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Effect of organic manures and liquid organic formulations on wheat (*Triticum aestivum* L.) economics

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Abstract
A field experiment was conducted during Rabi season of last week of December 2019 at the certified organic experiment farm of the SHIATS Model of Organic Farm (SMOF) in NAI, Prayagraj to study the response of wheat under different sources of organic manures and liquid organic formulation on yield attributes of wheat (*Triticum aestivum* L.). The experiment consists 10 treatments with 3 replications laid out in a randomized block design. Organic manures i.e., Control 16 t/ha, M1: FYM 25% (4 t/ha) + Vermicompost 75% (4.5 t/ha), M2: FYM 50% (8 t/ha) + Vermicompost 50% (3 t/ha), M3: FYM 75% (12 t/ha) + Vermicompost 25% (1.5 t/ha) and Liquid organic formulations i.e., L1: Panchagavya at 2%, L2: Vermiwash at 5%, L3: Panchagavya at 2% + Vermiwash at 5%. The result concluded that the maximum grain yield (2.39 t/ha) and straw yield (3.67 t/ha) was recorded with application of FYM 75% + VC 25% + Panchagavya at 2% + Vermiwash at 5% spray. The economic analysis clearly indicates that higher benefit: cost ratio (2.11) recorded with application of FYM 50% + VC 50% + Panchagavya at 2% spray.

Keywords: Wheat, FYM, vermicompost, panchagavya, vermiwash, economics

Introduction
Organic farming is an agriculture strategy of producing healthy food, soil, plants, environment and other biotic factors as a matter of concern. Simultaneously, avoiding the use of synthetically manufactured fertilizers, insecticides, pesticides and other growth regulating chemicals. It depends on use of biological fertilizer and management practices such as crop rotation, cover crops, green manures, legumes, crop residues, animal manures, off farm organic wastes and various aspects of biological pest control to improve soil quality and build soil organic matter parallelly controlling insect, pest, disease and weeds (Bishal Bista and Sagar Dahal, 2018).

The term ‘farm yard manure’ is expression to signify any manure prepared in the backyard using the farm waste, cattle dung and urine. Conventionally, FYM is prepared by spreading cattle dung, water and crop residues in a specially made pit at the backyard of every Indian household in the village and application of farm yard manure (FYM) results in improved crop yields, soil physical properties, nutrient availability, microbial activity and residual benefits to succeeding crops (Joshi and Prabhakarasetty, 2006) [9]. The application of FYM at 10 t/ha was significantly lower than 100 per cent NPK but it was on par with plot receiving 10 t/ha of dhaincha with respect to grain yield of rice and wheat, in rice-wheat cropping system (Vinay Singh, 2006) [12].

The depletion of soil organic carbon leads decreasing in yield in monocropping and double cropping system. There are several studies on long term effect of manures and fertilizers on soil organic pool has been done. The incorporation of organic manures, wheat straw and root residues are most effective for build-up of soil organic carbon while chemical N and P are not effective as compared to the organic matter addition (Manna *et al*., 2007 [10], Fan *et al*., 2007 [7], Bado *et al*., 2010) [3].

Continuous crop cultivation on a particular place for long period of time reduces the soil organic matter and affects the soil properties. Use of inorganic fertilizers, herbicides, pesticides deteriorate the soil physical, chemical and biological properties. Green manuring has significant positive influence on soil physical (Bruce *et al*., 1990) [5].

Earthworms are known to be among the nature's most potent scavengers and 'soil engineers. In performing these roles in nature, the earthworms mainly feed upon plant biomass or phytomass.

Panchagavya is an organic formulation, which in Sanskrit means the blend of five products obtained from cow i.e. milk, ghee, curd, dung and urine. The components like cow dung and cow urine enhances the insecticidal activity of pachagavya which can reduce the number of application hazardous chemicals on crops. It is a mixed culture of naturally occurring, beneficial microbes' mostly lactic acid bacteria (Lactobacillus), yeast (Saccharomyces) actinomyces (Streptomyces), photosynthetic bacteria (Rhodopsuedomonas) and certain fungi (Aspergillus) which promotes the growth and yield in different crops and provides high B:C ratio. So, panchagavya can be effective organic growth-promoter for small and marginal farmers. Panchagavya is an organic product having the potential for promoting growth and providing immunity in plant system. (Shaon Kumar Das *et al*., 2014) [11].

