International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2017; 5(6): 970-975

Received: 18-09-2017
Accepted: 21-10-2017

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Evaluation of the rice hybrids grown under different INM practices for primary nutrients content and yield under lateritic soil of South Konkan

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Abstract
An attempt has been made to study the response of rice hybrids *viz.*, Sahyadri-3 and Sahyadri-4 to integrated nutrient management comprising different combinations of chemical fertilizers with FYM, poultry manure, glyricidia (green manure) and Biofertilizers (Azospirillum and PSB) in lateritic soils of South Konkan during *Kharif*, It was revealed from the study that the performance of Sahyadri-3 and Sahyadri-4 hybrid rice in terms of their yield attributes, grain yield productivity, quality traits and economics (gross returns, net returns, B:C ratio) were highest under the application of 50 per cent recommended dose of N through chemical fertilizers, 25 per cent through application of FYM and remaining 25 per cent through poultry manure application. However, in general its effects were statistically at par with those of integrated nutrient management treatments. The said effects due to above treatments were superior over to those of alone application of 100% N applied through inorganic fertilizers to both the rice hybrids.

Keywords: Lateritic soil, rice, RDN, FYM, poultry manure, glyricidia and economic traits

Introduction

Introduction of hybrid rice is an important step towards augmentation of rice yield. Hybrid rice yield about 15-20% more than the promising high-yielding commercial varieties (Metwally *et al*. 2011) [15]. Fertilizers are costly inputs and need to be managed efficiently for higher nutrient recovery returns. The fertilizers contribute 50 to 60 per cent in crop yield enhancement. Nitrogen is considered as the ‘King pin’ in paddy fertilization since rice responded universally to nitrogen application. The laterite and lateritic soils cover an area of 15,28,400 ha in the state of Maharashtra out of which almost 70 percent area is distributed in the Konkan region. the soils have low to medium status of available N, very low to low available P_2O_5 status and low to high K_2O whereas the organic carbon status of soil in high to very high (Kadrekar *et al.* 1981) [12]. Rice is a major crop grown during *Kharif* season and the efficiency of conventional fertilizers applied through broadcast method is low primarily due to heavy rains received during *Kharif* season. The balanced fertilizer application to be very effective in enhancing crop yields and improving the fertility of the lateritic soils in the region (Dongale *et al.* 1987, Kadrekar 1993) [6, 11]. Therefore, judicious use of organic and inorganic sources of plant nutrition is to be evaluated under existing climatic conditions to increase the productivity of rice. The effects of organic and inorganic fertilizers are complementary to each other in terms of soil fertility improvement and sustainable agriculture. The increasing demand for rice grain production has to be achieved by using limited available resources in a sustainable manner. Balanced fertilization involves application of essential plant nutrients *viz.*, nitrogen, phosphorous, and potassium, not only in right proportion, but also in optimum quantities through correct methods and time of application, suited for a specific soil-crop-climate situation (Pieters 2004) [20].

In recent years with rapid increase in the number of poultry farm, a substantial amount of poultry waste is produced in India due to increase in poultry industry. Due to its rapid mineralization, it has been recognized as a valuable source of plant nutrient for crop plants. Glyricidia (*Glyricidia muculeata*) is the most promising green leaf manure for transplanted rice for enhancing the rice productivity and also to substitute inorganic N to some extent. Biomass production and nitrogen accumulation in glyricidia is very high and also very fast.

Its decomposition in soil is also faster than Dhaincha. Glyricidia leaves contain up to 2.7 percent N and have narrow C:N ratio. Besides having low lignin and polyphenolic content, they decompose rapidly in soil and mineral N tends to become available within 10-15 days after incorporation (Kadam *et al.* 1985) [10]. Farmyard manure is a heterogeneous composted organic material consisting of dung, crop residue and/or household sweeping in various stages of decomposition. Farmyard manure is mostly available and produced in farms and an important organic resource for agricultural production in livestock based farming systems in many countries including semi-arid regions of India. Fulfillment of nutritional requirement of hybrid rice through inorganic fertilizers is not only costly but it also detoriate the soil health, as these soils are more hungry than thirsty. Value of collective use of manures and fertilizers on sustainable crop production has been tested and proven through several long term experiments (Nambiar 1995) [17]. Combined application of fertilizers and manures unfailingly sustained productivity. Therefore, the present investigation *viz.*, "Comparative study of the nutritional qualities of rice hybrids grown under different INM practices" was undertaken.

