Preparation of Effective Microorganisms Based Compost Using Some Selected Wastes for Improvement of Plants Growth

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EM 02

ABSTRACT

Solid waste disposal is the most pressing problem facing mankind throughout the world. The solid waste management plays a significant role to create a sustainable environment. Some vegetable wastes such as rice husk, cotton husk, coconut husk, pigeon-pea husk and chicken manure were selected for chemical analysis. The physicochemical properties of vegetable wastes were carried out by using standard methods. The effective microorganism (EM) solution was prepared from kitchen vegetable wastes except onion and garlic peels to ferment for two months. The microorganisms that contain in prepared EM solution were studied by using microscopic morphology. The pH of prepared EM solution was measured by using pH meter. The compost was prepared from the vegetable waste materials and prepared EM solution by using aerobic method. The yield percent of compost was determined by calculation method. The yield percent of prepare compost was found to 55%. The mineral contents of compost and soil sample were measured by using EDXRF spectroscopy. The physicochemical properties of prepare compost and soil sample were determined by using standard methods. Planting the seedlings of some selected useful vegetables in various ratio of the prepare compost and soil sample .The growth of plant rates were found to be effective by the planting experiment.

INTRODUCTION

Compost is organic matter that has been decomposed in a process called composting. This process recycles various organic materials otherwise regarded as waste products and produces a soil conditioner.

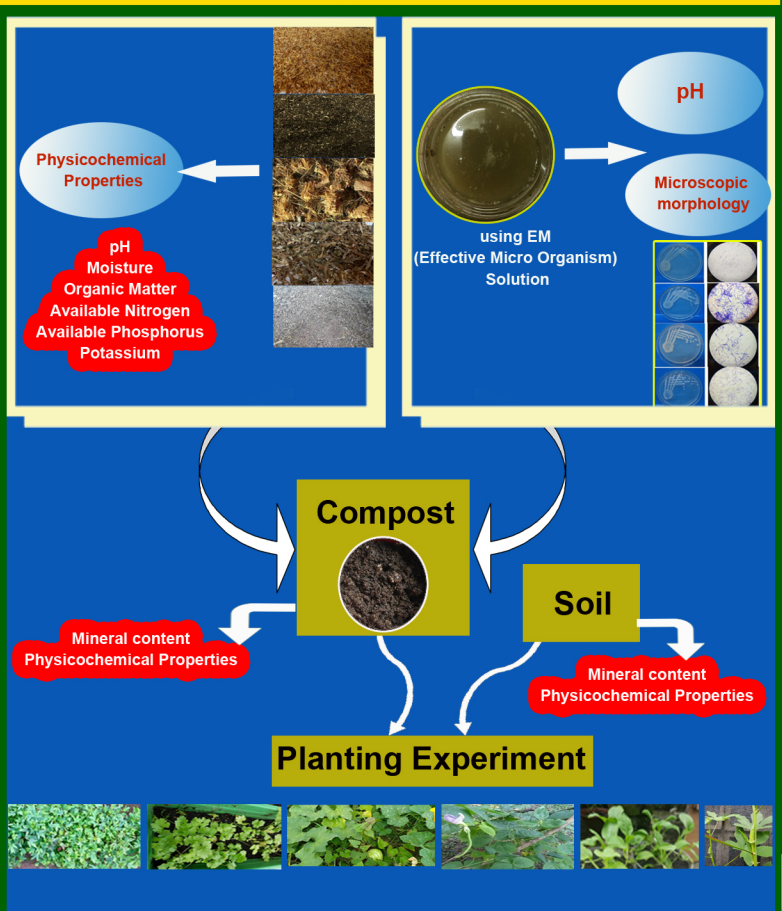
Composting is a technique which can be used to reduce the amount of organic waste through recycling and the production of soil fertilizers and conditioners. Compost is primarily used as a soil conditioner and not as much as a fertilizer because it contains a high organic content (90-95 %) but generally low concentrations of nitrogen, phosphorus, potassium as well as macro and micro nutrients compared to commercial fertilizers.

Effective Microorganisms (EM) are mixed cultures of beneficial naturally-occurring organisms that can be applied as inoculants to increase the microbial diversity of soil ecosystem.

OBJECTIVES

- To study the physicochemical properties of compost with different wastes.
- The vegetable wastes are very effective in soil nutrient.
- The principal goal of nature planting .
- To produce abundant and healthy crops without the use of chemical fertilizers and pesticides and without causing adverse effects on the natural environment.

METHODOLOGY



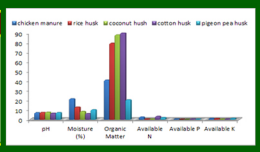
Method

pH	pH Meter
Moisture	Oven-drying Method
Organic Matter	Muffle Furnace
Available Nitrogen	Alkaline Permanganate
Available Phosphorus	Olsen's
Potassium	Atomic Absorption Spectroscopic

RESULTS AND DISCUSSION

Physicochemical properties of vegetable wastes

Sample description	chicken manure	rice husk	coconut husk	cotton husk	pigeon pea husk
pH	7.12	7.43	7.62	6.62	7.21
Moisture (%)	21.60	12.93	8.45	6.24	10.18
Organic Matter	41.02	79.36	88.12	89.97	20.50
Available N	2.66	0.41	0.31	3.36	2.15
Available P	0.52	0.02	0.01	0.48	0.28
Available K	1.12	0.93	0.16	0.51	1.25



