Plant Archives Vol. 18 No. 2, 2018 pp. 1584-1586 **e-ISSN:2581-6063 (online), ISSN:0972-5210**

EFFICACY OF VARIOUS PRIMING TECHNIQUES OF CANE NODE FOR ACCELERATING GERMINATION AND PRODUCTION POTENTIAL OF SUGARCANE (*SACCHARUM SP.* HYBRID)

Shri Prakash Yadav*, S.C. Singh, Sonia Yadav, A.K.Tiwari, S.K. Yadav and B.L. Sharma[1]

*U.P. Council of Sugarcane Research Institute, Shahjahanpur–242001 (U.P), India
[1]Director, Sugarcane Research Shahjahanpur -242001, (U.P) India.

Abstract

Field experiments were carried out during spring season for three consecutive years (2012-15) at the experimental farm of Sugarcane Research Institute, Shahjahanpur (U.P.) with an objective to assess the effect of priming techniques on cane code for accelerating germination. The experimental soil was sandy loam in texture, low in organic carbon (0.37%), low in available phosphorus (11.45 kg/ha) and medium in potassium (124 kg/ha) with 7.6 P^H value. Experiment was laid out in a randomized block design with six treatments and four replications employing variety CoSe 01434 (mid late maturing). The three years individual data recorded and pooled for outcome of the study. Significantly higher germination (40.16%) and cane yield (96.60 t/ha) were recorded with the treatment priming cane node with cattle dung , cattle urine and water in the ratio of 1:2:5 than that of unprimed cane node treatment which resulted 32.52% germination and 80.25 t/ha cane yield. CCS percent in cane was not affected significantly due to various priming cane node techniques.

Key Words: Sugarcane, Germination, Priming, Cane node, Cattle dung and Cattle urine.

Introduction

Sugarcane (*Saccharum officinarum* L.) is a tropical giant perennial grass and one of the most important cash crop belonging to family graminae. It assumes an important position in the Indian economy, contributing about 2.0% of national gross domestic product (GDP). India contributes nearly 13.2% of the world and about 41% of Asian sugar production scenario. The productivity of sugarcane in India is low due to poor germination as well as so many biotic & abiotic factors like drought, flood, temperature variation, salinity & alkalinity etc. Priming improves germination, vigour and performance of the crop, led to variable growth development of antioxidant capacity and allows for the regulation of the water content in the seed material. Seed priming has been used to shorten germination time, improve seed performance through synchronized accelerated germination, improved seedling establishment, stimulated vegetative growth and ultimately crop yield in many crops.

***Author for correspondence :** E-mail : drshriprakashyadav@gmail.com

(Iqbal and Ashraf, 2007; Casenave and Toselli, 2007; Patade *et.al.* 2011 and Sayed Mooheshni *et al.* 2014). Seed priming has also been demonstrated to enhance the yield of chick pea, maize, rice and wheat under semi arid conditions (Harris *et al.* 1999, Musa, *et al.* 2001). The plants grown from primed seeds emerge faster, grow more vigorously and perform better under sub- optimal conditions such as salinity stress (Patade *et al.* 2009 a.b; 2012 a, b). Dispite of such information on improved physiological parameters and on yield, there is not much information on the effect of priming in vegetatively propagated crop plants like sugarcane specially during crop development (Kaur *et al.* 2005). Hence, it was thought possible to undertake this study under low cane germinating tract of subtropical, India to evolve a low cost package for optimum germination of sugarcane.

Materials and methods

Field experiments were carried out during spring season to study the effect of priming cane node techniques on accelerating germination for three

consecutive years (2012-15) at the experimental farm of Sugarcane Research Institute, Shahjahanpur (U.P). The soil of experimental field was sandy loam in texture, low in organic carbon (0.37%), available phosphorus (11.45 kg/ha) and medium in potassium (124 kg/ha) with 7.6 P^H. The experiment was laid out in a randomized block design with four replications. Test variety was CoSe 01434 a mid late maturing variety. Data on germination, shoots, millable cane, cane yield and CCS percent in cane were observed. Cane yield was recorded after crop harvest. There were six treatments and details are as under.

T_1 - Un- primed cane node

T_2 - Treating cane node in hot water at 50ºc for 2 hrs.

T_3 - Treating cane node in hot water at (50ºc) + urea solution (3%) for 2 hrs.

T_4 - Priming cane node with cattle dung, cattle urine and water in the ratio of 1:2:5.

T_5 - Conventional three budded setts planting.

T_6 - Primed and sprouted cane node (incubated for 4 days after priming)

Results and discussion

Experimental data on germination, growth and yield parameters of sugarcane are presented in table in which higher germination, number of shoots, millable canes/ ha and cane yield were observed with the treatment priming of cane node with cattle dung, cattle urine and water in the ratio of 1:2:5. This treatment had produced singnificantly higher germination (40.16%), shoots (211728/ha) millable canes (136574/ha) and cane yield (96.60 t/ha). C.C.S percent in cane was not affected singnificantly due to various priming techniques. Priming effect on germination also confirmed with the finding of Patade *et al.* 2009 a, b and Raven 1985. Unprimed cane node treatment resulted lower germination because priming of cane node induced different mechanisms which have been proposed during seed pre conditional, temperature acclimation and systemic acquired resistance (Sung *et al.* 2003; Conrath 2011; Venture *et al.* 2012 and Sani *et al.* 2013). Significantly higher germination under priming cane node treatment with cattle dung, cattle urine and water (1:2:5. ratio) may be due to retention of cane setts moisture. Tadu *et al.*, 2007 also recorded higher sprouting under priming treatments.

