SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

3300/52 VARIETAL SUSCEPTIBILITY TO SMUT

Catalogue No.: 1238

OBJECT : To observe the development of smut infection in 26 varieties of sugarcane under conditions of natural infection.

THIS CROP : Plant Age : 7,7 months (22.10.80 - 11.6.81)

LOCATION : ZSA Experiment Station, Impala Block F10-11

SOIL TYPE : PE.1 sandy clay loam derived from gneiss

DESIGN : Randomised blocks, three replications

SPACING : 1,5 m between rows

FERTILISER : (kg/ha)

N	P_2O_5	K_2O
120	100	60

RAINFALL : 797 mm Irrigation : 484 mm

CONDUCT :

Plots consisted of a single row 15 m in length, with stools spaced 0,5 m apart. The border rows, and every third internal row, were planted to NCo 376 to serve as infection rows. Seedcane for these rows was dipped in a fresh smut spore suspension immediately prior to planting. Seedcane for varietal entries was not dipped in spore suspension but treated with mercurial fungicide before planting. Stools consisted of 3 single budded setts.

Monthly records were taken of smut whips, (which were rogued) and infected stools per plot. Number of stools showing leaf scald symptoms were counted in each plot.

TREATMENTS

25 Hawaiian introductions were tested against a standard variety (NCo 376).

SMUT RATING KEY : The following system was used for rating of smut infection level.

Rating	Description	Whips/ha
0	Immune	0
1	Very highly resistant	1-60
2	Highly resistant	61-120
3	Resistant	121-240
4	Intermediate resistant	241-625
5	Intermediate average	626-1 875
6	Intermediate susceptible	1 876-5 000
7	Susceptible	5 001-15 000
8	Highly susceptible	15 000-30 000
9	Very highly susceptible	>30 000

3300/52

It should be noted that the small plots (67,5 m^2 per variety) preclude accurate resistance rating. The minimum possible count of 1 whip per variety gave it a value of 148 whips/ha or a rating of 3 which would have been more accurately denoted as "1 to 3".

RESULTS

Relevant disease records from the plant crop are shown in the attached tables in conjunction with those recorded from the open quarantine nursery (Project 2010/6). The latter trial was grown under similar conditions with only a single row of each introduced variety and no replication.

Smut incidence. Low smut ratings in all varieties indicated that inoculum pressure in the plant crop was not heavy enough to cause high levels of infection.

A smut rating of 6 was attained by only one variety, and the rest had ratings of 5 or below. H 68-93 was the only variety to remain free of the disease in both this trial and in the open quarantine nursery (2010/6). It can be expected that most varieties will prove to be more susceptible when smut incidence increases in the first ratoon.

Leaf scald. Moderate susceptibility was recorded in five of the introductions, of which 4 had already shown susceptibility in the open quarantine nursery (2010/6).

PSM/July'81.
rw

3300/52 VARIETY SUSCEPTIBILITY TO SMUT

SMUT RECORDS

VARIETIES	Smut whips per ha.			Smut rating			Smut % stool infection
	3300/52	2010/6		3300/52	2010/6		3300/52
	P	1R	1R	P	P	1R	P
H 61-1721	1 630	6 111	63 888	5	7	9	1,1
H 61-3145	2 222	3 889	4 444	6	6	6	2,6
H 63-599	0	556	1 111	0	4	5	0,0
H 63-4342	593	556	7 222	4	4	7	2,2
H 64-848	444	556	16 111	4	4	8	2,3
H 65-1488	444	6 667	36 111	4	7	9	2,3
H 65-7193	1 037	0	2 778	5	0	6	4,7
H 66-2959	1 037	12 222	114 999	5	7	9	3,9
H 66-3232	444	0	64 999	4	0	9	2,8
H 66-8912	2 519	2 778	52 777	6	6	9	6,6
H 68-93	0	0	0	0	0	0	0,0
H 68-3472	741	0	13 889	5	0	7	2,6
H 69-2429	148	556	556	3	4	4	1,2
H 69-5123	1 333	0	2 778	5	0	6	2,4
H 70-2665	0	0	1 111	0	0	5	0,0
H 70-3339	148	0	16 667	3	0	8	1,1
H 70-5145	0	1 111	9 444	0	5	7	0,0
H 70-6211	296	556	3 333	4	4	6	1,2
H 71-1075	0	0	556	0	0	4	0,0
H 71-4205	1 481	1 111	11 111	5	5	7	4,0
H 71-4919	1 481	0	30 000	5	0	8	3,8
H 72-6317	148	0	1 666	3	0	5	1,2
H 73-852	0	0	2 222	0	0	6	0,0
H 73-4872	296	0	13 889	4	0	7	1,2
H 73-6136	0	556	22 778	0	4	8	0,0
NCo 376	148	5 556	43 333	3	7	9	1,3
Means	638	1 645	20 684	-	-	-	1,9