Material and Methods

The field experiment was conducted at Dapoli, Dist. Ratnagiri during *kharif* season on lateritic soils. The soil was sandy clay loam in texture, slightly acidic in reaction and having low electrical conductivity, very high in organic carbon, medium in available nitrogen and low in available phosphorus and potassium. The region receives very high rainfall (above 3000 mm, annually). The hybrid rice variety Sahyadri-3 and Sahyadri-4 were taken as a test crop during *Kharif*. Sahyadri-3 and Sahyadri-4 are late (125-130 days) and mid-late (115 to 120 days), respectively varieties, having long slender grain with 90 to 120 cm plant height, non-lodging, non-shedding and has yield potential of about 6.5 to 7.0 tons per hectare (Anonymous 2013) [1]. Experiment was laid out with Randomized Block Design comprising of fourteen treatments replicated three times. T_1:RDF-100% i.e. 150 kg N,50 kg P_2O_5 and 50 kg K_2O ha^{-1}, T_2: 100% RDN through FYM, T_3: 100% RDN through PM, T_4:100% N-GM-Glyricidia (GM) @ 15 t ha^{-1}, T_5 :75% RDF + 25% RDN through FYM, T_6 : 75% RDF + 25% RDN through PM, T_7 : 75% RDF + Glyricidia @ 3.75 t ha $^{-1}$, T_8 :75% RDF + Biofertilizer (Azospirillum + PSB), T_9 : 50% RDF + 50% RDN through FYM, T_{10} : 50% RDF + 50% RDN through PM, T_{11} : 50% RDF + Glyricidia @ 7.5 t ha $^{-1}$, T_{12} 50% RDF + 25% RDN through FYM + 25% RDN through PM, T_{13} 50% RDF + 25% RDN through FYM + Glyricidia @3.75 t ha $^{-1}$, T_{14} 50% RDF + 25% RDN through PM + Glyricidia @ 3.75 t ha $^{-1}$. Sample was prepared with the following standard procedure. The plant samples were digested with conc. H_2SO_4 and the total nitrogen content was determined by Kjelplus apparatus (Tandon 1993) [28]. Total phosphorus and potassium were determined by taking 1.0 g plant sample which was digested with di-acid mixture (HNO_3 + $HClO_4$) with the ratio 9:4 and acid extract used for determination of P and K (Singh *et al*. 1999) [26]. Phosphorus was determined by using known quantity of di-acid extract as mentioned above and the yellow colour was developed with combined HNO_3 vanadomolybdate reagent. Phosphorus was determined colorimetrically by using spectrophotometer at 420 nm wave length (Chopra and Kanwar 1978) [3]. Potassium was estimated flame photometrically by feeding diluted diacid digested solution duly diluted 10 times (Piper 1966) [22].

