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Odor, Taste and Toxin Producing Cyanobacteria and Algae in Surface Waters of North Central Province

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Abstract

North Central Province, the largest province in Sri Lanka, consists of two main districts; Anuradhapura and Polonnaruwa with a semi-arid climate. During the present study, Padaviya Wewa, Tissa Wewa, Nuwara Wewa, Kala Wewa, Basawakkulama Wewa and Rajanganaya Wewa from Anuradhapura District and Parakrama Samudraya, Minneriya Wewa, Ambagas Wewa, Kaudulla Wewa, and Girithale Wewa from Polonnaruwa District were studied to evaluate the potential odor, taste and toxin-producing cyanobacteria and algae in the water sources, since there's a lack of scientific data on plankton who are capable of producing odor, taste and toxins. The studied water bodies are being used for the purposes of drinking, fisheries and recreational activities. Sampling was done during November 2020 in triplicates and phytoplankton were observed under the microscope following Lugals' sedimentation procedure. According to the observations, the total phytoplankton density (Cyanobacteria+Algae) was higher in the Anuradhapura District (1176.33±129.19 cells/L) than in the Polonnaruwa District (699.20±28.76 cells/L). The phytoplankton groups found in the studied water bodies belong to Bacillariophyta, Chlorophyta, Chrysophyta and Cyanophyta. The most abundant species was *Microcystis* sp. both in the Anuradhapura District (929±123.02 cells/L) and in the Polonnaruwa District (462±22.79 cells/L) and the species is responsible for producing the cyanotoxins, microcystin (MC) and anatoxins and also responsible for causing taste and odor in water. Except for *Microcystis* sp., *Cylindrospermopsis* sp. was found in high numbers (163.50±13.52 cells/L) in Anuradhapura, which produces the cyanotoxins cylindrospermopsin (CYN), anatoxin, and saxitoxin and also gives rise to taste and odor in water. *Anabaena* sp. found in Anuradhapura (89.00±5.15 cells/L) and *Oscillatoria* sp. found in Polonnaruwa (191.00±0.00 cells/L) were also responsible for the production of cyanotoxins such as, MC, CYN, saxitoxin, and anatoxin and add taste and odor to the water too. Further, *Merismopedia* sp. was found both in Anuradhapura (94.00±4.54 cells/L) and Polonnaruwa (118.40±12.39 cells/L), which is responsible of producing toxic lipopolysaccharides. Among the observed algal species, *Dinobryon* sp. was detected in low numbers in Polonnaruwa, which is also responsible for the occurrence of taste and odor in water. Based on the assessment of phytoplankton in the North Central Province, it is clear that, the surface water is not pleasant and healthy enough to provide safe drinking water to the community, especially, due to the presence of unpleasant taste, odor and cyanotoxins producing organisms.

Keywords: North Central, Odor, Taste and toxins, Cyanobacteria, Algae