

Relative Performance of Sugarcane Clones Under Moisture Stress Conditions.

Key words : DAP (Days after Planting), Moisture stress, SOD (Super Oxide dismutase), SPAD/SCMR values Sugarcane clones.

Sugarcane is one of the important commercial crops of the world and its cultivation is being restricted to tropical and sub – tropical countries. It is grown in a wide range of temperatures (18 °C to 40 °C) and temperature requirement varies with growth stage. In India it is cultivated under rainfed and irrigated conditions. The annual rainfall and its distribution influences the irrigation requirement of sugarcane. The crop suffers from moisture stress that occurs usually during summer months which coincides with formative stage. The effects of water stress in sugarcane are high mortality of tillers, stunted growth, reduced internodal length, cane weight, millable canes, cane yield and juice quality. Moisture stress associated with high dry temperatures causes poor growth and high mortality of tillers in both tropical and sub –tropical conditions. Work pertaining to drought tolerance and avenues to overcome water stress through physiological approaches in sugarcane are very meager. Identification of clones tolerant to moisture stress is important hence, present study was conducted to evaluate the performance of sugarcane clones under moisture stress. Eight promising pre release mid-late sugarcane clones were studied including standard Co 7219 at Sugarcane Research Station, Vuyyuru during 2010-11 and 2011-2012. The design adopted was RBD with three replications. Each clone was planted in eight rows of eight meters length with a spacing of 80 cm between rows. Trash mulching @ 3 t/ha was done on 3rd day after planting. Only two irrigations were given one at 30th and other at 60th day in addition to planting. The moisture stress was recorded in the clones during formative phase.

A fertilizer dose of 168 kg N+ 75 kg P₂O₅ + 100 kg K₂O per ha was adopted. Data were recorded by following standard procedures (Meade and Chen 1977). Chlorophyll values were recorded

by using SPAD chlorophyll meter. Juice sucrose was recorded with Sucrolyzer cum refractometer. Data were analyzed statistically. (Panse and Sukhatme, 1978). The data on physiological parameters, yield parameters and cane yield were presented in Table -1. The clone 2005 V 96, recorded significantly higher cane yield (106.35 t/ha) than standard Co 7219 (62.86 t/ha). The next best varieties are 2005 V 170 (101.92 t/ha) 2006 V 92 (97.25 t/ha) 2006 V 87 (95.64 t/ha) Johari *et al.* (1998) and Mukundarao *et al.* (2011) also reported that growth and yield effected due to soil moisture tension but the magnitude varied with the clones. The clones 2006 V 92 (21.16) and 2006 V 71 (20.48) recorded more percent juice sucrose than standard (20.32). Significantly higher SOD was recorded in 2005 V 96 (1.213 OD per gram fresh weight per minute). The next best values were recorded in 2006 V 92 (1.067) 2006 V 87 (1.043) and 2005 V 170 (0.940) indicating their tolerance to moisture stress. The relative water content was more in all the clones than standard Co 7219. (Barrs 1968) also suggested the relative water content (RWC) under stress could be used as a measure of tolerance to stress and could be used in varietal screening programme. Less dead canes were recorded in 2005 V 96 followed by 2006 V 92, 2006 V 87 and 2005 V 170.

SCMR value measured at 120 DAP are presented in Table -1. Sugarcane clones 2006 V 87, 2006 V 92, 2005 V 170 recorded high SCMR values at 120 DAP indicating their tolerance to moisture stress conditions. The SPAD chlorophyll meter reading (SCMR) has been proposed to determine leaf nitrogen content destructively in a number of crops (Nageswara Rao *et al.* 2001). More single cane weight and girth of the cane were recorded in 2005 V 96 and 2006 V 87 clones. Kannappan *et al.*, 1994 reported that in sugarcane several

Table 1. Performance of sugarcane varieties under moisture stress conditions (Mid-Late).

SNo	Clone	Germi nation %	Shoot population at 90 DAP000's /ha	SPAD	RWC %	Leaf sheath moisture %	SOD (OD per gram fresh wt/min)	Dead canes %	Length of the cane (cm)	Girth (cm)	Single cane weight (Kg)	Yield t/ ha	% Juice Sucrose
1	2005 V 96	46.71	66.648	38.6	77.10	77.60	1.213	11.70	239.8	2.793	1.775	106.35	19.04
2	2005 V 170	43.16	85.480	43.73	76.10	74.60	0.940	19.64	275.0	2.387	1.458	101.42	18.62
3	2005 V 177	25.91	39.267	42.13	70.80	74.16	0.797	27.24	222.0	2.820	1.517	49.20	19.79
4	2006 V 44	42.40	74.509	40.50	73.10	75.70	0.923	22.27	232.4	2.657	1.192	56.90	18.95
5	2006 V 60	48.31	76.268	41.36	69.43	75.33	0.853	47.24	255.4	2.710	1.392	87.88	17.80
6	2006 V 71	45.53	74.711	40.96	70.90	67.23	1.010	29.3	190.4	2.313	0.908	77.53	20.48
7	2006 V 87	39.68	92.232	43.00	72.00	73.93	1.043	19.52	228.3	2.803	1.692	95.64	19.57
8	2006 V 92	38.99	92.279	43.00	69.76	74.80	1.067	16.03	176.4	2.663	1.317	97.25	21.16
9	Co 7219(C)	46.65	65.028	39.13	68.76	70.80	0.637	30.07	192.4	2.313	1.108	62.86	20.32
	SEM	1.616	1.975	1.193	1.916	2.147	0.50	1.131	10.115	0.054	0.088	4.318	0.642
	CD	4.846	5.920	NS	NS	NS	1.150	3.392	30.323	0.162	0.263	12.944	1.924
	CV%	6.9	5.0	5.0	4.7	5.0	9.2	7.9	7.8	3.6	11.1	9.2	5.7

agro techniques have found to improve morpho – physiological characters. One of them is mulching. Among the eight mid-late clones studied in comparison with standard Co 7219 under moisture stress/ drought conditions the clones 2005 V 96, 2006 V 87, 2006 V 92, 2005 V 170 were found superior to Co 7219 for cane yield, superoxide dismutase enzyme activity, Leaf sheath moisture content, RWC, SOD and single cane weight and found tolerant to moisture stress conditions.

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Department of Crop Physiology
Sugarcane Research Station
Vuyyuru 521165
Andhra Pradesh

**T Sujatha,
B Asha Jyothi,
K Jhansi**

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