Results and Discussion

Grain Yield: The growth, Productivity and quality of any crop depend upon different factors which are existed during the growth period of crop. It is well known fact that application of organic manures in combination with inorganic / mineral fertilizers minimized vegetative growth, grain yield, straw yield and improved quality of produce and also the soil health along with the sustainability of soil fertility. Grain yield of hybrid rice varied from 50.19 to 60.28 q ha^{-1} among various treatments of nutrient management during first year of experiment and from 62.8 to 66.3 q ha^{-1} during second year of experiment. Among these treatments significantly highest grain yield was recorded under the Treatment T_1 (60.28 q ha^{-1}) receiving 100 per cent RDF, which was at par with treatments T_5, T_6, T_7, T_{13} and T_{14}, during first year of experiment. The significantly highest grain yield was recorded with treatment T_{13} (66.3 q ha^{-1}) receiving 50 per cent RDF + 25 per cent RDN through FYM + Glyricidia (GM) 3.75 t ha^{-1}, which was at par with treatments T_2, T_3, T_4, T_5, T_{11}, T_{12} and T_{14} during second year of experiment. The increase in yield was attributed to the better availability of nutrients throughout the crop growth period and thereby increased the yields. Similar results were reported by Prasad (1994) [23]. Organics were beneficial in reducing the fixation or precipitation with those of soil components of added or mineralized nutrients and played complementary role to boost the crop yield. This is in agreement with the findings of Kher (1993) [13]. The increased grain yield might be due to increase in number of panicles m^{-2}, length of panicle as a result of adequate availability and transformation of organic nitrogen during reproductive and grain filling stages coupled with increased rate of photosynthesis and better availability and translocation of nutrients and photosynthates from source to sink. The reason may be application of organic manure might be enhance the physicochemical properties of soil and durable availability of plant nutrients for longer period (Singh *et al.* 2000) [25].

Straw yield (q ha^{-1}): The straw yield Sahyadri-3 also significantly increased from 57.53 to 69.77 q ha^{-1} during first year of experiment and from 61.77 to 71.38 q ha^{-1} during second year of experiment due to various nutrient management treatments. The highest straw yield was observed under treatment T_{13} (69.77 q ha^{-1}) which was significantly superior over rest of the treatments and at par with treatments T_1, T_4, T_9, T_{10} and T_{11} during first year of study. While in case of second year of experiment, treatment T_{12} i.e. 50 per cent RDF + 25 per cent RDN through FYM + 25 per cent RDN through PM recorded the highest straw yield (71.38 q ha^{-1}), which was significantly superior over rest of the treatments of different nutrient management combinations. The straw yield of Sahyadri-4 also significantly increased from 62.53 to 72.05 q ha^{-1} during first year of experiment and from 62.86 to 73.37 q ha^{-1} during second year of experiment due to various nutrient management treatments. The highest straw yield was observed under treatment T_8 (72.05 q ha^{-1}) which was significantly superior over rest of the treatments and at par with treatments T_1, T_5, T_7, T_9 and T_{10} during first year of investigation. While in case of second year of experiment, treatment T_{13} (73.37 q ha^{-1}) i.e. 50 percent RDF + 25 per cent RDN through FYM + Glyricidia (GM) @ 3.75 t ha^{-1} was recorded with highest straw yield, which was significantly superior over rest of the treatments except treatment T_9. Similar results are in agreement with Desai (2001) [5]. The increase in yield was attributed to the better availability of nutrients throughout the crop growth period and thereby increased the yields. Similar results were reported by Prasad (1994) [23]. Organics were beneficial in reducing the fixation or precipitation with those of soil components of added or mineralized nutrients and played complementary role to boost the crop yield. This is in agreement with the findings of Kher (1993) [13]. The reason may be application of organic manure might be enhance the physicochemical properties of soil and durable availability of plant nutrients for longer period (Singh *et al.* 2000) [25].

Effect of INM on primary nutrients in plant at different growth stages

The content of primary nutrients (N, P and K) in plant at different growth stages significantly affected due to supplementation of N through the combined application of organic and inorganic sources.

