Int.J.Curr.Microbiol.App.Sci (2020) *9*(2): 2860-2865

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 9 Number 2 (2020)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2020.902.325

Influence of Vigore and tab-sil (SiO_2) on Productivity and Profitability of Transplanted Rice (*Oryza sativa* L.) under Southern Dry Zone of Karnataka

C. Ramachandra[1] and B. S. Sowmyalatha[2]*

[1]ZARS, V.C. Farm, Mandya and [2]Department of Agronomy, College of Agriculture, V.C. Farm, Mandya -571 405, University of Agricultural Sciences, Bengaluru, Karnataka, India

**Corresponding author*

Keywords

Transplanted Rice, Vigore, Tab-sil,Productivity, Profitability, B:C

Article Info

Accepted:
20 January 2020
Available Online:
10 February 2020

A B S T R A C T

A field experiment was conducted during *Kharif* 2015 and 2016 at Zonal Agricultural Research Station, V.C. Farm, Mandya, Karnataka to study the effect of different sources of nutrients on growth and yield of transplanted rice. The experiment was laid out in RCBD having eight treatments and replicated thrice. The results of the study indicates that application of RDF with Tab-sil 100 % Silicate Tabs (SiO_2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1} at 50 DAT recorded significantly higher panicle number (436 m^{-2}), panicle weight (3.8 g), grain yield (7092 kg ha^{-1}) and straw yield (7696 kg ha^{-1}) followed by application of RDF with Tab-sil 100 % Silicate Tabs (SiO_2) @ 5 kg ha^{-1} at 50 DAT and found significantly superior over the other treatments. Higher net returns and B:C ratio was obtained with the application of 100 % RDF + Tab-sil 100 % Silicate Tabs (SiO_2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1} at 50 DAT (Rs. 73,764 ha^{-1} and 2.34) and lower net returns and B:C ratio was recorded in control plot (Rs. 33,486 ha^{-1} and 1.80, respectively).

Introduction

Rice (*Oryza sativa* L.) is one of the oldest and widely grown food crops of the world. It is also the major source of nutrition for more than half of the rice eating population. In India, it is grown in an area of 43.79 million hectares with production of 112.9 million tons of milled rice and the productivity of 2578 kg ha^{-1} (Anon, 2018). In Karnataka, it occupies in an area of 10.91 lakh ha with a production of 29.67 lakh tone of milled rice and the productivity of 2843 kg ha^{-1} (Anon, 2016). Deficiency of micro nutrients and imbalance use of fertilizer resulted decreasing organic carbon content of soil and in turns resulted

lower productivity. In recent year, the application of nanotechnology has led to the production of granulated and liquid silicon fertilizers with high bio availability. Vigore is a nano-technology product which includes all the nutrients required for complete and healthy development of the plant. It is an eco-friendly product and nontoxic for human, animals and plants as it has been prepared from substances found in nature by using infinite decimal doses and with the process of denomination and potentiality which increase effectiveness and remove toxicity. Vigore was applied 5-10 days after transplanting of rice @ 625g ha^{-1} as broadcast.

Adequate supply of silica is essential for rice plant through the entire growth period particularly in and after the stage of panicle primordial formation. Silicon promotes photosynthesis keeping the leaf erect and prevents fungal and insect injury and also alleviates lodging. It also increases the supply of oxygen to the rice plant roots. This alleviates the excessive amount of ferrous iron and also toxicity of H_2S (Singh *et al.*, 2017). Hence, there is necessity to evaluate the effectiveness of Vigore and Tab-sil products along with recommended dose of fertilizer for maximization of rice yield.

