

Effect of NOVA OM-K (A Bio-Enriched Organic Manure) and Nutrients on Yield and Yield Components of Rice (*Oryza sativa* L.)

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ABSTRACT

An investigation was carried out during kharif, 2017 in rice crop by application of NOVA OM-K an bio-enriched organic manure in combination with recommended dose of fertilizers to evaluate the efficiency of NOVA OM-K. The experiment was laid out in Randomized Block Design (RBD) with five treatments and control i.e T_1 : Control, T_2 : NOVA OM-K 25 kg/ac, T_3 : Recommended Dose of Fertilizers, T_4 : Recommended Dose of Fertilizers + NOVA OM-K 25 kg/ac, T_5 : 150% Recommended Dose of Fertilizers and T_6 : 150% Recommended Dose of Fertilizers + NOVA OM-K 25 kg/ac. Experiment revealed that application of 150% Recommended Dose of Fertilizers + NOVA OM-K 25 kg/ac (T_6) resulted in improved plant height, number of productive tillers per hill, panicle length, panicle weight, number of grains per panicle, test weight, grain yield, straw yield and harvest index of 13.27, 50.47, 33.16, 150, 57.45, 54.36, 145.47, 157.8 and 4.2% over control respectively.

Key words: Organic manure, Grain yield, Straw yield, Test weight, Chemical fertilizers.

INTRODUCTION

In the past few decades, chemical fertilizers have widely spread throughout the world focusing that the soil is inert medium for plant roots, rather than as a living biosphere in which the crop is only one of hundreds or thousands of interacting species. However, it is now realized that in fields under intensive monoculture which receive heavy applications of chemical fertilizers alone, there is a slow decline in productivity. This decline occurs even in irrigated paddy fields¹. Applications of nitrogen fertilizers are responsible for

emissions of greenhouse gases like nitrous oxide (N₂O) and ammonia (NH₃). Besides supplying nitrogen, ammonia can also increase soil acidity. Excessive nitrogen fertilizer applications lead to pest problems by increasing the birth rate, longevity and overall fitness of certain pests^{2,3}. Experience in tropical Asian countries generally shows that organic farming alone does not supply enough nutrients, and organic fertilizers need to be supplemented by a basal dressing of chemical fertilizer.

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However, over a longer period, applications of organic materials such as livestock manure and crop residues have been found to bring about a gradual improvement in soil productivity and crop performance. A study carried out on five crops in Japan showed that applications of organic matter enhance root growth and nutrient uptake, resulting in higher yields¹. Another benefit from the increased use of organic materials is that it can help to solve pollution problems caused by agro-industrial wastes.

In the light of these problems, it was planned to study the effect of NOVA OM-K an Bio-Enriched organic manure based on N, P, K and Zn bacteria along with recommended dose of fertilizers on growth and yield components in rice.

MATERIAL AND METHODS

A field experiment was conducted during kharif season of 2017 with rice variety MTU-1010 at the Nova Agri tech Ltd. Experimental farm (Latitude 18.3131848 Longitude 78.2544944), Kamareddy, Telangana, India to determine the effects of NOVA OM-K an Bio-Enriched organic manure along with recommended dose of fertilizers on growth, yield and yield components of rice. The experiment were laid out in Randomized Block Design (RBD) with three replications the treatments comprised of T₁: Control, T₂: NOVA OM-K 25 kg/ac, T₃: RDF, T₄: RDF+ NOVA OM-K 25 kg/ac, T₅: 150% RDF and T₆: 150% RDF+ NOVA OM-K 25 kg/ac. The rice was planted first in nursery and later thinned at four weeks old and transplanted within average of three seedlings per hill on prepared seed beds, at 20cm x 20cm within and between rows. Data was recorded on established plants using averages of two quadrates (20 cm x 20 cm) throws at 8 weeks after planting, plant height, number of productive tillers per m², length of panicle, panicle weight and number of grains per panicle on five tagged plants were recorded. Plants at maturity were manually harvested within 1 m² area from base, bound, air dried, panicles separated from stalks, manually

threshed, winnowed and recovered paddy weighed and recorded as paddy yield per hectare and 1000 seed weight as test weight. The straw was then weighed and recorded as weight per hectare. Harvest index was measured using following formula “Weight of grain/Total weight of above ground biomass”.

Treatments:

T₁: Control

T₂: NOVA OM-K 25 kg/ac

T₃: RDF

T₄: RDF+ NOVA OM-K 25 kg/ac

T₅: 150% RDF

T₆: 150% RDF+ NOVA OM-K 25 kg/ac

RESULTS AND DISCUSSION

The findings in the present study as well as relevant discussion have been presented under following heads.

Plant height (cm):

The plant height ranged from 98 to 111 cm. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly higher plant height of 111cm. Morteza Siavoshi *et al.*⁶, reported that maximum plant height was due to treatment of organic fertilizer+NPK than individual treatments.

Number of productive tillers per hill:

The number of productive tillers per hill ranged from 10.7 to 16.1. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly maximum number of productive tillers per hill (16.1). Morteza Siavoshi *et al.*⁶, reported that maximum number of fertile tillers was due to treatment of organic fertilizer+NPK than individual treatments. Mirza *et al.*⁴, observed that application of inorganic fertilizers is not necessary to produce effective tillers if we can supplement it from organic manures, which also help in providing essential micronutrients to the plants.

Panicle length (cm):

Panicle length ranged from 19.3 to 25.7 cm. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly higher panicle length of 25.7 cm. Morteza Siavoshi *et al.*⁶, reported that the

plants treated with chemical fertilizer in combination with organic fertilizer exhibited higher panicle length and was followed by chemical fertilizer treated plants.

