https://doi.org/10.29321/MAJ.10.A03786

A Note on Hybrid - Sorghum CSH. 1

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Synopsis: The performance of the *Sorghum* hybrid named CSH. 1 released to the farmers of Madras state early in 1965, has been described.

The evolution of hybrid *Sorghum* CSH. 1, which has recently been released to the farmers in Madras state is a landmark in *Sorghum* breeding in this country. This is the first *Sorghum* hybrid to be officially released and Madras state had the privilege of releasing it.

Sorghum (Cholam) is the most important millet of Madras State, cropped in about 1.9 million acres annually. Of this area, about 0.4 million acres are cropped under irrigated conditions. Intensive study of types grown in this large area and evolution of improved varieties has been in progress at the Millet Breeding Station, Coimbatore since 1923. The first attempt at this centre for launching on a programme of breeding new varieties involving hybrid vigour, were made in 1957. It was in this year that hybrid *Sorghum* varieties were extensively cultivated for the first time in the United States of America. From this source, two hybrids (Texas 610 and F. 62) were obtained and tried at the Millet Breeding Station, Coimbatore, during the years 1957 and 1958. Though the hybrid Texas-610 registered better yields of grain than the local varieties, it was poor in the production of straw and also in the quality of grain, which was unacceptable by local standards. Since the unsuitability of foreign hybrids was brought out in these preliminary trials, a programme was drawn up in 1959 to evolve new hybrid *sorghums* at Coimbatore, utilising the indigenous germplasm and also the cytoplasmic male-sterile parental stock obtained from elsewhere. However, before the project materialised, the Indian Council of Agriculture was also seized of the same objective and the work of evolving hybrid-*sorohums* was sponsored by the Council, on an All-India collaborative basis. Consequentially, several new hybrids were produced at the (PIRRCOM) research centres of the Council, with the active technical collaboration of the Rockefeller Foundation. These hybrids came on stream for introductory and exploratory regional trials for the first time during the summer season of 1963. The State department of agriculture organised these trials extensively and collaborated in the isolation of the most potential hybrids.

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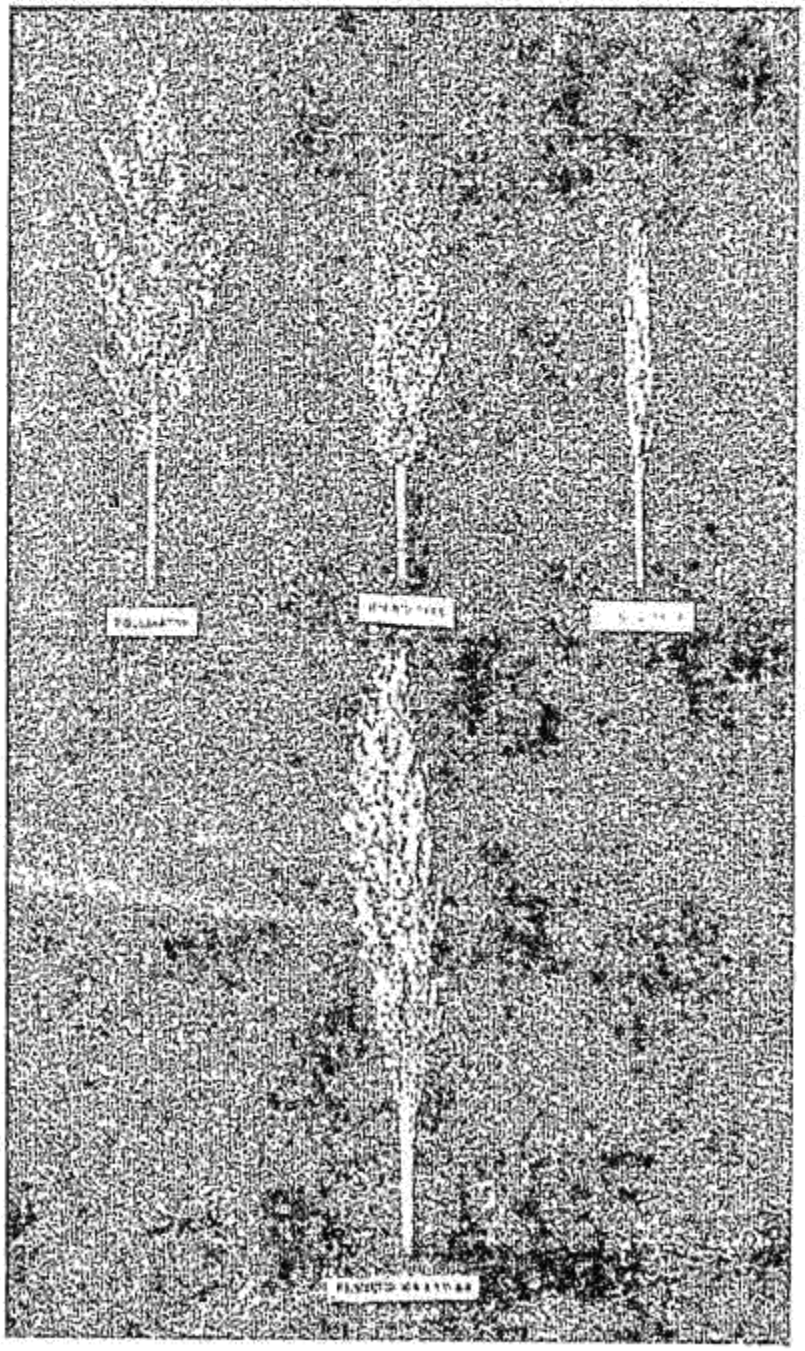
Received on 22—12—1965.

