

*Full Length Research Paper***Impact of Biovita on Growth, Yield and Economics of Rice****B Satheesh**

Faculty, Dept of Horticulture,

Bharatiya Engineering Science & Technology Innovation University, Andhra Pradesh, India.

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Abstract

An experiment was carried out during *Kharif* 2013 and 2014 in deep black soil to study the Impact of biovita on growth, yield and economics of rice (*Oryza sativa* L) at ARS, Dhadesugr, University of Agricultural Sciences, Raichur, Karnataka. Pooled data revealed that, panicle length was not significantly influenced by different rate of biovita application. However, Significantly higher grain yield (6491 kg/ha) and straw yield (7787 kg/ha) were recorded in the treatment applied with biovita granule at 12.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) and which was onpar with the application of biovita granule at 10.0 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita at 750 ml at grain filling stage (6339 kg/ha and 7586 kg/ha, respectively) and application of biovita granule at 7.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (5913 kg/ha and 7376 kg/ha, respectively). Whereas, application of only recommended dose of fertilizer recorded significantly lower grain yield (5087 kg/ha) and straw yield (6050 kg/ha) compared to other treatments.

Introduction

India is one of the world's largest producers of rice, accounting for 20% of all world rice production. Rice is India's prominent crop, and is the staple food of the people of the Eastern and Southern parts of the country. The country's rice production declined to 89.13 million tonnes in 2013-14 from 99.18 million tonnes in the previous year due to severe drought that affected almost half of the country. India could achieve a record rice production of 100 million tonnes in 2014-15 on the back of better monsoon this year. The India's rice production reached to a record high of 104.32 million tonnes in 2013-2014 (Anon., 2014).

Rice is produced by using organic fertilizers are gaining importance because of less chemical residues and better yield. Considering the adverse effects on soil health and environment, besides the residual effect, luxurious usage of inorganic fertilizers is not advisable. Several scientists are advocating the integrated nutrient management with organic and inorganic fertilizers to conserve the soil health and to get good quality produce. Therefore, judicious and proper use of organic and inorganic fertilizers is very essential not only for obtaining higher yield and quality produce but also to maintain soil health and sustainability for longer period.

Biovita is an extract from a seaweed *Ascophyllum nodosum*-a marine plant that has been recognized as an excellent natural fertilizer and a rich source of organic matter. The manufacturer of Biovita M/S PI Industries Ltd, claims that the application of Biovita enables plants to receive direct benefits from the naturally balanced nutrients and plant growth substances available in this seaweed extract. It provides over 60 naturally occurring major and minor nutrients and plant development substances comprising of enzymes, proteins, cytokinins, amino acids, vitamins, gibberellins, auxins, betaines etc. in organic form. It contributes to greater microbial activity when applied to soil thus increasing nutrient availability. It is an ideal organic product for better growth and productivity. Moreover, it is compatible with insecticides, fungicides, and fertilizers, which can be used in combination, without additional cost of application. It can be applied at all stages of the plant growth from seeding to fruiting. The repeated use of Biovita contributes towards better root system, excellent appearance of plants and greater yield potential. It enhances resistance of the plants to pests and diseases and environmental and moisture stress conditions. Keeping in view the above said properties of Biovita, attempts were made in the present investigation to study the impact of Biovita on growth, yield and yield components of rice.

Material and Methods

A field experiment was carried out at ARS, Dhadesugur, University of Agricultural Sciences, Raichur, Karnataka during Kharif 2013 and 2014 in deep black soil of uniform topography and texture with slightly alkaline pH (8.1), low in organic carbon (0.21%) and nitrogen (160 kg/ha), medium in available phosphorus (26 kg/ha) and high in available potassium (486 kg/ha). The field experiment was laid out in a randomized block design with seven treatments replicated