Cultural and Microscopic Morphology of Isolated Bacteria

	Colony Morphology				Microscopic Morphology		
Sample Name	Size (mm)	Color	Elevation	Shape	Size (um)	Gram' reaction	Shape
EM1	1	Yellow (opque)	raised	round	1-2 × 2-4	+	Small Rod
EM2	3- 4	White (opque)	flat	Irregular	1-2 × 2-4	+	Rod (spore)
EM3	3- 4	White (opque)	raised	Irregular	2-3 × 3-4	+	Rod (spore)
EM4	4-6	White (opque)	raised	round	2-3 × 3-4	+	Rod (spore)

pH of Effective Microorganism Solution

No	Sample	pH
1	Effective Microorganism Solution	4.29

Yield Percent of Prepared Compost

No	Prepared Compost	Total Weight of adding material(g)	Dried Weight of Prepared Compost(g)	Yield percent (%)
1.	PC	2000	1100	55

Relative Abundance (%) of Elemental Composition of Prepared Compost and Planting Soil

No	Element	Symbol	Prepare Compost (%)	Planting Soil (%)
1	Silicon	Si	40.413	56.573
2	Calcium	Ca	26.922	4.410
3	Iron	Fe	5.143	11.110
4	Potassium	K	22.596	5.546
6	Sulfur	S	2.997	2.225
7	Titanium	Ti	0.933	1.127
8	Manganese	Mn	0.350	0.219
9	Strontium	Sr	0.229	0.065
10	Copper	Cu	0.094	0.033
11	Chromium	Cr	0.088	0.032
12	Zinc	Zn	0.076	0.030
13	Zirconium	Zr	0.065	0.067
14	Rubidium	Rb	0.060	0.020
15	Bromine	Br	0.035	0.031

pH, Moisture and Ash Value of Prepared compost and Planting Soil

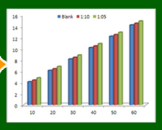
Sample	pH	Moisture(%)	Ash(%)
Planting soil	8.81	2.24	10
Prepared compost	8.76	12.19	45

Available Nitrogen, Phosphorus and Potassium Value of Prepared Compost and Planting Soil

Chemical Properties	Prepared Compost	Planting Soil
Available Nitrogen (%)	2.08	0.12
Available Phosphorus (%)	1.32	0.46
Available Potassium (%)	1.02	0.44

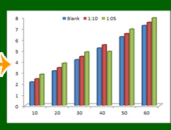
The Growth Rate of Roselle

Day	Roselle Blank	1:10	1:5
10	4.11	4.40	4.81
20	6.14	6.43	6.84
30	8.17	8.46	8.87
40	10.21	10.50	10.91
50	12.23	12.52	12.93
60	14.25	14.54	14.95



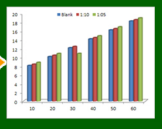
The Growth Rate of Nannan

Day	Nannan Blank	1:10	1:5
10	2.11	2.40	2.81
20	3.12	3.41	3.82
30	4.13	4.42	4.83
40	5.18	5.47	4.88
50	6.20	6.49	6.90
60	7.22	7.51	7.92



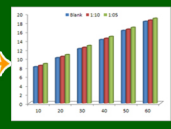
The Growth Rate of Pumpkin

Day	Pumpkin Blank	1:10	1:5
10	8.10	8.39	8.80
20	10.12	10.41	10.82
30	12.13	12.42	10.83
40	14.14	14.43	14.84
50	16.18	16.47	16.88
60	18.21	18.50	18.91



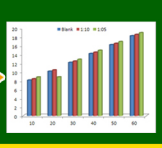
The Growth Rate of Lady's finger

Day	Lady's finger Blank	1:10	1:5
10	8.10	8.39	8.80
20	10.11	10.40	10.81
30	12.13	12.42	12.83
40	14.15	14.44	14.85
50	16.18	16.47	16.88
60	18.20	18.49	18.90



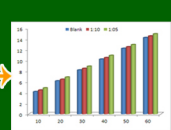
The Growth Rate of Cow pea

Day	Cow pea Blank	1:10	1:5
10	8.11	8.40	8.81
20	10.13	10.42	8.83
30	12.14	12.43	12.84
40	14.16	14.45	14.86
50	16.17	16.46	16.87
60	18.20	18.49	18.90



The Growth Rate of Mustard

Day	Mustard Blank	1:10	1:5
10	4.15	4.44	4.85
20	6.16	6.45	6.86
30	8.18	8.47	8.88
40	10.20	10.49	10.90
50	12.21	12.50	12.91
60	14.22	14.51	14.92



CONCLUSION

This experiment was done in an effort to solid wastes management by investigating homemade composting with effective microorganism solution. From this analysis, vegetable waste materials were used in evaluation provided a better environment for EM to grow produce quality compost. The yield percent of prepared compost was found to be 55% and it is acceptable mount in prepare compost. The some physicochemical properties of vegetable wastes and prepare compost were lie within the limiting range and it is suitable for planting. Treatment with prepared compost is most growth in every plant. Thus, the prepared compost was suitable to be used for plant growth.