Die-off Rates of *Escherichia coli* in a Silt Loam Soil

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Abstract

Even though animal waste is a resource, fecal contamination of soil is a concern for the public. Therefore, in this study, die-off of *Escherichia coli* (*E. coli*) was investigated in a silt loam soil under different temperatures and pH. Results indicated that *E. coli* persisted about a month under 30°C and 15 days under 20°C. Persistance of *E. coli* increased as acidity increased from pH 4 to 6. First order decay model fitted the data well. Die-off rate was highest under 30°C and pH4 and lowest under 20°C and pH6. It is recommended that animal waste be applied during hot season of the year before liming of soil is carried out.

Keywords: survival, *Escherichia coli*, soil, pH, temperature, die-off

Introduction

Animal waste is resource. However, it is underutilized due the concern of microbial pollution of soil and water. *E. coli* is a common indicator of microbial pollution. The fate of *E. coli* in the soil could provide us with information on the timing of waste application or rotation of plots grazing animals. It was reported that die-off of *E. coli* depends on different environmental factors such as pH, temperature and soil moisture (Reddy et al. 1981). There have been some studies of die-off of different bacteria in temperate soil (Howell et al. 1996, Cools et al. 2001). Howell et al. (1996) found that die-off rates decreased as sediment particle size became smaller and as temperature decreased from 35°C to 4°C and Cools et al. (2001), working on soils of different textures from Belgium reported that *E. coli* survived better at 5°C than at 25°C. However, the information is still lacking for tropical soils as tropical soils are generally more acidic (Pedro 1976). Therefore, in this study the die-off of *E. coli* under different conditions of temperature and pH was investigated in an acidic silt loam.

Materials and Methods

Bacteria and soil used

Bacteria used in this study were wild strain of *E. coli* isolated from fresh pig waste effluent. This bacterium was cultured on nutrient agar (Oxoid, England), Eosin methylene blue agar (Oxoid, England) and LB broth (Fluka, Switzerland). Topsoil was sampled from the foothill at 1°30'30"N/110°17'28"E. Location of the soil sampled was determined by using Geographical Positioning system (MAGELLAN GPS ProMARKX). The soil was air-dried for one week and sieved using 2.0mm sieve. Soil particle size analysis was performed by the pipette method described by Gee and Bauder (1986).