FEASIBILITY OF USAGE OF POULTRY LITTER AS MANURE IN AGRICULTURAL PRACTICES

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ABSTRACT

The application of poultry litter on land has been a long used disposal method that benefits plant and soil. Addition of organic amendment, such as animal manure may reduce use of synthetic fertilizers because of its nutritive value. The objectives of this study were to study the possible effective utilization of poultry litter as manure and biodegradable rate of poultry litter as manure by cultivating four selected plant species (Spinach sp ,Mustard sp ,Fenugreek sp and Amaranthus species) in terms of observing change in the Physico-chemical properties of soil and litter. The present investigation revealed that the poultry litter and the soil at the 1:3 ratio was found to be suitable for the seed germination and growth of four leafy vegetables and can be safely used as fertilizer for crop. The use of poultry litter as manure helps in reduction of solid waste at source and health problems generated due to indiscriminate disposal of litter will be reduced will be a pinnacle bonus.

Key words: *Poultry litter- Manure –solid waste- management.*

INTRODUCTION

Uncontrolled and excessive use of chemical fertilizers and pesticides for increasing yield in agriculture has become a major problem in India**.** Soil is a dynamic system because of the presence of microorganisms and their biochemical activities liberating a lot of enzymes in soil, which become stabilized in soil by binding to soil components[1-2]**.** For a good economy, Indian soil is being uncontrollably exposed to a variety of Agro-chemicals in order to increase crop yield, decrease crop infections and infestations, increase soil fertility etc[6].

The increasing cost of chemical fertilizers and their limited availability, coupled with the concern for efficient utilization of energy and natural resources, have generated an interest in alternative uses and utilization of urban and industrial wastes. Golueke claims that the use of organic fertilizers instead of chemical fertilizers can result in a two-thirds energy saving. The manorial value of composts and its use as a soil conditions has been subjected to detailed study by several investigators [3] because of their advantages over inorganic fertilizers and its long-term beneficial effects.

Management of solid waste is getting increased attention at national and local levels. Many communities and regulatory agencies are responding by considering a variety of solid waste management strategies, including voluntary and mandatory recycling programs, Source reduction programs and alternative waste processing options.

Eco-technology was the only available option that can guarantee sustainable development. The main option presently available is to recycle the poultry litter for composting.

Biodegradable matter includes organic manures, garden waste and vegetable market waste. The scope of the work is to search an effective methodology for production of nutritional food and better poultry litter management by cultivating four green leafy vegetables.

EXPERIMENTAL

The experiments were carried out in the Department of Environmental Studies, GITAM, Visakhapatnam, and A.P., INDIA during July 2005 to January 2006. Poultry litter was collected from Raj Kamal Poultry Farm, Anakapalli, Andhra Pradesh, India. The garden soil was collected from the garden of GITAM College, Visakhapatnam, and A.P., INDIA. Physico-Chemical characteristics of garden soil were carried out as per standard procedures [4-5].

Plantation:

32 pots were taken and labeled as per the code. 8 pots of 4 sets were allotted for 4 types of seeds Viz., Spinach species, Fenugreek species, Amaranthus species and Mustard species. The different materials used for each pot were given in One set (8 pots) were sown with fenugreek seeds, 50 seeds in each pot. Like wise the other three sets of were also sown with 50 seeds each of Spinach sp, Amaranthus sp,

Fenugreek sp and Mustard sp seeds in each pot. Watering was done in each pot everyday. Soil samples were collected from each pot on 0^{th} day, 10^{th} day and 50^{th} day and the each sample was analyzed for the Physico-Chemical parameters and Change in those was observed.

The rate of germination of seeds and the growth in each pot is observed everyday and the percentage off seed germination was calculated as followed –

Germination was recorded daily at prefixed time and the speed of germination was calculated by the following formula [4.]

Percentage of speed germination Index (% SGI) =

$$4(7 \times 1G + 6 \times 2G + 5 \times 3G + 4 \times 4G + 3 \times 5G + 2 \times 6G + 1 \times 7G)$$

Where 1G to 7G = Seeds germinated on first day to 7^{th} day.

