



RECYCLING OF GARBAGE WASTE: A GOOD ENVIRONMENTAL MANAGEMENT AT BHOPAL (M.P.)

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Abstract

In Bhopal city more than hundred tons of garbage comes out per day, comprising of both organic and inorganic materials. Agrich Manure can be manufactured by this garbage. Physical, Chemical analysis and quality reports of Agrich Organic manure reveals that in improves soil structure and productivity level of the farm substantially. Agrich Organic Manure increases water and nutrient efficiency of soil. This also increases soil humus and level of soil bacteria, which increased the total percentage of nitrogen by the plants. It is free from any foul smell; its nutrient value is approximately five times higher than other manure.

Introduction

Nature has designed a cyclic system for regular flow of nutrients and organic matter, keeping sustainability of system in focus. But urbanization and Industrialization in present time have broken the cyclic system of nature. Resulting creation of a situation wherein we have to face challenged of feeding at one end emptying at the other, both at a cost. Our society is paying price of breaking this organic cyclic system in the form of increase pollution in urban as well as rural sectors. M.P. AGROs mission is to rectify this basic problem of urban solid waste as far as possible in Madhya Pradesh. It is estimated that on an average approximately 300 to 500 grams of solid waste is generated per head in our country. This way approximately 40 Mt. garbage is generated by one lakh urban population, resulting conversion of one hectare land in to dumping ground every year. These figures itself speaks magnitude of the problem. Solid waste can be categorized as below depending upon the source of the generation.

Category	Source	%
Domestic Waste	Residential houses	54%
Trade Waste	Trader/Hawker/Shops/Market/Offices/Marriage hall/Hotels	31%
Clinical Waste	Hospital/Nursing Homes	2%
Industrial Waste/ Other Waste	Drain/Slit/Building Activity Waste, Street Sweeping, Waste from Industries Etc.	13%

M.P. State Agro Industries Dev. Corporation Ltd. Bhopal is pioneer in urban solid waste management activities in Madhya Pradesh and setup its first pilot cum demonstration project having 100 TPD garbage processing capacity at Bhopal in the year 1993-94. Looking to the success of this project second organic manure plant had been setup in the year 1995-96 at Gwalior having garbage processing capacity of 120 TPD.

Composition of India Garbage

Chemical composition of average Indian garbage is as below:

1	Moisture Content	40%	to	50%
2	Organic Matter	30%	to	35%
3	Nitrogen	0.5%	to	0.6%
4	Phosphorus	0.5%	to	0.6%
5	Potassium	0.5%	to	0.6%
6	Carbon	15%	to	20%
7	pH Value	6.5%	to	7.5%
8	C/N Ratio	25%	to	40%
9	Bulk Density	0.4%	to	0.6% Kg/Cum

Compositing Methods

Composting is a process involving bio-chemical conversion of organic matter into humus (Lignoproteins) by Mesophilic and thermophilic organisms. A composting process seeks to harness the natural forces of decomposition to secure the conversion of organic waste into organic manure for this Garbage is first of all turned into a big heap of about 8 to 9 feet height and spread up with cow dung and organic culture manufactured by Excel Industries Limited. Then this heap is let out in the same position for 7 to 8 days, during this period the heap is turned up-down thrice with continuous spraying of cow dung and organic culture.

After 22 to 24 days when the temperature of heap rises to 70-75°C at this temperature decomposition of garbage is completed, afterwards the raw manure is sent to treating plant on different sweepers with different particle sizes, by which the un-decomposed material was taken out and the resultant material at the bottom floor of sweeper is Agrich Manure. Before packing the Agrich Manure it again treated with Organic Culture so that if there are some of the decomposed material left, gets decomposed and it also helps in suppressing the foul smell of manure and also maintains the moisture contents.

Experiments

In order to ensure safe application of Compost (Agrich soil enricher) the following specifications for compost quality should be met as per notification of Govt. of India in extra ordinary Gazette of India No 640, New Delhi dated 03/10/2000.

Parameters	Concentration not to exceed (Mg/Kg dry basis) Except pH value and C : N ratio
Arsenic	10.00 %
Cadmium	05.00%
Chromium	50.00%
Copper	300.00%
Lead	
Mercury	0.15%
Nickel	50.00%
Zinc	1000.00%
C: N ratio	20-40%
pH	5.5-8.5%

Final product compost exceeding the above stated concentration limit is not to be used for food crops. However, it may be utilized for purpose other than growing food crops.

Analysis of Agrich Organic Manure:

Physical

(a)	Appearance	: Dark Brownish Black powder	
(b)	Odour	: Free from any foul smell	
(c)	Bulk density g/cc:	Lot May 2014	Lot August 2015
		Moist 0.98	1.1
		Dry 0.89	0.85
(d)	Moisture:	11.85%	32.01%

Chemical

S.N.	Parameters	Lot May 2014	Lot August 2015
(a)	pH	6.8	6.9
(b)	E:C (nmhos/cum)	2.45	3.72
(c)	Available Nitrogen (%)	1.11	1.02
(d)	Available Phosphorus (%)	1.38	1.41
(e)	Available Potash (%)	1.18	1.09
(f)	Calcium (%)	2.15	1.89
(g)	Magnesium (%)	0.80	0.68
(h)	Sulphate (%)	0.41	0.45
(i)	Iron ppm	65.48	114.0
(j)	Zinc ppm	95.0	118.0
(k)	Manganese ppm	113.0	85.0
(l)	Copper ppm	78.6	102.3

Molybdenum and Boron are also present in sufficient quantities with reference to agricultural crops. Material is free from weeds, plastics, glass etc in both the lots. Direct manorial value is about 3-4 times than normal cow-dung. Almost a complete plant foot, suitable for agricultural crops and also good for improving physical properties of soil.

Results and Discussion

Agrich organic manure is superior because:

1. It has increased water and nutrient usage efficiency of soil.
2. It has increased soil humus and level of useful soil bacteria's like Rizobium. Azetobector etc, which increase higher usage of natural nitrogen by the plants.
3. The taste and flavor of fruits has also been better.
4. The micronutrient available has contributed in increase of productivity of soil.
5. Its nutrient value is 10 times more than that of cow dung.

References

1. Fan Shu-Yang, Bill Freedman, and Raymond Cote (2004). "Principles and practice of ecological design". Environmental Reviews. 12: 97-112.
2. Anastas, P. L. and Zimmerman, J. B. (2003). "Through the 12 principles of green engineering". Environmental Science and Technology. March 1. 95-101A.

3. Paul Hawken, Amory B. Lovins, and L. Hunter Lovins (1999). *Natural Capitalism: Creating the Next Industrial Revolution*. Little, Brown.
4. Ryan, Chris (2006). "Dematerializing Consumption through Service Substitution is a Design Challenge". *Journal of Industrial Ecology*. 4(1).