The Pharma Innovation Journal 2023; 12(8): 1253-1256

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(8): 1253-1256

www.thepharmajournal.com
Received: 24-05-2023
Accepted: 27-06-2023

RT Bhowate
Sorghum Research Unit
Dr. PDKV, Akola, Maharashtra, India

KG Patel
Department of Soil Science and Agricultural Chemistry
Navsari Agricultural University, Navsari, Gujarat, India

PK Dubey
Department of N.R.M., Navsari Agricultural University, Navsari, Gujarat, India

AR Kaswala
Department of N.R.M., Navsari Agricultural University, Navsari, Gujarat, India

Trupti K Vyas
Food Quality Testing Laboratory, Navsari Agricultural University, Navsari, Gujarat, India

Corresponding Author:
RT Bhowate
Sorghum Research Unit
Dr. PDKV, Akola, Maharashtra, India

Effect of different liquid organic formulations on quality of organic rice

RT Bhowate, KG Patel, PK Dubey, AR Kaswala and Trupti K Vyas

Abstract
A field experiment was conducted at Organic Farm, ASPEE College of Horticulture, Navsari, Navsari Agricultural University, Navsari, Gujarat during *kharif* season of the year 2021 to study the effect of different liquid organic formulations on quality of organic rice under direct seeding. The experiment was laid out in a Randomized Block Design, comprising seventeen treatments of NADEP compost with different liquid organic formulation *viz*., jivamrut, amritpani and panchgavya. The results indicated that significantly enhance the quality of rice grain, *i.e*., Fe in T_4 (94.23 mg/kg), Mn in T_{14} (57.63 mg/kg) and Zn in T_9 (28.35 mg/kg) as compared to control and absolute control. The higher grain length of rice in treatment T_{10} (8.84 mm) which was at par with all treatments except treatments T_5, T_6, T_{13}, T_{16} and T_{17}, respectively, while breadth of the rice grain was higher in treatment T_3 and T_{14} (2.75 mm), which was remain at par with all treatments but except treatments T_9, T_{10}, T_{16} and T_{17}. Whereas did not differ significantly effect was observed on N, P, K and Zn nutrients contents as well as protein of organic rice grain.

Keywords: Liquid formulations, nutrient quality, protein, rice

Introduction

Excessive and inappropriate application of chemical fertilizers and pesticides had polluted waterway, salt build up in soil poisoned agricultural workers and killed beneficial insects and microbes (Wheeler and Von, 2013) [12], synthetic chemicals that inevitably leave residues in the produce (Mogkos *et al*., 2006) [6], 30 per cent high risk for pesticide contamination than organic (Crystal *et al*., 2012) [1]. For these reasons, consumers are requested for safer and better foods which are produced through more ecologically and authentically by local systems. Organically grown foods have become one of the best choices for both consumers and farmers. Organic product demand is increasing especially in developed nations. Based on the international survey by FiBL on organic farming carried out in 2020, it is now followed in more than 190 countries with a total area of 74.9 mha. Rice is the vital staple food crop grown globally, supplying almost half of the world's population, particularly in developing countries. Rice supplied 20% of the world's dietary energy. Rice provides more than 70% of calorie supply in some Asian countries (GRiSP, 2013) [3]. Rice provides 15% total protein per capita. Furthermore, in many countries, rice bran and rice straw are significant animal feed and bio-fuel resources (Pode, 2016) [8]. Liquid organic formulations preparations are obtained by active fermentation of animal and plant product over specific duration (Ram *et al*., 2022) [9]. It is improves the plant growth directly through nutrient mobilization and producing plant growth hormones and indirectly by suppressing plant pathogens. Liquid organic formulation can work as a pest control source and also provides nutrients for the plants. They are easily preparable, biodegradable, less expensive, eco-friendly and non-hazardous for human health and environment. The fermented liquid organic manures add much needed organic and mineral matter to the soil and play an important role in the buildup of soil organic matter, beneficial microbes and enzymes besides improving the physico-chemical properties of the soil (Revusehab, 2008) [10].

