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Cyanobacterial and micro-green algal diversity in Wahawa, Mahaoya and Madunagala geothermal springs in Sri Lanka

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Geothermal springs have been recorded to exhibit a considerable diversity of cyanobacteria and microalgae. The cyanobacterial and microalgae diversity in Sri Lankan geothermal springs is under–studied. The current study was conducted to determine the cyanobacteria and micro-green algae diversity of 3 springs: Wahawa (7° 21′ N, 81° 18′ E), Mahaoya (7° 33.08′N, 81° 21.11′E) and Madunagala (6° 14.49′N, 81° 59.04′E). Surface temperature and conductivity of water were recorded at 15 cm depth in 3 separate wells in Wahawa, seven and six connected wells in Mahaoya and Madunagala, respectively. The level of human activity at each location was recorded. Three or more water samples with algal mats were collected from each well. Samples were observed under light microscope within one week for identification based on morphological characters. Average temperatures of three wells in Wahawa were 41^0C, 43^0C, and 45^0C and conductivity was 1432 µS, 1439 µS and 1477 µS. In Mahaoya, the average temperature ranged from 43^0C to 54^0C and average conductivity was 1500 µS. In Madunagala the average temperature ranged from 38^0C to 44^0C and average conductivity was 8471 µS. Wells in Mahaoya and Madunagala are frequently used by visitors for bathing while those in Wahawa are seldom used. Eighteen different species were identified in all three springs belonging to two Divisions, Cyanophyta and Chlorophyta. Thirteen species of Cyanophyta were identified which belongs to three orders: *viz Chroococcus* sp., *Synechococcus* sp., *Microcystis* sp., *Gleocapsa* sp., *Gloeothece* sp., under Chroococcales, *Oscillatoria* sp., *Lyngbya* sp., *Phormidium* sp., *Homeothrix* sp. and *Spirulina* sp. under Oscillatoriales and *Nostoc* sp., *Calothrix* spp. and *Tolypothrix* sp. under Nostocales. Five species of Chlorophyta were distributed among three orders: *viz Chlorella* sp., *Chlorococcum* sp., and *Oocystis* sp. under Chlorococcales, *Cosmarium* sp. under Zygnematales and *Microspora* sp. under Chaetophorales. Highest diversity was observed in Wahawa springs with 17 species while six species were recorded from Mahaoya. Six species were identified from Madunagala up to date and identification is in progress. Only two species, *Phormidium* sp. and *Calothrix* spp. were recorded in all three springs while *Cosmarium* sp. was restricted to Wahawa. Slight temperature differences and salinity (measured as conductivity) among springs seem to affect the algal diversity, however, disturbances through human activities seem to affect the algal diversity more. In general, Wahawa, Mahaoaya and Madunagala harbour a significant algal diversity despite prevailing extreme environmental conditions.

Keywords: Cyanobacteria, diversity, geothermal springs, micro-green algae