thrice. The treatments consisted of biovita granule and liquid application viz., T1: Biovita granule followed by 2 sprays of biovita liquid (Biovita granule at 7.5 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), T2: Biovita granule followed by 3 sprays of biovita liquid (Biovita granule at 7.5 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), III spray of biovita liquid at 750 ml at grain filling (75 DAP), T3: Biovita granule followed by 2 sprays of biovita liquid (Biovita granule at 10 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), T4: Biovita granule followed by 3 sprays of biovita liquid (Biovita granule at 10 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), III spray of biovita liquid at 750 ml at grain filling (75 DAP), T5: Biovita granule followed by 2 sprays of biovita liquid (Biovita granule at 12.5 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), T6: Biovita granule followed by 3 sprays of biovita liquid (Biovita granule at 12.5 kg within 10 DAP: I spray of biovita liquid at 500 ml at tillering (30 DAP), II spray of biovita liquid at 750 ml at panicle initiation (60 DAP), III spray of biovita liquid at 750 ml at grain filling (75 DAP) and T7: Control and Recommended dose of fertilizer (150:75:75 kg NPK/ ha) is common for all the treatments. The gross plot size for each treatment was 9m x 6m. Rice seedlings were transplanted at a spacing of 20 cm x 15 cm. Biovita granule and liquid applied as per the treatment. The data on the growth and yield parameters were recorded from a sample of five plants taken at randomly at harvest. The cost of inputs that were prevailing at the time of their use was considered for working out the economics of various treatments. Net return per hectare was calculated by deducting the cost of cultivation from gross returns per hectare, gross returns was calculated by using the total income obtained from grain and straw yields and the benefit cost ratio was worked out as follows. Benefit cost ratio = Net returns/ Cost of cultivation. All the data were analyzed statistically.

Results and Discussion

Growth parameters of rice

The pooled data on growth parameters of rice as influenced by different rate of biovita application is presented in Table 1. Application of biovita granule at 12.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) recorded significantly taller plants (85.5 cm) and more number of productive tillers per hill (27.3) and which was on par with the application of biovita granule at 10.0 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita at 750 ml at grain filling stage (83.0 cm and 25.1, respectively) and application of biovita

granule at 7.5 kg within 10 days after trans- planting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (81.7 cm and 23.8, respectively). Whereas, application of only recommended dose of fertilizer recorded significantly shorter plants (67.9 cm) and less number of productive tillers per hill (19.8) compared to other treatments.

Yield and yield parameters of rice

The pooled data on grain and straw yield of rice as influenced by different rate of biovita application is presented in Table 2 & 3. The panicle length was not significantly influenced by different rate of biovita application. However, Significantly higher grain yield (6491 kg/ha) and straw yield (7787 kg/ha) were recorded in the treatment applied with biovita granule at 12.5 kg within 10 days after trans- planting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) and which was onpar with the application of biovita granule at

Treatments	Root length (cm) at 30 DAP			Plant height (cm) at harvest			Number of productive tillers/hill at harvest		
	2013	2014	Pooled	2013	2014	Pooled	2013	2014	Pooled
T ₁ : Biovita granule (7.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	13.7	14.0	13.9	70.1	72.6	71.4	20.0	21.1	20.6
T ₂ : Biovita granule (7.5 kg/ha) followed by 3sprays of biovita liquid (500, 750 &750 ml/ha)	14.2	14.8	14.5	81.2	82.1	81.7	23.0	24.6	23.8
T ₃ : Biovita granule (10.0 kg/ha) followed by 2 sprays of biovita liquid (500 &750 ml/ha)	13.8	14.2	14.0	73.5	75.2	74.4	21.0	22.3	21.7
T ₄ : Biovita granule (10.0 kg/ha) followed by 3 sprays of biovita liquid (500, 750 &750 ml/ha)	15.0	15.3	15.2	82.5	83.5	83.0	25.0	25.2	25.1
T ₅ : Biovita granule (12.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	14.1	14.5	14.3	76.8	78.5	77.7	22.0	23.1	22.6
T ₆ : Biovita granule (12.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 &750 ml/ha)	15.2	15.6	15.4	85.2	85.8	85.5	26.0	28.5	27.3
T ₇ : Control	13.5	13.8	13.7	65.2	70.5	67.9	19.0	20.5	19.8
SEm ±	0.53	0.43	0.41	3.14	3.36	3.60	1.24	1.77	1.41
C.D. at 5%	1.60	1.30	1.24	9.42	10.1	10.8	3.73	5.32	4.23

Table 1: Growth parameters of rice as influenced by different rate of biovita application.

10.0 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita at 750 ml at grain filling stage (6339 kg/ha and 7586 kg/ha, respectively) and application of biovita granule at 7.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) +

third spray of biovita liquid at 750 ml at grain filling stage (5913 kg/ha and 7376 kg/ ha, respectively). This could be due to the positive effect of all the yield components viz., panicle length, number of grains per panicle and test weight. Sandhya Rani (1998) also reported that application of higher dose of organic fertilizer gave higher yield and uptake of nutrients in radish. Similar observations were made by Praveen Kumar (2000) who opined that the increased fresh weight of carrot with increased dose of castor cake. This might be due to increased and readily available nutrients, which might have contributed to, increased growth and yield parameters, thereby increased grain yield. Whereas, application of only recommended dose of fertilizer recorded significantly lower grain yield (5087 kg/ha) and straw yield (6050 kg/ha) compared to other treatments. The results corroborate with the findings of Mangal (1985) in onion.

