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Enriched Rooting Media for Higher Sugarcane Seedling Vigour Index

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ABSTRACT

Cultivation of sugarcane with single node seedling or single bud seedling is gaining popularity among sugarcane cultivators due to its reduction in cost of cultivation coupled with yield advantage. under this Technology raising of healthy sugarcane seedlings is a prime factor for success of this advanced sugarcane Technology. An experiment was conducted in portrays with different rooting media and raised sugarcane seedlings at RARS, Anakapalle with RBD of four replications during sugarcane cropping season of 2014-15 and 2015-16. The results of the experiment revealed that the seedling vigour index (SVI) of sugarcane was better with the sugarcane seedlings raised in rooting medias of coir pith + vermi compost (1:1) (T1) + Urea 5 kg per 100 kg media (SVI 37.95), T1 + Sett dipping with 10% lime solution (SVI 33.36) and T1 + Sett treatment with GA3 100 PPM (SVI 30.46). The seedlings performed better with high seedling vigour index which can sustain well under transplanted conditions / fields. The additional nourishment through Nitrogen in Urea, Calcium content of 10% lime solution and plant growth substance (GA3) helped in the respective treatments for better seedling vigour index over other treatments studied. Sugarcane rooting media (vermin compost + coir pith) is rich in Nitrogen (0.864%), Phosphorous (0.82%), Potassium (1.16%), Iron (4,220 ppm) and Manganese (1200 ppm).

Key words: *Sugarcane single node seedling, Protray, Rooting media, GA3, IAA, Seedling vigour index (SVI), Coir pith and Vermin compost.*

INTRODUCTION

Sugarcane is normally propagated by stock cuttings consisting of 2-3 bud setts. In commercial system of sugarcane planting nearly 6-8 tones of seed cane per hectare is used as planting material. Establishing the sugarcane crop using bud chip / single node in place of setts could save about 80% by weight of stock material (Radha Jain & Solomon, 2010 a). Indian sugarcane experts Narsimha Rao (1977) and Ramaiah *et al.*, (1977) showed the feasibility of eliminating the internode part of the seed piece and using only buds for commercial planting. Sugarcane seedling transplanting expected to reduce overall pressure on water resources and contributing to recovering of eco system in long run.

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Seedling transplanting is an alternative to conventional seed - water and space intensive sugarcane cultivation. Seedling transplanting in sugarcane (Single node technology) is becoming very popular and sugar industry is also encouraging due to its advantage on reduced cost of cultivation and higher yields. Moreover the seed cane: out put ratio is improved to 1:40 compared to that of 1:10 in conventional planting (Prasada Rao, 2015) and it gives better yield in ratoon crop (Solomon, 2015). In addition Naidu et al., 2015 reported that use of single bud setts also reduces seed cane rate and there by reduces cost of cultivation. But there is no information on standard rooting media for raising cane seedlings. Different people are using as their own knowledge for rooting media preparation thinking rooting media as a support medium for raising sugarcane seedlings. Some people are using enriched nutrient medium and some are using with out any nutrient enrichment. So, it is essential to take up study on standardization of rooting media for raising sugarcane seedlings under a scientific manner. Under this background a trial was conducted for two years at Regional Agricultural Research Station, Anakapalle.