Number of seeds = 50

$$\text{Germination percentage} = \frac{\text{Number of seeds germinated}}{\text{Number of seeds sown}} \times 100$$

Soil samples were collected on the days of 0^{th} day, 10^{th} and 50^{th} days. Soil samples were analyzed for the following physic – chemical parameters by adopting standard procedures from as per standard procedures[7].Soils were analyzed for Physico-chemical parameters like pH, Phosphates (mg/g), Sulphate (mg/g) , & Total Nitrogen(%).

RESULTS AND DISCUSSION

Seed germination and percentage of speed germination index (%SGI) values of the growth in pots were shown in the table –1. Out of four leafy vegetables seeds sown it was observed that Spinach seeds showed 100% germination, followed by Amaranthus, Fenugreek and Mustard (table-1).The pH values of the poultry litter amended soil samples of different treatments for different plant species over the period of time were varied (data not shown). After a period of 50 days the highest pH value 8.43 was recorded in the treatment S_{13} and that of the treatment S_{11} showed the lowest value of 7.29. Similar findings are reported [5] by carrying studies on decomposition of coir pith using vermiculture, fungal inoculants and amendments.

The Sulphate values showed by the poultry litter amended soil samples of different treatments after 50 days of study, the highest Sulphate value 1.3 mg/gm was recorded in the treatment MC_L and that of the treatment MCs showed the lowest value of 0.35 mg / g.

Post harvested results that pots showed concentrations of P,K and Nitrogen(N) were significantly higher in the poultry litter treated pots with respect to control. Similar findings were reported by [7-8] that successive application of city waste compost on rye grass and tomato increase soil N, oxidizable organic matter, P and CEC in the top 1-10 cm soil and at a depth of 12-22 cm following applications of 150 and 400 tons compost per hectare.

Table –1: Effect of Poultry Amended Soil on Seed Germination and Seed Germination Index

S.No.	Sample Code	Treatment	Speed Germination (%)	% of Speed Germination Index (%SGI)
1	SC_S	Control	18	980
2	$1S_{11}$	1:1	64	6120
3	$2S_{12}$	1:1	100	9724
4	$1S_{12}$	1:2	48	4476
5	$2S_{12}$	1:2	40	4048
6	$1S_{13}$	1:3	84	5924
7	$2S_{13}$	1:3	54	4292
8	SC_L	Poultry Litter	46	4316
9	FC_S	Control	12	6368
10	$1F_{11}$	1:1	10	2868
11	$2F_{11}$	1:1	10	2900
12	$1F_{12}$	1:2	2	28
13	$2F_{12}$	1:2	2	28
14	$1F_{13}$	1:3	3	38
15	$2F_{13}$	1:3	3	38
16	FC_L	Poultry Litter	2	308
17	AC_S	Control	5	65
18	$1A_{11}$	1:1	56	6772
19	$2A_{11}$	1:1	52	5196
20	$1A_{12}$	1:2	68	6804
21	$2A_{12}$	1:2	40	2584
22	$1A_{13}$	1:3	34	2600
23	$2A_{13}$	1:3	40	4064
24	AC_L	Poultry Litter	36	2936
25	MC_S	Control	30	1072
26	$1M_{11}$	1:1	4	260
27	$2M_{11}$	1:1	48	5212
28	$1M_{12}$	1:2	8	98
29	$2M_{12}$	1:2	4	228
30	$1M_{13}$	1:3	6	780
31	$2M_{13}$	1:3	18	2080
32	MC_L	Poultry Litter	18	2084

