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## Cyanobacteria and 2-Methylisoborneol: the influence of Nitrogen and Phosphorous

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2-Methylisoborneol (2-MIB) is a key compound, which causes taste and odour (T&O) issues in water. Despite of no recorded health hazards reported associated with 2-MIB, water consumers reject the water with 2-MIB due to its unpleasant musty (moldy) T&O. The aim of this study was to study the correlation between cyanobacteria abundance, 2-MIB levels coupled with Nitrogen and Phosphorous levels. 2-MIB contamination level in sixteen raw water bodies, which are being used for drinking in six districts (Anuradhapura, Pollonnaruwa, Ampara, Batticaloa, Trincomalee and Hambanthota) were analyzed using Gas Chromatography–Mass Spectrometry coupled with Solid-phase micro extraction. Enumeration and identification of cyanobacteria was carried out using standard microscopic methods. *Anabaena*, *Microcystis*, *Oscillatoria*, and *Cylindrospermopsis* species were identified as the most abundant cyanobacteria. 2-MIB levels ranged from  $5.3 \pm 0.94$  to  $139.4 \pm 0.21$  ppt throughout the dry season of the sampling period, where the highest level was recorded in Kondawatuwana tank ( $139.4 \pm 0.21$  ppt) and the lowest was detected in Ridiyagama tank ( $5.3 \pm 0.94$ ). At wet season, 2-MIB levels ranged from  $4.4 \pm 0.78$  to  $73.8 \pm 0.65$  ppt, where the highest level was recorded in Jayanthi tank ( $73.8 \pm 0.65$  ppt), while the lowest was detected in Ridiyagama tank ( $5.3 \pm 0.39$  ppt). Recorded 2- MIB level was greater in dry season compared to the wet season. Seventy five percent (75%) of the sampling locations exceeded the human threshold levels of 2-MIB (5 ppt). Questionnaire survey showed that more than 95% end water consumers rejected drinking water contaminated with 2-MIB. Further it was found that the total cyanobacterial cell density (T.C.D) was positively correlated with 2-MIB and total phosphorous levels ( $p < 0.05$ ). Moreover, cell densities of *Oscillatoria*, *Anabaena* and *Cylindrospermopsis* species showed significant positive correlations ( $p < 0.05$ ) with 2-MIB contamination levels along with Pearson Correlation Coefficients (P.C.C) of 0.788, 0.682 and 0.731. However, no significant correlation was observed between *Microcystis* sp. and 2-MIB. Further, 2-MIB showed significant positive correlation ( $p < 0.05$ ) with total phosphorous (P.C.C 0.876), electrical conductivity (EC) (P.C.C, 0.771), and pH (P.C.C, 0.825). Increment of pH value leading to alkalinity is a known optimum condition for cyanobacteria growth while the current study shows alkalinity is favorable for 2-MIB. No significant correlation was obtained between total nitrogen (Nitrate –N, Nitrite –N, Ammonia –N) and 2-MIB nor T.C.D and total nitrogen. Thus, the results of the study indicate there is a direct positive correlation between 2-MIB, cyanobacteria and total phosphorous.

**Keywords:** 2-MIB, Cyanobacteria, N: P ratio, Solid-phase micro extraction

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