This concerted venture by different agencies resulted in the early development of hybrid CSH. 1 as particularly suitable for Madras state. (CSH. 1 is an abbreviation for 'Co-ordinated *Sorghum* Hybrid No. 1').

Sorghum-hybrid CSH. 1 has been developed by crossing types MS. CK. 60A and IS. 84. The former is a cytoplasmic male-sterile type and functions as the mother parent on which the hybrid seed is produced. The latter is the pollinating parent which contributes the necessary pollen for effecting seed-set on the mother parent. (MS. CK–60A is a *Kafir* type of *Sorghum* and IS. 84 is an yellow-endosperm *Feterita* type).



Sorghum Hybrid CSH. 1 and parents.

The salient features of hybrid *Sorghum* CSH. 1 are :—

Duration of maturity	:	90 days from seed to seed.
Plant height (average)	:	150 cm
Grain colour	:	Cream-pearly.
Threshability	:	Easy.
Lodging	:	Less than one per cent.
Grain yield potential (average)	:	4885 kilograms per hectare.

The hybrid was first tried during the summer season of 1963 and again, more extensively, during the next summer, (on farmers' holdings as well as on Research Stations) under irrigated conditions. Along with the hybrid, the reputed high-yielding variety Co. 18 was also included for comparison. The yield data are summarised in the following table.

S. No.	Trial centres and year	Grain yield kg/ha			Fodder yield kg/ha		
		CSH.1	Co.18	C.D. at 5% probability	CSH.1	Co.18	C.D. at 5% probability
1.	Millet Breeding Station Coimbatore (1963)	2657	1414	490	8948	10816	1876
2.	Agricultural Research Station, Bhavanisagar (1963)	4440	1884	612	8305	10159	1390
3.	Agricultural Research Station, Bhavanisagar (1964)	5520	2549	295	10690	12600	533
4.	PIRRCOM Centre, Coimbatore (1964)	5840	4265	665	4975	7790	780
5.	Scattered Block Trials on Farmers' field (1964)	5218	3597	532	15280 (fresh weight)	17330	Not. Sig.
6.	Agronomy trial PIRRCOM Centre, Coimbatore (1964)	5630	4484	533	12950 (fresh weight)	15360	1429
	Mean of all trials	4885	3032		10191	12343	
	Percentage on check	161	100		83	100	

The consistency of the superiority of CSH. 1 and its significant increased yield of 61 per cent over the existing improved variety Co. 18,

advanced the case for an immediate release of the hybrid. The additional income to the farmer, due to growing the hybrid, is about Rs. 800 per hectare, based on the average increase of grain production.