Nitrogen content (%): The N content of the straw of Sahyadri-3 as affected by various treatments and time intervals indicated that its content varied from 1.08 to 1.72 per cent at panicle initiation stage and 0.83 to 1.09 per cent at harvest during first year of experiment and in case of second year of experiment it varied from 1.37 to 1.67 per cent at panicle initiation stage and 0.90 to 1.21 per cent at harvest stage. The growth wise concentration of N in rice plants, influence of various levels of fertilizers application on N content and periodical declining trend of N content in plants with crop age advancement is in agreement with Mahajan and Tripathi (1992) [14] and Pandey and Agarwal (1991) [18]. Similar ranges of N content were also reported by Parchure (2011) [19] in rice. It can be observed that at panicle initiation stage application of different nutrient management treatments increased N content significantly. The highest N content (1.72%) was observed in treatment (T_1), where 100 per cent RDF was applied during first year of experiment. In second year of experiment the highest N content (1.67%) was observed in treatments T_4 and T_{14} i.e. application of Glyricidia (GM) @ 15 t ha^{-1} and 50 per cent RDF + 25 per cent RDN through PM + Glyricidia (GM) 3.75 t ha^{-1}, respectively which were significantly superior over rest of the treatments and at par with treatments T_3, T_{12} and T_{13}. At harvest stage, Application of 100 per cent RDN (T_1) and 75 per cent RDN + Biofertilizers (T_8) showed significant increase in N content during first year of experiment, which was significantly superior over rest of the treatments and at par with treatments T_6 and T_7, while in case of second year treatment T_{10} receiving 50 percent RDN + 50 per cent RDN through PM was significantly superior over rest of the treatments and at par with treatments T_3 and T_{13}. The N content in grain of Sahyadri-4 varied from 1.16 to 1.37 per cent (Table 22). The highest N content in grain recorded with treatment T_{11} (50 per cent RDF + Glyricidia 7.5 t ha^{-1}), which was at par with T_1, T_7, T_9, T_{10}, T_{12}, T_{13} and T_{14}, but significantly superior over rest of the treatments during first year of experiment, while in the second year of experiment, highest N content in grain recorded with treatment T_{12} (50 per cent RDF + 25 per cent RDN through FYM + 25 per cent RDN through PM), which was at par with T_2, T_3, T_{13} and T_{14} and significantly superior over rest of the treatments. The ranges of N content in grain are in agreement with Desai (2001) [5]. In grain, N content was found to be higher than the straw which may be due to translocation of photosynthate to sink i.e. grain (Mishra and Lal 1994) [16]. Pillai (2004) [21] reported that N content in grain of Sahyadri hybrid-2 varied from 0.87 to 1.20 due to integrated use of fertilizer and organic manures. Similar results are in agreement with Bamugade (2007) [2].

Phosphorus Content (%): The effect of different nutrient management treatment application on P content of the straw indicated that P content in plants varied from 0.138 to 0.187 per cent at panicle initiation stage and 0.157 to 0.196 per cent at harvest stage during first year of study, while in the second year study, it varied from 0.147 to 0.210 at panicle initiation stage and 0.159 to 0.216 at harvest stage, indicating that P concentration increased at the later stage of growth. The P per cent ranges reported here are in agreement with Jagtap (2007) [8]. Progressive decline in P concentration with advancement of crop age in rice plants reported by Zheng and Xiao (1992) [29], Pandey and Agarwal (1991) [18] and Ramanathan and Kothandaraman (1985) [24] is in agreement with present study. Phosphorus is component of proteins, is absorbed rapidly during vegetative growth and translocated from the vegetative organs to the grain after flowering (De Datta, 1981) [4]. At panicle initiation stage, the highest P content in straw was noted in treatment T_1 (0.187%) receiving 100 per cent RDF, which was significantly superior over rest of the treatments during first year of experiment and in case of second year of experiment, the highest P content was noted in treatment T_{10} (0.210%) receiving 50 percent RDF + 50 per cent RDN through PM, which was significantly superior over rest of the treatments. At harvest the highest P content in straw was noted in treatment T_1 (0.196%) receiving 100 per cent RDF which was significantly superior over rest of the treatments during first year of experiment and in case of second year of experiment, the highest P content was noted in treatment T_2 (0.216%) receiving 100 per cent RDN through FYM which was significantly superior over rest of the treatments. In lateritic soils of Konkan, Jagtap (2007) [8] observed positive effect of application of chemical fertilizer alone as well as in combination with organic manures also with respect to phosphorus content in rice. The reasons attributed to this are more supply of phosphorus from organic sources such as FYM, poultry manure, glyricidia with inorganic sources of phosphorus and due to enhanced availability of phosphorus as a result of reduction in P fixation capacity of soil. These observations corroborate with those reported by Jambhekar (1990) [9]. Gavanang (2000) [7] also reported mean P concentration values and also observed slightly lower p concentration in plants due to different levels of fertilizer application, which is corroborative to the trends in present study. This may be due to three reasons *viz.*, (i) dilution effect caused by higher DMP under fertilizer treatment, (ii) low P status of soil and (iii) fixation of applied P being the soil is lateritic.