MATERIALS AND METHODS

A poly tray experiments was conducted at Regional Agricultural Research Station, Anakapalle in the net house during 2014-15 and 2015-16 sugarcane cropping season with date of planting in January month. The experiment was conducted under RBD design with four replications (each poly tray as one replication) duly following procedure of raising single node seedling in sugarcane. The following are the treatments under the poly tray experiment. T1- Coir pith + Vermi compost (1:1); T2- T1 + DAP (5kg / 100 kg media); T3 - T1 + Urea (5kg / 100 kg media); T4- T1 + DAP (2.5 kg / 100 kg media) + Urea (2.5 kg / 100 kg media); T5- T1 + Sett treatment with $CaCl_2$ (2g/lt) + Ethrel (2ml/lt); T6- T1 + $ZnSo_4$ (0.5 kg) + FeSo4 (1.0 kg) /100 kg media) ; T7- T1 + Sett treatment $CaCl_2$ (2g/lt) + Urea (10g/lt); T8- T1 + Ethephan (2ml/lt); T9- T1 + Sett treatment with 10 % lime solution; T10- T1 + Sett treatment with 100 ppm GA3; T11- T1 + Sett treatment with IAA 50 ppm; T12- T1 + Sett treatment with DM 45 + Chlorpyriphos; T13- Progressive farmers rooting media.

The seedlings were grown, observed upto 45 days and data was taken duly following standard procedures. The seedling vigour index was calculated based on the formulae seedling length multiplied by per cent germination and divided by 100. Data was statistically analyzed by following standard statistical methods. (Panse & Sukhatme, 1978).

RESULTS AND DISCUSSIONS

Sugarcane rooting media (vermin compost + coir pith) is rich in Nitrogen (0.864%), Phosphorous (0.82%), Potassium (1.16%), Iron (4,220 ppm) and Manganese (1200 ppm) (Table 1).

Table1: Nutrient composition of rooting media

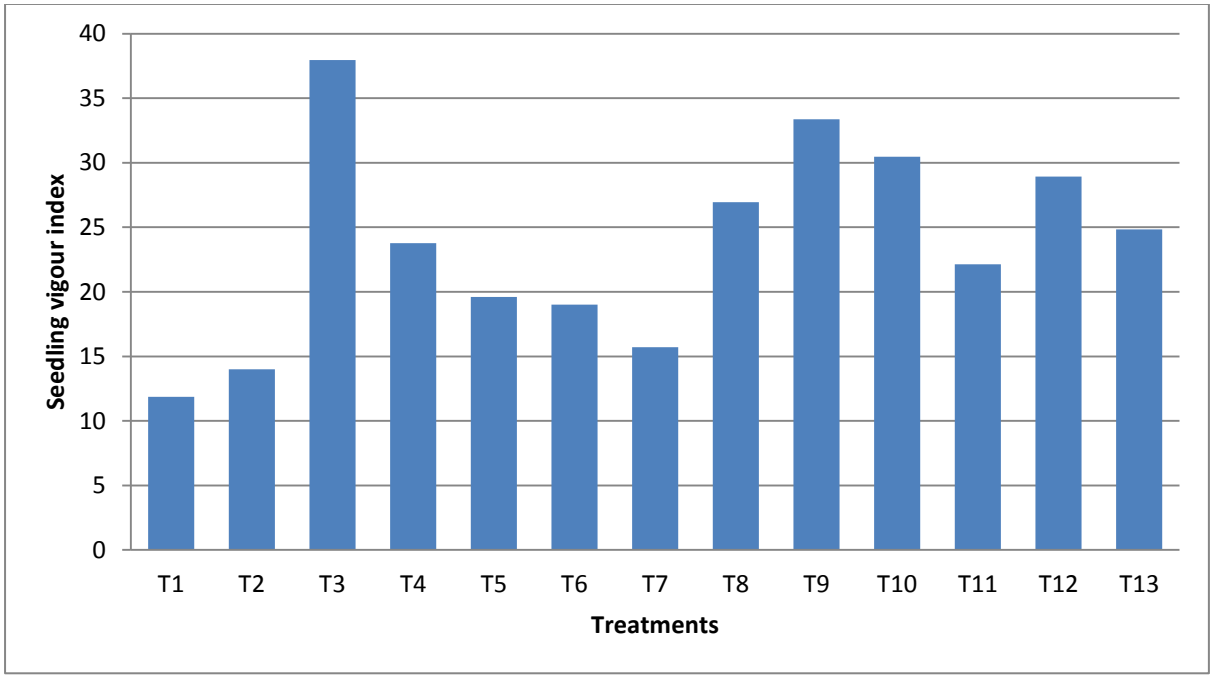
Media	Nutrient composition						
	Total Micro nutrients %			Total macro nutrients (ppm)			
	N	P	K	Zinc	Iron	Copper	Manganese
Vermicompost	0.640	0.61	0.54	68	3800	37.8	1000
Coir pith	0.224	0.21	0.62	32	420	13.6	200
Sugarcane node	0.210	0.22	0.86	58	104	11.8	57
Organic enricher	0.440	1.15	2.48	262	2200	46.7	664

