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Effect of Poultry Manure on Physical, Chemical and Biological Soil Properties

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Introduction

Poultry manure contains all the essential plant nutrients that are required by the plants. These include nitrogen (N), phosphorous (P), potassium (K), calcium (Ca), magnesium (Mg), sulphur (S), manganese (Mn), copper (Cu), zinc (Zn), chlorine (Cl), boron (B), iron (Fe) and molybdenum (Mo). The amounts of these nutrients can vary depending upon many factors including the age and diet of the flock, as well as the moisture content and age of the manure. Poultry manure contains nutrient elements that can support crop production and enhance the physical and chemical properties of the soil. It increases the moisture holding capacity of the soil and improves lateral water movement, thus improving irrigation efficiency and decreasing the general doughtiness of sandy soils. Poultry manure application improves soil retention and uptake of plant nutrients. It increases the number and diversity of soil microorganisms. Poultry manure enhances crop health by increasing water and nutrient availability, as well as suppressing harmful levels of plant parasitic nematodes, fungi and bacteria. Inspite of the benefits of poultry manure, there are certain problems during storage of the manure i.e ammonia emission, flies, water pollution, manure gases, Loss of nutrients, loss of nutrients after application, volatilization loss, Denitrification, Immobilization, Mineralization, Leaching. Poultry manure is utilized as organic manure due to its content of essential soil nutrients.

Effect of Poultry Manures on Soil properties:

1. **Effect of poultry manures on soil physical properties**: Poultry manure application improves the physical properties of the soil as it act as an organic manure. Low bulk density, high total porosity Organic manure decreases bulk density and increases total porosity, infiltration capacity and water holding capacity therefore poultry wastes after composition is used as an organic manure (Ravikumar and Krishnamoorthy, 1975).

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Soil physical properties such as bulk density, water holding capacity and percent water stable aggregation are the factors that determine the quality of the soil physical properties and addition of poultry waste has improve this properties of soil and improved soil quality(Weil and Kroontje, 1979).Organic manure decreases the bulk density and increases the soil porosity and Mbagwu (1992) reported that poultry manure significantly decreased bulk density and increased total and macroporosity, infiltration capacity and available water capacity. Poultry manure improved soil physical properties significantly by reducing soil temperature and increasing total porosity and moisture content .(Agbede *et al*., 2008).As poultry manure can be utilized as organic manure ,it functions with all the advantages organic manure offers in Agriculture.

2. **Effect of poultry manures on soil chemical properties**: Poultry manure has high potential of gradual nutrient release to the soil that can help to improve the fertility of a degraded soil thereby sustaining yield in a continuous cropping system so it has a huge role in improving the quality of the soil. Soil nutrients determines the fertility of the soil and the presence of nutrients in poultry wastes have made the required nutrients available to the plants. Poultry manure can also be added along with fertilizers. Adding single super phosphate and poultry manure together to soil resulted in higher phosphorus availability. Application of poultry manure decreased the adsorption capacity and increased the soluble P and phosphorus desorption(Reddy *et al*., 1980,Ravikumar and Krishnamoorthy,1983, Ghonsikar,1988).Application of poultry waste with other organic manure also improves the chemical properties of the soil and Sharma and Saxena (1990) confirmed that poultry manure followed by castor cake and FYM were found to increase the P availability in soil and nutrient uptake in maize. Poultry wastes is a good source of nitrogen and the combination of nitrogen from different organic manures was comparable on equivalent N basis in which poultry manure proved to be a better source (Ketkar, 1993).Increase in exchangeable potassium is occurs on addition of poultry manure (Madhumita Das *et al*. 1991).Poultry manures provides soil nutrients which increases the soil fertility and quality and thereby contributes to improved soil health as a whole.

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3. **Effect of poultry manures on soil biological properties:** Biologically, organic matter acts as the nutrient and energy supply for microbial biomass and higher plants. Poultry manures increases the microbial population of the soil but sometimes it can also be a source of pathogens therefore proper management is required to get the maximum benefit of poultry manure. The carbon present in the poultry manures contributes in increasing the soil microbial decomposition and releases carbonic acids in the soil. Poultry manure contains higher amount of growth promoting substances, vitamins, and enzymes, which in turn increased the microbial population and similar findings were reported with Vermicompost which resulted in higher production of root exudates increasing the beneficial bacteria, fungi and actinomycetes population in rhizosphere region. (Gunadi *et al*.,1999 and Masciandaro *et al*.,2000).

Conclusion:

The importance of poultry manure is increasing as it functions as the other organic manure and sometimes even better in making the soil nutrients available. Its effect on soil properties, nutrient supplying ability, yield and quality of crops is beneficial to the farmers and highly used as it also improves soil health. There are some limitations to the use and the method of composting poultry manure before application but It can be concluded that poultry manure can be efficiently used for the crops after composting the same to save the nutrients.

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