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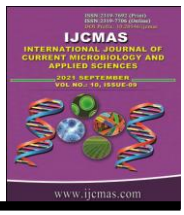

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Organic Minerals Suitability Assessment on the Biochemical Characters of Common Wheat, *Triticum aestivum* L. under Bundelkhand Region of Uttar Pradesh

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A B S T R A C T

An experiment has been conducted to assess the real time utility and abundance of organic minerals in cultivation of common wheat, *Triticum aestivum* L. in Bundelkhand region of Uttar Pradesh with the aim of finding the effect of available soil organic minerals on various biochemicals or chemical characters including yield attributes. For the experiment, the cultivar namely RAJ-4037 which is best for dry land area and crop matures in 120 days. This variety is suitable for bakery and beverage industry, has been taken. The pre availability of manures were measured and the application of various fertilizers have been done as per the recommended dose for the cultivation. The data of various biochemical characters like Dry matter accumulation, Protein content, NPK in grain, NPK in straw, yield and biological yields have been recorded as per standard methods. The results revealed that organic minerals had a significant impact to influence the various biochemical traits such as dry matter accumulation maximum in FYM, Protein content (11.18), NPK (0.60; 0.35 and 0.36) were recorded maximum in vermin compost treatment.

Keywords

Wheat, organic matter, minerals, biochemical traits, protein, weed

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Introduction

Despite the impressive advances that have been made over the years in improving the yields of food crops, including wheat, there is little reason to become complacent about the food supply, especially in the developing world (Anonymous, 2015-16). During the next three decades, the population of developing countries will grow by at least 1.6%. As this growing population becomes increasingly urban-based, as incomes rise, and as consumers substitute out of rice and coarse grain cereals, the demand for wheat will rise. By 2020, two-thirds of the world's wheat consumption will occur in developing

countries (Goswami & Kistler, 2004). To meet demand across the Asian Subcontinent, we will have to maintain wheat yield growth at 2.5% per year over the next 30 years, because cropped area is expected to remain minimal or even negative (Barma *et al.,* 2011). Yields will not only have to grow; they will have to grow without depleting the natural resource base on which agriculture depends.

This is no small challenge for agricultural research, but there are reasons to be optimistic that researchers will be able to develop technologies that can improve wheat yields and at the same time preserve the resource base(Fischer & Beyerlee 1991). Some of the most exciting opportunities for sustainably improving wheat system productivity have been developed through crop management research, and they are reviewed in this paper (Jat *et al.,* 2007). We begin by describing the gap between farmers' actual yields and potential yields and the reasons for that yield gap. Next, we review a series of factors that influence yields: nutrients, planting date, crop establishment, water management, lodging, and weed control. We provide examples of how agronomic practices can improve the efficiency of each factor and ultimately increase yield in a sustainable manner. In addition, we discuss some potential interactions of alternative crop management strategies and some of the requirements for farmers to adopt new management strategies (Jat *et al.,* 2003).

The nutrients when applied through organic sources provide better conditions for growth of weeds too. Moreover, the use of herbicide depletes the environment and has tendencies to live for a long time in soil and directly affect the human health. It affects adversely the physical and chemical properties of soil. It also decreases the microorganism in soil and ultimately the decomposition of crop residue takes more time. Particles of herbicides found in women milk which affects the growth and development of children. High dose of herbicide also pollutes the underground water that tends to different types of diseases in human body. Therefore, is it desirable to manage the weed through culture methods as organic farming weed control through use of herbicides is not allowed (Mishra *et al.,* 2007).

Considering the above issues, the organic farming appears to be better option to handle the emerging problems. Wheat being the important cereals crop grown in Bundelkhand with limited use of chemical fertilizer and pesticides(Yadav *et al.,* 2009). However. the information on nutrient management through organic sources and weed management through cultural methods in wheat in general and for Bundelkhand in particular is meager or not available. Therefore, present study was planned to know impact of organic minerals on biochemical attributes like NPK, Protein (Yadav *et al.,* 2005).

