

STUDY OF DIFFERENT FODDER SORGHUM GENOTYPES FOR ABIOTIC STRESS

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Abstract: The present investigation entitled “Study of different fodder sorghum genotypes for abiotic stress.” comprised of twelve fodder sorghum varieties viz., HC-136, HC-171, HC-308, HJ-513, HJ-541, Pant Chari-7, GFS-5, Pant Chari-3, PC-5, SSV-84, CSV-15, UP Chari-2 were used in present study. The field experiment was conducted in Research Area of Forage Section, Department of Genetics and Plant Breeding, CCS Haryana Agricultural University, Hisar during the year 2012-2013 and Accelerating aging test was conducted in laboratory of Department of Seed Science and Technology. The maximum Seedling establishment % was found in HJ-513, SSV-84, HC-136 and CSV-15 which showed superiority almost for all the genotypes. The standard germination %, Accelerated ageing test that were found most suitable vigour parameters for prediction of seedling establishment in field conditions in relation to abiotic stress. The above superior listed genotypes have the maximum normal seedling establishment in laboratory for abiotic stress condition and its positive correlation with Seedling establishment in field.

Introduction: Sorghum [*Sorghum bicolor*(L.) Moench], belonging to family Poaceae, is an important **kharif** season crop which is widely grown to meet the green as well as dry fodder requirement of the livestock. It is fast growing, adaptive to vast environmental condition and provides palatable nutritious fodder to the animals. India supports 512.05 million of livestock, which includes 37.28 per cent cattle, 21.23 per cent buffalo, 12.71 per cent sheep, 26.40 per cent goat and 2.01 per cent pig (DAHD & F, 2012). India supports nearly 20 per cent of the world's livestock being the leader in cattle (16%) and buffalo (5.5%) population. Deficiency in feed and fodder has been identified as one of the major components in achieving the desired level of livestock production. The shortage in dry fodder is 21.8 per cent compared with requirement of 560 million tonnes for the current livestock populations (Rana *et al.*, 2013). Proper and adequate fertilization and suitable genotypes are one among the major factors limiting fodder sorghum production in our country. Identification of good quality sorghum genotypes and development of location specific production technology offer an excellent opportunity to provide fodder for better nutrition to bovine population (Pushpendra and Sumariya, 2012). It is well established fact that maximum normal seedling establishment in laboratory for abiotic stress condition play important role in the growth and development of crop plants and its positive correlation with Seedling establishment in field. Thus, suitable genotype and which is stand well in abiotic stress are very important for mitigation of present fodder requirement in water stress condition. Hence, the present study was undertaken to find out entitled “Response of different fodder sorghum [*Sorghum bicolor*(L.) Moench] genotypes to the accelerating ageing test.”

Materials and Methods: The field experiment was conducted during rainy (kharif) season of 2013 at

Forage Section Research Area, CCS Haryana Agricultural University, Hisar, Haryana, India (29°10' N or 75°46' E, at an average elevation of 215.2 m above mean sea level). The site has semi-arid and sub-tropical climate with hot dry summer and severe cold winter. Average annual rainfall is about 450 mm, 75 per cent of which is received in three months, from July to September during south-west monsoon. July and August are the wettest months. The crop received 103.8 mm rainfall during the crop duration. The soil of the experimental field was sandy loam in texture, slightly alkaline in reaction (pH 7.7), low in available nitrogen (180.40 kg/ha), medium in available phosphorus (14.10 kg/ha) and potassium (275.70 kg/ha) with moderate water holding capacity. The present experiment consist of 12 fodder sorghum varieties viz., HC-136, HC-171, HC-308, HJ-513, HJ-541, Pant Chari-7, GFS-5, Pant Chari-3, PC-5, SSV-84, CSV-15, UP Chari-2. The study about accelerating ageing test was conducted in the laboratories of the Department of Seed Science and Technology during 2013-2014. According to Rules of International Seed Testing Association (ISTA), 2011,

