direct effect on grain yield. A similar trend was observed by Clark (1981) in sweet sorghum. Days to 50 per cent flowering had a negative direct effect on grain yield which was reported by Khairwal *et al,* (1990) earlier. Number of productive tillers had the highest positive indirect effect on grain yield through earhead weight, days to 50 per cent flowering and leaf number. Leaf number had a negative direct effect on grain yield. The negative direct effect of 1000 grain weight on grain yield was influenced by the negative indirect effects of earhead length, plant height and straw yield. Singh *et al* (1980) reported that hundred grain weight had a negative direct effect on grain yield.

Grain yield exhibited a strong positive significant genotypic correlation with plant height and earhead weight. Similarly straw yield per plant recorded positive and highly significant correlation with leaf-stem ratio and juice yield per plant. This indicated the possibility of utilising these desirable characters for a good quality fodder sweet pearl millet. Path analysis showed that earhead weight exerted the highest positive direct effect towards grain yield. As the causal basis of the relationship between earhead weight and grain yield was found to be maximum, this character can be highly relied upon as a selection criteria for the grain yield improvement in sweet pearl millet.

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VARIETAL SUSCEPTIBILITY TO SUGARCANE SMUT IN RELATION TO BUD CHARACTERS

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ABSTRACT

A strong positive correlation was observed between incidence of smut and bud sprouting in standing canes. The position of the germpore is subapical in most of the resistant entries and apical in the susceptible genomes. Sprouting of side buds is promoted by the attack of internode borer. Correlations were found between smut incidence, bud size and internode borer incidence.

KEY-WORDS : Sugarcane Smut, Varieties, Susceptibility, Bud characters

Smut *Ustilago scitaminea* Sydow is recorded in many promising sugarcane varieties. Infection by this fungus is mainly through the buds and physical properties of buds are associated with response of resistant varieties (Fawcett, 1946). Singh and Budhraja (1964) reported that the bud scales appear to regulate resistance to smut infection. In this study, 10 susceptible and 10 resistant varieties were examined for their size, shape, position of germpore and sprouting characters and the relationship of these factors were examined for three years and reported here.

MATERIALS AND METHODS

Ten susceptible and 10 reported resistant varieties (Table 1) were chosen and examined in 10 months old annual crop. About 100 canes were

Table 1. Percentage of smut incidence and bud characters

Variety	Mean % of smut incidence	Grade	Mean % of bud sprouting	Mean bud area in cm^2	Mean % of inter node borer incidence	Bud shape	Position of germpore
Co 740	48.5	HS	25.3	0.80	29.5	Obovate	Dorsal
Co 6304	12.5	MS	16.4	0.66	15.1	Obovate	Apical
CoC 8001	18.4	MS	12.8	1.23	15.1	Triangular	Apical
G 8611	11.1	MS	14.4	1.24	7.9	Triangular	Apical
G 8619	29.0	S	15.6	0.73	11.9	Triangular	Apical
G 8637	13.5	MS	18.4	0.96	10.3	Ovate	Apical
G 81916	11.6	MS	19.7	1.04	16.1	Round	Apical
G 83001	15.5	MS	11.0	0.98	17.0	Round	Sub Apical
G 83242	21.8	S	10.9	1.04	17.2	Triangular	Sub Apical
Co 419	12.2	MS	20.4	0.77	20.4	Triangular	Sub Apical
Co 449	1.8	MR	2.1	0.53	11.1	Ovate	Apical
CoC 671	8.3	MR	6.2	1.01	8.8	Obovate	Sub Apical
CoC 771	9.4	MR	6.3	0.53	9.6	Round	Sub Apical
CoC 8201	5.1	MR	6.0	0.73	10.8	Round	Sub Apical
CoC 85061	9.2	MR	4.5	0.57	8.2	Round	Sub Apical
Co 853	4.3	MR	6.4	0.77	7.0	Ovate	Sub Apical
G 84056	2.7	MR	3.8	0.60	10.9	Ovate	Sub Apical
Co 658	0.5	R	1.9	0.57	11.8	Round	Sub Apical
G 8208	0.8	R	2.9	0.52	7.0	Round	Sub Apical
G 84087	0.4	R	3.1	0.48	3.4	Pentagonal	Sub Apical
CD at 5% level	2.1		2.8	0.05	2.2		

MR : Moderately resistant; MS : Moderately susceptibles; R : Resistant; S : Susceptible; HS : Highly susceptible

chosen at random from lot and assessed for the per cent of sprouting buds and as also internode borer incidence. The bud of the top most joint leaf of which had dried was chosen for the bud size and shape and position of germ pore. Sugarcane setts were steeped in suspension of 95 per cent viable smut spores and planted in randomised block design with three replications. Steeped setts were incubated for 24 h under shade covered with cane trash. Smut incidence was recorded at every fortnight for 35 days. The smut infected clumps were rogued out, to avoid the secondary spread. At harvest, in 12 month age, progressive smut incidence was computed and the variety graded. The trial was carried out for 3 more years.

