International Journal of Forestry and Crop Improvement
Volume 3 | Issue 2 | December, 2012 | 95-98

Research Article

Physiological studies on ratoonability of promising sugarcane genotypes

N.J. DANAWALE, A.B. DHAGE, D.D. GAIKWAD AND K.M. GAWARI

ABSTRACT : Sixteen sugarcane genotypes were evaluated in *suru* season at the Central Sugarcane Research Station, Padegaon (M.S.) during 2006-07, 2007-08 and 2008-09 to study growth, development and their ratoonability. The data on morpho-physiological traits *i.e.* number of tiller ('000'/ha), total dry matter (g) and leaf area index (LAI), relative leaf water content (RLWC) chlorophyll content and heat use efficiency (HUE) was presented in Table 1 indicated that, the genotype CoM 0265 recorded significantly highest number of tillers (125500/ha) than rest of the genotypes at 120 DAP while at 180 DAP, the same genotype recorded numerically higher tillers (133120/ha). As regard to the total dry matter (TDM) at 180 and 240 DAP, the genotype CoM 0265 recorded significantly higher TDM (266.01 and 290.53g/cane, respectively)The genotypes CoM 0265, MS 0217 and Co 86032 were found superior for better rationing, higher cane and CCS yield.

KEY WORDS : CCS %, LAI, TDM, HUE

How to cite this Article : Danawale, N.J., Dhage, A.B., Gaikwad, D.D. and Gawari, K.M. (2012).Physiological studies on ratoonability of promising sugarcane genotypes, *Internat. J. Forestry & Crop Improv.,* **3** (2) : 95-98.

Article Chronical : Received : *12.07.2012;* Revised : *18.08.2012;* Accepted : *25.09.2012*

INTRODUCTION

It is well known that sugarcane is a most important cash crop of our country. It is a sure crop and farmers are assured upto some extent returns even in adverse conditions. There are many constraints in increasing the sugarcane production and one of the important constraints is poor ratoonability. At present, sugarcane production dose not fulfil the requirement of ever increasing population of the country. According to the estimates, the Indian population expected to be 1160 million by 2010 A.D; which will required 27.20 million tonnes of sugar and 14.60 million tonnes of jaggery and khandsari (Yadav *et al*., 2004). An integrated approach especially by enhancing the ratoon cane productivity would be needed for achieving the targeted production of sugar and sugarcane (Anonymous, 2004). In India, nearly 40 per cent of area under sugarcane cultivation is occupied by sugarcane ratoon and one of the major reasons of low yield of sugarcane ratoon is low plant population and low average cane weight which ultimately influence both cane and sugar yield. Ratooning of sugarcane is a most important aspect considering the economics in sugarcane cultivation. However, the number of ratoon crop depends upon varietal genetic architecture, climatic conditions and socioeconomic conditions in different sugarcane growing regions. Most of the early maturing high sugar varieties presently under cultivation are relatively poor in ratoon ability. Now, there is a need to have an appropriate variety with good rationing potential and genetic advances to enhance ratoon productivity. For improving the average cane yield and total sugar production, it is most essential to find out the suitable sugarcane variety with high cane, CCS yield and better ratoon ability.

In view of this, present study was undertaken at the Central Sugarcane Research Station, Padegaon.

MEMBERS OF RESEARCH FORUM

Address of the Correspondence :
D.D. GAIKWAD, Central Sugarcane Research Station, Padegaon, SATARA (M.S.) INDIA
Email : gaikwad.dd@gmail.com

Address of the Coopted Authors :
N.J. DANAWALE, A.B. DHAGE AND K.M. GAWARI, Central Sugarcane Research Station, Padegaon, SATARA (M.S.) INDIA

