Effect of Poultry manure, Vermicompost and Zinc on Growth and Yield of Rice

Abstarct:

The field experiment was conducted during *rabi* 2022 at Crop Research Farm, Department ofAgronomy,SHUATS,Prayagraj(U.P).Thesoilofexperimentalplotwassandyloamintexture, nearly neutral in soil reaction (pH 7.1), low in organic carbon (0.36 %), available N(171.48 kg/ha), available P (15.2 kg/ha) and available K (232.5 kg/ha).The experiment waslaid out in Randomized Block Design with nine treatments including control each replicatedthrice on the basis of one year experimentation. The treatments consists of T1: Poultry manure 4t/ha+ zinc 15kg/ha, T2: Poultry manure 4t/ha + zinc 20kg/ha, T3: Poultry manure 4t/ha + zinc 30kg/ha, T4: Vermicompost 12t/ha + zinc15kg/ha, T5: Vermicompost 12t/ha + zinc 20kg/ha, T6: Vermicompost 12t/ha + zinc 30kg/ha,T7:Poultry manure 50% + vermicompost 50% + zinc15kg/ha,T8:Poultry manure 50% + vermicompost 50% + zinc 20kg/ha,T9:Poultry manure 50% + vermicompost 50% + zinc 30kg/ha are used. The application of Poultry manure 50% + vermicompost 50% + zinc 20kg/ha recorded significantly higher Plant height (41.07 cm), Number of tillers per plant (14.33), Plant dry weight (19.05 g/plant), Significantly maximum number of panicles/plant (13.00), grains/panicle (84.00), Test weight (20.01 g), grain yield (5.98 t/ha), Haulm yield (9.44 t/ha), Harvest index (38.79 %) were recorded with the treatment of Poultry manure 50% + vermicompost 50% + zinc 20kg/ha.

Higher gross returns (Rs. 2,98,907.00/ha), net return (Rs. 2,15,897.00/ha) and benefit cost ratio (2.59) was obtained in the treatment of Poultry manure 50% + vermicompost 50% + zinc 20kg/ha.

Keywords:*Poultry manure,Rice,Vermicompost, Zinc.*

Introduction:

Rice is the seed of the grass species Oryza sativa (Asian rice) or the less common Oryza glaberrima (African rice). Cultivated rice, a cereal grain, is the most commonly consumed staple food for over half of the world's population, especially in Asia and Africa. It is the world's third largest agricultural product after sugarcane and corn. Rice is the most important food crop in terms of human nutrition and caloric intake, supplying more than one-fifth of his calories consumed by humans worldwide. A monocotyledonous plant, rice is usually grown as an annual, but in tropical regions it can survive as a perennial and produce rattan crops for up to 30 years. Cultivated rice is an annual plant that grows to a height of about 1.2 meters. The leaves are long, flat, and grow on hollow stems. The fibrous root

system is often widely spread. Inflorescences or inflorescences (flower clusters) consist of spikelets with flowers that produce fruit or grain. Varieties vary widely in panicle length, shape, weight, and overall productivity of a particular plant. Rice cultivation is labor-intensive and requires abundant water, so it is suitable for countries and regions with low labor costs and high rainfall.

The poultry industry is one of the most advanced agricultural production chains in the world. The growing demand for poultry meat is mainly due to its acceptance in most societies and its relatively low cholesterol content.The total population of poultry in India is 851.81 million (20 according to the national census). H. Approximately 6.25 million to 8 million tons of waste are generated annually, up 16.8% from the last census. The regional nature of poultry production also means that it can represent a large part of the agricultural economy in many states and regions of the country. face complex and difficult environmental problems.

Rice is a highly sensitive crop to zinc deficiency, and zinc is an important micronutrient that limits rice growth and yield. cause some symptoms. When brown spots or streaks develop on the leaves, and they merge and completely cover the old leaves, the plant remains stunted and in severe cases may die, but those that recover are less mature. Shows significant lag and reduced yields. Zinc deficiency in rice reduces tillering and increases spikelet sterility and time to harvest. Zinc application to seedbeds had no significant effect on grain yield. Zinc solution sprayed on rice seedlings 3 weeks after transplanting was the most effective post-transplanting method to compensate for deficiencies. It was the processing of Foliar application can be effectively used to address the problem of micronutrient deficiencies in subsoils.

