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Short Communication

Studies on the Mobilization Efficiency of Seed Reserves in Sorghum (*Sorghum biocolor (L) Moench)**

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Seed germination and seedling establishment are important characters which could provide advantage to hybrids over their parents. This may be dependent on their ability to utilize seed reserves more efficiently, since there is hardly any difference in the seed weight between parents and hybrids. Earlier, Rao and Sinha [1] reported mobilization efficiency of seed reserves in some Sorghum hybrids and their parents. The present study was undertaken to find out the efficiency of seed reserve utilization during seed germination in twenty five sorghum genotypes as affected by different temperature regimes.

The pure seeds of five hybrids viz. CSH-13, CSH-14, CSH-15, CSH-16, CSH-17, their parents viz. MS-296A, RS-29, MS-14A, AKR-150, MS-104A, RS-585, MS-27A, C-43, MS-14A, RS-673 and ten varieties viz. CSV-10, CSV-12, CSV-13, CSV-15, SPV-1333, M-35-l, SPV-86, Sel. 3, Phule Yashoda and Phule Maulee were collected from the Sr. Sorghum Breeder, MPKV, Rahuri. Fifty seeds of each genotypes in four replications were weighed and then were kept for germination at 20, 25and 30°C temperature in germinator by adopting BP method according to ISTA rules (2). The final count of germination was taken on 10th day. The shoot and root weight, remaining seed weight and seedling dry weights were recorded. The dry weight of seedling (shoot, root and seeds) was measured after drying for 24 hrs. in hot air oven at 80°C.

The Seed Mobilization Efficiency (SME) was calculated as per procedure described by Rao and Sinha [1]. The amount of seed material respired (RESP) was calculated as :

$$RESP = SDW- (SHW+RTW+ RSW)$$

Where,

RESP- Seed material respired, SDW- seed dry weight before germination. SHW- Shoot weight, RTW- Root weight, RSW- Remaining seed weight.

The SME was calculated as

$$SME = \frac{SHW + RTW}{RESP}$$

The seed metabolic efficiency is the amount of dry seed weight that is respired for producing one gram of dry root and shoot. Thus, higher the value of SME, lower is the efficiency of seeds as more seed reserves could be used for producing roots and shoots.

Table 1 revealed that, temperature had a profound effect on seed metabolic efficiency. The amount of seed reserves respired increased from 20 to 30°C temperature in all genotypes (hybrids, parents and varieties). This indicated that 30°C temperature regime was suitable for higher seed metabolic efficiency (SME). Among the genotypes, the varieties had the highest SME (1.76g) when averaged over temperature regimes followed by 1.21 g in hybrids and 1.15g in male parents. Whereas, it was lowest by 0.93 g in female parents. These results are in agreement with those reported earlier (1). They have stated that the seed metabolic

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Table 1. Seed metabolic efficiency of sorghum hybrids, their parents and varieties as influenced by temperature regimes.

Genotypes	Temperature regimes				S.E. +	C.D. at 5%
Hybrids	20°C	25°C	30°C	Mean		
CSH-13	1.23	1.34	1.91	1.49	V-0.05	0.16
CSH-14	1.02	1.21	1.26	1.16	T-0.04	0.12
CSH-15	1.20	1.21	1.61	1.34	I-0.09	NS
CSH-16	0.82	0.71	1.03	0.85		
CSH-17	1.24	1.25	1.27	1.25		
Mean	1.10	1.14	1.41	1.21		
Female parents						
MS-296A	0.44	0.63	1.50	0.85	V-0.06	0.18
MS-14A	0.35	0.43	0.54	0.44	T-0.05	0.14
MS- 104 A	1.12	1.37	1.25	1.24	I-0.11	NS
MS-27A	1.21	1.27	1.42	1.30		
MS-14A	0.54	0.93	1.01	0.83		
Mean	0.73	0.92	1.14	0.93		
Male parents						
RS-29	1.03	1.13	1.08	1.08	V-0.03	0.09
AKR-150	0.91	1.05	1.12	1.02	T-0.02	0.06
RS-585	0.99	1.20	1.14	1.11	I-0.05	0.15
C-43	1.36	1.37	1.17	1.30		
RS-673	1.23	1.20	1.24	1.22		
Mean	1.10	1.19	1.27	1.15		
Varieties						
CSV- 10	0.89	1.19	1.23	1.10	V-0.05	0.15
CSV-12	1.82	1.51	1.43	1.58	T-0.03	0.08
CSV-13	1.47	1.79	2.12	1.79	I-0.09	0.26
CSV- 15	1.37	1.36	1.26	1.34		
SPV-1333	1.79	1.79	2.16	1.91		
M-35-1	2.17	2.32	2.18	2.22		
SPV-86	1.10	1.27	1.06	1.14		
Sel. 3	1.53	1.22	1.18	1.31		
Phule Yashoda	2.68	2.75	2.88	2.77		
Phule Maulee	2.36	2.48	2.59	2.47		
Mean	1.62	1.77	1.81	1.76		

efficiency increased in all genotypes till a temperature of 30°C. However, there was not much improvement in SME at 40°C. The lowest SME was at 20°C temperature suggests that substrate respiration was not linked to building any useful plant part, and could led to thermal dissipation of respiratory energy by the way of alternate oxidase pathway or cynide resistant pathway [3].

However, the interaction between hybrids and temperature was non-significant. Among the hybrids, CSH-17 showed maximum SME (1.24g) at 20°C temperature. Whereas CSH13 recorded highest SME of 1.34g and 1.91g at 25°C and 30°C temperature respectively. At over all three temperatures, CSH-13 recorded significantly highest

(1.49g) SME as compared to others, while CSH-16 showed lowest (0.85g) SME.

In case of female parents, MS-27A showed maximum SME (1.21g) at 20°C temperature, but it was at par with female MS-104A (1.12g). MS 104A and MS-296A recorded maximum of 1.37g and 1.50g SME at 25 and 30°C respectively. MS-14A recorded minimum SME at all three temperature regimes. Among the females, MS-27A showed maximum SME over all three temperature regimes. Among the male parents, C-43 showed significantly higher SME of 1.36, 1.37, 1.17g at 20, 25, 30°C temperature, respectively, while AKR-150 recorded lowest SME of 0.91, and 1.05g at 20 and 25°C temperatures respectively. Among the parental lines, male parents had higher SME at all the temperature regimes. Similar results were also observed in the parents and hybrids with respect to excised leaf water retention curves [4]. Among the varieties, Phule Yashoda recorded significantly higher SME of 2.68, 2.75 and 2.88g at 20, 25 and 30°C temperatures respectively. CSV-10 showed lowest SME of 0.89 and 1.19g at 20 and 25°C temperatures respectively and it was lowest in SPV-86 (1.06g) at 30°C temperature.

In the present study, male parent had higher SME, which is a desirable character as under water stress environment when emergence is delayed due to insufficient soil moisture, genotype having high SME would not run out of the substrate before emergence. It would be desirable to screen the parents having higher SME for inclusion in the breeding programme.

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