

Preliminary Studies on the Influence of Soil Moisture on the Growth and Duration to Flowering in Sorghum Variety CS 3541*

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Pot culture experiments conducted under glass house conditions with CS 3541, male parent of CSH. 5 hybrid sorghum, indicated that of the plants maintained at 25, 50, 75 and 100 per cent available soil moisture levels, those maintained at 50 per cent flowered 81.0 days after sowing while those maintained at 75, 100 and 25 per cent 1, 6 and 11.5 days respectively there-after, indicating there by the possibility of altering the duration to flowering in this variety by adjusting the soil moisture levels.

Synchronous flowering of the parental lines in some of the hybrid Sorghums like CSH. 5 is a problem often escapes solution resulting in low hybrid seed yields. Under Coimbatore conditions, depending upon the date of sowing the female and male lines of CSH 5 hybrid reach the flowering stage at different periods. Remedial measures such as sowing the male lines twice at suitable intervals, spraying of certain chemicals, heat treatment, with holding irrigation etc. are suggested so that simultaneous flowering takes place in both the lines. With this end in view, the effect of available soil moisture at different levels on the flowering period of CS 3541, male parent of CSH 5 hybrid sorghum was studied.

MATERIALS AND METHODS

The experiment was conducted under glass house conditions. Soil

collected from a fallow ~~area~~ was thoroughly mixed with farm yard manure in 1:1 proportion. The field capacity of the mixed soil was estimated to be 25.0 (Bonyoucos, 1935) and the permanent wilting coefficient 11.75 per cent (Dastane, 1967). Twenty earthen pots of uniform size were taken and seven kg. of soil mixture was added to each one of them. Five seeds of variety CS 3541 were sown in each pot and a known volume of water was added to each one of them. Ten days after sowing, the seedlings were thinned to two per pot and four pots were allotted to each one of the following four treatments viz. maintaining the soil at the level of 25 per cent available moisture (T1); 50 per cent (T2); 75 per cent (T3); and 100 per cent (T4). Maintenance of the soil moisture in the pots at the required level was ensured by addition of calculated quantity of water daily after weighment. In order to compensate

*Part of M. Sc. (Ag) thesis approved by the Tamil Nadu Agricultural University, Coimbatore.

TABLE . Effect of different levels of soil moisture and plant growth

	T1	T2	T3	T4	F Test	SE	CD
(i) 25th day							
Height	58.35	65.30	64.15	67.30	NS	—	—
No. of leaves	7.20	7.00	7.40	7.60	NS	—	—
(ii) 50th day							
Height ^x	92.00	105.30	106.70	100.10	**	2.078	5.961
No. of leaves	7.50	7.80	7.70	8.20	NS	—	—
Diameter of culm (cm)	1.26	1.28	2.25	1.26	NS	—	—
(iii) 75th day							
Height ^{xx}	88.31	98.34	99.65	96.73	**	1.696	4.865
No. of leaves	10.10	10.20	10.60	11.30	NS	—	—
Diameter of culm	1.30	1.29	1.27	1.26	NS	—	—
Area of 4th leaf	188.13	116.35	224.23	191.98	NS	—	—
(iv) Number of days to half-bloom	92.7	81.1	81.8	87.4	**	1.405	2.025

X Measured upto the tip of last leaf

XX Measured upto the tip of the panicle

** Significant at 1 per cent level.

the increase in plant weight, daily increment of 6 ml of water was provided to each pot over and above the calculated quantity.

Observations on height of plant and number of leaves were recorded on 25th, 50th and 75th day while the diameter of culm on 50th and 75th day after sowing. The area of the 4th leaf on 75th day and the day of half bloom were recorded adopting the methods, followed by Hyung *et al* (1974) and Vanderlip and Reeves (1972) respectively.

RESULTS AND DISCUSSION

The effects of different levels of soil moisture on height (cm) of plant, number of leaves, diameter of culm

(cm) and area of 5th leaf (Cm²) as recorded on 25th, 50th and 75th day after sowing and days to half-bloom are furnished in Table.

From the results it becomes clear that the flowering time can be altered to some extent by altering the soil moisture levels. Plants raised under 25 per cent available soil moisture flowered 11.6 days later than those raised under 50 per cent. Langlet (1973) observed that drought generally increased the time taken for all panicles to reach a particular stage of development and altered distribution of flowering time. Wilson and Whiteman (1965) and Tsoi (1972) have reported that decrease in the soil moisture levels delayed flowering in sorghum. In maize, Robins and Domingo (1953).

Claassen and Shaw (1970) and Nadanam and Morachan (1974) have reported similar results. According to Cavor *et al.*, (1964) such a delay could be profitably utilized to ensure synchrony in the flowering of parental lines. In maize, Ali (1970) reported acceleration in tasseling and delay in silking by the soil moisture stress at the flowering stage, whereas, in wheat, Day and Intalap (1970) found that plants stressed for water at the jointing stage of growth flowered earlier. It was also found that the height of plant maintained at 25 per cent available soil moisture was lower than those maintained at other levels (Table). Robins and Domingo (1953) and Claassen and Shaw (1970) in maize and Oizumi *et al.* (1965) in sorghum have reported similar results. There was also reduction in the number of leaves and leaf area with decrease in the soil moisture. The results are in confirmity with those reported by Wilson and Whiteman (1965) and McCree and Davis (1974) in sorghum, Denmead and Shaw (1960) in maize and Sionit *et al.*, (1973) in sunflower. In the present study, variations in soil moisture did not bring significant changes in culm diameter, whereas, in pearl millet, Naidu and Venkateswarlu (1967) recorded reduction in stem diameter with decrease in soil moisture. Thus, the results have indicated that maintaining soil moisture at 50 per cent level induces early flowering by 11.6 days as against 25 per cent whereas in 75 and 100 per cent soil moisture levels, the delay was one and six days respectively. Therefore by withholding irrigation, flowering can be delayed for more than a

week. However, studies on similar lines may have to be conducted under field conditions to confirm the results.

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