Materials and Methods

An experiment was conducted during the *kharif* season of the year 2021 at Organic Farm, ASPEE College of Horticulture, Navsari Agriculture University, Navsari. The experimental soil site was was *Inceptisols* and slightly alkaline in reaction (pH 7.66), EC (0.35 dS/m), Organic C (0.68%), N (170.3 kg/ha) P_2O_5 (60.7 kg/ha) and K_2O (390.2 kg/ha), DTPA extractable Fe (3.3 mg/kg), Mn (8.5 mg/kg), Zn (0.48 mg/kg) and Cu (3.6 mg/kg), respectively. The experiment was laid out in a Randomizes Block Design with four replications. There were 17 treatments consisting of liquid organic formulation including control and absolute control. The experimental treatments was *viz*., T_1: T_{16}+0 day conditioned jivamrut 500 l/ha, T_2: T_{16}+7 days conditioned jivamrut 500 l/ha, T_3: T_{16}+14 days conditioned jivamrut 500 l/ha, T_4: T_{16}+21 days conditioned jivamrut 500 l/ha, T_5: T_{16}+28 days conditioned jivamrut 500 l/ha, T_6: T_{16}+0 day conditioned amritpani 500 l/ha, T_7: T_{16}+7days conditioned amritpani 500 l/ha, T_8: T_{16}+14 days conditioned amritpani 500 l/ha, T_9: T_{16}+21 days conditioned amritpani 500 l/ha, T_{10}: T_{16}+28 days conditioned amritpani 500 l/ha, T_{11}: T_{16}+0 day conditioned panchgavya 50 l/ha, T_{12}: T_{16}+7 days conditioned panchgavya 50 l/ha, T_{13}: T_{16}+14 days conditioned panchgavya 50 l/ha, T_{14}: T_{16}+21days conditioned panchgavya 50 l/ha, T_{15}: T_{16}+28 days conditioned panchgavya 50 l/ha, T_{16}: NADEP compost @ 3 t/ha and T_{17}: Absolute control. The preparation of liquid organic manures use byproduct by native local cow (Gir) and procedure was followed by (NCOF, 2017) [7]. The treatment of liquid organic formulation was applied as per treatments at time of sowing and 30 DAS. The aerobic rice variety NAUR-1 was sown with a spacing of 30 cm x 10 cm. Rice grains were harvested at maturity and air dried naturally for further processing. The dried grains were stored at room temperature for one month prior to analysis of nutrient quality. The rice grain were analyzed for nutrient quality parameters after tri-acid digestion (NHO_3:$HClO_4$:$H2SO_3$; 10:1:4). Nitrogen, phosphorus and potassium in rice grain was determined by using Kjeldahl's distillation methods, Vanodo-Molybod-Phsophoric yellow colour method in nitric acid (Jackson, 1973) [4] and Lange's Flame Photometer (Jackson 1973) [4] respectively, while Fe, Mn, Zn and Cu contents were analyzed by using an atomic absorption spectrophotometer. The per cent nitrogen in the grain was estimated using Micro Kjeldahls' method of Mckenzine and Wallace (1964) [5] and it was multiplied by 5.95 to copute the crude protein content in grain. A slide caliper was used for measurement of grain length and breadth and expressed in mm of respective value of L/B for each treatment.

Results and Discussion

The data on nutrient content in organic rice *viz*., N, P, K and S are presented in Table 1. The result indicated that nutrient composition was improved as compared with control and absolute control treatments, but were did not rich the significant levels.

Application of NADEP @ 3 t/ha + 21 condition jivamrut 500 l/ha recorded the higher Fe (94.23 mg/kg) content in rice grain presented in (Table 2), but it was on par with the treatments T_3 (92.93 mg/kg), T_5 (87.93 mg/kg), T_{11} (87.26 mg/kg) and T_{15} (88.25 mg/kg), respectively. Incorporation of NADEP @ 3 t/ha with 21 days cond. Panchgavya 50 l/ha enhance the Mn content in rice grain (57.63), it was remain on par with the treatment T_1, T_6, T_{12}, T_{13} and T_{15}, respectively. The Zn content in rice grain was highest due to liquid organic formulations treatments, which varied from 19.75 to 28.35 mg/kg. The Zn content was highest in treatment T_9 (28.35 mg/kg) than all the treatments, but it was on par with treatment T_{12} (26.95 mg/kg). Moreover, Cu content in rice grain was found non- significant level. Micronutrient content was improved in rice grain due to organic treatments as compared to absolute control. That means no addition improvement in nutrient content was observed by application of liquid organic formulation with NADEP compost. Similar result also found by (Gore and Sreenivas, 2011) [2].