3300/52 VARIETY SUSCEPTIBILITY TO SMUT

LEAF SCALD RECORDS

VARIETIES	Leaf Scald % stool infection		
	3300/52	2010/6	
	P	P	1R
H 61-1721	4,5	0	8
H 61-3145	0,0	0	0
H 63-599	0,0	0	10
H 63-4342	0,0	0	6
H 64-848	1,1	0	13
H 65-1488	0,0	0	8
H 65-7193	0,0	0	0
H 66-2959	0,0	0	0
H 66-3232	0,0	0	6
H 66-8912	0,0	0	4
H 68-93	0,0	0	0
H 68-3472	0,0	0	0
H 69-2429	0,0	0	6
H 69-5123	0,0	0	8
H 70-2665	0,0	0	0
H 70-3339	0,0	6	4
H 70-5145	0,0	0	0
H 70-6211	0,0	0	0
H 71-1075	1,8	0	0
H 71-4205	2,6	6	2
H 71-4919	6,3	0	19
H 72-6317	0,0	0	0
H 73-852	0,0	0	0
H 73-4872	0,0	0	2
H 73-6136	0,0	0	0
NCo 376	0,0	0	0
Means	0,6	0,5	3,7

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS: ASSOCIATION

Title: VARIETAL SUSCEPTIBILITY TO SMUT 3300/52

TERMINAL REPORT

Cat.: 1238

Object : To observe the development of smut infection in 26 varieties under conditions of natural infection.

Planted : 22.10.80

Terminated : 17.2.82

Harvest dates & Ages :		**Harvested :**	**Age :**
	P	11.6.81	7,7 months
	1R	17.2.82	8,2 "

Location : ZSA Experiment Station, Impala Block F10-11

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

Design : Randomised blocks, three replications

Spacing : 1,5 m between rows

Fertiliser (kg/ha) :

	N	P_2O_5	K_2O
P	120	100	60
1R	90	100	60

Rainfall & Irrigation :		**Irrigation (mm)**	**Rainfall (mm)**
	P	484	797
	1R	794	288

Treatments : 25 Hawaiian introductions were tested against a standard variety (NCo 376)

Conduct : Plots consisted of a single row 15 m in length, with stools spaced 0,5 m apart. The border rows, and every third internal row, were planted to NCo 376 to serve as infection rows. Seedcane for those rows was dipped in a fresh smut spore suspension immediately prior to planting. Seedcane for varietal entries was not dipped in a spore suspension but treated with mercurial fungicide before planting. Stools consisted of 3 single budded setts. Monthly records were taken of smut whips (which were rogued) and infected stools per plot. The number of stools showing leaf scald symptoms were counted in each plot.

2./ Smut Rating ..

Smut Rating Key : The following system was used for rating of smut infection levels :

Rating	Description	Whips/ha
0	Immune	0
1	Very highly resistant	1-60
2	Highly resistant	61-120
3	Resistant	121-240
4	Intermediate resistant	241-625
5	Intermediate average	626-1 875
6	Intermediate susceptible	1 826-5 000
7	Susceptible	5 000-15 000
8	Highly susceptible	15 001-30 000
9	Very highly susceptible	> 30 000

It should be noted that the small plots (67,5 m^2) per variety preclude accurate resistance rating. The minimum possible count of 1 whip per variety gave it a value of 148 whips/ha or a rating of 3, which would have been more accurately denoted as "1 to 3".

RESULTS

Relevant disease records from the plant and first ratoon crops are shown in the attached tables in conjunction with those recorded from the Open Quarantine Nursery (Project 2010/6). The latter trial was grown under similar conditions with infection rows of NCo 376 throughout, but with only one small plot per variety and no replication.

Smut incidence. The level of smut in the plant crop was low but infection increased considerably in the first ratoon. Results obtained from both trials indicated that none of the introductions was immune to smut.

Out of 25 introductions, H 71-1075 and H 72-6317 were the most resistant entries, with the smut rating of 4 followed by H 70-2665 with the smut rating of 5; the rest attained ratings of 6 or more.

H 65-7193 was the only entry with smut rating of 6 and a low percentage of smut stool infection. H 68-93, the variety which did not produce whips in the previous crops of both trials attained the susceptibility rating of 7 in the first ratoon.

Leaf scald. The incidence of leaf scald increased markedly in the first ratoon when all introductions showed various degrees of susceptibility.

The disease incidence in 8 entries where well above 15% stool infection. The lowest stool infection percentages were recorded on H 65-7193, H 68-93, H 68-3472 and H 73-852.

Rust. The symptoms of rust were noted on the leaves of 6 introductions of which H 73-852 was affected severely, whilst the extent of the disease on five other entries was low.

Gumming. Six introductions exhibited the symptoms of gumming disease, of which H 69-5123 was affected moderately and the rest showed low symptoms of the disease.

3./ ...

CONCLUSIONS

The trial terminated after the first ratoon results when over 50% of introductions exhibited high degrees of susceptibility to smut, and there were none with complete immunity or very high resistance.

Out of 25 tested introductions the following three were selected for further critical performance testing :

H 72-6317 : Very low smut incidence, low leaf scald symptoms and low rust infection.