The phosphorus concentration in grain yield of Sahyadri-3 varied from 0.127 to 0.183 per cent during first year of experiment and from 0.147 to 0.203 per cent in the second year of experiment. The highest P content (0.183%) in grain was contributed by T_1 (100 per cent RDF) which was significantly superior over rest of the treatments during first year of experiment. In second year of experiment, the highest P content (0.203%) in grain was contributed by T_3 (100 per cent RDN through PM) which was at par with treatment T_4 and significantly superior over rest of the treatments. Pillai (2004) [21] and Bamugade (2007) [2] also reported similar results.

4.3.1.3 Potassium content (%)

The effect of different nutrient management treatment application on K content of the straw indicated that K content in plants varied from 1.56 to 2.00 per cent at panicle initiation stage and 1.68 to 2.03 per cent at harvest stage during first year of study, while in the second year study, it varied from 1.59 to 2.02 at panicle initiation stage and 1.25 to 1.95 at harvest stage, indicating that K concentration increased at the later stage of growth. The K per cent ranges were reported here are in agreement with Bamugade (2007) [2]. The highest K content in straw was noted in treatment T_1 receiving 100 per cent RDF at panicle initiation stage (2.00%) and at harvest (2.03%), which was significantly superior over rest of the treatments during first year of experiment and in case of second year of experiment, the highest K content was noted in treatment T_2 receiving 100 per cent RDN through FYM at panicle initiation stage (2.02%) and at harvest (1.95%), which was significantly superior over rest of the treatments. Zheng and Xiao (1992) [29] also reported that the K concentration in the hybrid rice plant was highest during maximum tillering stage and gradually declined as the growing stage progressed. Pandey and Agarwal (1991) [18] also observed decreasing K concentration in rice plants with advancement of the crop age. Similar trend was also observed in the present study. The trend of higher K content in straw as compared to grain at harvest is also in agreement with Pandey and Agarwal (1991) [18]. Singh *et al.*(2002) [27] studied the effect of green manuring and FYM on nutrient content of upland rice where they reported that green manure and FYM @ 5 t ha^{-1} are mineralized rapidly and maintain adequate potassium and supplied K from K bearing minerals by the organic acids and increased its content in plants. The Potassium concentration in grain varied from 0.243 to 0.293 per cent during first year of experiment and from 0.257 to 0.363 per cent in the second year of experiment. The highest K content (0.293%) in grain was contributed by T_1 (100 per cent RDF) which was at par with treatment T_3 and significantly superior over rest of the treatments during first year of experiment. In second year of experiment, the highest K content (0.363%) in grain was contributed by T_{12} (50 per cent RDF + 25 per cent RDN through FYM + 25 per cent RDN through PM), which was at par with treatment T_3 and significantly superior over rest of the treatments.

Table 1: Effect of INM on Grain and Straw yield of Rice (q ha^{-1})