Acknowledgment

Greater thanks are extended to Project Investigator, All India Co-ordinated Research project for allotting such research works to our Institute and giving financial support.

References

Case nave, E.C. and M.E. Toselli (2007). Hydro-priming as a pretreatment for cotton germination under thermal and water stress condition. *Seed Science and Technology.* **35:** 88-98.

Conrath, U. (2011). Molecular aspects of defenace priming. *Trends in Plant Science,* **16**: 524-531.

Harris, D., A. Joshi, P.A. Khan, P. Gothkar and P.S. Sodhi (1999). On farm seed priming in semi-arid agriculture. Development and evaluation in maize, rice and chick pea in India using participatory methods. *Experimental Agriculture,* **35**: 15-29.

Iqbal, M. and M. Asraf (2007). Seed treatment with auxins modulates growth and ion partitioning in salt stressed wheat plants. *Journal of Integrative Plant biology,* **49**: 1003-1015.

Table : Effect of treatments on germination, shoots, milliable canes, cane yield and CCS% .

S. No.	Treatments	Germination (%)	Shoots /ha	NMC /ha	Cane Yield (t/ha)	C.C.S. (%)
T_1	Un - Primed cane node	32.52	165277	110956	80.25	11.10
T_2	Treating cane node in hot water at 50ºc for 2 hours.	35.39	186728	109259	77.47	11.21
T_3	Treating cane node in hot water at (50ºc) urea solution (3%) for 2 hours.	36.72	198919	129938	91.98	11.01
T_4	Priming cane node with Cattle dung, Cattle urine and water 1:2:5 ratio.	40.16	211728	136574	96.60	11.11
T_5	Conventional three budded setts planting	33.44	160648	108024	76.08	11.07
T_6	Primed and sprouted cane node (incubated for 4 days after priming).	31.72	156327	116820	88.58	11.17
	SE±	**1.54**	**12558.92**	**4606.94**	**4.73**	**0.18**
	CD (5%)	**3.43**	**27981.28**	**10264.26**	**9.66**	**NS**

Kaur, S., A.K. Gupta and N. Kaur (2005). Seed priming increases crop yield possibly by modulating enzymes of sucrose metabolism in chick pea. *Journal of Agronomy and Crop Science,* **191**: 81-87.

Musa, A.M, D.O. Harris, C. Johansen and J. Kumar (2001). Short duration chick pea to replace fallow after Aman rice. The role of on farm seed priming in the high Barind tract of Bangladesh. *Experimental Agriculture,* **37**: 509-521.

Patade, V.Y; S. Bhargva and P. Suprasanna (2009a). Halo - priming imports tolerance in sensitive sugarcane culivar to salt and PEG induced drought stress. *Agriculture, Ecosystems and Environment,* **134**: 24-28.

Patade, C; C. Veleria and L.C. Salvatore (2009b). Germination and panicle growth in unprimed and primed seed of sweet sughum as affected by reduced water potential in Nacl at different temperature. *Industrial Crops and Products,* **30**: 1-8.

Patade, V.Y; Maya Kumari and Zakwan Ahmed (2011a). Chemical seed priming as a simple technique to impart cold and salt stress tolerance in capsicum. *Journal of Crop Improvement,* **25**:497-503.

Patade, V.Y., Maya Kumari and Zakwan Ahmed (2012a). Chemical seed priming as an efficient approach for developing cold tolerance in Jatropha. *Journal of Crop Improvement,* **26**: 140-149.

Patade, V.Y, S. Bhargva and P. Suprasanna (2012b). Halo priming mediated salt and iso - osmotic PEG stress tolerance and gene expression profiling in sugarcane. *Molecular Biology Reports,* **39**: 9563-9572.

Raven, J.A. (1985). Regulation of P^H and generation of osmolarity in vascular plant. A cost benefit analysis in relation to efficiency of use of energy, nitrogen and water. *New Phytologist,* **101**:25-77.

Sayed–Moocheshi, A., A. Shekoofa, H. Sadeghi and M. Pessarakali (2014). Drought and salt stress mitigation by seed priming with KNO_3 and urea in various maize hybrids. *Journal of Plant Nutrition,* **37**: 674-689.

Sani, E., P. Herzik, G. Perrela, V. Calot and A. Amimann (2013). Hyperosomatic priming of *Arabidopsis* seedlings establishes a long term somatic memory accompanied by specific changes of the epigenome. *Genome Biology,* **14(6)**: R.59.

Sung, D.Y., F. Kalplan, K.J. Lee and C.L. Guy (2003). Aquired tolerance to temperature extremes. *Trends in Plant Science* **8**: 179-187.

Tadu, S., D. Mandal and G.C. De (2007). Studies on sprouting and rooting of single budded sugarcane setts in seed bed. *Agric. Sci. Digest*, **27(3)**: 222-224.

Ventura , L., M. Dona, A. Mecovei, D. Carbonera, A. Buttafava, A. Mondoni, G. Rassi G and A. Balestrazzi (2012). Understanding the molecular pathway associated with seed vigor. *Plant Physiology and Biochemistry,* **60**: 196-206.