Sufficient number of seeds from each variety were taken and put on in a single layer on wire mesh tray fitted in plastic boxes having 20 ml of distilled water in bottom. The boxes were placed in accelerating ageing chamber after closing their lids. The seeds were aged at 40 ± 1 °C temperature and about 100 % RH for 72 h. and then tested for germination in three replications of 100 seeds. The number of normal seedlings was counted and expressed in percentage. For field parameter One hundred seeds of all the twelve fodder sorghum varieties in three replication each were sown in a Randomized Block Design (RBD) in the Research farm, Department of Seed Science and Technology, CCS Haryana Agriculture University, Hisar and the observations like field emergence index, Mean emergence index(days) and seed ling establishment (%) were recorded. The experimental

data were analyzed by the application of factorial randomized block design using OPSTAT software available on CCS Haryana Agricultural University

home page (Sheoran, 2015). The results were presented at 5 per cent level of significance (P=0.05) for making comparison among treatments.

Results and Discussion:

Accelerating aging test (AAT): All sorghum varieties were subjected to stress condition i.e 40 ± 1° C and 100 % relative humidity for 72 h. The seed lot which gave maximum germination even after going under the stress was regarded as vigorous seed and the results are presented in Table 1. The variety HC 136 recorded maximum value (55.67 %) followed by HJ 513 (54.66 %) and CSV 15 (54.66 %) whereas SSV 84 and GFS 5 recorded minimum value (39.00 and 39.67 % respectively). The value of accelerated ageing test ranged from 39.00% to 55.67 % in all the varieties. The variety SSV -84 and GFS-5 were found significantly superior over all varieties except UP Chari-2 and HJ-541 at par value.

Mean emergence time (days)

Table 1 : Study of different fodder sorghum genotypes for abiotic stress

Sr.no	Genotypes	AAT (%)	MET	SE(%)
1.	Pant Chari 7	43.667(41.344)	5.047	60.667(51.199)
2.	GFS 5	39.667(39.019)	4.647	59.333(50.411)
3.	Pant Chari 3	45.667(42.496)	5.137	57.667(49.403)
4.	PC 5	49.333(44.600)	4.800	53.333(46.893)
5.	HC- 308	52.667(46.511)	4.803	56.000(48.427)
6.	SSV- 84	39.000(38.626)	4.600	67.667(55.331)
7.	UP chari -2	47.667(43.645)	4.900	58.000(49.604)
8.	CSV -15	54.667(47.659)	4.990	61.000(51.366)
9.	HC 171	45.333(42.305)	5.000	58.000(49.588)
10.	HC- 136	55.667(48.23)	4.950	64.000(53.124)
11.	HJ -513	54.667(47.659)	4.597	67.667(55.348)
12.	HJ-541	47.667(43.645)	4.793	59.333(50.381)
	SE(m)	0.739	0.118	2.293
	C.D. at 5 %	2.170	0.349	6.768

Note- AAT- Accelerating ageing test, MET – Mean emergence time, SE – Seedling establishment.

The emergence time was calculated for all fodder sorghum varieties and the results are presented in Table 1. The variety PC 3 recorded highest value (5.13) followed by PC 7 (5.00) and HC 171 (5.00), while SSV 84 and HJ 513 recorded lowest value (4.60). The Mean emergence time ranged from 4.60-5.13 in all the varieties. All sorghum varieties were found significantly superior over SSV-84 and HJ-513 except HJ-541 and GFS-5 which were found at par.

Seedling establishment (%): The results of seedling establishment are presented in Table 1 and the variety SSV 84 and HJ 513 recorded highest seedling establishment (67.67 % each) followed by

while, the variety PC 5 recorded lowest value (53.33%). The seedling establishment ranged from 53.33 -67.67 in all the varieties. All sorghum varieties were found significantly superior over PC-5 except Pant Chari-3, HC-308, UP Chari -2.

Conclusion: Based on the results, it can be concluded that among varieties SSV 84, CSV-15, HC-136 and HJ-513 have the maximum standing ability in abiotic stress and optimum seedling establishment in field condition. So based on above study I will recommended the above listed fodder sorghum varieties for fodder requirement in water stress condition.

HC 136 (64.00%)

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