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Response of Nutrient Management Practices through Organic Substances on Rice *var.* GR-11 in North Konkan Coastal zone of Maharashtra

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***Abstract*— *The management of soil organic matter is crucial to maintain a productive organic farming system. No one source of nutrient usually fulfills to maintain productivity and quality control in organic system. In addition, the inputs to supplement nutrient availability are often not uniform presenting additional challenges in meeting the nutrient requirements of crops in organic system. With this concept, a field experiment was conducted at the research farm of ASPEE Agricultural Research and Development Foundation, Tansa Farm, at Nare, Taluka Wada, Dist. Palghar, Maharashtra, during Kharif 2018-19 in rice. Different treatments comprising organic amendments such as T_1-FYM @ 5 t/ha (control), T_2-T_1 + vermicompost @2.5 t/ha, T_3-T_1+Neem cake @ 250 kg, T_4- T_1+ vermiwash @ 3% spray, T_5-T_1+ Jeevamrut @ 3 % spray, T_6-T_1+ Panchgavya @ 3 % Spray, T_7-T_1+ Enriched Bananpseudostem sap @ 3% spray and T_8-T_1+ Regular Banana sap @ 3% spray were tried in organic crop production. These treatments were compared with absolute control (FYM @ 5 t/ha + No biofertilizer+ No Spray). A Rice variety 'GR-11' was taken for study. Results revealed a significant enhancement in grain yield of rice over absolute control due to the application of different organic amendments applied alone or in combinations. The rice grain yield (3.19 t ha^{-1}) obtained under combined application of FYM and vermicompost was at par with the yield recorded under neem cake, vermiwash and panchgavya. An interesting observation recorded was that there was no serious attack of any insects pest or disease in organically grown crop. The study revealed that addition of four organic amendments viz. vermicompost, vermiwash, neem cake&panchgavya could give the optimum yield of organic rice var. GR-11.*

Keywords*— *Vermiwash, Noval fertilizer, Panchgavya, Jeevamrut.

I. INTRODUCTION

Organic farming production system aims at promoting and enhancing agro-ecosystem health, biodiversity, biological cycles and soil biological activities. The popularity of organic food and organic farming across the world has tempted rice producers in India to focus on the production of organic rice. Organic farming is an alternative agriculture which has been proposed as a solution to the problems associated with inputs of chemical fertilizers and pesticides. It is based on ecological approach to nutrient supply and crop protection rather than a chemical one. In organic farming, we constantly work to build the healthy soil that translates into healthy plants. Crop plants remove varying amounts of different nutrients from soil and to compensate the loss from the soil, organic amendments rich in nutrients must be added (Singh &Mandal, 2000). In organic farming, we feed to the soil micro and macro-organisms, which deliver minerals, vitamins and other nutrients to the crop. Through organic farming, incidences of diseases and insects may be reduced and soil and grain quality improved (Stockdale *et al.* 2001). With such background, an experiment was conducted to find out the feasibility of organic farming in rice and examine the impact of this on the yield and quality of grain.

II. MATERIALS AND METHODS

The experiment was conducted at ASPEE Agricultural Research and Development Foundation Farm, Village- Nare, Tauka- Wada, district- Palghar in *kharif* season during 2018 in Randomized Block Design (RBD) with three replications. The plot size was 14.4 m x 10.8 m. The experimental site was located at 19.65^{0}N latitudes and 73.13^{0}E longitudes with average annual rainfall of 2600 mm. Eight treatments comprising different organic amendments such as T_1-FYM @ 5 t/ha (control), T_2-T_1 + vermicompost @ 2.5 t/ha, T_3- T_1+Neem cake @ 250 kg,

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T_4- T_1+ vermiwash @ 3% spray, T_5- T_1+ Jeevamrut @ 3 % spray, T_6- T_1+ Panchgavya @ 3 % Spray, T_7- T_1+ Enriched Bananpseudostem sap @ 3% spray and T_8- T_1+ Regular Banana sap @ 3% spray were tested in organic crop production.

Vermicompost is an organic manure (bio-fertilizer) produced as the vermicast by earth worm feeding on biological waste material; plant residues. This compost is an odourless, clean, organic material containing adequate quantities of N, P, K and several micronutrients essential for plant growth. Vermicompost is a preferred nutrient source for organic farming. It is eco-friendly, non-toxic, consumes low energy input for composting and is a recycled biological product. Neem cake organic manure is the by-product obtained in the process of cold pressing of neem tree fruits and kernels, and the solvent extraction process for neem oil cake. It is a potential source of organic manure. Neem cake organic manure protects plant roots from nematodes, soil grubs and white ants probably due to its residual limonoid content. It also acts as a natural fertilizer with pesticidal properties.

