



Animal Manure Can Raise Soil pH

Hailin Zhang

Department of Plant and Soil Sciences

Most people recognize the value of animal waste as a plant nutrient source or soil amendment, but the potential of manure, especially poultry litter, to neutralize soil acidity and raise soil pH is less known. On the contrary, some people even think manure lowers soil pH as some commercial nitrogen fertilizers do. Long term field and greenhouse studies have demonstrated the liming effect of animal manure in acid and neutral soils.

One study conducted in Eastern Oklahoma a few years ago found the soil pH of the surface 2 feet soil received swine and poultry manure for 5 years was significantly higher than the pH of the soils received no manure during the same period.

The Magruder Plots at OSU Agronomy Research Farm in Stillwater are the oldest continuous soil fertility wheat research plots in the Great Plains region. Animal manure has been applied for many decades on part of the plots. The soil pH of the top six inches of the manured plots is greater than any other treatments as illustrated in Table 1. Manure maintained soil pH in the ideal range for most field crops. However, plots received other treatments need lime to correct the low pH for optimum crop production.

Researchers from Mississippi State University studied the impact of long-term (15 years) land application of broiler litter on environmentally related soil properties, and found

soil pH was 0.5 unit higher to a depth of 2 feet under littered soils than unlittered counterparts.

Table 1. Effects of Manure and Chemical Fertilizer Application on Soil pH

Treatments	Soil pH
Manure	6.32
Check	5.83
P	5.66
NP	5.21
NPK	5.26
NPKL	5.51

Another study in Hawaii compared the growth response of a tropical forage legume to lime and organic manure as acid soil amendments in a green house. Researchers found that chicken manure was as effective as lime in raising soil pH and in reducing aluminum toxicity. The same study suggested that plants were able to absorb more Ca from the manure than from lime.

The main reason for manure to raise soil pH is due to the lime like materials such as calcium and magnesium in the manure. For example, poultry litter contains about 100 lbs. calcium per ton on a dry weight basis. Therefore, applying manure to acid soils not only supply much needed nutrients and organic matter for plant growth but also reduce soil acidity, thus improve phosphorus availability and reduce aluminum toxicity. In Oklahoma, many fields are acidic and animal manure would be an good amendment.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, sex, age, religion, disability or status as a veteran in any of its policies, practices or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1913, in cooperation with the US Department of Agriculture, Sam E. Curl, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources.