Economics of rice

The pooled data on economics of rice as influenced by different rate of biovita application is presented in Table 4. Treatment with the application of biovita granule at 12.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) recorded significantly higher net returns (Rs 72962/ha) and B:C ratio (3.27) and which was on par with the application of biovita granule at 10.0 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita at 750 ml at grain filling stage (Rs 70643/ha and 3.21, respectively) and application of biovita granule at 7.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (Rs 96071/ha and 3.01, respectively). Whereas, application of only recommended dose of fertilizer recorded significantly lower net returns (Rs 51914/ha) and B:C ratio (2.71) compared to other treatments.

Treatments	Panicle length (cm)			Number of filled grains per panicle		
	2013	2014	Pooled	2013	2014	Pooled
T ₁ : Biovita granule (7.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	20.2	20.4	20.3	249	256	253
T ₂ : Biovita granule (7.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	22.4	22.9	22.7	274	277	276
T ₃ : Biovita granule (10.0 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	21.5	21.0	21.8	257	265	261
T ₄ : Biovita granule (10.0 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	23.2	23.8	23.5	276	279	278
T ₅ : Biovita granule (12.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	22.2	22.5	22.4	268	272	270
T ₆ : Biovita granule (12.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	24.1	24.6	24.4	279	281	280
T ₇ : Control	19.6	19.8	19.7	235	241	238
SEm ±	3.12	3.33	3.54	8.08	5.06	6.16
C.D. at 5%	NS	NS	NS	24.2	15.2	18.5

Table 2: Yield parameters of rice as influenced by different rate of biovita application.

Treatments	Grain yield (kg/ha)			Straw yield (kg/ha)		
	2013	2014	Pooled	2013	2014	Pooled
T ₁ : Biovita granule (7.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	5555	5623	5589	6440	6625	6533
T ₂ : Biovita granule (7.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	5863	5962	5913	7300	7452	7376
T ₃ : Biovita granule (10.0 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	5682	5714	5698	6873	7012	6943
T ₄ : Biovita granule (10.0 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	6266	6412	6339	7547	7625	7586
T ₅ : Biovita granule (12.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	5794	5842	5818	7074	7254	7164
T ₆ : Biovita granule (12.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	6456	6526	6491	7717	7856	7787
T ₇ : Control	5049	5124	5087	5988	6112	6050
SEm ±	210.1	250	264	262.7	278	280
C.D. at 5%	630.0	752	792	787.6	835	842

Table 3: Grain and straw yield of rice as influenced by different rate of biovita application.

Treatments	Cost of cultivation	Gross returns	Net returns	B:C ratio
	(Rs/ha)	(Rs/ha)	(Rs/ha)	
T ₁ : Biovita granule (7.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	31509	90368	58859	2.87
T ₂ : Biovita granule (7.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	31866	96071	64205	3.01
T ₃ : Biovita granule (10.0 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	31671	92413	60742	2.92
T ₄ : Biovita granule (10.0 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	32028	102671	70643	3.21
T ₅ : Biovita granule (12.5 kg/ha) followed by 2 sprays of biovita liquid (500 & 750 ml/ha)	31833	94434	62601	2.97
T ₆ : Biovita granule (12.5 kg/ha) followed by 3 sprays of biovita liquid (500, 750 & 750 ml/ha)	32190	105152	72962	3.27
T ₇ : Control	30441	82355	51914	2.71
SEm ±	-	-	4041	0.10
C.D. at 5%	-	-	12125	0.32

Table 4: Economics of rice as influenced by different rate of biovita application (Pooled data).

Materials	Urea	DAP	MOP	Biovita granule	Biovita liquid	Grain	Straw
Prices (Rs/kg)	5	20	15	64	475	15	1.0

Conclusion

The experimental results are concluded that, application of recommended dose of fertilizer + biovita granule at 12.5 kg within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) observed higher net returns and cost benefit ratio. So, further concluded that, application of 12.5 kg biovita granule within 10 days after transplanting + first spray of biovita liquid at 500 ml at tillering (30 DAP) + second spray of biovita liquid at 750 ml at panicle initiation (60 DAP) + third spray of biovita liquid at 750 ml at grain filling stage (75 DAP) along with 100 per cent recommended dose of fertilizer per hectare recorded significantly higher grain and straw yield.

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