They also ingest animal droppings but to a much lesser extent. This being the situation earthworms should be utilizable in processing the billions of tonnes of waste plant biomass that is generated annually in the world, in the form of horticultural waste and weeds. But in controlled vermicomposting only the use of animal manure as a substrate has been successful so far—with very few exceptions (mainly of food waste) (Abbasi *et al*., 2015) [11].

Delayed sowing of wheat in India is very common due to the wide spread intensive cropping system which so often extended the sowing of wheat up to the January, particularly in northern plains of India where, it is generally sown after harvest of paddy, sugarcane pigeon pea etc. As a result, a portion of the maturity period of the crop is pushed forward and thus has to face higher temperatures of the summer as well as hot spells often occurring at that time. This high temperature at the time of grain in development limits the yield quality of wheat (Alkhatib and Paulson, 1984).

Material and Methods

Exhaustive wheat crop experiment was taken in rabi season during 2019-2020 on a sandy clay loam at certified organic farm, SMOF. [SMOF was developed under the National Project on Organic Farming (NPOF) by the department of Agronomy, with Dr. Thomas Abraham, Professor (Agronomy) as its Principal Investigator. The 2 hectares area has been certified by Lacon Quality Certification (P) Ltd, (Accreditation by Ministry of Commerce, Govt. of India). Naini Agricultural Institute, Sam Higginbottom University of Agricultural Technology and Sciences, Prayagraj. Climate of the region is sub-tropical and semi-arid climate with the monsoon commencing from July and withdrawing by the end of September. For the intended study 10 treatments were tested under three replications by using randomized block design. Three organic manures *viz*., Control FYM 16 t/ha, M1: FYM 25% (4 t/ha) + Vermicompost 75% (4.5 t/ha), M2: FYM 50% (8/ha) + Vermicompost 50% (3/ha), M3: FYM 75% (12 t/ha) + Vermicompost 25% (1.5 t/ha) and Liquid organic formulations i.e., L1: Panchagavya at 2%, L2: Vermiwash at 5%, L3: Panchagavya at 2% + Vermiwash at 5%. The farm yard manure and vermicompost doses were mixed in the soil before sowing and vermiwash and panchgavya were used as foliar application on the crop at 20, 40 and 60 DAS. The wheat variety K 7903 (HALNA) was selected for experiment. The seeds were sown by line sowing with the spacing of 22.5 cm × 10 cm. Seeds were treated using luke warm water followed by dipping the 5 kg of seed in 10 liters of luke warm water to remove lighter seeds and impurities.

Table 1: Effect of organic manures and liquid organic formulations on wheat (*Triticum aestivum* L.) economics

Treatment	Grain yield (t/ha)	Straw yield (t/ha)	Cost of cultivation (₹/ha)	Gross returns (₹/ha)	Net returns (₹/ha)	B:C ratio
Control	1.61	2.75	37530	74172.67	36642.67	1.98
FYM 25% + VC 75% + Panchagavya at 2% spray	2.95	4.20	67230	130483.50	63253.50	1.94
FYM 25% + VC 75% + Vermiwash at 5% spray	3.15	4.32	70530	138238.83	67708.83	1.96
FYM 25% +VC 75% + Panchagavya at 2% + Vermiwash at 5% spray	3.29	4.51	71730	144430.00	72700.00	2.01
FYM 50% + VC 50% + Panchagavya at 2% spray	2.75	3.95	57730	122062.00	64332.00	2.11
FYM 50% + VC 50% + Vermiwash at 5% spray	2.60	3.84	61030	116026.00	54996.50	1.90
FYM 50% + VC 50% + Panchagavya at 2% + Vermiwash at 5% spray	2.43	3.67	62230	108905.00	46675.00	1.75
FYM 75% + VC 25% + Panchagavya at 2% spray	2.16	3.33	48230	97288.17	49058.17	2.02
FYM 75% + VC 25% + Vermiwash at 5% spray	2.08	3.22	51530	93658.67	42128.67	1.82
FYM 75% + VC 25% + Panchagavya at 2% + Vermiwash at 5% spray	2.39	3.67	52730	107572.00	54842.00	2.04
F test	S	S	S	S	S	S
SEm(±)	0.07	0.11		2753.48	2753.48	0.05
CD (P=0.05)	0.22	0.32		8181.01	8181.01	0.14

Result and Discussion

Grain and straw yield

Application of organic manures resulted significantly higher grain and straw yields (3.29 t/ha, 4.51 t/ha respectively) in T4 -FYM 25% +Vermicompost 75% + Panchagavya at 2% + Vermiwash at 5% spray compared to control. However, T3 (FYM 25% +Vermicompost 75% + Vermiwash at 5% spray) and T2 (FYM 25% +Vermicompost 75% + Panchagavya at 2% spray) were found statistically at par, with T4. Desire yield is achieved through effective utilization of FYM, vermicompost, liquid organic formulations and green manures incorporation.

