

Preliminary Reaction of some Nigerian Local Sugarcane Clones to Smut Pathogen (*Ustilago scitaminea* Sydow)

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The sugarcane smut caused by *Ustilago scitaminea* Sydow is posing a great threat to the Nigerian sugar industry where some of the promising exotic varieties have lost their commercial values, as a result of heavy decline in yield due to smut infection. Thus, the commercial variety D46/141 reputed to be promising in its country of origin has been found to be highly susceptible to smut disease at Bacita. Also two other promising commercial varieties (Co 1001 and Co957) have been found to be slightly susceptible to this disease. It appears therefore that these exotic varieties which are resistant in their countries of origin are becoming susceptible to smut under Nigerian conditions.

There is need therefore, to breed resistant varieties suitable for the Nigerian ecosystems. During the collection expedition to assemble a local sugarcane germplasm, it was observed that some of the collected materials appeared clean in their local environment. Walker (1977) suggested establishing a simple smut susceptibility observation trial. The objective of the present investigation is to expose some of the local sugarcane clones to smut pathogen and determine the degree of tolerance or susceptibility in order to locate a source of resistance.

Two eye pieces of the commercial variety D46/141 known to be susceptible to the smut pathogen (*Ustilago scitaminea* Sydow) was planted continuously in a row 6m long in between rows of ten local sugarcane clones (Table 1) and spaced 1.5m apart. These were randomly planted in three replications. The experiment was planted on 3rd May, 1978.

Smut whips were collected from the field, cut into pieces and blended for 30 minutes in a Waring blender. The suspension was filtered through muslin cloth to remove the plant tissue. The filtrate of the conidial suspension was adjusted to a concentration of 25×10^3 conidia/ml under a microscope using a Rosenthal haemocytometer. The two-eye seed pieces were dipped into the suspension containing the smut spores and planted continuously in rows 6m long.

Five months after planting each stalk of the clones was counted and the number of clean and infested stalks were recorded on 13th October, 1978. The infected stalks were expressed as percentages of the total stalks tested. One month after planting, stalks were assessed for smut whip incidence and thereafter at monthly intervals.

The smut reaction was graded on a 1 to 9 scale (Table 2), grade 1 being the most resistant and grade 9 the most susceptible.

Table 1. Reaction of some local sugarcane clones to smut pathogen at different dates.

Clone	OCTOBER '78 *			NOVEMBER '78			DECEMBER '78		
	No. of stalks tested	% of total stalks	Smut grade	No. of stalks tested	% of total stalks	Smut grade	No. of stalks tested	% of total stalks	Smut grade
B46/141	1366	19.3	5	1573	82.6	9	1667	83.7	9
Apomu Local	114	0.0	1	97	0.0	1	108	0.0	1
Siun ..	144	0.0	1	196	0.0	1	168	0.0	1
Papa Lanto ..	139	0.0	1	162	0.0	1	158	0.0	1
Ijebu Ode ..	135	0.0	1	125	0.0	1	142	0.0	1
Ajasse ..	164	0.0	1	170	1.0	1	154	6.0	1
Iwo ..	118	1.0	1	136	0.0	1	112	0.0	1
Ogerre ..	123	0.0	1	160	0.0	1	163	0.0	1
Odogbolu ..	84	0.0	1	87	0.0	1	77	0.0	1
Ibadan ..	59	0.0	1	50	0.0	1	117	0.0	1
Olojo ..	122	0.0	1	141	0.0	1	149	0.1	1

* Before inoculation with suspension of smut spores

Table 2. smut rating scale

REACTION	SMUT GRADE	Stalks infected (%)	
		PLANT	RATOON
Resistant or Tolerant	1	1-3	0-6
	2	4-6	7-12
	3	7-9	13-16
Intermediate	4	10-12	17-20
	5	13-25	21-30
	6	26-35	31-40
Susceptible	7	36-50	41-60
	8	51-75	61-80
	9	76-100	81-100

* After Comstock and Heinz. Hawaiian Sugar Planters' Association, Experiment Station, Aiea, Hawaii. (Personal Communication.)

The commercial variety D46/141 used as a check showed 19.3 infection in October while the local clones (except two local having 1 infection) appeared clean (Table 1). One month later, the highest infection of 82.8% was again recorded for variety D46/141 while the local clones (except Ajasse local having 1/infection) appeared clean. In December, the same picture was obtained; the highest infection of 83.7% being that of the commercial variety D46/141. All the local clones appeared clean except Ajasse local which had 6/infection.

Substituting Table 2 for the results presented on Table 1, the commercial variety D46/141 was found to be susceptible. In contrast the local clones appear to show some tolerance.

The present investigation suggests that some Nigerian local sugarcane clones appear tolerant to smut disease. Thus, only the commercial variety D46/141 was highly susceptible while the local clones appear resistant (Table 1). It seems likely that the degree of adaptation by the local clones over several years of cultivation in their local environment may account for their tolerance and make them potential parents in a breeding programme.

There is evidence that there are physiologic races of the sugarcane smut fungus (Stackman and Harrar, 1969). Comstock and Heinz (1976) reported the presence of two distinct races (A and B) of smut in Hawaii. The same authors postulated that some clones were resistant to race 'A' which was discovered in 1971 and susceptible to race 'B', which was discovered in 1976. However, since

no race of smut has been reported in Nigeria, it is unlikely in the present investigation that the clones are merely escaping the smut disease.

The varieties Co 1001 and D46/141 were formally the two leading varieties resistant to smut and other diseases in the country (Personal observation). The sudden break down of the resistance of D46/141 to smut disease is a pointer to the possibility of the existence of more virulent races of *U. scitaminea* than what was obtained before.

Further test is needed particularly on ratoon crops in other locations to confirm the tolerance of our local clones to smut. If further tests confirm the present tentative results, some Nigerian local clones may provide a source of resistance to smut.

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REFERENCES

- Comstock, C. and Heinz, D. J. 1976. A race of culmicolous smut in Hawaii. *Sugarcane Pathologists' Newsletter*, 19 : 24-25.
- Stakman, E. C. and Harrar, J. C. 1957. Principles of Plant Pathology. The Ronald Press Company, New York, U. S. A. p. 581.
- Walker, D/T. T. 1977. Report of the Caribbean Sugar delegation on the role and organisation of a Research Institute for the Nigerian Sugar Industry. West Indies Central Sugarcane Breeding Station, Barbados. p. 15.