Materials and Methods

Geographical location of the experimental site

The field experiment was laid out on "Organic Research Farm," Kargunaji, Bundelkhand University, Jhansi (Uttar Pradesh). This farm is situated behind the Bundelkhand University in foot hills of Kemashan Mata temple during *Rabi* seasons of 2017-18 and 2018-19.

Soil of experimental site

Five soil samples were collected randomly from different spots of the experimental field from 0-15 cm depth before the field preparation. The collected samples were dried in hot oven and then crushed and mixed. Later by dividing half and mixed again, the process was repeated and soil sample of 0.5 kg was taken for laboratory test. The samples were

subjected to appropriate mechanical and chemical analysis to know its texture as well as initial fertility status.

The experiment was laid out in factorial randomized block design with three replications. Treatment involved in present investigation were three methods of weeding and four organic sources of N viz: vermicompost, poultry manure, city manure and FYM applied to supplement 100 kg N/ha as recommended. The twelve Treatment combinations were allotted in each experimental plot randomly and the following data have been recorded as per the standard methods:

Dry matter accumulation

Protein

NPK in grain and straw

Yield and biological yield

Results and Discussion

Dry matter accumulation (g m^{-2})

Dry matter accumulation is directly related to the growth pattern of the crop, which influences the grain yield directly. It is obvious from the data that the dry matter accumulation increased continuously up to 90 days stage and decreased afterwards. The rate of increase was rather slow up to 30 days, increased abruptly up to 75 days and slows down thereafter, indicating grand growth period of the crop lies between 45-75 days stage during both the years. The data given in the Table 1 revealed that crop dry matter accumulation (gm^{-2}) was increased significantly due to various organic sources of N supplementation at different growth stages during both the years, except at 30 days stage where the variations in dry matter accumulation were non-significant.

Both the vermin-compost and poultry manure sources of N supplementation at all the growth stages being at par recorded significantly more dry matter accumulation over city manure and FYM sources. Dry matter accumulation was almost similar under city manure and FYM sources at all the stages of crop growth during both the years of experimentation.

The increase in plant height might be due to addition of vermin compost in to soil improved physical, chemical and biological properties of soil and this leads to improve the root growth and development and thereby uptake of nutrients and water from greater soil volume resulting in to better plant growth (Kumar *et al.,* 2019). Better growth of plant in terms of plant height and number of primary branches $plant^{-1}$, ultimately resulted in significantly higher dry matter accumulation (Bahera *et al.,* 2007). The present findings are in close agreement with Das *et al.,* (2019); Ghansyam and Jat (2010) and Tomar *et al.,* (2013). Phosphorus is an essential macronutrient for legume growth and function (Ribet and Drevon, 1996).

Protein content (%)

It is evident form summary of data presented in Table 1. that harvest index was not influenced significantly neither due to different sources of organic manure for nitrogen supplementation nor weed management practices during both the years of experimentation.

Table.1 Effect of weed control method and nitrogen supplementation through organic sources on dry matter accumulation at different crop duration

Organic source of nitrogen	DMA 30 DAS		DMA 60 DAS		DMA 90 DAS		DMA at Harvest	
	2018	2019	2018	2019	2018	2019	2018	2019
M_1	61.53	62.84	793.47	811.01	1322.46	1351.68	1520.07	1553.65
M_2	61.18	62.49	730.33	743.22	1217.22	1238.71	1399.10	1423.80
M_3	56.35	57.56	634.62	646.32	1057.70	1077.21	1215.75	1238.17
M_4	56.93	58.15	658.89	670.07	1098.16	1116.79	1262.25	1283.67
SE(m)±	1.167	1.514	17.136	20.407	33.086	26.321	24.454	32.026
CD (p=0.05)	3.422	4.440	50.258	59.853	97.038	77.197	71.722	93.928

Table.2 Effect of weed control method and nitrogen supplementation through organic sources on quality attributing characters of wheat

