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Bat Guano; A Resource or a Contaminant?

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Abstract

Bat guano which consists of urine and feces of bats is known to be the vitality source inside a cave ecosystem. Nevertheless, commensal as well as pathogenic microorganisms that inhabit the gut of the bats might also get released into the environment via bat guano. The tested hypothesis was that there is a microbial contamination due to the release of bat guano into a water body. In the present study “Waulpane” cave was selected since it houses the largest bat roost in Sri Lanka and a freshwater stream (Halwinnedola) that flows through the cave covering the cave floor throughout the entire year. Main objective of this study was to investigate the fecal and total coliform bacteria along with total viable bacteria (TVB) and pathogenic *Salmonella* spp. and *Shigella* spp. Water and fecal samples were taken times from 29th April to 29th September 2019. Two sites were selected other than the site (site 1-100 m ahead of the cave mouth, site 2-100 m inside from the cave mouth, site 3-100 m after the cave exit) inside the cave to compare the variations of releasing bat guano into the freshwater stream. Detection and enumeration of pathogenic bacteria *Salmonella* spp. and *Shigella* spp., fecal and total coliform bacteria and TVB in the samples were done following the standard protocols. Tukey comparison of one-way ANOVA with a 95% confidence interval (CI) in Minitab 17 software application package was used to distinguish any changes in the TVB count among the selected sites. The most intriguing finding was the contamination of both site 1 and 2 by *Salmonella* spp. Since bats are known to be potential reservoir and host for *Salmonella* spp. and the first *Salmonella* spp. occurrence in bats was recorded in the rectal swab of the fruit bats (*Rousettus leschenaulti*) in Sri Lanka, it was evident that the key contaminating source is bat guano. Clearly, as the results portray, dispensation of bat guano has elevated the degree of contamination of fecal coliforms in the water because higher amount of fecal coliform colonies were detected in site 2. There were no significant differences in the TVB counts among the sites. Nonetheless, significantly higher TVB counts were recorded from the fecal samples. This study proves the microbial contamination specifically *Salmonella* spp. by the release of bat guano into a freshwater body for the first time in Sri Lanka and the contamination of the water critically create environmental and health issues when the downstream water is used for agriculture drinking and other domestic consumption.

Keywords: Bat guano, *Salmonella* spp., Fecal coliform bacteria, Total coliform bacteria