

Organic Inputs in Soil – A Sustainable Way of Conserving Soil Health

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Introduction

According to the USDA, soil is not an inert growing medium, it is rather a living and life-giving natural resource. Although soil is a vital component of the ecosystem, maintaining it has proven to be quite difficult in the present scenario. Additionally, it has the capacity to interact with a broad range of species in order to create a better habitat that is favorable for rhizospheric and micro floral organisms. Also, according to the USDA, soil health is the continuous ability of the soil to serve as a vital living ecological system that helps sustain plants, animals and human beings. Generally, soil health quickly deteriorates due to improper intensification of agri-ecosystems. However, proper management strategies enhance soil quality in terms of physical, chemical and biological characteristics.

For this purpose, the potential of organic matter application in the soil can be fully exploited for maintaining the soil ecosystem. When organic matter decomposes, nutrients are released in a form that is accessible to plants. The rate of organic matter input from different sources must match the rate of decomposition in order to sustain this nutrient cycle system. This rate must also take into account the rate of absorption by plants as well as losses due to leaching and erosion (Bot and Benites, 2005). There is a wide range of organic materials that can be employed in sustainable agriculture, like compost, green manures, animal manures, etc.

Types of organic inputs

1. Compost

Among the organic inputs utilized in the agriculture sector, compost is regarded as the best and most widely used organic fertilizer. It is a mixture of organic wastes with a high C:N ratio and wastes with a high N content that are decomposed under specific conditions. Compost produced from food scraps and garden waste is a low-cost, slow-release fertiliser

and soil conditioner for agriculture. Composting also helps in the removal of domestic and farm garbage, and it utilize it in a better way.

2. Green manure

Green manures are crops grown for the purpose of increasing the nutrient status of the soil by incorporating them into it. The best group of plants to fulfil this objective can be legume plants, as they fix atmospheric nitrogen in the soil and leave some nitrogen for the following crop. Green manure has enhanced soil health in many ways, including chemical and biological aspects. Research has shown that the addition of green manure to soil helps increase the biomass production of crops. Additionally, the soil's capability to store water and its ability to infiltrate and percolate water were all significantly improved. Warm season cover crops can be used to fill in gaps in crop rotation, stop soil from weathering, prepare land for a perineal crop, or supply supplemental animal feeds, although they are not always effective. Summer green manure crops are only present on the field for a brief period of time. Some of the examples of summer green manuring crops are *Melilotus indicus*, *Vigna unguiculata*, *Glycine max*, *Crotalaria spp.*, *Sesbania spp.* and *Mucuna pruriens*. Most of the beneficial impacts expected from the green manuring come from the aerial parts of the plant (Goss *et al.*, 2013).

3. Animal manure

The manure obtained from different farm animals, which helps in providing essential nutrients to the crop when added to the soil, is referred to as animal manure. The most common animal manures found on Indian farms are cattle manure, pig manure, and poultry manure. In general, the production of manure by the dairy industry is higher than that of the pig industry and poultry manure production is much lower than that of cattle and pigs. Additionally, worm castings are posing as a revolutionary option for organic inputs.

4. Municipal Biosolids

The municipal wastes are applied to agricultural land after proper treatment to promote crop productivity. It must go through regulatory norms before its application to the field. It has also been observed that around 50–70% of sewage solids are applied to agricultural lands. Many people have started to use the untreated versions of these wastes directly in the fields. Such application of municipal waste is not wise and can create environmental perturbation.

5. Green sand

Green sand is a slow-release soil conditioner composed largely of a green-coloured mineral called glauconite, which is harvested from ancient forest floors. The material is high in potassium and other trace minerals such as iron and magnesium. The key advantage of the mineral is that it helps loosen clay soil and improve moisture retention.

Function of organic inputs on soil health

In the present scenario, the heavy load of pesticides, herbicides, inorganic fertilizers, etc. has hastened the extinction of many plants and animals. Organic soil amendments are considered the chief option for soil management. All types of organic amendments in general help improve soil health however, an integrated use of all possible soil inputs is still suggested. It is presumed that the quality and quantity of organic inputs directly affect the soil's physical, chemical, and biological features (Albiach *et al.*, 2000).

The addition of organic inputs not only improves the fertility of soil but also helps increase its physical properties. The soil organic inputs themselves have good aeration and high water holding capacity, so their addition to the soil enhances these properties. Additionally, the soil aggregate stability and soil porosity are also considerably enhanced.

The restoration of soil health will continue to be a distant goal for researchers without the proper organic input on agricultural land. It is because the use of chemical fertilizers not only changes the physico-chemical properties of the soil but also produces deleterious effects on soil enzymes and microbial diversity and increases soil salinity. So, in order to overcome this obstacle, the addition of organic input becomes an essential step.

References

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