

Bioslurry A Sustainable Approach for Agriculture and Environment

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ARTICLE ID: 11

In recent years, the exponential rise in the use of chemical fertilizers has created severe problems for agriculture and the environment. Chemical fertilizers application is considered an essential agricultural tool to boost crop productivity and yield. However, using huge amount of these chemical fertilizers is harmful for the environment, human health and agriculture.

A fertilizer is a material, either natural or chemical, that is added to soil to provide macro and micro nutrients necessary for plant growth. Fertilizers can often be divided into two categories *i.e.*, *chemical (or inorganic) fertilizers* and *organic fertilizers*. Organic fertilizers are not employed economically because of their lower productivity. These fertilizers degrade in nature, which makes them less useful for industrial purposes but far more environmentally beneficial. Instead, the world's agricultural systems use various chemicals, such as fertilizers, pesticides and herbicides to increase production per unit area. But use of chemical fertilizers at higher doses causes a number of issues, including environmental pollution (soil, water, and air pollution), decreased input efficiency, decreased food quality, the emergence of weeds, diseases, insects, resistance, soil degradation and micronutrient deficiencies.

Despite these numerous issues, it is difficult to develop agricultural products that are chemical-free and high in nutrition for both human and animal use. Consequently, choosing organic farming will result sustainable environment along with human health safety.

One of the greatest methods for organic farming is “*bio-slurry*”. Bio-slurry is a byproduct of biogas that has many advantages. It is also known as sludge or digestate. Bio-



slurry is a useful organic fertilizer and waste product that is the ideal addition to soil and agriculture for the creation of a sustainable ecosystem. Probiotics included in bio-slurry can fertilize the soil. Bio-slurry can be a solution for farmers who need a place to dispose of their animal waste but also need a supply of wide range of nutrients to their crops. Bio-slurry is suitable for soil, plants and the environment due to its strong nutrient and humus content.

The liquid released at the bio-digester outlet after gas has been used for energy is called bio-slurry. Fresh cattle's dung and water are used to feed the bio-digesters on a daily basis. The combination is held in the digester for two to three months before being released as bio-slurry. Two types of bio-slurry *i.e.*, solid and liquid will exit the outlet pipe from the biogas product. There is no nutritional or qualitative difference between these bio-slurries. Solid bio-slurry release from slurry pit or slurry shelter while the liquid bio-slurry can be found from the outlet to store. Solid bio-slurry can be added as fertilizer when the soil is being prepared for planting or can be mixed into the ground. It is also possible to mix solid bio-slurry in the middle of the growth season. Liquid bio-slurry needs to be combined with water before usage. The ratio for mixing might be 1:1 or 1:2. Liquid bio-slurry can be used as insecticides in addition to fertilizer.

The composition of bio-slurry is 93% water and 7% dry materials. The dry matter contains the necessary nutrients for crops to grow healthily, including nitrogen (N), phosphorus (P) and potassium (K). The micronutrients *viz.*, zinc, copper, iron, and manganese., etc are also found in bio-slurry. Bio-slurry can be utilized as ready-made manure because these nutrients are conserved during the fermentation process. The termites and other pests that are typically drawn to raw dung are repelled by bio-slurry because it has no odour, pathogen-free, and does not attract the flies. The biogas digester's process eliminates organisms that can lead to plant illnesses and is applicable to crops of vegetables or fruits. Bio-slurry is a great soil conditioner since it increases humus content and the soil's ability to hold the water content. The quality of bio-slurry depends on the species and age of the animal from which the dung was extracted, the quality of the water used to mix the dug, the types of animals and their feeding rates, the use of urine along with the dung or not, as well as the storage, handling, and application of the bio-slurry.

When compared to the application of raw animal manure and artificial fertilizers, the bio-slurry application results in higher yields since it has higher protein content. A lower crop



production results from the soil's inability to fully absorb nutrients due to poor management and the application of artificial fertilizers. Humic acid, which is included in bio-slurry, helps to soil conditioning and maintain soil moisture *whereas*, artificial fertilizers tend to deplete it. Bio-slurry supports to soil humification which in turn slows erosion. The ability of bio-slurry to hold water helps to keep the soil moist and reduces soil erosion. Humic acid is crucial for promoting plant growth since it boosts the soil's nitrogen supply and hygroscopicity. Bio-slurry has been shown to increase crop output while retaining soil nutrients, *whereas*, commercial fertilizers only refill a small portion of the soil's nutrients. While conventional fertilizers increase nitrate and nitrate pollution, bio-slurry does not create such kind of pollution. Chemical fertilizers make crops more vulnerable to insects, microbial attacks, and weeds *whereas*, bio-slurry inhibits weed growth by 50% and serves as an organic fungicide. One of the causes of global warming and climate change is chemical fertilizers. Another rising global issue is high ammonia emissions due to over fertilization with chemical fertilizers. Hence, bio-slurry may be the ideal solution for the cost and environmental problems associated with the use of chemical fertilizers.

“Growth in the economy is simply one aspect of development; it must also be sustainable and safe for both the environment and people. Chemical fertilisers have a number of adverse effects on the environment due to their increased consumption and decreased nutrient use efficiency. While, bio-slurry is an efficient alternative to conventional composts and artificial fertilisers as of its high nutrient content. It is a great opportunity for small-scale farmers for their agriculture and livelihood security. Bio-slurry results more crops productivity and enough food is produced to feed a large population. Therefore, the production of bio-slurry should be promoted as much as feasible in order to promote sustainable agriculture and safe environment”.