Beaulah *et al*., (2002) [4] opined that the beneficial microorganisms from panchagavya and their establishment in the soil improved the sustainability of agriculture as the microorganisms present in the rhizospheres environment around the roots influence the plant growth and crop yield. Hafiz Mokhum Hammad *et al*., (2011) [8] concluded that application of green manure + farm yard manure + poultry manure, through this manure grain and straw yield is

significantly increased may be due to direct available nutrients such as NPK to the plants and these organic manures improve the proportion of water holding capacity.

Davari *et al.*, (2007) [6] reported that under organic production, Organic sources of nutrients are the best option to maintain the health of soil, provide the equal opportunity for all living existence to live and use from their beneficial activities, like nitrogen fixation, phosphorus solubilization, recycling of animal waste and green manure. FYM 25% +VC 75% + Panchagavya at 2% + Vermiwash at 5% spray, found better result in yield.

Economics

The highest gross returns (₹144430.00/ha), net returns (₹72700.00/ha) were recorded in FYM 25% + VC 75% + Panchagavya at 2% + Vermiwash at 5% spray. However, Benefit Cost ratio (2.11) was obtained under treatment FYM 50% +VC 50% + Panchagavya at 2% spray in wheat. Since, the findings were based on the research done in one season it may be repeated for further confirmation.

Overall, with the application of FYM 25% +VC 75% + Panchagavya at 2% + Vermiwash at 5% spray, resulted higher grain yield upto 48% over control.

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Reference

1. Abbasi SA, Nayeem-Shah M, Tasneem Abbasi. Vermicomposting of phytomass: limitations of the past approaches and the emerging directions. Journal of Cleaner Production 2015;93:103-114.
2. Bista B, Dahal S. Cementing the Organic Farming by Green Manures. International journal of applied science and biotechnology 2018;6(2):87-96.
3. Bado BV, Aw A, Ndiaye M. Long-term effect of continuous cropping of irrigated rice on soil and yield trends in the Sahel of West Africa. Proceeding of Second Africa Rice Congress, Bamako, Africa Rice Centre, Sahel regional station, B.P. 96 Saint-Louis, Senegal 2010 2.10.1-2.10.5.
4. Beaulah A. Growth and development of moringa (*Moringa oleifera* Lam.) under organic and inorganic systems of culture. Ph.D. Thesis, Tamil Nadu Agric Univ, Coimbatore 2001.
5. Bruce RR, Langdale GW, Dillard AL. Tillage and crop rotation effect on characteristics of a sandy surface soil. Soil Science Society of America journal 1990;54:1744-1747.
6. Davari MR, Sharma SN, Mirzakhani M. The effect of combinations of organic materials and biofertilisers on productivity, grain quality, nutrient uptake and economics in organic farming of wheat (*Triticum aestivum*). Journal of Organic system 2007;7(2):26-35.
7. Fan T, Xu M, Zhou G, Ding L. Trends in grain yields and soil organic carbon in a long-term fertilization experiment in the China Loess Platue. American-Eurasian journal of agriculture & Environmental Science 2007;2(5):600-610.
8. Hafiz Mohkum Hammad, Abdul Khaliq, Ashfaq Ahmad, Wajid Farhad. Influence of Different Organic Manures on Wheat Productivity. International Journal of Agriculture & Biology 2011;13(1):137-140.
9. Joshi M, Prabhakarasetty TK. Sustainability through organic farming. Xpress Graphics, Delhi-28 2006.
10. Manna MC, Swarup A, Wanjari RH, Ravankar HN. Long-term effect of NPK fertilizer and manure on soil fertility and a sorghum-wheat farming system. Australian Journal of Experimental Agriculture 2007;47(6):700-711.
11. Shaon Kumar Das, Avasthe RK, Gopi R. Vermiwash: Use in Organic Agriculture for Improved Crop Production. Popular Kheti article 2014;2(4):45-46.
12. Vinay Singh. Productivity and economics of rice (*Oryza sativa*) wheat (*Triticum aestivum*) cropping system under integrated nutrient, supply system in recently reclaimed sodic soil. Indian journal of Agronomy 2006;51(2):81-84.