Comparative Study of Physicochemical properties of Soil, Aheri, Maharashtra & Effect of Vermicompost Fertilizer

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***Abstract:** Farmers are using chemical fertilizer for farming to extend the yield of crops. Chemical fertilizer reduces soils fertility and it also contaminate ground water table..Recycling of biowaste is necessary to reduces waste .It makes our campus clean likewise as contribute in sustainable development. This waste are often converted into useful fertilizer as a Vermicompost.Vermicompost will enrich the soil and its fertility. Vermicompost also results in decrease the environmental problems. Vermicompost could be a vital biofertilizer and Vermicompost is enriched with all beneficial soil bacteria and also contains many of the essential plant nutrients like N, P, K and micronutrients.(1) Vermicomposting is that the process of production of compost by breeding earthworms, leading to homogeneous and stabilized humus used as manure and significantly increased the quantity of N, P, K and C concentration in vermicompost. The aim of this paper to recycle biowaste and study various physicochemical property of soil and impact of vermicompost fertilizer on soils property of Aheri, Nagpur . The observed values of various physicochemical parameter in all soil samples, after addition of vemicompost is fairly good.*

***Keywords:** Soil, Fertilizer, fertility, Vermicompost, recyling*

I. INTRODUCTION

Vermicompost materials are gaining acceptance as organic fertilizers in sustainable agriculture, and there has been a substantial increase in research dedicated to the study of the consequences of vermicompost like materials on soil properties and plant growth .As a results of the various processes involved within the producing of vermicompost, they exhibit different physical and chemical characteristics that affect soil properties and plant growth in diverse ways. Vermicomposting generally converts organic interest a more uniform size, which provides the ultimate substrate a characteristic earthy appearance, whereas the fabric resulting from composting usually features a more heterogeneous appearance. The important role of earthworm in eco system is in nutrient recycling, particularly nitrogen. Thus, the effect physicochemical properties of soil. By using sort of earthworms waste are often converted into compost. we will use vegetable waste, domestic waste, paper, agro industrial waste, bio gas digester, effluent, sewage sludge and other industrial waste. Vermicomposting are often extensively utilized for plant based residues those containing top quality of cellulose, hemicelluloses, lining, starch, etc

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II. METHODOLOGY

Verimocompost unit was setup by utilizing college bio waste .Vermi bed has been setup at proper place, which is covered with shed

A Waste Selection:

Cattle dung (except pig, poultry and goat), farm wastes, crop residues, vegetable waste, agro industrial waste, fruit market waste and every one other bio degradable waste are suitable for vermicompost production. The cattle dung should be decomposed before used for vermicompost production. All other waste should be pre-digested with trash for twenty days before put into vermibed for composting. Heavy spices and metallic products aren't utilized in this process. Direct sunlight and rain to the vermi-composting is avoided. The worms that are utilized in composting systems prefer temperatures between 12-21 ^{o} C and temperature of the bedding shouldn't get below freezing or above 29 ^{o} C. The vermicompost production would be around 23 kg per week under well managed conditions. • The total time to get vermicompost form waste is about 75 – 100 days depending on various factors. The prepare vermicompost has been utilized at different location of Soil Sample.

Vermicomposting is a bio-technique and vermicompost are good superlatives for organic farming.(2) During vermicomposting the nutrients are released and converted into soluble and available forms that is providing nutrients like available N (nitrogen), soluble K (potassium), exchangeable Ca (calcium), Mg (magnesium), P (phosphorus) and microelements like Fe (iron), Mo (molybdenum), Zn (zinc), and Cu (cupper) which may easily haunted by plants

B. Advantages of Vermicomposting

Vermicompost is that the product of composting process using various species of earthworms usually red earthworms and black earthworms to make a mix of decomposing vegetables or garbage, bedding materials, and vertices. Vermicompost is break down of organic matter by earthworms. Vermicompost contains water soluble nutrients and is a superb, nutrients rich organic and soil condition Vermicompost is employed in farming and little scales sustainable organic farming.