Organic source of nitrogen	Protein content		N content in grain		N content in straw	
	2018	2019	2018	2019	2018	2019
M_1	11.06	11.18	1.77	1.79	0.602	0.608
M_2	11.00	11.12	1.76	1.78	0.598	0.605
M_3	10.63	10.74	1.70	1.72	0.578	0.584
M_4	10.81	10.93	1.73	1.75	0.588	0.595
SE(m)±	0.172	0.217	0.033	0.045	0.016	0.011
CD (p=0.05)	NS	NS	NS	NS	NS	NS

Table.3 Effect of weed control method and nitrogen supplementation through organic sources on quality attributing characters of wheat

Organic source of nitrogen	P content in grain		P content in straw		K content in grain		K content in straw	
	2018	2019	2018	2019	2018	2019	2018	2019
M_1	0.354	0.36	0.111	0.112	0.359	0.363	1.44	1.45
M_2	0.352	0.36	0.110	0.111	0.357	0.361	1.43	1.44
M_3	0.340	0.34	0.106	0.107	0.345	0.349	1.38	1.40
M_4	0.346	0.35	0.108	0.109	0.351	0.355	1.40	1.42
SE(m)±	0.009	0.009	0.002	0.002	0.010	0.008	0.025	0.039

Table.4 Effect of weed control method and nitrogen supplementation through organic sources on yield and harvest index of wheat

Organic source of nitrogen	Straw yield q^{-1}		Biological yield q^{-1}	
	2018	2019	2018	2019
M_1	91.07	92.50	152.01	155.37
M_2	84.47	85.40	139.91	142.38
M_3	74.00	74.87	121.58	123.82
M_4	76.45	77.22	126.23	128.37
SE(m)±	1.991	2.334	3.780	2.347

Chemical analysis

N, P, K content in grain and straw

Data pertaining to N,P,K content in grain and straw of wheat have been portrayed in Table 2 and 3 An examination of on account of above traits clearly indicates that N,P,K content were un influenced under the influence of sources of organic manure for nitrogen supplementation and weed management practices during both the years of study.

Straw yield (q ha^{-1})

The data on straw yield have been presented in Table 4.

Among the various organic manures, vermin-compost recorded significantly higher values of straw yield over poultry manure and rest organic manure treatments of nitrogen supplementation during both the years.

As far as the weed management practices were concerned, straw yield of wheat was affected significantly. The manual weeding twice at 25- & 50-days stage of wheat sowing achieved significantly higher values of straw yield over one hand weeding treatment (hand weeding at 25 days stage) alone as well as weedy check during both the years of experimentation. However, weedy check treatment recorded significantly lowest values of straw yield as compared to rest of the treatments.

Biological yield (q ha^{-1})

It is clear from the Table-4that biological yield of wheat was affected significantly due different organic manure for supplementation of nitrogen as well as various weed management practices during both the years of experimentation. Among the various organic source's vermin-compost recorded significantly higher values of biological yield over rest sources of organic manure. In case rest organic manures, poultry manure treatment recorded significantly higher values of biological yield as compared to city manure and FYM. Differences among values of biological yield of city manure and FYM treatments were at par. The trend of data was similar during both the years of experimentation.

The present experiment aimed the evaluation of efficacy of various organic minerals on growth and development parameters of wheat. The results indicated various slopes of results.

The biochemicals and other Nutritional factors like NPK showed greater variations in response to organic minerals. experiment has been conducted to assess the real time utility and abundance of organic minerals in cultivation of common wheat, *Triticum aestivum* L. in Bundelkhand region of Uttar Pradesh with the aim of finding the effect of available soil organic minerals on various biophysical or Biochemical characters including yield attributes. For the experiment, the cultivar namely RAJ-4037 which is best for dry land area and crop matures in 120 days.

This variety is suitable for bakery and beverage industry, has been taken. The pre availability of manures were measured and the application of various fertilizers have been done as per the recommended dose for the cultivation. The data of various biochemical characters like Dry matter accumulation, Protein content, NPK in grain, NPK in straw, yield and biological yields have been recorded as per standard methods. The results revealed that organic minerals had a significant impact to influence the various biochemical traits such as dry matter accumulation maximum in FYM, Protein content (11.18), NPK (0.60; 0.35 and 0.36) were recorded maximum in vermin compost treatment.

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