

Survival of *Escherichia coli* on soil particles surface in Opaepala Watershed of Oahu, Hawaii

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Justification:

The over presence of *Escherichia coli* in agricultural watersheds contributes to water quality deterioration and introduces uncertainty and anxiety in food security. The enormous genetic diversity of *E. coli* mandates investigations beyond typical laboratory type strains in order to understand its environmental survival. In this study, we aim to examine the abundance and genetic diversity of soil *E. coli* in a tropical watershed that features different microclimates and distinct land uses within short geographic distances. In addition, we will examine the soil *E. coli* isolates for their survival on soil particles under environmental stresses typical of agricultural lands. Knowledge obtained from this study will help us more accurately assess the impacts of different agricultural practices on water biological quality and food safety, and may also enable us to devise prevention and remediation strategies against *E. coli* contaminations

Objectives:

The goal of this project is to understand how changes in soil parameters related to agricultural practices affect the survival of *E. coli* in soil. Two specific research objectives are proposed. The first objective studies the survival spectrum of soil *E. coli* strains by examining their spatial concentration dynamics and genetic diversities in the Opaepala watershed. It is hypothesized that different *E. coli* strains colonize different soil environments according to their particular stress resistances. The second objective investigates how soil parameters, in particular those subject to alterations by agricultural operations, affect the survival of natural *E. coli* strains. The working hypothesis is that soil *E. coli* cells, by attaching to the soil particle surfaces, exhibit enhanced resistance to environmental stresses, and the agriculture-related soil changes exacerbate this phenomenon. The expected outcomes of the project may help improve the best management practices of agricultural operations for the reduction of *E. coli* in agricultural watersheds.

Progress to date:

The project officially started on Jan. 1, 2009. No significant progress has occurred to date.

Impacts:

Field monitoring will be carried out in coming months to determine the abundances of *E. coli* in the Opaepala watershed according to the land use pattern and local conditions. Environmental *E. coli* libraries will be constructed and genotypically analyzed. The planned works will reveal *E. coli* biodiversity in this tropical agricultural watershed, and provide candidate strains for subsequent surface-associated survival studies.