IDENTIFICATION OF A MALE-STERILE GENE IN SORGHUM

THE development of random mating populations in sorghum was made possible with the availability of genetic and cytoplasmic-genetic male-sterility systems. So far, ten genetic male-steriles have been reported[1] but only a few of them are free from undesirable character associations. An efficient and easily identifiable male-sterility source is very important for effective random mating and recurrent selection.

This note describes a genetic male-sterility system in sorghum and reports its inheritance.

MATERIALS AND METHODS

Three male-sterile plants were observed in the sorghum line IS 104 in 1974 *rabi* season. The anthers were very small, thin, white and rudimentary (Fig. 1) and there were no traces of pollen in them. There was no female-sterility. This sorghum line had several desirable characteristics such as short stature, early maturity, bold and white grains (but with persistent sub-coat). No differences were noticed between male-sterile and fertile plants.

FIG. 1. Male-sterile (left) and fertile anthers.

One male-sterile plant was crossed with bulk pollen from all the fertile plants in the family. Seventy-five plants were grown in F_1 in 1975 summer. In 1975 *kharif*, an F_2 population of 688 plants was grown and male-sterile plants were identified at bloom. Fifty male-sterile heads were crossed with pollen from separate fertile plants (plant-to-plant sibbing). Ten F_2 fertile plants were grown as F_3 families along with 50 sibs in 1975 *rabi*. In each segregating family, steriles and fertiles were counted at flowering.

RESULTS AND DISCUSSION

All F_1 plants were fertile indicating that the male-sterility is not due to cytoplasmic factors but genetic in nature. The results obtained from F_2, F_3 and sibs are presented in Table 1. In the F_2 generation

TABLE I

Inheritance of male-sterility in sorghum

Segregation in F_2	X^2	F_3 families	X^2	Sibs	X^2
517 (516)* F	0·006	6 (6·67) Sg	0·201	35 (33·33) Sg	0·250
171 (172) S		4 (3·33) NSg		15 (16·67)NSg	

* Figures in parentheses are expected values.
F = Fertile; S = Sterile;
Sg = Showing segregation;
NSg = Not showing segregation.

171 male-steriles appeared out of a total of 688 plants which exactly fit into 3 : 1 ratio. The ten F_3 families derived from individual F_2 fertile plants had six families (60%) segregating in 3 : 1 ratio as against expected value of 6·67 (66·67%) on the basis that the ratio of fertile homozygous plants to the heterozygous fertile plants in F_2 is 1 : 2. These results are confirmed by the segregation pattern observed in families derived from plant-to-plant sibbing. Out of 50 families 35 (70%) segregated into 1 : 1 ratio and 15 (30%) families did not segregate. These results clearly show that the male-sterility reported here is inherited as a single gene recessive.

Morphological features of this male-sterility appear to be very distinct and superior to ms_3 and ms_7 genes, and it is much more easily recognised in the field. Comparatively the anthers are very small, thin and show complete sterility as against ms_3 gene which is often showing only partial sterility now. Genetic studies are in progress to determine whether it is different from them. A gene symbol will be proposed after confirmation. The stability of this gene in a wide range of genetic and cytoplasmic backgrounds is being tested.

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