

Survival of an *Escherichia coli* in a Sarawak Soil

T. Y. LING, A. KASING & A. L. MIJEN

*Faculty of Resource Science and Technology
Universiti Malaysia Sarawak
94300 Kota Samarahan, Sarawak*

ABSTRACT

Soil is a natural digestion system for animal wastes. However, land disposal sites and agricultural land pose serious threats to the quality of surface and groundwater. In this study, a clay loam, Semongok series, from Sarawak was inoculated with wild strain *E. coli* isolated from animal wastes. Results indicated that first order decay rate increased as temperature increased from 25°C to 35°C and as moisture decreased from saturation to air-dry. Lag period of the bacteria was found to be the longest (8 days) in saturated soil at 25°C and the shortest (1 day) in air-dried soil at 35°C. Interaction between temperature and moisture was significant. First order decay model can be used after lag period to estimate *E. coli* decay. The best data fit was obtained under cool wet condition. Temperature correction coefficient in the range of 25-35°C was 1.18. It is recommended that disposal of animal wastes be carried out during hot dry seasons of the year.

Keywords: *E. coli* survival, moisture effect, Semongok series, temperature correction coefficient, temperature effect

INTRODUCTION

As animal production increases to meet the demand of meat, animal wastes also increases. Due to a lack of alternative uses, the land remains the primary means of waste disposal (Sims 1995). Animal wastes are also used to fertilize the soil for crop production for human and animal consumption. Whether animal waste is used as a resource to fertilize the land or just disposed off on land, one of the potential risks to the public is the pathogenic organisms in animal wastes (Pell 1997). Land disposal sites and agricultural land pose a serious threat to the quality of river water and groundwater as well as the soil itself. Studies have shown that rivers and ground water that receive runoff or seepage from agricultural land have high faecal bacteria concentrations (Buckhouse and Gifford 1976; Niemi and Neimi 1991), and pasture soils isolates have high percentage of *Escherichia coli* (*E. coli*) (Faust 1982).

Indicator organisms such as faecal coliform are used globally as a sign of possible faecal contamination and also as an index of water quality deterioration. *E. coli* is the predominant faecal coliform used as a specific indicator of possible faecal contamination. Faecal coliform density in wastes ranged from 230,000 g⁻¹ for cattle to 13 million for human beings (Gelreich 1977), and the percentage of *E. coli* found was 83.5% for pigs, 97% for sheep and humans and 99% for cows (Dufour 1977).