

Environmental and Microbiological Assessment of Small - Scale Vegetable Farming Systems irrigated with Wastewater from Upper Balili River, La Trinidad Benguet, Philippines

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Abstract. In developing countries like the Philippines, it is a common practice to use river wastewater for the irrigation of agricultural lands. The determination of coliform bacteria in the Balili River wastewater, agricultural soils irrigated by it, and vegetable, particularly lettuce, *Lactuca sativa*, grown in these areas were carried out to serve as indicators of their microbiological quality and potential risks. Bacteriological counts of the water, soil, and vegetable samples were enumerated via membrane filter technique and multiple tube fermentation technique. Primers of the *wecA* gene, which encode for the protein responsible for the enterobacterial common antigen (ECA), were used for the detection of *E. coli* by the Polymerase Chain Reaction Method. The results revealed that the total coliform and fecal coliform of the samples for the four sampling periods all exceeded the acceptable standards (> 6,000 to 13,000 MPN/100 mL). The low Water Quality Index values ranging from 21-28, let alone the presence of coliform bacteria such as *Enterobacter*, *Pantoea*, *Escherichia*, and *Klebsiella* in the samples, confirm the reports about the worsening quality of the river and stress the danger of directly introducing the wastewater to these agricultural fields. Furthermore, lettuce is a very high-risk crop for coliform contamination and as fecal coliforms were isolated from this vegetable, it can be inferred that the continued use of Balili River wastewater for crop irrigation is unsuitable and an unhealthy practice to consumers.

Keywords: Balili River, Benguet, Philippines, *Lactuca sativa*, *Escherichia*, Enterobacteriaceae

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