Abstract

Movement of phosphorus from soils where poultry litter has been applied for many years has been raised as a potential concern for water quality. The purpose of this project was to develop a methodology to quantify the relationship between soil phosphorus content in litter-amended pastures and the concentration of phosphorus in surface runoff. These relationships need to be understood for development of best management practices (BMPs) for pastures where poultry litter is being applied.

Four established pasture sites within the Lake D'Arbonne watershed in Union Parish were selected for the project. Poultry litter (manure plus rice hull bedding) had been applied to each of the four sites for a period of time ranging from one year for Site 1 to 20 years for Site 4. Site 1 had been cleared of pine trees 3-5 years prior to the project and had sparse vegetative cover at the beginning of the project. The dominant forage cover at the sites was burmudagrass. Both soil and water samples were collected after each simulated rainfall event in order to determine the concentration of total and dissolved phosphorus in the soil and in the water leaving the site.

The results of the project indicated that soil phosphorus content increased with increasing years of poultry litter application with a range from 124 mg/kg for Site 1, which had received only one application of litter to 1400 mg/kg for Site 4, which had received over 20 years of litter application. The surface water quality data indicated that in general, total P concentration in surface runoff responds to soil P content. Mean total P concentration in surface runoff were 3.22 mg/L for Site 1 and 6.40 mg/L for Site 4. The mean dissolved P in surface runoff ranged from 70 to 100% of the total P value, which indicated that control of dissolved P transport to surface waters must be considered in addition to particle or sediment-bound P. Therefore, development of best management practices for application of poultry litter to pastures needs to factor this into the design and efficiency of the BMPs.