Materials and Methods

A field experiment was conducted during *Kharif* 2015 and 2016 at Zonal Agricultural Research Station, V.C. Farm, Mandya, Karnataka to study the effect of different sources of nutrients on growth and yield of transplanted rice. The experimental soil was red sandy loam in texture, neutral in reaction (pH 6.45) with electrical conductivity 0.28 dSm^{-1}. The soil had medium in available nitrogen (278 kg ha^{-1}), medium in available phosphorus (26.0 kg ha^{-1}) and medium in available potassium (185.0 kg ha^{-1}). The amount of rainfall received during the crop growth period was 370.6 mm and 307.3 mm during both the year of study. The experiment consists of eight treatments viz., T_1: 100% recommended dose of fertilizer (RDF) i.e. 100 kg N + 50 kg P_20_5 + 50 Kg K_2O ha^{-1}, T_2: 100% RDF + Vigore application @ 625 g ha^{-1} as basal, T_3: 100% RDF + Vigore application @ 625 g ha^{-1} as basal application + Spray @ 1.25 g $litre^{-1}$ at panicle stage, T_4: 100% RDF + Tab sil- silicate Tabs SiO_2 (effervescent tablet with silicate) @ 2.5 Kg ha^{-1} (25 DAT),T_5: 100% RDF + Tab sil-silicate Tabs SiO_2 (effervescent tablet with silicate) @ 5.0Kg ha^{-1} (50 DAT),T_6: 100% RDF + Tab-sil + Silicate tabs SiO_2 (effervescent tablet with silicate) @ 2.5 Kg ha^{-1} at 25 DAT and 2.5 Kg ha^{-1} (50 DAT),T_7: 100% RDF + 10 t FYM ha^{-1} + 20 kg $ZnSO_4$ ha^{-1}, T_8 : Without NPK (Control) were tested in randomized block design with three replications. The fertilizer was applied as per the treatments i.e., 50 % N applied as basal dose, 25 % at maximum tillering and 25 % at panicle initiation stage + 100 % P_2O_5 and 100 %K_2O at the time of sowing. Vigore was applied at 5 days after transplanting rice @ 625g ha^{-1} as broadcast method. The vigore and Tab-sil were applied as per treatment indicated in the treatment details. The data on yield and yield parameters like panicle number m^{-2}, panicle weight (g), grain and straw yield (kg ha^{-1}) was recorded at harvest and the economics were also worked out. The data collected on yield and yield parameters were subjected to statistical analysis as per statistical procedure given by Sundarrajan *et al.*, (1972).

Results and Discussion

Effect of vigour and Tab-silon yield and yield attributes of transplanted rice

The data on panicle number m^{-2}, panicle weight (g), grain and straw yield (kg ha^{-1}) of rice differed significantly due to different sources of nutrients on growth and yield of

transplanted rice and presented in Table 1. Application of 100 % recommended dose of fertilizer (100:50:50 Kg NPK ha^{-1}) with Tab-sil100 % Silicate Tabs (SiO_2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1} at 50 DAT resulted higher panicle number (436m^{-2}) followed by application of RDF with Tab-sil100%+ Silicate Tabs (SiO_2) 5 kg ha^{-1}at 50 DAT (404m^{-2}) compared to other treatments in the study. Lower panicle number was observed with the plot receiving no NPK (322m^{-2}).Application of 100 % RDF + Vigore application @ 625 g/ha as basal application + Spray @ 1.25 $glitre^{-1}$at panicle stage produced higher panicle weight (4.0 g) followed by application of 100 % RDF with Tab-sil100 % Silicate Tabs (SiO_2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1} at 50 DAT (3.8 g) and lower panicle weight was observed with the plot receiving no NPK (3.1 g). Increase in panicle weight and number were mainly due to higher growth attributes owing to improvement in availability of plant nutrients through improved root system and higher uptake of nutrients from soil by improving photosynthesis efficiency of plant. These results are in conformity with Singh *et al.*, (2017).