Tr. No	Treatments	Sahyadri – 3				Sahyadri – 4			
		Grain yield		Straw yield		Grain yield		Straw yield	
		2011	2012	2011	2012	2011	2012	2011	2012
T_1	RDF	60.28	62.8	68.85	64.69	63.90	62.27	70.52	67.33
T_2	100% N-FYM	55.73	65.4	62.03	66.05	54.80	64.31	62.53	65.23
T_3	100% N-PM	55.74	65.4	58.50	67.57	57.52	64.78	67.80	64.76
T_4	100% N-GM	54.16	65.6	65.86	63.41	57.73	63.84	66.83	62.86
T_5	¾ RDN + ¼ N-FYM	57.43	64.6	61.58	61.93	56.81	66.20	70.44	63.26
T_6	¾ RDN + ¼ N-PM	57.57	64.3	64.25	61.77	55.21	66.87	66.66	63.37
T_7	¾ RDN + ¼ N-GM	58.24	63.2	57.53	64.69	56.04	64.96	70.69	64.77
T_8	¾ RDN + BF	50.19	63.7	62.11	64.69	57.96	64.61	72.05	63.74
T_9	½ RDN + ½ N-FYM	51.46	64.1	69.55	64.58	55.62	64.05	68.64	71.30
T_{10}	½ RDN + ½ N-PM	56.70	63.8	67.19	63.32	58.00	65.91	69.44	64.99
T_{11}	½ RDN + ½ N-GM	55.82	65.3	66.75	64.68	58.65	63.18	66.50	67.95
T_{12}	½ RDN + ¼ N-FYM + ¼ N-PM	54.77	66.0	58.58	71.38	56.45	67.00	66.89	66.38
T_{13}	½ RDN + ¼ N-FYM + ¼ N-GM	58.88	66.3	69.77	67.55	58.69	66.02	68.21	73.37
T_{14}	½ RDN + ¼ N-PM + ¼ N-GM	58.22	65.5	67.91	64.47	57.89	65.22	66.44	67.60
S.E. ±		1.04	0.6	1.37	1.16	1.31	0.82	1.23	1.17
C.D. (P=0.05)		3.02	1.9	3.97	3.39	3.82	2.37	3.59	3.41

Table 2: Effect of INM on N content (%) in straw

Tr. No	Treatments	N content (%)							
		Sahyadri – 3				Sahyadri – 4			
		2011		2012		2011		2012	
		PI	AH	PI	AH	PI	AH	PI	AH
T_1	RDF	1.72	1.09	1.43	0.92	1.71	1.15	1.47	1.03
T_2	100% N-FYM	1.22	0.91	1.57	1.02	1.26	0.87	1.59	1.11
T_3	100% N-PM	1.11	0.89	1.64	1.20	1.21	0.93	1.65	1.18
T_4	100% N-GM	1.17	0.95	1.67	1.05	1.21	0.84	1.70	1.07
T_5	¾ RDN + ¼ N-FYM	1.44	0.96	1.49	1.04	1.39	0.97	1.56	1.02
T_6	¾ RDN + ¼ N-PM	1.45	1.02	1.56	0.98	1.47	1.00	1.51	0.94
T_7	¾ RDN + ¼ N-GM	1.52	1.02	1.59	0.92	1.39	1.01	1.58	0.95
T_8	¾ RDN + BF	1.28	1.09	1.37	0.90	1.41	1.02	1.42	0.91
T_9	½ RDN + ½ N-FYM	1.17	0.85	1.40	1.03	1.23	0.97	1.37	1.01
T_{10}	½ RDN + ½ N-PM	1.09	0.92	1.54	1.21	1.18	0.90	1.57	1.16
T_{11}	½ RDN + ½ N-GM	1.08	0.95	1.57	1.06	1.12	0.90	1.62	1.08
T_{12}	½ RDN + ¼ N-FYM + ¼ N-PM	1.10	0.84	1.62	1.12	1.12	0.86	1.63	1.16
T_{13}	½ RDN + ¼ N-FYM + ¼ N-GM	1.13	0.90	1.63	1.10	1.04	0.83	1.68	1.06
T_{14}	½ RDN + ¼ N-PM + ¼ N-GM	1.11	0.83	1.67	1.17	1.11	0.86	1.71	1.19
S.E. ±		0.05	0.04	0.02	0.03	0.04	0.04	0.02	0.02
C.D. (P=0.05)		0.13	0.12	0.06	0.07	0.12	0.11	0.06	0.06

