

Effect of salinity on regeneration of callus in sugarcane

A.S. KADAM

Received : November, 2010; Accepted : December, 2010

SUMMARY

The present work has been carried out to study the regeneration efficiency of callus on different salinity levels in three varieties of sugarcane viz., Co. 86032, Co. 7714 and Co. 671. For callus induction apical meristems were subjected to *in vitro* culture on MS medium supplemented with 2mg/l 2,4-D. The calli were transferred on the media having different levels of salinity viz., 2,4,5,6 and 8 Ece mmhos/cm, obtained by combination of salts viz., NaHCO₃, Na₂SO₄, CaCl₂ and MgCl₂ in proportion of 2:1:1 of chlorides, carbonates and sulphates, respectively. The callus treated with different concentrations of salinity were transferred for regeneration on MS medium with 2mg/l BAP. The variety Co.86032 showed early regeneration than other varieties. The regeneration ability was maximum in Co. 86032 followed by Co.7714 and it was lowest in Co.671. In salinity levels there was progressive drop of regeneration with the increase of salinity. The 5,6 and 8 Ece salinity levels showed drastic reduction in regeneration in Co.7714 and Co. 671. However, in a variety Co. 86032, the regeneration was better even in the highest salinity levels. The variety Co 86032 was found most tolerant to salinity compared to Co.7714 and Co. 671.

Kadam, A.S. (2011). Effect of salinity on regeneration of callus in sugarcane. *Internat. J. Plant Sci.*, 6 (1): 183-184.

Key words : Callus induction, *In vitro* salt tolerance, Regeneration ability, Sugarcane

Sugarcane (*Saccharum officinarum* L.) is one of the most important sugar crop of India. Because of semi-arid climate and salinity of its cultivation area in country increasing, salt tolerance of sugarcane is signifying. *In vitro* selection of plants in salt stressed culture medium is a potential tool to raise plants tolerance to saline environment (Tal 1984, Rains, 1989, Collins and Pix, 1990, Chopra and Narasimhulu, 1991). In most cases regeneration of plants from resistant cell lines is difficult to achieve (Naik and Babu, 1988). Therefore, in the present investigation regeneration efficiency of callus on different salinity levels was carried out.

MATERIALS AND METHODS

To study the regeneration efficiency of callus on different salinity levels, three varieties of sugarcane viz., Co. 86032, Co. 7714 and Co. 671 were taken. For callus induction apical meristem (explant) were subjected to *in vitro* culture on MS (Marashige and Skoog, 1962) medium supplemented with 2mg/l 2,4-D. The well developed calli were transferred on the media having different salinity levels viz., 2,4,5,6 and 8 Ece Mmhos/cm, obtained by

combination of salts viz., NaHCO₃, Na₂SO₄, CaCl₂ and MgCl₂ in proportion of 2:1:1 of chlorides, carbonates and sulphates, respectively. After 6 weeks of salt treatment on different salinity levels, the calli showing well growth were removed and transferred to MS medium supplemented with 2mg/l BAP for regeneration. The calli were incubated in a culture room illuminated for 16 hours of photoperiod with 8 hours dark cycle. The 15 tubes of each salinity levels and varieties in three replications were kept for regeneration of calli. The days required for regeneration and percentage of regeneration were recorded.

RESULTS AND DISCUSSION

The data presented in Table 1 and 2, shows regeneration efficiency of calli of different varieties in different salinity levels. The results revealed that as the concentration of salts increases there was increase in number of days for ignition of regeneration. The variety Co.86032 showed early regeneration(11.44) compared to Co.7714(16.33) and Co.671(16.50). Maximum regeneration ability in the salt induced callus was observed in the variety Co. 86032 followed by Co. 7714 and Co. 671. The varietal difference were significant. In the salinity levels maximum per cent regeneration was observed in 2 Ece and there was gradual decrease in regeneration, which was non-significant in the progressive

Correspondence to:

A.S. KADAM, Department of Botany, D.S.M. College, Jinture, PARBHANI (M.S.) INDIA
Email : kadamambadas@rediffmail.com

Table 1 : Days required for regeneration of salt treated calli

Varieties	MS + Salinity levels						Mean
	Control	2EC	4EC	5EC	6EC	8EC	
Co. 86032	8.33	10.00	10.66	11.66	12.33	15.66	11.44
Co. 7714	11.66	14.00	15.66	17.33	20.33	22.33	16.33
Co. 671	13.66	14.00	15.33	17.00	18.33	20.66	16.50
Mean	11.22	12.66	13.88	15.33	17.00	19.55	14.94
	Variety	Treatment		Interaction			
S. E. \pm .	0.146	0.207		0.360			
C. D. (P=0.05)	0.406	0.575		0.996			

Table 2 : Per cent regeneration ability of salt treated calli

Varieties	MS + Salinity levels						Mean
	Control	2EC	4EC	5EC	6EC	8EC	
Co. 86032	97.77	95.55	93.33	86.66	73.33	66.66	85.55
Co. 7714	88.66	73.33	66.66	53.33	40.00	33.33	58.88
Co. 671	80.00	66.00	46.66	33.33	26.66	19.99	45.55
Mean	88.14	78.51	68.88	57.77	46.66	39.99	63.33
	Variety	Treatment		Interaction			
S. E. \pm .	2.755	3.897		6.749			
C. D. (P=0.05)	7.626	10.785		NS			

NS=Non-significant

salinity levels. In the variety Co. 86032 the reduction in per cent regeneration of calli was not at a higher side as has been observed in the other two varieties. Under 8 ECE level the response of regeneration was very poor in the variety Co. 7714 and Co. 671. It was found that the variety Co. 86032 was most tolerant to salinity compared

to Co. 7714 and Co. 671. The differential response of cultivars has been reported by Bansali and Singh (1982), Kresovich (1983), Naik and Babu (1988) in sugarcane. Liu and Yeh (1984) reported that in the selection procedure for salinity tolerant lines, the callus cells lose their regeneration ability.

REFERENCES

- Bhansali, R.R. and Singh, K. (1982). Callus and shoot formation from leaf of sugarcane in tissue culture. *Phytomorphol.*, **32**(2/3): 167-170.
- Chopra, V. L. and Narasimhulu, S. B. (1991). *Biotechnology in oilseed brassicas in Indian Agriculture*, pp. 257-301, Vikas Pub. House. N. Delhi.
- Collins, H. A. and Dix, P. J. (1990). Culture systems and selection procedures; In: *Plant cell line selection; procedure and application* pp. 3-18 VCH weinheim N. Y. Basel. U. K.
- Kresovich, S. (1983). Application of *in vitro* techniques to sugarcane improvement in texas. *Sugarcane*, **6**: 8-10.
- Liu, M. C. and Yeh, H. S. (1984). Regeneration of NaCl tolerant sugarcane plants from callus regenerated from NaCl preselected plantlets. Proc. Nati. Sci. Council., ROC(B): 8-11.
- Murashige, T. and Skoog, F. (1962). A revised medium for rapid growth and bioassays with tobacco tissue culture. *Physiol. Plantarum*, **15**: 473-497
- Naik, G. R. and Babu, K.H. (1988). Redifferentiation of NaCl tolerant sugarcane plants from callus derived resistant lines. *Curr. Sci.*, **57**(8): 432-434.
- Rains, D.W. (1989). *Plant tissue and protoplast culture: Application to stress physiology and biochemistry*; pp. 181-196 Cambridge University press.
- Tal, M. (1984). *Physiological genetics of salt resistance in higher plants: Strategies of crop improvement*; pp. 301-320, John Wiley and Sons, New York, U.S.A.