Table.1 Yield components of transplanted rice as influenced by different sources of nutrients

Treatment		Panicle number m^{-2}			Panicle weight (g)		
		***Kharif* 2015**	***Kharif* 2016**	**Mean**	***Kharif* 2015**	***Kharif* 2016**	**Mean**
T_1	Recommended fertilizer dose of the region (RDF) (100-50-50 kg NPK/ha)	405	369	387	3.7	2.9	3.3
T_2	T_1 + Vigore application @ 625 g/ha as basal application at 50 DAT	425	396	411	3.7	3.0	3.4
T_3	T_1 + Vigore application @ 625 g/ha as basal application + Spray @ 1.25 g/ litre at panicle stage	396	432	414	4.3	3.7	4.0
T_4	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha (25 DAT)	408	415	412	3.6	3.3	3.5
T_5	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 5.0 kg/ha (50 DAT)	357	450	404	3.4	2.8	3.1
T_6	T_1 + Tab sil-RDF 100% + Silicate tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha at 25 DAT and 2.5 kg/ha (50DAT)	396	476	436	4.1	3.5	3.8
T_7	RDF (100-50-50 kg NPK/ha) + 10 t FYM/ha + 20 kg $ZnSO_4$/ha	410	406	408	3.4	3.3	3.4
T_8	Without NPK (Control)	339	304	322	3.4	2.7	3.1
	S. Em. $\pm$	6.79	8.19	--	0.04	0.05	--
	C. D. at 5 %	20.58	24.9	--	0.13	0.16	--

Table.2 Grain and straw yield (kg ha^{-1}) of transplanted rice as influenced by different sources of nutrients

Treatment		Grain yield (kg/ha)			Straw yield (kg/ha)		
		***Kharif* 2015**	***Kharif* 2016**	**Mean**	***Kharif* 2015**	***Kharif* 2016**	**Mean**
T_1	Recommended fertilizer dose of the region (RDF) (100-50-50 kg NPK/ha)	5503	6000	5752	6305	6953	6629
T_2	T_1 + Vigore application @ 625 g/ha as basal application at 50 DAT	5690	6367	6029	6402	7524	6963
T_3	T_1 + Vigore application @ 625 g/ha as basal application + Spray @ 1.25 g/ litre at panicle stage	5943	6533	6238	6573	7439	7006
T_4	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha (25 DAT)	6028	6733	6381	6923	7591	7257
T_5	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 5.0 kg/ha (50 DAT)	6167	6833	6500	7587	7800	7694
T_6	T_1 + Tab sil-RDF 100% + Silicate tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha at 25 DAT and 2.5 kg/ha (50DAT)	6883	7300	7092	7043	8350	7696
T_7	RDF (100-50-50 kg NPK/ha) + 10 t FYM/ha + 20 kg $ZnSO_4$/ha	5733	6433	6083	6362	7397	6879
T_8	Without NPK (Control)	4083	4133	4108	4734	5124	4929
	S. Em. $\pm$	135.2	194.9	--	265.6	384.5	-
	C. D. at 5 %	410.0	591.2	--	805.5	1166.2	-

Table.2 Economics of transplanted rice as influenced by different sources of nutrients

Treatment		Economics			
		Cost of cultivation (Rs. ha^{-1})	**Gross returns (Rs. ha^{-1})**	**Net returns (Rs. ha^{-1})**	**Benefit:Cost ratio**
T_1	Recommended fertilizer dose of the region (RDF) (100-50-50 kg NPK/ha)	42100	105290	63190	2.50
T_2	T_1 + Vigore application @ 625 g/ha as basal application at 50 DAT	43763	110390	66627	2.52
T_3	T_1 + Vigore application @ 625 g/ha as basal application + Spray @ 1.25 g/ litre at panicle stage	44588	113820	69232	2.55
T_4	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha (25 DAT)	48850	116610	67760	2.39
T_5	T_1 + Tab sil- RDF 100 % + silicate Tabs SiO_2 (effervescent tablet with silicate) 5.0 kg/ha (50 DAT)	55100	119388	64288	2.17
T_6	T_1 + Tab sil-RDF 100% + Silicate tabs SiO_2 (effervescent tablet with silicate) 2.5 kg/ha at 25 DAT and 2.5 kg/ha (50DAT)	55100	128864	73764	2.34
T_7	RDF (100-50-50 kg NPK/ha) + 10 t FYM/ha + 20 kg $ZnSO_4$/ha	47600	111086	63486	2.33
T_8	Without NPK (Control)	42100	75586	33486	1.80
	S. Em. ±	-	-		-
	C. D. at 5 %	-	-		-

