were as follows:-

Treatments	Stalks/ha x 10 ⁻³			
	P	1R	2R	Mean
Control	157,3	152,8	153,5	154,5
1% inoculated seedcane	150,1	146,5	151,2	149,3
5% " "	154,0	150,9	145,8	150,2
10% " "	154,5	148,6	156,3	153,1
20% " "	154,5	151,4	152,3	152,7
50% " "	157,3	145,1	148,8	150,4
75% " "	155,8	138,7	134,3	142,9
100% " "	154,0	136,2	141,4	143,9
Means	154,7	146,3	148,0	149,7

Stalk populations were unaffected by treatments in the plant crop, but in the ratoons there was evidence of reduced stalk counts at high smut incidence levels.

CONCLUSIONS

Although results showed that yield losses occurred at high smut infection levels, they did not reveal a simple relationship between yield and whip counts. Whereas the latter may provide a satisfactory means of comparing treatment effects, they cannot be expected to give an absolute index of infection level, particularly when lodging is severe and recording has to be stopped as early as at 6 months of age.

3300/44 LEVELS OF SMUT INFECTION

HARVEST DATA - PLANT TO SECOND RATOON CROP

Treatments	CANE YIELD t/ha				ERC % CANE				TERC/ha			
	P	1R	2R	Mean	P	1R	2R	Mean	P	1R	2R	Mean
Control	162,73	166,75	136,20	155,23	11,76	12,93	13,30	12,66	19,16	21,56	18,13	19,62
1% inoculated seedcane	162,65	160,50	140,56	154,57	11,89	13,28	13,34	12,84	19,31	21,31	18,76	19,79
5% " "	158,14	163,08	139,12	153,45	11,92	13,22	13,36	12,83	18,82	21,54	18,55	19,64
10% " "	167,18	153,53	146,11	155,61	11,56	12,88	13,47	12,64	19,33	19,77	19,70	19,60
20% " "	158,96	161,12	143,51	154,53	12,25	13,47	13,43	13,05	19,50	21,68	19,27	20,15
50% " "	155,22	152,65	141,10	149,66	12,02	13,03	13,55	12,37	18,61	19,90	19,13	19,21
75% " "	152,72	140,03	130,71	141,17	11,87	12,89	13,05	12,60	18,00	18,04	17,07	17,70
100% " "	161,97	132,65	127,50	140,71	11,55	13,08	13,33	12,67	18,72	17,31	17,08	17,70
L.S.D. P=0,05	N.S.	19,70	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	2,43	N.S.	-
P=0,01	N.S.	26,82	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	3,31	N.S.	-
Trial mean	159,95	153,80	138,80	150,62	11,85	13,10	13,36	12,77	18,93	20,14	18,46	19,18
S.E. mean ±	4,18	6,70	4,21	-	0,36	0,22	0,22	-	0,45	0,83	0,69	-
C.V.%	5,22	8,71	6,10	-	6,02	3,39	3,35	-	4,71	8,21	7,52	-

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3./ (c)

(c) Stalk counts. Stalk population levels in the three crops were as follows:-

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1% inoculated seedcane	162,65	160,50	140,56	154,57	11,89	13,28	13,34	12,84	19,31	21,31	18,76	19,79
5% " "	158,14	163,08	139,12	153,45	11,92	13,22	13,36	12,83	18,82	21,54	18,55	19,64
10% " "	167,18	153,53	146,11	155,61	11,56	12,88	13,47	12,64	19,33	19,77	19,70	19,60
20% " "	158,96	161,12	143,51	154,53	12,25	13,47	13,43	13,05	19,50	21,68	19,27	20,15
50% " "	155,22	152,65	141,10	149,66	12,02	13,03	13,55	12,37	18,61	19,90	19,13	19,21
75% " "	152,72	140,03	130,71	141,17	11,87	12,89	13,05	12,60	18,00	18,04	17,07	17,70
100% " "	161,97	132,65	127,50	140,71	11,55	13,08	13,33	12,67	18,72	17,31	17,08	17,70
L.S.D. P=0,05	N.S.	19,70	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	2,43	N.S.	-
P=0,01	N.S.	26,82	N.S.	-	N.S.	N.S.	N.S.	-	N.S.	3,31	N.S.	-
Trial mean	159,95	153,80	139,80	150,62	11,85	13,10	13,36	12,77	18,93	20,14	18,46	19,18
S.E. mean ±	4,18	6,70	4,21	-	0,36	0,22	0,22	-	0,45	0,83	0,69	-
C.V.%	5,22	8,71	6,10	-	6,02	3,39	3,35	-	4,71	8,21	7,52	-