H 70-2665 : Low smut incidence, very low leaf scald symptoms and low rust infection.

H 65-7193 : Intermediate smut susceptibility rating, but low percentage of smut stool infection, very low leaf scald symptoms and no sign of any other diseases.

The remaining 22 entries, due to the high susceptibility to smut and/or leaf scald (and rust in the case of H 73-852), do not justify further consideration.

PSM/Feb. '82
rw

3300/52 VARIETAL SUSCEPTIBILITY TO SMUT

SMUT RECORDS

VARIETIES	Smut whips/ha				Smut rating				Smut % stool infection	
	3300/52		2010/6		3300/52		2010/6		3300/52	
	P	1R	P	1R	P	1R	P	1R	P	1R
H 61-1712	1 630	24 148	6 111	63 888	5	8	7	9	1,1	40,0
H 61-3145	2 222	49 926	3 889	4 444	6	9	6	6	2,6	41,3
H 63-599	0	3 111	556	1 111	0	6	4	5	0,0	6,3
H 63-4342	593	13 037	556	7 222	4	7	4	7	2,2	15,1
H 64-848	444	14 815	556	16 111	4	7	4	8	2,3	18,3
H 65-1488	444	28 000	6 667	36 111	4	8	7	9	2,3	35,1
H 65-7193	1 037	2 815	0	2 778	5	6	0	6	4,7	3,6
H 66-2959	1 037	73 926	12 222	114 999	5	9	7	9	3,9	60,3
H 66-3232	444	69 333	0	64 999	4	9	0	9	2,8	68,2
H 66-8912	2 519	92 444	2 778	52 777	6	9	6	9	6,6	55,6
H 68-93	0	10 222	0	0	0	7	0	0	0,0	10,3
H 68-3472	741	41 185	0	13 889	5	9	0	7	2,6	39,2
H 69-2429	148	4 148	556	556	3	6	4	4	1,2	7,0
H 69-5123	1 333	4 593	0	2 778	5	6	0	6	2,4	8,8
H 70-2665	0	1 037	0	1 111	0	5	0	5	0,0	3,2
H 70-3339	148	23 556	0	16 667	3	8	0	8	1,1	19,8
H 70-5145	0	11 556	1 111	9 444	0	7	5	7	0,0	12,7
H 70-6211	296	11 556	556	3 333	4	7	4	6	1,2	11,9
H 71-1075	0	593	0	556	0	4	0	4	0,0	2,8
H 71-4205	1 481	14 963	1 111	11 111	5	7	5	7	4,0	11,5
H 71-4919	1 481	34 667	0	30 000	5	9	0	8	3,8	36,9
H 72-6317	148	593	0	1 666	3	4	0	5	1,2	2,3
H 73-852	0	2 519	0	2 222	0	6	0	6	0,0	5,4
H 73-4872	296	35 407	0	13 889	4	9	0	7	1,2	38,1
H 73-6136	0	25 185	556	22 778	0	8	4	8	0,0	22,2
NCo 376	148	59 704	5 556	43 333	3	9	7	9	1,3	40,5
Means	638	25 117	1 645	20 684	-	-	-	-	1,9	23,2

3300/52 VARIETAL SUSCEPTIBILITY TO SMUT

LEAF SCALD AND OTHER DISEASES

VARIETIES	Leaf scald % stool infection				Other * Diseases as noted
	3300/52		2010/6		
	P	1R	P	1R	
H 61-1712	4,5	20,0	0	8	-
H 61-3145	0,0	6,7	0	0	-
H 63-599	0,0	11,3	0	10	-
H 63-4342	0,0	15,4	0	6	-
H 64- 848	1,1	4,3	0	13	-
H 65-1488	0,0	39,0	0	8	G(1)
H 65-7193	0,0	1,2	0	0	-
H 65-2959	0,0	3,8	0	0	R(1)
H 66-3232	0,0	18,3	0	6	R(1)
H 66-8912	0,0	11,5	0	4	-
H 68-93	0,0	1,2	0	0	-
H 68-3472	0,0	2,7	0	0	R(1), G(1)
H 69-2429	0,0	10,5	0	6	G(1)
H 69-5123	0,0	34,6	0	8	G(2)
H 70-2665	0,0	3,2	0	0	R(1)
H 70-3339	0,0	25,6	6	4	G(1)
H 70-5145	0,0	5,2	0	0	-
H 70-6211	0,0	3,6	0	0	-
H 71-1075	1,8	12,7	0	0	-
H 71-4205	2,6	14,3	6	2	G(1)
H 71-4919	6,3	37,9	0	19	-
H 72-6317	0,0	5,7	0	0	R(1)
H 73-852	0,0	2,7	0	0	R(3)
H 73-4872	0,0	16,6	0	2	G(1)
H 73-6136	0,0	10,0	0	0	-
NCo 376	0,0	0,0	0	0	-
	0,6	12,2	0,5	3,7	-

*G = Gumming, R = Rust.

1,2,3 in brackets indicate the severity of the disease, i.e. low, moderate and severe incidence respectively.