Panicle weight (g):

Panicle weight ranged from 1.4 to 3.5 g. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly maximum panicle weight of 3.5g. Salem⁵ reported that application of FYM along with nitrogen fertilizer significantly increased panicle weight.

Number of grains per panicle:

Number of grains per panicle ranged from 94 to 148. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly maximum number of grains per panicle (148). Salem⁵ reported that application of FYM along with nitrogen fertilizer significantly increased number of filled grains/panicle.

Test weight (g):

Test weight ranged from 19.5 to 30.1g. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly maximum test weight of 30.1g. Salem (2006) reported that application of

FYM along with nitrogen fertilizer significantly increased 1000-grain weight in rice.

Grain yield (q/ha):

Grain yield ranged from 45.3-111.2 q/ha. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly higher grain yield of 111.2 q/ha. Salem⁵ reported that application of FYM along with nitrogen fertilizer significantly increased grain yield in rice. Morteza Siavoshi *et al.*⁶, reported that the plants treated with chemical fertilizer in combination with organic fertilizer exhibited higher grain yield. and was followed by chemical fertilizer treated plants.

Straw yield (q/ha):

Straw yield ranged from 49.5 to 127.6 q/ha. Among the various treatments application of NOVA OM-K+150% RDF (T₆) accounted for significantly higher straw yield of 127.6q/ha. Yadana *et al.*⁷, reported that the application of organic manure and compost in rice resulted in higher dry matter accumulation.

Harvest index:

Harvest index ranged from 0.47 to 0.49. Among the various treatments harvest index not varied significantly.

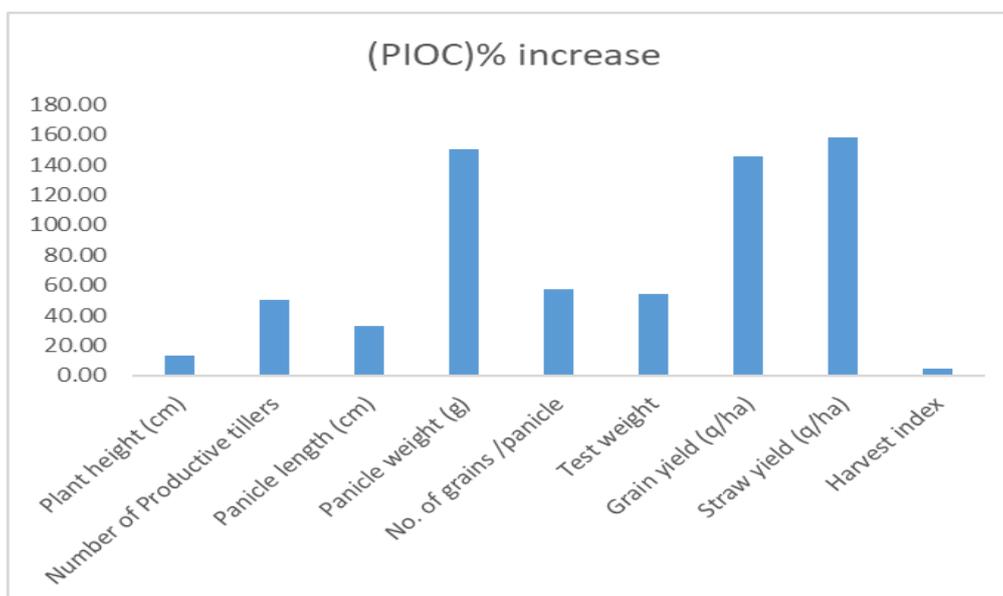


Fig. 1: Percent increase of yield components of NOVA OM-K+150% RDF (T₆) over control (T₁)

Table 1: Effect of different levels of NOVA OM-K on yield and yield components in rice

Treatments	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	Mean	S.Em	CD (0.05)	C.V	(PIOC)% increase
Plant height (cm)	98	104	101	109	103	111	104.33	1.99	1.49	0.78	13.27
Number of Productive tillers/hill	10.7	12.5	13.0	15.2	13.6	16.1	13.52	0.79	1.55	6.3	50.47
Panicle length (cm)	19.3	21.7	21.7	24.7	23.3	25.7	22.73	0.95	2.85	6.88	33.16
Panicle weight (g)	1.4	1.9	2.0	3.0	2.5	3.5	2.38	0.32	0.41	9.44	150
No. of grains /panicle	94	117	118.3	133	124.7	148	122.50	7.36	22.49	10.01	57.45
Test weight	19.5	22.2	23.7	27.3	25.8	30.1	24.77	1.54	2.27	5.04	54.36
Grain yield (q/ha)	45.3	57.1	84	102.5	92.3	111.2	82.07	10.56	1.24	0.83	145.47
Straw yield (q/ha)	49.5	59.7	88.3	117.4	96.0	127.6	89.75	12.6	0.21	0.13	157.8
Harvest index	0.47	0.48	0.49	0.47	0.49	0.49	0.48	0.004	NS	2.76	4.2

PIOC: Percent increase over control

CONCLUSION

Here it was concluded that application of NOVA OM-K+150% RDF (T₆) produced high values for grain yield and yield components in rice. It has increased the plant height, number of productive tillers per hill, panicle length, panicle weight, number of grains per panicle, test weight, grain yield, straw yield and harvest index of 13.27, 50.47, 33.16, 150, 57.45, 54.36, 145.47, 157.8 and 4.2% over control respectively.

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