It enhances germination, plant growth and crop yield and improves root growth and structure. Vermicompost helps to shut the metabolic gap through recycling the waste on site. The production of vermicompost reduces greenhouse emission emission like Methane and gas. Bio wastes conversion reduces waste flow to landfills, elimination of bio-waste from the waste stream reduces contamination of recyclables collected during a single bin. Vermicompost could release nutrients slowly and steadily into system and enables the plants to soak up these nutrients over time. Vermicompost has been found to effectively enhance the basis formation elongation of stem and production of biomass (,3)

Fig 1Vermicompost **Fig 2 Earthworms**

III. RESULT & DISCUSSION

Soil samples were collected in all location Aheri,Nagpur Maharashtra at soil depth of 0-20cm .&various physicochemical test have been carried out in all soil samples(S1-S7). The Results have been reported in Table1,2,3&4

. Various physical and chemical parameters were determined in soil before and after addition of vermocompost fertilizer. Following physical &chemical test were carried out in the laboratory

a)Plastic limit
b)Liquid limit
c)Specific gravity
d)Unconfined compression test
e)pH
f)N,P,K &org C

N,P,K, organic carbon, test was carried out in laboratory and observation was recorded. A fixed dose of vermicompost fertilizer was added at collection point of various soil samples.(.4,5).pH of all soil sample was observed in the range of 7

After 20 days interval again soil samples were collected and analyzed for various physicochemical properties.

Soils with a high PI tend to be clay, those with a lower PI tend to be silt and folks with a PI of zero (non plastic).

IV. CONCLUSION

The observed value of N,P,& organic carbon in all soil samples after addition of vemicompost are fairly good after addition of vermicompost but available Potassium vale is high in soil before &after addition of vermicompost fertilizer(6) .Whereas results of physical properties in the same soil sample shows that soil is medium plastic as well there no remarkable change in specific gravity,pH&unconfined compression test. Vermicompost is good for the soil as well as aerial environment.

Table I: Chemical Analysis of Vermicompost

PARAMETERS	VERMICOMPOST (%)
Nitrogen	1.26
Potassium	2.98
Phosphorus	5.35
Organic Carbon	15.2

Table II Comparison of Chemical Properties in Soil before Addition of Fertilizer

Soil Sample	N (kg/hec)	P(kg/hec)	K(kg/hec)	Organic(%) Carbon
S1	244.6	35.32	452.40	0.89
S2	255.2	44.33	450.40	0.92
S3	253.4	41.33	443.50	0.98
S4	249.4	49.88	441.50	0.95
S5	249.2	49.62	445.32	0.88
S6	251.14	49.02	442.8	0.86
S7	250.84	49.00	440.6	0.97

Table IIIComparison of Physical Properties in Soil before Addition of Fertilizer

Soil Sample	Plastic Limit(%)	Liquid Limit(%)	Specific Gravity	Unconfined Compression Test(N/mm2)
S1	23.16	35.39	2.02	11.8
S2	**21.14**	**34.31**	**2.00**	**11.4**
S3	**21.06**	**32.33**	**1.99**	**12.8**
S4	**22.8**	**32.12**	**1.84**	**12.9**
S5	**22.2**	**33.80**	**1.80**	**11.9**
S6	**21.08**	**33.72**	**1.78**	**11.6**
S7	**21.62**	**33.24**	**1.72**	**10.6**

TableIV Comparison of Chemical property in Soil Samples after addition of Vermicompost Fertilizer

Soil Sample	N (kg/hec)	P(kg/hec)	K(kg/hec)	Org C(%)
S1	263.4	53.55	469.40	2.02
S2	270.2	53.89	462’66	2.00
S3	273.4	50.12	464.50	1.98
S4	277.6	49.88	462.25	1.98
S5	276.5	49.66	462.72	1.96
S6	269.8	50.92	466.88	1.98
S7	271.6	52.44	462.42	2.00

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Table V Comparison of Physical property in Soil Samples after addition of Vermicompost Fertilizer

