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Survival of *Escherichia coli* in Soil- Effect of pH and Moisture Content

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Abstract

The survival of *Escherichia coli* (*E. coli*) in soil was examined under different pH and moisture content. Soils under pH 4, 5 and 6 with 10% (w/w) and 20% (w/w) moisture content were inoculated with wild strain of *E. coli* incubated at 35°C. Decay rate of *E. coli* increased when pH decreased from pH of 6 to 4 and also when moisture content decreased from 20% to 10%. In 10% moisture content at pH of 4, 5 and 6, *E. coli* colonies were undetectable after 1, 2 and 3 days, respectively. However, in 20% moisture content at pH of 4, 5 and 6, *E. coli* colonies were undetectable after 2, 10 and 28 days, respectively. Increasing moisture and decreasing acidity increased the survival of *E. coli* in the soil.

Keywords: survival, *Escherichia coli*, soil, pH, moisture content.

Introduction

Fecal contamination of surface and groundwater could result from uncontrolled application and poor management of animal waste. Animal waste such as pig waste and cow feces may contain various types of fecal bacteria. *Escherichia coli* (*E. coli*) is the predominant component of fecal coliform and act as a specific indicator of microbial pollution of water (Eaton *et al.*, 1998).

Studies of the survival of *E. coli* in soil under various factors have been reported (Reddy *et al.*, 1981; Boyd *et al.*, 1969; Jiang *et al.*, 2002). However, information on the effect of pH on the survival of *E. coli* in soil is limited. Factor of pH has a great effect on the survival of *E. coli* as reported by McFeters & Stuart (1972). According to their study, the optimum pH for the survival of *E. coli* MH3427 in water was between 5.5 and 7.5.

Moisture also plays an important role in *E. coli* decay. Boyd *et al.* (1969) indicated that increased soil moisture from 10% to 50% enhanced the survival of *E. coli* on a fine sandy loam soil. *E. coli* decay rate increased as moisture decreased from saturation to air-dry as reported by Ling *et al.* (2002). Mubiru *et al.* (2000) found that higher unsaturated soil matric potential contributed to higher mortality rates of *E. coli* O157:H7.

Most of the previous studies on the survival of *E. coli* in soil were conducted in temperate regions where the soils in those regions are physically and chemically different from soil in tropics regions. Majority of the humid tropics soil are acid and soils with pH values of less than 6 occupy a large proportions of the tropical regions (Pedro, 1976). Quantitative information relating to the survival of *E. coli* in tropical soil under different pH and moisture content, and the interactive effect between these two factors are still lacking in literature. Therefore, in this study, the survival of *E. coli* in soil under different pH and moisture were conducted. The objective of this study was to investigate the survival of *E. coli* in a soil of different pH and moisture content.