Concrete differences in seedling vigour index and root length of sugarcane seedlings in different treatments were observed and presented in table 2, and graph 1.

Table2: Effect of rooting media on seedling vigour of sugarcane (Pooled data of 2014-15 and 2015-16)

Treatment No.	Treatments	Root length (cm)	Seedling vigour index (SVI)
T1	Coir pith + Vermi compost (1:1)	17.25	11.86
T2	T1 + DAP (5kg / 100 kg media)	11.65	14.00
T3	**T1 + Urea (5kg / 100 kg media)**	**17.45**	**37.95**
T4	T1 + DAP (2.5 kg / 100 kg media) + Urea (2.5 kg / 100 kg media)	14.25	23.77
T5	T1 + Sett treatment with $CaCl_2$ (2g/lt) + Ethrel (2ml/lt)	15.05	19.61
T6	T1 + $ZnSo_4$ (0.5 kg) + FeSo4 (1.0 kg) / 100 kg media)	15.98	19.01
T7	T1 + Sett treatment $CaCl_2$ (2g/lt) + Urea (10g/lt)	12.70	15.72
T8	T1 + Ethephan (2ml/lt)	14.15	26.94
T9	**T1 + Sett treatment with 10 % lime solution**	**18.30**	**33.36**
10	**T1 + Sett treatment with 100 ppm GA3**	**15.86**	**30.46**
T11	T1 + Sett treatment with IAA 50 ppm	15.31	22.13
T12	T1 + Sett treatment with DM 45 + Chlorpyriphos	14.75	28.93
T13	Progressive farmers rooting media	17.80	24.84
	SEm+/-	1.63	2.20
	CD (0.05)	4.81	6.89

Root length: The root length of sugarcane seedling was more with the treatments T1 (Coir pith + Vermi compost (1:1)), T3 (T1 + Urea (5kg / 100 kg media), T9 (T1 + Sett treatment with 10 % lime solution) and T13 (Progressive farmers rooting media) and these are statistical on par with each other.



Graph 1: Graphical representation of effect of rooting media on seedling vigour index of sugarcane.

Seedling vigour index (SVI): Seedling vigour index was high in the treatments T3 (T1 + Urea (5kg / 100 kg media), T9 (T1 + Sett treatment with 10 % lime solution) and T10 (T1 + Sett treatment with 100 ppm GA3) followed by T12 (T1 + Sett treatment with DM 45 + Chlorpyriphos), T8 (T1 + Ethephan (2ml/lt)) and T13 (Progressive farmers rooting media). With the data we can derive that the treatments T3 (T1 + Urea (5kg / 100 kg media), T9 (T1 + Sett treatment with 10 % lime solution) and T10 (T1 + Sett treatment with 100 ppm GA3) were found to perform better for sustainable sugarcane seedling vigour which can perform well for better establishment of sugarcane seedlings under transplanted fields. The treatments comprises of nitrogen in Urea, Calcium in 10% lime dipping, and growth substance GA3 in addition to coir pith and vermin compost favored the germination per cent and improved the seedling vigour index in respective treatments over other treatments tested. Similar type of observations with different rooting media was also reported with sugarcane seedling study by Vijakumar and Suresh, (2010) and Jain and Solomon, (2010 b).

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