

## Studies on Flowering in the Parents of Three Sorghum Hybrids

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It is inferred from the results obtained that in the production of hybrid seeds of CSH 5, flowering synchronisation between the two parents is easier as difference in flowering is on an average 3 to 4 days which can be adjusted by staggered sowings of parents. The sowing of parents should be taken up between April to November. In the case of CSH 6, the best nicking period falls for the parents sown during the beginning of the year as well towards the middle of the year (February, March and June and July). Regarding CoH<sub>2</sub> (Kovilpatti Tall) hybrid seed production is a problem due to the erratic flowering behaviour of IS 3541 the male parent. Natural synchronisation of both the parents can be adjusted only if the sowings of the parents are taken up during September to December.

In sorghum cross pollination occurs up to 10 to 15 per cent depending on the variety and weather conditions. Since the development of male sterile lines by Stephen and Holland in 1954, large scale cross fertilization could be effected for the commercial production of hybrids on a large scale. As the relative time taken for 50 per cent bloom of the parental lines varies from season to season it has become necessary to fix the correct time of sowing for synchronisation in flowering. Hence the present study was undertaken during 1973-74 to ascertain the best period for sowing the parents of three popular hybrids namely CSH 5, CSH 6 and CoH<sub>2</sub> (Kovilpatti Tall).

### MATERIAL AND METHODS

Parents of three hybrids viz; 2077A and CS 3541, 2219A and IS 3541, 2219A and CS 3541 were taken for conducting the flowering studies. The

parents of the three popular hybrids are as follows: CSH 5 - 2077A x CS 3541, CSH 6 - 2219A x CS 3541 and CoH<sub>2</sub> (Kovilpatti Tall) - 2219A x IS 3541 (Anon. 1973-74). Seeds of each parent were sown in a plot of 10' x 6' at Millet Breeding Station, Tamil Nadu Agricultural University, Coimbatore. Seeds dibbled in four rows each, adopting a spacing of 15 cm x 45 cm. Sowing was taken up on the 1st and 15th of every month beginning on January 1st 1973 and ending on December 15th of the same year. Regular plant protection measures and fertilisers at 36 N, 18 P and 18 K were applied. Half the quantity of nitrogen was given as basal dressing and the other half as top dressing. Population was limited to 20 plants per 10 ft. row. Flowering dates were recorded for the four parents, when half the number of plants in each variety had flowered. An ear head is taken to have flowered when 50 per cent of its

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spikelets have completed flowering. 2077A and 2219A are two male sterile lines with good combining ability, being the female parents of the three high yielding hybrids. IS 3541 though photo sensitive is a high yielding tall variety and is a good combiner. It is the male parent of the tall hybrid CoH<sub>2</sub> (Kovilpatti Tall) (Appadurai *et al.*, 1973). CS 3541 is high yielding non season bound variety with high combining ability and is the male parent of CSH 5, the midium tall popular hybrid with high grain yield potential (Anon, 1975).

## RESULTS AND DISCUSSION

Flowering duration was recorded for all the variants. In the sorghum panicle, the terminal flowers open first and in general, flowers within any hori-

zontal plane within the panicle open at the same time (Stephens and Quinby, 1934). The emergence of stigma starts from the top florets and reaches the bottom flowers within three days. The stigma in 2077A and 2219A are white and feathery and stayed receptive for 7 to 10 days (Ayyangar and Rao, 1931), and maximum blooming took place between the third and sixth day of flowering. Flowering is delayed by cool or wet weather (Ayyangar and Rao, 1931)

Meteorological data namely maximum and minimum temperature, relative humidity percentage, bright sunshine in hours and rainfall in mm, were recorded for the fortnights from January or December 31st 1973 respectively and is presented in Table II. (Fig.3). It is

TABLE II. Fortnightly data on the weather conditions during the period under report.

Month and year	Max Temp. <sup>o</sup> C		Main Temp. <sup>o</sup> C		Rainfall in mm		RH% Forenoon		RH% Afternoon		Bright sunshine in hr	
	I	II	I	II	I	II	I	II	I	II	I	II
	fort.	fort.	fort.	fort.	fort.	fort.	fort.	fort.	fort.	fort.	fort.	fort.
January 73	28.9	30.3	17.3	17.9	Nil	Nil	93.5	88.0	52.9	43.2	142.0	166.1
February	31.0	32.8	20.6	20.0	Nil	Nil	85.0	88.5	37.7	36.5	154.3	135.1
March	34.9	35.1	18.6	20.0	Nil	Nil	83.9	82.9	30.3	28.5	161.2	171.2
April	34.2	35.7	23.6	24.3	36.0	Nil	92.0	85.4	51.4	44.4	113.2	146.4
May	35.0	33.6	24.4	23.2	12.5	24.7	84.0	87.3	44.1	53.4	149.1	135.1
June	31.5	30.6	23.9	22.6	30.5	45.5	82.2	87.5	62.1	64.5	87.5	116.8
July	28.7	31.1	22.6	22.4	52.6	16.0	77.7	89.6	67.5	57.8	47.7	125.2
August	29.2	29.2	21.9	22.6	10.5	10.2	87.4	79.5	65.2	60.9	49.3	99.5
September	31.8	31.5	22.0	22.1	—	37.8	92.6	88.1	52.9	50.7	130.5	116.0
October	31.6	29.3	21.0	22.0	77.0	152.6	84.3	95.6	48.6	66.4	114.9	72.1
November	29.9	29.6	20.9	20.0	113.7	41.8	92.0	90.4	53.2	50.0	121.9	113.8
December	28.8	26.3	19.0	16.9	66.6	28.5	89.5	92.6	49.1	64.2	106.4	92.4