Table 2. Correlations between smut incidence and bud characters

Character	1	2	3	4
% of smut incidence		+0.688*	+0.582*	+0.898*
% of internode borer incidence			+0.098*	+0.678*
Bud size				+0.583#
% of bud sprouting				

* Significant at 1% level; # Significant at 5% level

RESULTS AND DISCUSSION

The variations among varieties for smut incidence, bud characters and internode borer incidence were highly significant. A strong and significant correlation (r=0.893) was observed between smut incidence and bud sprouting. Susceptible varieties showed more than 10 per cent bud sprouting. Co 740, the known smut susceptible genome showed 25.3 per cent sprouted buds. It is likely that buds provide entry to smut promycelium while sprouting. This was suggested earlier by Appalanarasiah (1961). This conjecture is yet to be proved scientifically. It was observed that the germpore in more of the susceptible varieties is apical except in G.83001, while it is

sub-apical in the resistant varieties except in Co 449 (Table 1). Apical germpore might perhaps make entry of the promycelium of smut spores adhering to buds.

The positive correlation between smut incidence, bud size and sprouting were significant (Table 2). Correlations were also found between internode borer incidence, bud sprouting and smut incidence. The sprouting observed during this investigation was due to attack by internode borer. This insect damage induced sprouting of buds immediately below the point of attack. The effect then appears to spread to all lower buds. The incidence of internode borer was higher in smut susceptible varieties. It was also evident that varieties with larger buds were more likely to sprout and contract smut infection. The percentage of sprouting in the varieties Co 449 and Co 658 were low, despite the high internode borer incidence. It could be due to smaller size buds. In general, varieties with triangular buds are susceptible to smut.

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EFFECT OF INTERCROPPING OF BLACK GRAM GENOTYPES ON THE SEED COTTON YIELDS UNDER RAINFED VERTISOLS

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ABSTRACT

Field investigations were carried out at the Agricultural Research Station, Kovilpatti during 1990-91 and 1991-92 to find out the effect of intercropping of black gram genotypes on the yields of *Gossypium hirsutum* and *G.arboreum* cotton varieties *viz.*, MCU 10 and K 10 under rainfed vertisols. It was observed that cotton intercropped with black gram genotypes KBG 512 recorded a mean seed cotton yield of 602 kg/ha with MCU 10 and 1073 kg with K 10, respectively. Net monetary returns and LER were also higher when cotton was intercropped with black gram genotype KBG 512. The other black gram genotypes tested reduced the cotton yield in both the species of cotton varieties.

KEY WORDS : Black gram, Intercropping, Effect, Seed Cotton Yield

In the rainfed vertisols of southern districts of TamilNadu, cotton is one of the important cash crops grown by farmers, in an area of 1.5 lakh ha. Depending upon the receipt of monsoon rains and choice, farmers grow either *Gossypium hirsutum* or *G.arboreum* cotton species. Intercropping of cotton with pulses is a viable technology in drylands as it gives higher total productivity and income per unit area of land apart from improving soil fertility. Genetic nature of component crops grown plays an import role in the success of intercropping. Balasubramanian (1987) reported that black gram as the best pulse crop suitable for intercropping in *G.hirsutum* and *G.arboreum* cotton under rainfed conditions. Balasubramanian *et al.* (1994) also observed that black gram was the best suitable intercrop for combodia cotton. But intercropping of cotton with black gram can adversely affect the yield of cotton. On the contrary Bavale and Vyahalkar (1981) reported increased yields of cotton due to intercropping with black gram and green gram. Singh and Chauhan (1981) found no adverse effect on cotton yields due to mung intercropping which has dwarf and compact growth habit. Hence the present investigation was taken up to investigate the effect of black gram genotypes as intercrop on seed cotton yield