EXPERIMENTAL METHODS

A field experiment with sixteen sugarcane genotypes was

conducted in *suru* season at the Central Sugarcane Research Station, Padegaon (M.S.) during 2006-07, 2007-08 and 2008-09 in continuous three years for the physiological studies on ratoonability of the promising sugarcane genotypes. The experiments were conducted in RBD with three replications with plot size 16.5 m x 6 m. All the recommended package of practices alongwith recommended dose of fertilizer (250: 115:115 NPK kg/ha) were followed during the crop growing season for the proper crop growth and development. At harvest, sugarcane leaf samples were analysed for the morpho-physiological traits such as total dry matter (TDM), leaf area index (LAI) and chlorophyll content were determined by Yoshida *et al.* (1976). Data on yield, yield contributing attributes and quality parameters were analysed by following the standard statistical procedure laid by Panse and Sukhatme (1978). The quality parameters were estimated from the juice extracted from five representative cane samples at random from each replication. Pooled mean for cane yield (t/ha), CCS yield (t/ha), CCS per cent, NMC '000' /ha and average weight (kg/cane) were compared at the time of harvest.

EXPERIMENTAL RESULTS AND ANALYSIS

The data on morpho-physiological traits *i.e.* number of tiller ('000'/ha), total dry matter (g) and leaf area index (LAI), relative leaf water content (RLWC) chlorophyll content and heat use efficiency (HUE) presented in Table 1 indicated that, the genotype CoM 0265 recorded significantly highest number of tillers (125500/ha) than rest of the genotypes at 120 DAP while at 180 DAP, the same genotype recorded numerically higher tillers (133120/ha). As regard to the total dry matter (TDM) at 180 and 240 DAP, the genotype CoM 0265 recorded significantly higher TDM (266.01 and 290.53g/cane, respectively), however, it was at par with genotype Co 86032 (258.21 and 277.20 g/ cane, respectively). The genotype CoM 0250 recoded significantly higher leaf area index (2.25) which was at par with Co 86032 and CoM 0265 (2.15 and 2.11, respectively). The genotype CoM 0265 recorded significantly higher RLWC (91.30 and 90.64 %, respectively) which was at par with Co 86032 (90.35 and 89.21 %, respectively) at 180 and 240 DAP. As regard the chlorophyll content, genotype CoM 0265 recorded significantly highest chlorophyll content (3.08 and 2.90 mg/g fr.wt.) which was at par with CoM 0254 (3.01 and 2.90 mg/g fr.wt.) and Co 86032 (3.00 and 2.86 mg/g fr.wt.) at 180 and 240 DAP, respectively. Genotype CoM 0265 also registered significantly higher HUE (0.048) which was at par with MS 0217 (0.042) and Co 86032 (0.041).

Yield, yield attributing characters and juice quality parameters:

The data on yield, yield attributing characters and juice quality parameters presented in Table 2 indicated that, the

Table 1 : Mean growth and physiological characters in different sugarcane genotypes (Ratoon)

Genotypes	No. of tillers ('000' /ha)		TDM (g/cane)		LAI	RLWC (%)		Chlorophyll content (mg/g Fr. Wt)		HUE
	120 DAP	180 DAP	180 DAP	240 DAP	180 DAP	180 DAP	240 DAP	180 DAP	240 DAP	
MS 0202	106.50	118.25	224.33	238.38	1.20	87.21	85.79	1.91	1.82	0.026
MS 0219	110.75	118.91	205.29	242.97	1.73	89.06	87.76	2.11	1.94	0.028
CoM0250	102.69	107.07	203.06	242.33	2.25	89.36	88.04	2.38	2.26	0.029
CoM 0251	106.04	117.54	244.36	269.46	2.11	89.10	86.25	2.39	2.34	0.036
CoM 0254	118.60	121.25	194.86	234.63	1.72	91.07	89.37	3.01	2.90	0.025
MS 0272	108.54	111.91	203.85	251.73	1.83	88.03	86.02	2.53	2.41	0.030
MS 0217	110.83	112.72	223.78	243.81	2.04	87.03	84.80	2.37	2.25	0.042
MS 0221	105.37	118.25	191.07	214.61	1.15	87.88	86.27	2.30	2.18	0.031
MS 0211	112.14	111.83	206.75	243.07	1.73	88.25	86.56	2.62	2.53	0.033
MS 0301	105.07	111.55	226.42	261.34	1.89	87.75	85.83	2.55	2.46	0.035
MS 0204	98.54	126.21	193.33	213.79	1.24	85.57	84.93	2.32	2.28	0.028
CoM 0326	99.50	102.16	201.55	232.14	1.43	88.67	86.43	2.49	2.34	0.029
CoM 0341	109.38	115.52	192.34	216.90	1.40	86.69	84.74	2.62	2.57	0.030
CoM 0265	125.50	133.12	266.01	290.53	2.06	91.30	90.64	3.08	2.90	0.048
Co 86032	119.37	125.52	258.21	271.20	2.15	90.35	89.21	3.00	2.86	0.041
Co 94012	104.91	107.93	202.44	217.46	1.37	88.45	86.72	2.51	2.38	0.026
Mean	108.98	116.23	214.85	243.15	1.71	88.49	86.84	2.51	2.40	0.032
S.E. ±	1.99	6.31	4.54	5.12	0.08	0.91	0.62	0.034	0.03	0.002
C.D. (P=0.05)	5.68	NS	12.93	14.59	0.23	2.60	1.78	0.09	0.08	0.007
CV %	3.66	10.86	4.23	4.21	9.49	2.06	1.44	2.69	2.52	14.99