Even though the average yield of grain of CSH. 1 was only 4885 kilograms per hectare, it gave considerably higher yields in several trials, the maximum being 7410 kilograms per hectare, on a farmer's field where one of the Scattered-Block trials was located. This trial, like all the Scattered-Block trials, received a manurial schedule of five tons of farmyard manure, 60 lb N and 30 lb $P_2 O_5$ per acre.

Apart from grain-yield, the hybrid is favourably qualified in other aspects also. Its duration of maturity is the same as for Co. 18, the culm also being as juicy. The grains of the hybrid are heavier, its 1000 grains weight being 27·7 grams as against 25·3 grams for Co. 18. The volume expansion of the grain (ratio of cooked to uncooked grain) is also higher with the hybrid, by about eight per cent. In grain-colour itself, the cream-pearly colour of the hybrid is better accepted by the farmers than the red-tinted white grain of Co. 18. Systemically, the hybrid is also more resistant than Co. 18, to rust and other leaf-spots.

In the yield of fodder, though the hybrid falls short of Co. 18, the fodder itself is of good quality, the leaf-to-stalk ratio being higher. The reduction in outturn of fodder is also more than compensated by the spectacular increase in grain. The farmers themseves, in all the locations of trial were highly impressed with the hybrid in all its aspects and the demand for its seed is already gaining momentum.

While thus, the first sorghum-hybrid was making its impact, the problem of enlarging the production and supply of hybrid seed was also concurrently recognised. During the summer season of 1964, an one-acre production plot was experimentally laid, for producing seeds of CSH. 1. The male sterile and the pollinator parents were raised in lines, in the ratio of 2 : 1 respectively, with strip of the pollinator parent running all around the plot as an additional source of pollen. The rows of the pollinator were actually sown on two different dates (about a week apart) so as to facilitate nicking (synchronisation of the receptivity of the stigma of the male-sterile parent and pollen-availability from the pollinator) over a longer period so that the seed-set on the mother parent does not suffer for want of pollination. From this production plot, a quantity of 304 kilograms of hybrid seed was obtained.

Prior to the work referred above, preliminary studies on the production of hybrid seed were conducted at the Millet Breeding Station, Coimbatore during summer 1963 (Shanmughasundaram *et al*, 1964). In this

investigation, the production of another promising hybrid MS. x IS. 3687, was attempted, adopting a 4:2 ratio between the male-sterile and the pollinator parents. The production of hybrid seed from this plot was only 168 kilograms for an acre.

Even though the production of hybrid seed per acre had been somewhat low in the two experimental plots mentioned above, the experience had been valuable in modifying the technique for further work on the line, particularly from the angle of commercial production. Some private growers in Coimbatore district, under arrangement with the National Seed Corporation and with the advice of the State department of Agriculture, have been able to secure economic outturns of hybrid seed. The commercially grown seeds of CSH. 1 were actually put on the market by these growers for the first time during the summer of 1965. There has been considerable demand for the seed even though it was selling at Rs. 5/- per kilogram. This could be considered as a good augury for the spread of the hybrid variety at a fast pace.

In Madras state, excepting the southern districts and the hilly tracts, CSH. 1 has been found suitable for a potential coverage of over two lakhs acres, in which *Sorghum* is raised as an irrigated crop during the summer months. If this entire area is spread with the hybrid variety, the production of *cholam (Sorghum)*, which is an important food grain, could be considerably increased.

In order to generate firm interest in the hybrid among farmers and to accelerate its spread on the countryside, special schemes are underway by the State department of Agriculture, in collaboration with the National Seed Corporation.

Summary: A potential *Sorghum* hybrid has been developed by the Co-ordinated efforts of the Indian Council of Agricultural Research, the Rockefeller Foundation and the Agricultural Department of Madras State. The hybrid has been named CSH. 1 and released to the farmers of Madras State early in 1965. In several trials, the hybrid consistently outstripped Co. 18 (another reputed elite variety) by an average margin of 61 per cent. In a farmer's field, the hybrid produced a grain yield of 7410 kilograms per hectare, which is the highest on record for *Sorghum* in Madras State. Schemes are under way for effecting a rapid spread of this new improved variety among the farmers.

REFERENCES

Shanmughasundaram, A. M. S. Thangam and K. Venkataraman 1965 Preliminary studies on the production of hybrid *Sorghum* seed. *Madras agric. J.* 52 (2) 61-63.