Soil Sample	Plastic limit(%)	Liquid Limit(%)	Specific Gravity	Unconfined Compression Test(N/mm2)
S1	25.99	44.11	1.78	8.82
S2	26.48	44.92	1.82	9.24
S3	26.22	44.88	1.72	8.68
S4	25.82	43.72	1.80	8.56
S5	24.92	43.12	1.84	8.44
S6	25.88	43.98	2.02	8.66
S7	26.02	44.86	2.00	9.02

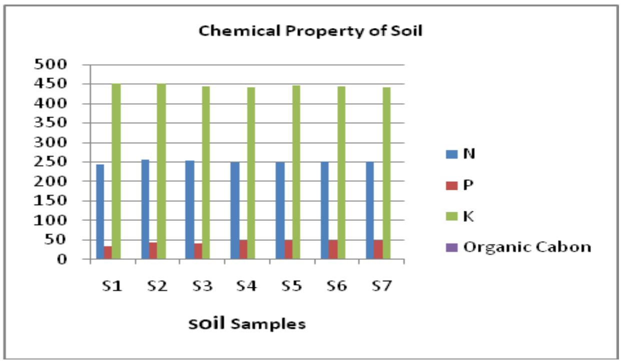

Fig 3Comparison of Chemical property in Soil Samples

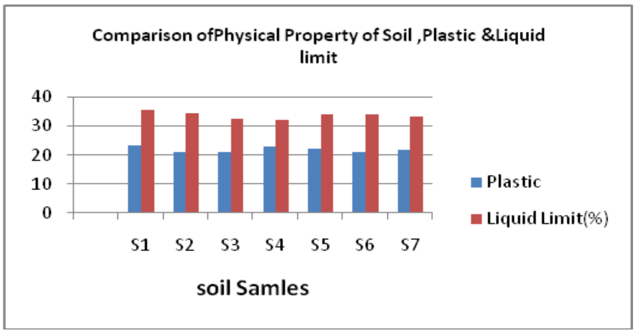

Fig 4Comparison of Physical property in Soil Samples

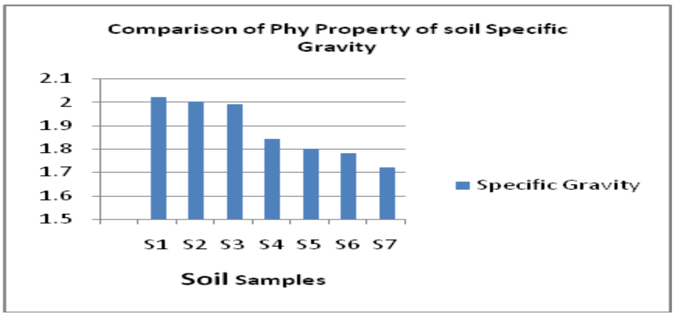

Fig 5Comparison of Physical property (Spec.Gravity) in Soil Samples

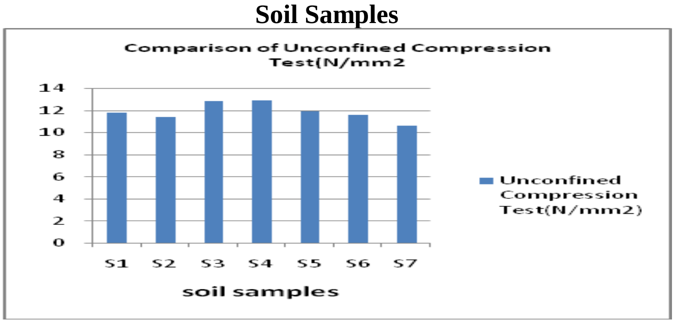

Fig 6Comparison of Physical property (Unconfined Compression test) in Soil Samples