Table 2 : Mean yield and yield characters in different sugarcane genotypes (Ratoon)

Genotypes	Cane yield (t/ha)	CCS yield (t/ha)	CCS % at harvest	NMC ('000' /ha)	Av. cane wt. (kg/cane)
MS 0202	55.30	7.43	13.47	57.02	0.97
MS 0219	62.11	8.45	13.59	67.51	0.92
CoM0250	59.53	7.71	12.92	75.92	0.76
CoM 0251	76.99	11.30	13.70	62.27	1.45
CoM 0254	69.44	9.89	14.23	73.83	0.95
MS 0272	74.67	10.42	13.92	61.10	1.23
MS 0217	83.41	11.08	13.73	68.84	1.27
MS 0221	71.60	9.81	13.70	78.92	0.93
MS 0211	75.77	10.21	13.46	62.69	1.13
MS 0301	82.58	11.36	13.79	70.59	1.27
MS 0204	57.85	7.81	13.49	60.46	0.92
CoM 0326	61.86	8.71	14.09	59.60	0.99
CoM 0341	61.95	8.52	13.78	64.18	0.98
CoM 0265	91.84	12.98	14.14	79.17	1.24
Co 86032	78.77	11.21	14.25	73.10	1.08
Co 94012	60.96	8.93	14.73	55.94	1.04
Mean	70.92	9.74	13.81	66.97	1.07
S.E. ±	3.48	0.54	0.28	3.86	0.08
C.D. (P=0.05)	9.91	1.54	0.81	11.01	0.23
CV %	9.90	11.13	4.13	11.54	14.97

Table 3 : Mean ratoon cane yield, CCS yield and CCS % in different sugarcane genotypes (Ratoon)