Table-2: Selected Physico-Chemical Parameters of Poultry Litter Amended Soils

Plant Name	pH		N		SO^{2-}		P	
	DAY 0-10	DAY 10-50	DAY 0-10	DAY 10-50	DAY 0-10	DAY 10-50	DAY 0-10	DAY 10-50
Spinach sp	6.64	7.06	12	26	0.75	2.5	0.02	1.92
S.D	0.7629	0.3517	0.894	4.427	0.6145	0.3505	0.6914	0.1007
Amaranthus sp	6.64	7.05	12	24.8	0.5	1.89	0.01	1.87
S.D	0.9468	0.64615	3.3105	6.0464	0.7738	0.2933	0.1289	0.3115
Fenugreek sp	6.63	7.60	11	25.4	0.49	2.3	0.03	1.99
S.D	0.7694	0.5683	1.5491	5.1536	0.7718	0.3271	0.4786	0.9785
Mustard sp	6.64	7.34	12	25.9	0.4	2.2	0.01	2.2
S.D	3.3310	0.7996	0.4898	4.0199	0.5237	0.6493	0.3335	0.21

Soil samples of Fenugreek sp cultivated experimental pots, at the end of study, the highest Soil humus value 1.542% was recorded in the treatment FC_L and that of the treatment FC_s showed the lowest value of 0.360%.

The Nitrate values showed by the poultry litter amended soil samples of different treatments for different treatments for different plant species over the period of time are presented in table-2. Soil samples of Spinach sp cultivated experimental pots, at the end of 50 days of study, the highest Nitrates value 0.249mg/gm was recorded in the treatment S_{13} and that of the treatment SC_s showed the lowest value of 0.099mg/gm. Soil samples of Fenugreek sp cultivated experimental pots, at the end of 50 days of study, the highest Nitrates value 0.249mg/gm was recorded in the treatment F_{11} and that of the treatment FCs showed the lowest value of 0.749mg/gm. Soil samples of Amaranthus sp cultivated experimental pots, at the end of 50 days of study, the highest Nitrates value 0.124mg/gm was recorded In the treatment ACI and that of the treatment ACs showed the lowest value of 0.549mg/gm.Soil samples of Mustard sp cultivated experimental pots, at the end of 50 days of study, the highest Nitrates value 174.94mg/gm was recorded in the treatment M_{12} and that of the treatments M_{11} and MC_1 showed the lowest value of 0.124mg/gm (Table 2).

CONCLUSION

The rise in public consciousness about the environment is another factor influencing practice of agriculture to adopt sustainable management methods. Adopting eco-friendly technologies can not only save on pollution control costs but also make recycling of waste and minimization of waste. Present work enunciates that the use of poultry litter is suitable for the cultivation of

green leafy vegetables. The present investigation also reveals that the poultry litter at the 1:3 ratio is found to be suitable for the seed germination and growth of four leafy vegetables and can safely used as fertilizer for crop. The use of poultry litter as manure helps in reduction of solid waste at source and reduction in use of fertilizers. The health problem will be reduced due to better yield of agricultural products will be a pinnacle bonus.

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REFERENCES

1. A.A Abdul Baki and J.D Anderson,. *Crop science* **13**., 630-6 (1973)
2. M**.** Alexander, Introduction to soil microbiology II, ed, (M1985.) Wiley Eastern Limited, New Delhi
3. T.D Biswas, B.Das and H.K.G Varma, *Bulletin*, National Institute of Science, India, **26**,142-147**(**1984).
4. H.E .Carley, R.D Watson and *Bota.gaz* **123 ,**57-6(1968)
5. P.K Das, D.P Rout., M.K Jena and S.Mohanty. *Indian J. Environ & Ecoplan*. **7 (2) ,**375-380(2003).
6. M.S Deshpande, *Environmental Geochemistry* , **1** (1996) Jackson, M.L. (1973)
7. J.M Murillo, J.M Hermandez.,M.Barrosa. and R. Lopez ,**591** (1989);Anales De Edafdoga Agrpnilogia, Spain, **48**,143-160. (1990)
8. C.R Patil, D.Radha Krishna. C.Mallesh.and R.D Kale.. *Indian Coconut Journal*. **XXIX**, 4-7, (1999).

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