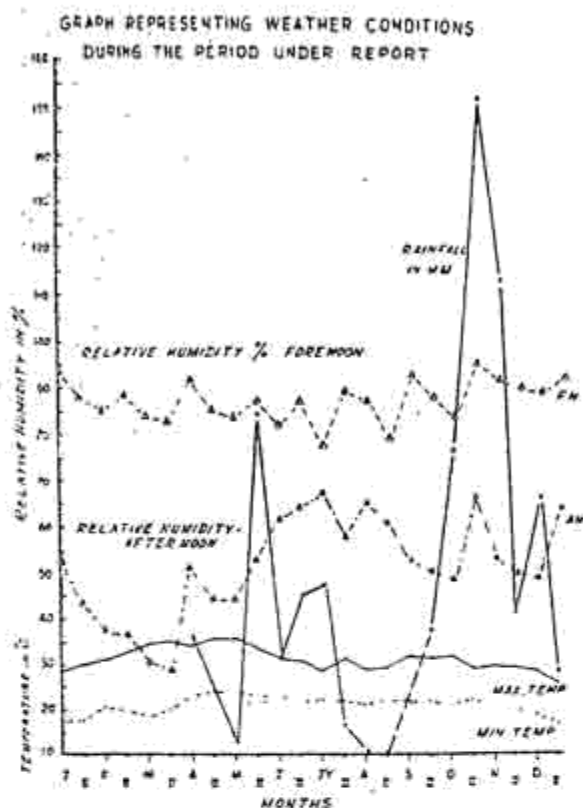


Fig. 3.

observed from the data presented in Table I and II, that the female parent 2219A, took a longer period namely 58 to 60 days for flowering when sowing was taken up during the months of October and November. During the flowering, the maximum and minimum temperature was comparatively low (Table II). When the crop was sown during January to May, the parent flowered earlier, within a period ranging from 47 days to 54 days, when the atmospheric temperature was relatively high, ranging from 28° to 35.7°C with bright sunshine and low rainfall. It can therefore be inferred that 2219A, the female parent of CSH 6 and CoH<sub>1</sub> (Kovilpatti Tall) rushes to flowering when the crop is sown in March, April, May and June i.e., within 47 to 54 days, while the flowering is prolonged for 58 to 60 days, when the sowings are taken up

during the months of September, October and November. In the case of the female parent 2077A the crop sown from April to June came to flowering in 62 days; while the crops sown from December to March from 75 to 80 days to reach 50 per cent bloom.

In the case of the pollen parent CS 3541, the flowering duration was very short (58 days) when the crop was sown on the 15th of December. The sowings taken up on 15th October flowered after 70 days, this delay in flowering is attributed to the low temperature prevailing during the flowering period.

CS 3541 was found to be non photosensitive and its flowering duration ranged from 58 to 70 days. The pollen parent IS 3541 on the other hand was observed to be highly photosensitive and behaved differently when sown in different periods of the year (Table I). The following duration ranged from 55 to 90 days. When the sowing was taken up on 1-3-73 and 15-3-73, IS 3541 flowered on 89 and 90 days respectively while the same crop when sown in first and second fortnight of November came to flowering in 55 days (Table I).

#### Production of hybrid seeds

Hybrid CSH 5 - 2077A x CS 3541  
From the flowering data gathered for the whole year, it is seen that the flowering duration of 2077A, ranged from minimum of 62 days to maximum of 80 days while for CS 3541 the restorer parent the minimum and maximum flowering period ranged from 58 to 70 days. When both the parents were sown on every fortnight from April 1st

sown during February, March and June, July, adopting staggered sowings for CS 3541 at an interval of 5 days (Fig. 1).

CoH<sub>2</sub> (Kovilpatti Tall) - 2219A x IS 3541: The flowering duration of 2219A ranged from minimum 47 days to

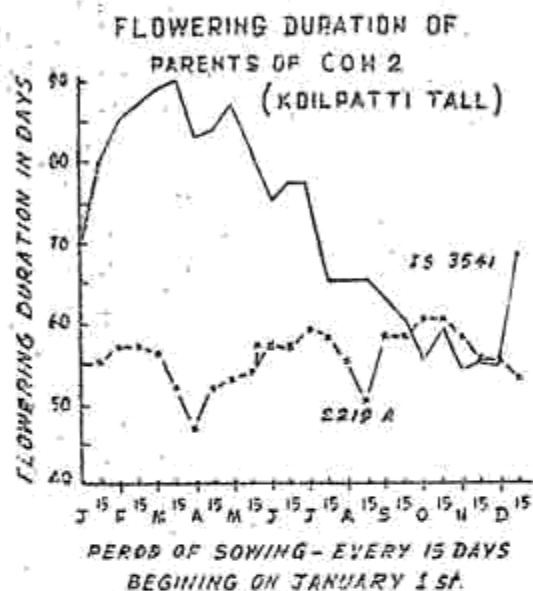


Fig. 2

maximum of 60 days while the male parents IS 3541 fluctuated from a minimum of 54 to a maximum of 90 days. The synchronisation difference between the two parents was much less, ranging from nil to 5 days, when both the parents were sown during the period September first to December first. The greatest difference was observed when

the parents were sown during January 15th to May 15th. Therefore CoH<sub>2</sub> or Kovilpatti Tall hybrid seeds can be successfully produced with comparative ease if both the parents are sown between the period first of September to first of December (Fig 2).

The authors acknowledge with thanks the help and encouragement given by the Professor of Millets and Professor and Head of the Department of Agricultural Botany, Tamil Nadu Agricultural University, Coimbatore.

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