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# MULTIVARIATE STATISTICAL ANALYSIS OF GEOGRAPHICAL AND SEASONAL PATTERNS OF GEOSMIN IN ENVIRONMENTAL WATER IN EASTERN PROVINCE, SRI LANKA

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Increasing eutrophication has led to frequent outbreaks of cyanobacterial blooms in many lakes around the world in recent decades. Cyanobacteria produce metabolites, such as algal toxins and taste and odor (T&O) compounds, which impact water supplies and finally causing drinking water not suitable to drink. Geosmin (*trans-1, 10-dimethyl-trans-9-decalol*) is a common odorant, tertiary alcohol produced as a secondary metabolite by numerous cyanobacteria and actinomycetes. In this study, water samples were collected (during both dry and wet seasons in the year 2017) from five water bodies (three replicates from each water body), which are used for drinking purposes in Eastern province (Ampara, Batticaloa and Trincomalee districts) Sri Lanka. The objectives of the current study were to screen Geosmin level in the raw water bodies in both dry and wet seasons and to perform a multivariate statistical analysis of water quality parameters using Principal Component Analysis (PCA). Geosmin content was analyzed using Gas Chromatography–Mass Spectrometry coupled with Solid-phase micro extraction. Water pH, temperature and Electric Conductivity were measured at the site itself using standard meters and nitrate-N, nitrite-N, ammonia-N, Total Phosphorous (TP) and total cell density of cyanobacteria were measured at the laboratory using standard methods. Water quality was evaluated with an empirical approach using PCA. In dry season Geosmin levels ranged from 8.3 to 34.6 $ngL^{-1}$ where the highest was recorded in Sagama tank (34.6 $ngL^{-1}$) and the lowest was detected in Unnichchai tank (8.3 $ngL^{-1}$). Kantale tank had Geosmin levels below the minimum detection level (1.5 $ngL^{-1}$) during the sampling period. In wet season, Geosmin level of all the raw water bodies were below the minimum detection level. When compared dry and wet seasons, one-way Anova statistical analysis suggested that Geosmin level, total cyanobacteria cell density, chlorophyll- a content and TP levels of dry season significantly greater than the wet season ($p<0.05$). Furthermore, a significantly positive correlation between TP and Geosmin concentration with a Pearson correlation coefficient of 0.960 ($p<0.05$) was identified indicating TP may be the limiting factor for the production/existence of Geosmin. Geosmin and total cyanobacteria cell density was significantly correlated ($p<0.05$) with a Pearson correlation coefficient of 0.957 showing strong positive association between cyanobacteria and Geosmin. Above results might explain Geosmin not detecting at reservoirs in wet season when low density of total cyanobacteria and low TP levels were encountered. The results revealed that Geosmin has clear relationship with surrounding water quality parameters and when taking necessary actions to remove Geosmin from water, it's important to consider the other circumstances in the environmental water as well.

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