Application of 100 % recommended dose of fertilizer (100:50:50 Kg NPK ha^{-1})with Tab-sil100 % Silicate Tabs (SiO2) 2.5 kg/ha at 25 DAT and 2.5 kg/ha at 50 DAT resulted significantly higher grainand straw yield (7092and 7696kgha^{-1}, respectively) followed by application of RDF with Tab-sil100%+ Silicate Tabs (SiO_2) 5 kg/ha at 50 DAT (6500 and 7694 kgha^{-1}, respectively). The lower grain and straw yield was recorded in control plot (4108 and 4929 kg ha^{-1}, respectively) during both the year of study. However, increase in rice yield with silicon tablet application along with 100% RDF might be due to increased availability of silicon in soil solution. The lower yield in control plot without silicon might be due to leading to fixation loss of native silicon in submerged conditions which is unavoidable to meet out the Silicon requirement by the crop (Singh *et al.*, 2017).

The increase in yield with silicon application could be due to beneficial effect of decreasing

mutual shading by improving leaf erectness, decreasing susceptibility to lodging and preventing manganese and iron toxicity. Increase water use efficiency observed with the application of Silicon, probably might be due top retention of excessive transpiration. During reproductive stage, silicon is preferentially transported into the flag leaves and interruption of silicon supply at this stage is determinates for spikelet fertility (Ma *et al*., 2006). Silicon application increased grain yield by increase of panicle number and panicle weight stated by Chen *et al*., 2011.

Effect of vigour and Tab-silon economics of transplanted rice

The data on economics on response of different sources of nutrients on transplanted rice are presented in Table 3.Application of 100 % recommended dose of fertilizer (100:50:50 Kg NPK ha^{-1})with Tab-sil 100 % Silicate Tabs (SiO_2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1} at 50 DAT resulted higher net returns (Rs. 73,764 ha^{-1}) and B:C ratio (2.34) followed by T_1 + Vigore application @ 625 g/ha as basal application + Spray @ 1.25 g/litre at panicle stage (Rs. 69,232 $ha^{-1}$and 2.55 respectively). Higher net returns and benefit: cost ratio was mainly due to higher yield as compared to other treatments in the study.

Based on the study it could be concluded that application of 100 % RDF with Tab-sil100 % Silicate Tabs (SiO2) 2.5 kg ha^{-1} at 25 DAT and 2.5 kg ha^{-1}at 50 DAT are benefited to improve growth, yield components, grain and straw yield and profit in transplanted rice by providing better availability of nutrients and water use efficiency.

References

Anonymous, 2018.https://www.indiastat.com

Chen, J.X., Tu. N.M., Yi, Z. X. and Zhu.H.L. 2011. Effect of silicon fertilizer on yield formation and some physiological characteristics of super early rice.*Crop Research*, 25: 544-549.

Ma, J.F., Tamai, K., Yamaji, N., Mitani, N., Konishi, S., Katsuhara, M., Ishiguro, M., Murata, Y. and Yamo, M. 2006.A silicon transporter in rice. *Nature,* 440: 688-691.

R.A. Singh, G. Singh, T. Kumar, V. Kumar and A. L. Upadhyay.2017.Effect of Vigore and Tab-sil on growth, yield and economics of transplanted rice in lowlands. *Bull. Env. Pharmacol. Life Sci.*, 6(3): 654-657.

Sundarrajan, N., Nagaraju, S., Venkataramana, S. and Jaganath, M.H. 1972. *Design and analysis of field experiments. Univ. Agric. Sci.,* Hebbal, Bangalore.

How to cite this article:

Ramachandra, C. and Sowmyalatha, B. S. 2020. Influence of Vigore and tab-sil (SiO_2) on Productivity and Profitability of Transplanted Rice (*Oryza sativa* L.) under Southern Dry Zone of Karnataka. *Int.J.Curr.Microbiol.App.Sci.* 9(02): 2860-2865.
doi: https://doi.org/10.20546/ijcmas.2020.902.325