Table 1: Effect of different liquid formulation on major nutrient content in rice

Treatments		Nutrient content (%)			
		N	P	K	S
T_1:	T_{16}+0 days cond. jivamrut 500 l/ha	1.04	0.25	1.60	0.141
T_2:	T_{16}+7 days cond. jivamrut 500 l/ha	1.05	0.26	1.54	0.136
T_3:	T_{16}+14 days cond. jivamrut 500 l/ha	1.01	0.25	1.50	0.135
T_4:	T_{16}+21 days cond. jivamrut 500 l/ha	1.02	0.23	1.45	0.151
T_5:	T_{16}+28 days cond. jivamrut 500 l/ha	1.14	0.26	1.47	0.154
T_6:	T_{16}+0 days cond. amritpani 500 l/ha	1.11	0.28	1.43	0.139
T_7:	T_{16}+7days cond. amritpani 500 l/ha	1.06	0.23	1.47	0.133
T_8:	T_{16}+14 days cond. amritpani 500 l/ha	1.00	0.24	1.54	0.143
T_9:	T_{16}+21 days cond. amritpani 500 l/ha	1.02	0.27	1.40	0.145
T_{10}:	T_{16}+28 days cond. amritpani 500 l/ha	1.01	0.23	1.47	0.143
T_{11}:	T_{16}+0 days cond. panchgavya 50 l/ha	1.02	0.26	1.52	0.152
T_{12}:	T_{16}+7 days cond. panchgavya 50 l/ha	1.02	0.27	1.39	0.149
T_{13}:	T_{16}+14 days cond. panchgavya 50 l/ha	1.01	0.25	1.45	0.156
T_{14}:	T_{16}+21days cond. panchgavya 50 l/ha	1.06	0.27	1.39	0.144
T_{15}:	T_{16}+28 days cond. panchgavya 50 l/ha	1.05	0.27	1.41	0.146
T_{16}:	NADEP compost	1.00	0.24	1.34	0.131
T_{17}:	Control	0.97	0.24	1.42	0.129
S Em±		0.04	0.01	0.08	0.010
CD at 5%		NS	NS	NS	NS
CV (%)		7.10	9.38	11..64	13.62

Table 2: Effect of different liquid organic formulation on micronutrient content in organic rice

Treatments		Mg/kg			
		Fe	Mn	Zn	Cu
T_1:	T_{16}+0 days cond. jivamrut 500 l/ha	85.00	53.33	22.90	16.22
T_2:	T_{16}+7 days cond. jivamrut 500 l/ha	78.98	52.80	25.90	16.95
T_3:	T_{16}+14 days cond. jivamrut 500 l/ha	92.93	52.20	22.63	16.34
T_4:	T_{16}+21 days cond. jivamrut 500 l/ha	94.23	48.13	22.83	16.77
T_5:	T_{16}+28 days cond. jivamrut 500 l/ha	87.93	52.75	22.50	16.34
T_6:	T_{16}+0 days cond. amritpani 500 l/ha	73.23	54.38	20.38	15.82
T_7:	T_{16}+7days cond. amritpani 500 l/ha	73.23	52.90	23.28	15.98
T_8:	T_{16}+14 days cond. amritpani 500 l/ha	79.63	51.68	21.73	15.85
T_9:	T_{16}+21 days cond. amritpani 500 l/ha	75.00	47.88	28.35	16.22
T_{10}:	T_{16}+28 days cond. amritpani 500 l/ha	82.55	53.35	25.75	16.25
T_{11}:	T_{16}+0 days cond. panchgavya 50 l/ha	87.26	49.00	20.03	16.40
T_{12}:	T_{16}+7 days cond. panchgavya 50 l/ha	79.80	57.57	26.95	16.07
T_{13}:	T_{16}+14 days cond. panchgavya 50 l/ha	77.60	55.85	20.53	16.28
T_{14}:	T_{16}+21days cond. panchgavya 50 l/ha	80.45	57.63	20.55	17.68
T_{15}:	T_{16}+28 days cond. panchgavya 50 l/ha	88.25	55.18	20.58	17.93
T_{16}:	NADEP compost	72.80	48.70	20.15	16.25
T_{17}:	Control	71.28	48.23	19.75	15.67
S Em±		2.53	1.62	0.83	0.87
CD at 5%		7.13	4.57	2.34	NS
CV (%)		6.23	6.18	7.34	10.58

