Short Communication

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Utilization of Biogas Effluent as Manure

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The use of manure is one of the most important factor in crops production. The chemical fertilizers have been substituted for the organic manure for quick and rapid growth but its harmful effects came to notice very recently [1]. Now it has been realized that the organic manure is necessary for the physical structure of the soil beside providing nutrient to the plant growth [2]. The soil serves two other functions (i) providing air to the roots of the plants, (ii) supply water. In both these functions organic matter has an important role to play. The structure of the soil has to be kept open so that air may easily percolate within the soil. For this purpose soil must be composed of small aggregates and should not be puddled. Here organic matter (manure) plays an important role informing aggregates. In this respect the biogas plants slurry is of great importance for high yield than ordinary organic manure.

Keeping in view the importance of biogas slurry we have tried to investigate the various aspects of this type of manure and its compositions available to us as a by-product. Because such biogas units are installed in other countries in a very large number. These units can provide organic manure at no cost for the farmers besides fuel gas.

The biogas plants installed in the Rural Technology Centre, PCSIR and Nasir Bagh Village with a capacity of 1.7 cum and 5.50 cum are in operation. The production of slurry is about 30 kg/24 hrs, 55 kg/24 hrs with a feeding capacity of 50 kg of dung water and 80 kg of dung, straw and water.

Ten number of slurry samples from each biogas unit after an interval of 24 hrs were collected and dried at 100°. These samples were tested for Nitrogen, Phosphorous and Potassium (N.P.K.) values. The average percentage composition of these slurries and fresh dung have been determined according to the following method. Ten grams of each sample was ignited at 800° in a porcellin dish and weighed for organic matter. The ash was treated with concentrated HCl and filtered off. The insoluble matters is SiO_2 was diluted to 250 ml in a volumetric flask. The FeO_2, CaO, MgO, K_2O, NO_3 and PO_4 were determined according to the standard method as referred by Furman [3]. The average percentage composition of the slurries and fresh dung is given in Table 1. The percentage of nitrogen was estimatged by Keldahl-Ganning [2] Arnold method. The percentage of nitrogen is given in Table 1. The animal waste is the primary raw material for the biogas plant i.e. the animal dung.

Apart from fuel saving, an important function of biogas system is the use of digester [4] effluent as fertilizer. Some owners of biogas plant consider manure as the primary product and biogas as secondary product. The composition of effluent from the digester of biogas unit depends upon the quality of raw material fed. Animal waste is presently the primary raw material for the biogas plant. During fermentation in gas plant, about 27% of animal dung is converted into combustable gas and the remaining of 73% becomes available for use as manure. Thus for a family sized plant 1.7 Cubic meter digester capacity required 50 kg of fresh dung per day. The quantity of manure obtained will be about 9 tons per anum.

The slurry collected from the bio-gas unit installed in Rural Technology Centre, PCSIR, Peshawar the percentage composition of nitrogen potassium and phosphate is 2.0, 1.0 and 1.0 respectively (Table 1). While the percentage composition of N.P.K. (Nitrogen Phsphorus and Potassium) in the slurry collected from the biogas unit Nasir Bagh Peshawar is 2.0, 1.0 and 2.0 respectively (Table 1). It is now obvious from the above analytical composition that the significant difference in potassium only is due to the raw material fed to the biogas unit. In case of Rural Technology Centre digester the raw material fed to the digester is fresh dung and water only while the raw material fed to the digester is fresh dung and water only while the raw material fed to the digester of Nasir Bagh is 50% fresh dung and 50% straw, tree leaves and water. The nitrogen content in the fresh dung is 3.0 (Table 1). The

TABLE 1. COMPOSITION OF BIO GAS UNITS SLURRY AND ITS COMPARISON WITH FRESH DUNG.

S. No.	Constituents	Biogas unit R.T.C.% composition(*)	Biogas unit II Nasir Bagh composition(*)	Fresh dung % composition(*)
1.	Organic matter	58.0	51.0	56.0
2.	Silica	29.0	31.0	27.0
3.	Fe_2O_3	9.0	13.0	11.0
4.	CaO	5.0	3.0	3.0
5.	MgO	0.2	1.0	1.0
6.	K_2O	1.0	1.0	1.0
7.	N_2 (Nitrogen in ammonical form)	2.0	2.0	3.0 (in the form of nitrates & nitrites)
8.	PO_4	1.0	2.0	1.0

(*) Each reading is the average of ten samples.

nitrogen content in the fresh dung (Aerobic organic waste) is mostly in oxidized from (Nitrates and Nitrites). Although the total nitrogen content in the slurry is the same as in the fresh dung. The digestable nitrogen in the form of Amonium [4,6] is higher than the slurry collected from the biogas unit. This indicates that the fertilizer value of the slurry collected from the biogas units as fertilizer is greater than the raw material. Now it has been verified that the slurry from the anaerobic [5] digestion has a higher fertilizer value than the equivalent of slurry from aerobic digestion, due to the greater percentage of nitrogen in the ammonical form. The slurry of the bio-gas unit also contain good amount of micro [6] neutrients e.g. Mg, Fe, Ca considered to be a complete fertilizer. The composition of animal waste depends upon the type of feed and health of the animal as well as nature of the food fed to them. The digestable nitrogen in the form of Ammonium is higher in the slurry so its value as a fertilizer is greater than the raw material. Different researcher have quoted varying figures of nitrogen content but almost every one agrees, that the slurry from the anaerobic digestion has a higher fertilizer value than equalent amount of the effluent from aerobic digestion of organic matter.

Key words: Biogas Manure, Dung.

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