Due to the increasing cost of chemical fertilizers, depletion of soil micronutrients,environmental and health hazards, the use of organic manure in farming has much attention(Ramesh *et al.*, 2005). Organic manures are an excellent fertilizer containing nitrogen, phosphorus,potassium and micronutrients for healthy growth of plants. Organic manure such as poultrymanure increases the organic matter (OM) content of soil and in turn releases the plant nutrients inavailable form for the use of the plants (Magkos*et al.*, 2003). It contained essential nutrientelements association with high photosynthetic activities and thus promotes root and vegetablegrowth (John *et al.*, 2004). The previous studies have shown that the integration of inorganicfertilizer and organic manure has also been reported to be more beneficial than the use of eithermineral fertilizer or organic manure alone especially in intensive agricultural production.Therefore, integrated use of both

organic manure and chemical fertilizers shows as the bestapproach in providing greater stability in production and improving soil fertility status, asevidenced in the past (Islam *et al.,* 2011).

Material and Methods:

The field experiment was conducted during *Khairf*2022 at Crop Research Farm, Departmentof Agronomy, SHUATS, Prayagraj (U.P). The experiment waslaid out in Randomized Block Design with nine treatments including control each replicatedthrice on the basis of one year experimentation.The treatments consists ofT1: Poultry manure 4t/ha + zinc 15kg/ha,T2: Poultry manure 4t/ha + zinc 20kg/ha,T3:Poultry manure 4t/ha + zinc 25kg/ha,T4:Vermicompost 12t/ha + zinc 15kg/ha,T5:Vermicompost 12t/ha + zinc 20kg/ha,T6:Vermicompost 12t/ha + zinc 25kg/ha,T7:Poultry manure 50% + vermicompost 50% + zinc 15kg/ha,T8:Poultry manure 50% + vermicompost 50% + zinc 20kg/ha, T9: Poultry manure 50% + vermicompost 50% + zinc 25kg/ha areused.

Results

Pre - harvest Parameters:

The perusal of data indicate that plant height measured at(i.e., 60 DAS) highest plant height (41.07 cm) has been recorded with the application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum plant height was recorded inVermicompost 12t/ha + zinc 25kg/ha (32.50 cm) and Poultry manure 50% + vermicompost 50% + zinc15kg/ha (40.80 cm) which isstatisticallyatpartoPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha.

highest number of tillers (14.33) has been recorded with the application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum number of tillers was recorded inVermicompost 12t/ha + zinc 25kg/ha (8.00) and Poultry manure 50% + vermicompost 50% + zinc 15kg/ha (14.00) which isstatisticallyatpartoPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha. Combination of organic and inorganic fertilizers significantly increased the number of effectiveand decreased the number of non-effective tillers plant-1 than sole use of inorganic fertilizer andthan that of organic manure. Amin et al. (2004) found that increased fertilizer dose of NPKincrease number of total tillers plant

At 60 DAT, highest plant dry weight (19.05 g) has been recorded with the application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum plant dry weight was recorded inVermicompost 12t/ha + zinc 25kg/ha (14.78 g) and Poultry manure 50% + vermicompost 50% + zinc15kg/ha (18.67 g) which isstatisticallyatpartoPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha.

Post - harvest Parameters:

Significantly higher number of panicles/hill (13.00) were recorded in with application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum was recorded in Vermicompost 12t/ha + zinc 25kg/ha(9.00) whereas with application of Poultry manure 50% + vermicompost 50% + zinc15kg/ha (12.67) and Poultry manure 50% + vermicompost 50% + zinc 25 kg/ha (12.67) werefoundto bestatisticallyatpar with thehighest.