Genotypes	Cane yield (t/ha)				CCS yield (t/ha)				CCS %			
	2006-07	2007-08	2008-09	Pooled mean	2006-07	2007-08	2008-09	Pooled mean	2006-07	2007-08	2008-09	Pooled mean
MS 0202	56.00	56.60	55.30	55.97	7.75	7.86	7.43	7.68	13.88	13.89	13.46	13.74
MS 0219	80.00	64.77	62.11	68.96	10.74	9.31	8.45	9.50	13.39	13.84	13.58	13.60
CoM0250	70.58	73.08	59.53	67.73	8.68	9.99	7.71	8.79	13.45	13.61	12.92	13.32
CoM 0251	94.77	91.30	76.99	87.79	12.36	14.30	11.30	12.66	13.20	13.49	13.70	13.46
CoM 0254	73.67	65.11	69.44	79.41	10.47	9.35	9.89	9.90	14.24	14.35	14.24	14.27
MS 0272	64.49	74.58	74.67	71.25	9.26	10.24	10.42	9.97	13.99	13.73	13.92	13.88
MS 0217	112.66	98.40	83.41	98.16	15.11	12.97	11.08	13.05	13.53	13.39	13.73	13.55
MS 0221	75.25	87.57	71.60	78.14	11.23	11.89	9.81	10.98	13.23	13.57	13.69	13.49
MS 0211	93.67	83.16	75.77	79.58	11.86	10.83	10.21	10.97	12.65	13.00	13.45	13.03
MS 0301	84.33	92.56	82.58	86.49	12.24	12.34	11.36	11.98	14.23	13.32	13.79	13.78
MS 0204	87.25	69.29	57.85	69.97	10.77	9.17	7.81	9.25	13.37	13.20	13.49	13.35
CoM 0326	66.75	69.83	61.86	66.15	9.07	9.72	8.71	9.17	13.98	13.93	14.09	14.00
CoM 0341	69.08	66.18	61.95	65.74	8.43	9.18	8.52	8.71	13.69	13.85	13.77	13.77
CoM 0265	108.83	108.23	91.84	102.97	14.76	15.12	12.98	14.29	13.57	13.89	14.14	13.86
Co 86032	98.75	99.40	78.77	92.31	13.85	14.03	11.21	13.03	14.10	14.03	14.24	14.12
Co 94012	67.75	58.86	60.96	62.72	9.77	8.53	8.93	9.08	15.09	14.51	14.73	14.77
Mean	81.49	78.68	70.92	76.44	11.02	10.93	9.74	10.96	13.73	13.73	13.81	13.75
S.E. ±	5.41	4.94	3.48	3.93	0.67	0.79	0.54	0.48	0.26	0.24	0.28	0.14
C.D. (P=0.05)	15.40	14.08	9.91	11.35	1.91	2.25	1.54	1.40	0.73	0.71	0.81	0.42
CV %	13.27	12.57	9.90	8.91	12.15	14.45	11.13	7.94	3.75	3.63	4.13	1.84

genotype CoM 0265 recorded significantly higher cane and CCS yield (91.84 and 12.98 t/ha, respectively) which was at par with MS 0217 (83.41 and 11.08 t/ha, respectively) and MS 0301 (82.54 and 11.36 t/ha, respectively). As regard the NMC genotype CoM 0265 recorded significantly higher NMC (79170/ ha) which was at par with genotypes MS 0221, CoM 0250 and CoM 0254 (78920, 75920 and 73830/ha, respectively). The genotype CoM 0251 recorded significantly higher average cane weight (1.45 kg/cane) which was at par with MS 0217 and MS 0301 (1.27 kg/cane, respectively) and CoM 0265 (1.24 kg/cane). The genotype Co 94012 recorded significantly higher CCS per cent (14.73 %) which was at par with Co 86032, CoM 0254, CoM 0265, CoM 0326 and MS 0272 (14.25, 14.23, 14.14, 14.09 and 13.92, respectively).

Pooled results:

The pooled data of ratoon cane yield, CCS yield and CCS per cent presented in Table 3 indicated that, the genotype CoM 0265 recorded significantly highest cane and CCS yield (102.97 and 14.29 t/ha, respectively) which was at par with MS 0217 (98.16 and 13.05 t/ha, respectively) and Co 86032 (92.31 and 13.03 t/ha, respectively). As regard the CCS per cent genotype Co 94012 recorded significantly highest CCS per cent (14.77%).

Conclusion:

On the basis of morpho-physiological traits, yield and yield attributing parameters genotypes CoM 0265, MS 0217 and Co 86032 proved their superiority for cane yield, CCS yield and ratoonability.

REFERENCES

Annonymous (2004). IISR- Total and Tomorrow (Preface).

Panse, V.G. and Sukhatma, P.V. (1978). *Statistical methods for agricultural workers*. ICAR Publications, New Delhi (INDIA).

Yadav, R.L., Yadav, D.V. and Verma, R.P. (2004). *Cane management and development in Sugarmill Reserved Zone*, IISR, Lucknow, (U.P.) INDIA.

Yoshida, S, Forno, D.A, Cock, J.H. and Gomez, K.A. (1976). *Laboratory manual for physiological studies of rice*. Int. Rice Res. Inst., Laguna, Philippines.

****