The Liquid organic manure Panchagavya&Jeevamrut was freshely prepared at farm and vermiwash was collected from vermicompost unit at farm. Panchgavya is a cow excreta based indigenous nutrient solution. Panchagavya consists of products *viz.* cow dung, cow urine, milk, curd, jaggery, ghee, banana, tender coconut and water. The noval fertilizer was brought from Navsari Agricultural University, Navsari. It was a sap extracted from banana pseudo-stem. This sap was rich source of major nutrients like nitrogen, phosphorus, potash and micro nutrients like iron, boron, molybdenum, magnesium, calcium, sulphur, zinc and copper. This sap was also worked as a growth promoters like gibbrelic acid and cytokinin.

Rice variety 'GR-11' was sown in first fortnight of June during 2018-19 after seed treatment with the fungicide thiram @ 3 g kg^{-1} seeds. Twenty five days old seedlings were transplanted at spacing of 20cm x 15 cm. The bed size was 14.4 m x 10.8 m (total 1 acre). Randomly five plants were selected from each plot for recorded regular biometric observations from 30 DAT till harvest. Data were compiled and analyzed using appropriate statistical methods.

III. RESULT AND DISCUSSION

Plant growth parameters

The plant growth parameters *viz.*, plant height and number of tillers were markedly influenced by various organic amendments applied in rice. The maximum value of these parameters was recorded with treatment T_2FYM @ 5 t/ha + Vermicompost @2.5 t/h which was at par with treatments T_4 and T_3. Vermicompost, a rich source of readily available nutrients, has high microbial activity and contains growth hormones.

The similar findings were reported by Bal*et al.* (1993), Kandasamy and Ramasamy in 1998, Solunke*et al.*, 2006 and Amitava*et al.* (2008) in plant height and number of tillers of rice.

Yield parameters

Yield contributing parameters such as length of panicle, seeds per panicle, test weight, grain and straw yields were measured at harvest of the crop. The results in table 1 indicated that different treatments induced marked variations in length of panicle, seeds per panicle, test weight, grain and straw yields. Highest values of all these parameters were found with treatment T_2 (FYM @ 5 t/ha + Vermicompost @2.5 t/ha).

The higher length of panicle (28.6 cm), seeds per panicle (245), test weight (21.7 g), grain (3.19 t/ha) and straw (6.53 t/ha) yields were recorded in treatment T_2*i.e.*FYM @ 5 t/ha + Vermicompost @2.5 t/ha. In case of panicle per plant, panicle length, grain yield andstraw yield the treatment $T_2$was at par with treatment T_3& T_4 while in case of test weight, it was at par with treatment T_3. The same results wasreported by Purushotam*et al.*, in 1990, Parida*et al.*in 1994at Bhubaneswar and Reddy and Shivaraj (1999) in rice.

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Treatment Detail	**Plant height (cm)**	**No. of tillers per plant**	**No. of Panicle per plant**	**Lenght of panicle (cm)**	**Seed per panicle**	**Test weight (g)**	**Seed Yield (t/ha)**	**Straw Yield (t/ha)**
FYM @ 5 t/ha	96.9	6.1	6	20.2	183	15.4	2.44	5.01
FYM @ 5 t/ha + vermicompost @2.5 t/ha	100.4	7.9	7.2	28.6	245	21.7	3.19	6.53
FYM @ 5 t/ha +Neem cake @ 250 kg	99.6	7.5	7.1	25.8	233	19.6	3.13	6.42
FYM @ 5 t/ha + vermiwash @ 3% spray	99.4	7.4	7	23.2	210	17.7	3.04	6.24
FYM @ 5 t/ha + Jeevamrut @ 3 % spray	98.4	6.6	6.2	21.9	198	16.7	2.81	5.77
FYM @ 5 t/ha + Panchgavya @ 3 % Spray	98.7	6.8	6.6	22.5	204	17.1	2.97	6.09
FYM @ 5 t/ha + Enriched Bananpseudostemsap @ 3% spray	98.1	6.5	6.13	21.3	193	16.2	2.71	5.55
FYM @ 5 t/ha + Regular Banana sap @ 3% spray	97.9	6.2	6.07	21.2	192	16.1	2.56	5.21
S.Em.±	0.53	0.3	0.18	0.9	1.5	0.9	0.11	0.14
C.D.	1.6	1.05	0.55	2.8	4.5	2.7	0.31	0.43