Significantly higher number of panicles/hill (84.00) were recorded in with application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum was recorded in Vermicompost 12t/ha + zinc 25kg/ha(75.00) whereas with application of Poultry manure 50% + vermicompost 50% + zinc15kg/ha (83.33) and Poultry manure 50% + vermicompost 50% + zinc 25 kg/ha (82.67) wasfoundto bestatisticallyatpar with thehighest.

Significantly higher test weight (20.01 g) is recorded in with application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum was recorded in Poultry manure 50% + vermicompost 50% + zinc 20 kg/ha(14.56 g) whereas with application of Poultry manure 50% + vermicompost 50% + zinc15kg/ha (19.45 g) werefoundto bestatisticallyatpar with thehighest.

Significantly higher grain yield (5.98 t/ha) is recorded in with application ofPoultry manure 50% + vermicompost 50% + zinc 20 kg/ha, minimum was recorded in Poultry manure 50% + vermicompost 50% + zinc 20 kg/ha(3.78 t/ha) whereas with application of Poultry manure 50% + vermicompost 50% + zinc15kg/ha (3.83 t/ha) werefoundto bestatisticallyatpar with thehighest.

Discussions:

The supremacy of enriched poultry manure compost lies in the fact that it can supply the nutrients in soluble form for a quite longer period by not allowing the entire soluble form into solution, to come in contact with soil and other inorganic constituents, thereby minimizing fixation and precipitation from the enriched manures, the plant roots can very well compete with loss mechanisms and absorb more nutrients leading to better yield [Mohandas 2008]. S. P. Sangeetha, A. Balakrishnan, P. Devasenapathy (2.3 $t \cdot ha^{-1}$) recorded higher yield attributes and grain yield of rice, which was however comparable with composted poultry manure. The residual effect of enriched poultry manure compost and composted poultry manure applied to preceding rice crop improved yield attributes and yield of succeeding blackgram. Improved rice grain quality, in terms of chemical composition, cooking quality and high score of sensory evaluation was achieved under organic manures application. The recommended NPK fertilizer recorded higher milling

recovery, head rice per cent and lower broken percentage of rice and which was comparable with enriched poultry manure compost and composted poultry manure. The absolute control had shown lower milling recovery, head rice percentage and higher broken rice percentage. This might be due to better amenability for shelling, good grain size and less number of chalky grains was observed under recommended NPK fertilizer application.

Conclusion:

It was concluded that for obtaining higher yield attributes with better quality of groundnut application of Poultry manure 50% + vermicompost 50% + zinc 20kg/ha was recorded significantly higher number of panicles/plant (13.00),grains/panicle (84.00),benefit cost ratio (2.59) as compared to other treatments. Since, the finding based on the research done in one season.

Table 1.InfluenceofPoultry manure, Vermicompost and Zincon growth and Yield attributes and their combination on growth and yield of Rice at 60 DAS.

Treatments	Plant Height	Number of tillers/plants	Dry weight	Number of panicle/hills	Number of grains/hills	Test weight	Grain yield (kg/ha)
T1	38.27	12.00	17.63	10.67	79.33	18.41	4.60
T2	38.60	12.33	18.00	12.33	81.00	18.78	4.69
T3	37.10	11.67	17.21	10.00	78.67	17.99	4.35
T4	35.40	10.00	15.15	9.00	75.67	15.93	3.62
T5	36.90	11.00	16.11	11.00	78.33	16.89	4.22
T6	32.50	8.00	14.78	9.00	75.00	14.56	3.78
T7	40.80	14.00	18.67	12.67	83.33	19.45	5.83
T8	**41.07**	**14.33**	**19.05**	**13.00**	**84.00**	**20.01**	**5.98**
T9	39.60	13.67	18.32	12.67	82.67	19.00	5.75
F– Test	S	S	S	S	S	S	S
SEm**(±)**	0.51	0.22	0.22	0.17	1.23	0.25	0.08
CD(p=0.05)	1.52	0.67	0.67	0.51	3.70	0.75	0.25

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