Table 3: Effect of INM on P content (%) in straw

Tr. No.	Treatments	P content (%)							
		Sahyadri - 3				Sahyadri – 4			
		2011		2012		2011		2012	
		PI	AH	PI	AH	PI	AH	PI	AH
T_1	RDF	0.187	0.196	0.173	0.194	0.192	0.193	0.187	0.192
T_2	100% N-FYM	0.138	0.159	0.183	0.216	0.139	0.155	0.193	0.205
T_3	100% N-PM	0.153	0.160	0.173	0.192	0.143	0.159	0.197	0.178
T_4	100% N-GM	0.142	0.166	0.147	0.172	0.143	0.156	0.170	0.167
T_5	¾ RDN + ¼ N-FYM	0.173	0.176	0.183	0.178	0.168	0.170	0.173	0.182
T_6	¾ RDN + ¼ N-PM	0.170	0.183	0.193	0.172	0.152	0.174	0.180	0.168
T_7	¾ RDN + ¼ N-GM	0.162	0.183	0.170	0.164	0.158	0.176	0.170	0.162
T_8	¾ RDN + BF	0.167	0.179	0.163	0.159	0.165	0.178	0.153	0.161
T_9	½ RDN + ½ N-FYM	0.146	0.166	0.193	0.191	0.155	0.162	0.193	0.191
T_{10}	½ RDN + ½ N-PM	0.152	0.159	0.210	0.184	0.149	0.159	0.220	0.190
T_{11}	½ RDN + ½ N-GM	0.151	0.161	0.167	0.170	0.149	0.160	0.173	0.172
T_{12}	½ RDN + ¼ N-FYM + ¼ N-PM	0.142	0.166	0.183	0.201	0.133	0.156	0.200	0.215
T_{13}	½ RDN + ¼ N-FYM + ¼ N-GM	0.155	0.157	0.183	0.189	0.137	0.160	0.177	0.191
T_{14}	½ RDN + ¼ N-PM + ¼ N-GM	0.148	0.158	0.183	0.178	0.141	0.158	0.183	0.178
S.E. ±		0.004	0.002	0.005	0.004	0.006	0.002	0.007	0.003
C.D. (P=0.05)		0.012	0.005	0.015	0.011	0.017	0.007	0.019	0.008

Table 4: Effect of INM on K content in straw (%)

Tr. No	Treatments	K content (%)							
		Sahyadri – 3				Sahyadri – 4			
		2011		2012		2011		2012	
		PI	AH	PI	AH	PI	AH	PI	AH
T_1	RDF	2.00	2.03	1.727	1.407	2.02	1.98	1.76	1.44
T_2	100% N-FYM	1.59	1.75	2.023	1.953	1.60	1.71	2.09	1.92
T_3	100% N-PM	1.56	1.73	1.820	1.587	1.60	1.75	1.75	1.57
T_4	100% N-GM	1.59	1.68	1.717	1.330	1.60	1.71	1.68	1.45
T_5	¾ RDN + ¼ N-FYM	1.70	1.89	1.910	1.610	1.76	1.86	1.89	1.62
T_6	¾ RDN + ¼ N-PM	1.79	1.92	1.823	1.520	1.79	1.89	1.82	1.46
T_7	¾ RDN + ¼ N-GM	1.84	1.88	1.713	1.370	1.83	1.87	1.77	1.35
T_8	¾ RDN + BF	1.82	1.94	1.597	1.257	1.83	1.90	1.70	1.37
T_9	½ RDN + ½ N-FYM	1.61	1.72	1.907	1.743	1.68	1.73	1.83	1.79
T_{10}	½ RDN + ½ N-PM	1.68	1.72	1.817	1.670	1.57	1.68	1.79	1.67
T_{11}	½ RDN + ½ N-GM	1.59	1.72	1.670	1.517	1.62	1.71	1.71	1.57
T_{12}	½ RDN + ¼ N-FYM + ¼ N-PM	1.60	1.70	1.890	1.733	1.62	1.66	1.90	1.66
T_{13}	½ RDN + ¼ N-FYM + ¼ N-GM	1.61	1.68	1.820	1.577	1.61	1.71	1.82	1.72
T_{14}	½ RDN + ¼ N-PM + ¼ N-GM	1.58	1.70	1.743	1.537	1.58	1.70	1.74	1.56
S.E. ±		0.02	0.02	0.018	0.025	0.02	0.02	0.02	0.02
C.D. (P=0.05)		0.07	0.05	0.053	0.073	0.05	0.05	0.06	0.06

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