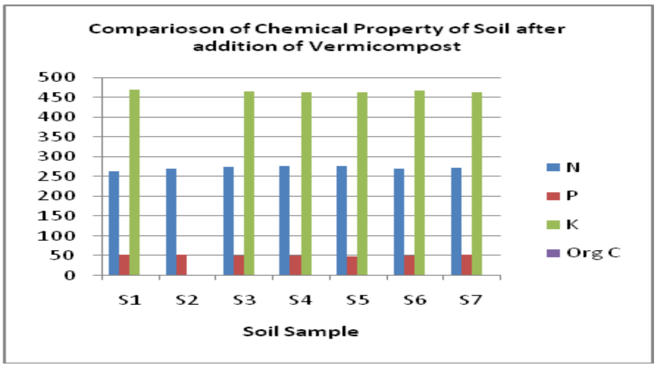

Fig 7Comparison of Chemical property in Soil Samples after addition of Vermicomost

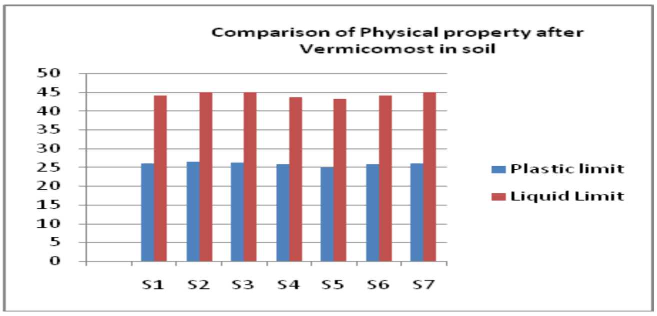

Fig 8Comparison of Physical property in Soil Samples after addition ofvermicomost

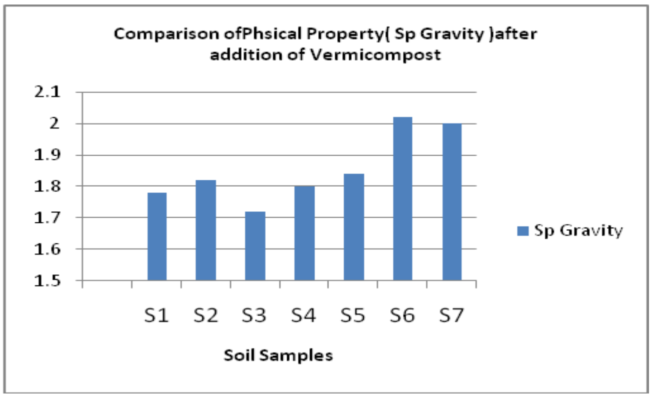

Fig 8Comparison of Physical property (Sp Gravity) in Soil Samples after addition of vermicomost

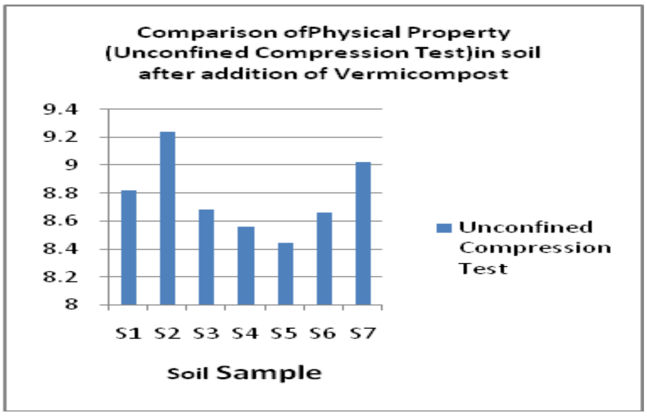

Fig 9Comparison of Physical property (Unconfined Compression test) in Soil Samples after addition of vermicomost

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Dr Kavita Gour, is presently working as a Dean FY &Associate Professor in Priyadarshini J L College of Engineering, Nagpur.Having an Experience of 26 Years in teaching & Research and Guided PhD& PG students. She has Published 70 research paper & Presented many research papers in & around India. She has organized Conferences & Seminar for the faculty & students. She is honored with BHARAT JYOTI Award for contribution in academics& Research.