Table 3: Effect of liquid organic formulation on quality of organic rice

Treatments		Length (mm)	Breadth (mm)	Protein (%)
T_1:	T_{16}+0 days cond. jivamrut 500 l/ha	8.82	2.73	6.16
T_2:	T_{16}+7 days cond. jivamrut 500 l/ha	8.82	2.71	5.87
T_3:	T_{16}+14 days cond. jivamrut 500 l/ha	8.82	2.75	6.00
T_4:	T_{16}+21 days cond. jivamrut 500 l/ha	8.81	2.71	6.08
T_5:	T_{16}+28 days cond. jivamrut 500 l/ha	8.76	2.70	6.12
T_6:	T_{16}+0 days cond. amritpani 500 l/ha	8.74	2.70	5.79
T_7:	T_{16}+7days cond. amritpani 500 l/ha	8.83	2.73	5.96
T_8:	T_{16}+14 days cond. amritpani 500 l/ha	8.83	2.71	5.96
T_9:	T_{16}+21 days cond. amritpani 500 l/ha	8.79	2.68	5.91
T_{10}:	T_{16}+28 days cond. amritpani 500 l/ha	8.84	2.69	5.71
T_{11}:	T_{16}+0 days cond. panchgavya 50 l/ha	8.78	2.70	6.04
T_{12}:	T_{16}+7 days cond. panchgavya 50 l/ha	8.83	2.70	6.08
T_{13}:	T_{16}+14 days cond. panchgavya 50 l/ha	8.77	2.74	5.83
T_{14}:	T_{16}+21days cond. panchgavya 50 l/ha	8.80	2.75	6.33
T_{15}:	T_{16}+28 days cond. panchgavya 50 l/ha	8.80	2.71	6.33
T_{16}:	NADEP compost	8.77	2.68	5.79
T_{17}:	Control	8.74	2.67	5.71
S Em±		0.02	0.02	0.26
CD at 5%		0.06	0.05	NS
CV (%)		0.46	1.28	8.79

The result indicated that length of organic rice grain significantly highest under the treatment T_{10} (8.84 mm) due to the application of NADEP @ 3 t/ha+28 days cond. amritpani 500 l/ha which was at par with all the treatments except T_4, T_5, T_6, T_{13}, T_{16}, and T_{17}, while significantly higher breath length in treatments T_3 and T_{14} (2.75 mm), but at par with all the treatments except treatments T_9, T_{10}, T_{16} and T_{17}, respectively. Similar results were earlier recorded by (Walia *et al*., 2021) [11]. Whereas, protein content of organic rice grain was non-significant.

Conclusion

Based on the above results, it is concluded that, incorporation of NADEP compost along with liquid organic formulations *viz*., jivamrut, amritpani and panchgavya in different conditioning periods improve the quality of organic rice.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

1. Crystal SS, Margaret LB, Grace EH, Bavinger JC, Maren P, Paul J, *et al*. Ann Itern Med. 2012;157:348-366.
2. Gore N, Sreenivas MN. Influence of liquid organic manures on growth, nutrient content and yield of tomato (*Lycopersicon esculentum* Mill.) in the sterilized soil. Karnataka J Agric. Sci. 2011;24(2):153-157.
3. GRiSP, Rice almanac. International Rice Research Institute, Los Banos; c2013.
4. Jackson ML. Soil Chemical Analysis. Prentice Hall on India Pvt. Ltd., New Delhi; c1973.

5. Mckenzine, Wallace. The Kjeldahl determination of Nitrogen: A critical study of digestion conditions temperature, catalyst and oxidizing agent. Australian J Chem. 1964;7:55-70.
6. Mogkos F, Arvaniti F, Azmpelas A. Organic food: nutritious foods or food for thought A review of the evidence. Int. J Food Sci Nutr. 2006;54:357-71.
7. NCOF. Organic farming newsletter, National Centre of organic farming, Ghaziabad. 2017;4(4):3-17.
8. Pode R. Potential applications of rice husk ash waste from rice husk biomass power plant. Renewable and Sustainable Energy Reviews. 2016;53:1468-1485.
9. Ram RA, Israr A, Kumar A, Shailendra M. Microbial validation of organic preparation used in natural farming. Eco-friendly agric. J. 2022;17(1):16-16.
10. Revusehab N. Studies on nutrient management practices through organics in Sesame (*Sesamum indicum* L.). Thesis M.Sc. (Agri.), UAS, Dharward, 2008, p. 230.
11. Walia SS, Kumar N, Kaur T. Response of different cultivars of Basmati Rice (*Oryza sativa*) on nutrient uptake and quality parameters under direct seeding. J Krishi Vigyan. 2021;10(1):223-229.
12. Wheeler T, Von BJ. Climate change impacts on global food security. Sci. 2013;341(6145):508-513.