SURVEY OF TOXIC ALGAE IN SELECTED MULTIPURPOSE RESERVOIRS IN KANDY AREA

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Introduction

Algae are a group of organisms that live in all types of aquatic environments. They serve as primary producers and therefore are ecologically very important. During dry periods when the water bodies start to concentrate nutrients and other forms of dissolved materials, the microscopic algae start to come out as blooms. Some of these blooms can be considered as harmful because they release toxic compounds into water. These toxins are mainly of three types: neurotoxins, endotoxins and hepatotoxins. Many of these toxins are not destroyed by boiling. These harmful algal blooms are caused mostly by 60-80 species of phytoplankton and 90% of them are dinoflagellates. In addition, blue green algae such as *Microsystis, Cylindrospermopsis and Anabaena* are also known to produce toxins in aquatic environments. Further, *Euglena* spp. are also known to be responsible for mass fish kills in pond environments. Sri Lanka, which has a high density of aquatic systems could also be in a vulnerable situation. Few studies carried out during the recent past also have confirmed the occurrence of such blooms. Therefore, the current study was undertaken to explore the presence of potentially toxin producing algae in reservoirs in Kandy district where the human population density is very high.

Materials and Methods

The study was carried out in five selected multipurpose reservoirs in Kandy area: Dunumadalawa, Walala, Rosneath, Kundasale and Sikurapotha. Plankton samples were collected once a month for six months using a dipnet and a plankton net (pore size 10- 50 μm) and were preserved using standard methods. Identifications were made using a student microscope. Identifications were clarified and confirmed using a research microscope (Olympus CX 31) equipped with phase contrast optics. Standard plankton identification guides were used in identification of taxa (Fernando, (2002); Yatigammana (2004). Specimens were identified to generic level and occasionally to species level. Selected environmental variables (temperature, conductivity, dissolved oxygen, total phosphorus and nitrate concentration of water at the study sites were measured.

Results

A total of 15 species of phytoplankton and 11 species of zooplankton were recorded from the five study reservoirs. A high abundance of toxin producing algae, *Microcystis* was recorded from four

reservoirs. In three reservoirs: *Microcystis* spp. were very abundant in the Dunumadalawa, Walala & Rosneath where the temperature values , nutrient concentrations, were high and DO ,conductivity and pH levels were low (Table 1). The relative abundance of *Microcystis* spp. in the three selected reservoirs was 90.34%, 86.3% and 65.02% respectively (Figure 1). In contrast, Kundasale reservoir showed a higher abundance of *Euglena* spp. (>1000 cells/cm^3) while the other planktons occurred at < 100 cells/cm^3.

Discussion

The current study indicates that the study reservoirs are experiencing environmental stress and thus provide better breeding grounds to potentially toxin producing algae such as M*icrocystis* spp. and *Euglena* spp. In addition the high abundance of *Euglena* species in Kundasala reservoir and the dense growth of macrophytes at the littoral areas of the reservoir could be an indication of the mutual relationship between aquatic communities. Additionally these species prefer increased levels of temperature, conductivity, dissolved oxygen (DO), and nutrients. Our results agree with previous studies (Bielanska & Gladysz, 2010). Further, *Microcystis* spp. are known to prefer tropical eutrophied systems that exhibit higher temperature, higher nutrient, and lower DO values. However, as the study reservoirs provide water to domestic purposes including drinking water it is important to highlight the vulnerability of exposure of human communities to yet another environmental problem that can directly affect both animal and human health. Since the areas has experienced such a situation in 2008 (O.A. Ileperuma, personal communication) it is necessary to be alert a potential epidemic situations. As, *Mycrocystis* species are very hazardous organisms in freshwater systems effecting the physical and chemical nature of water bodies it is important to educate authorities and the general public of a potential environmental danger.

Conclusion

There was no significant difference in diversity of algae in the study reservoirs with the exception of Kundasale reservoir where the *Euglena* spp. was dominant. *Mycrocystis* spp. was recorded as the most common and abundant algae in four of the reservoirs.

References

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Appendix

Table 1.Limnological variables of the study reservoirs

Limnological Variable	Reservoir name				
	Dunum adalawa	Walala	Rosneath	Kundasale	Sikurapotha
Temperature / °C	26	27	27	28	26
pH	7.48	7.32	6.89	7.39	6.98
Conductivity / µS/cm	138	144	159	258	40.5
Dissolved Oxygen mg/l	3.99	2.99	4.69	5.93	4.16
Nitrate Concentration (NO_3^-)/mg/l	0.066	0.281	0.484	0.490	0.131
Total Phosphorus Concentration µg/l	0.02	0.092	0.072	0.082	0.092

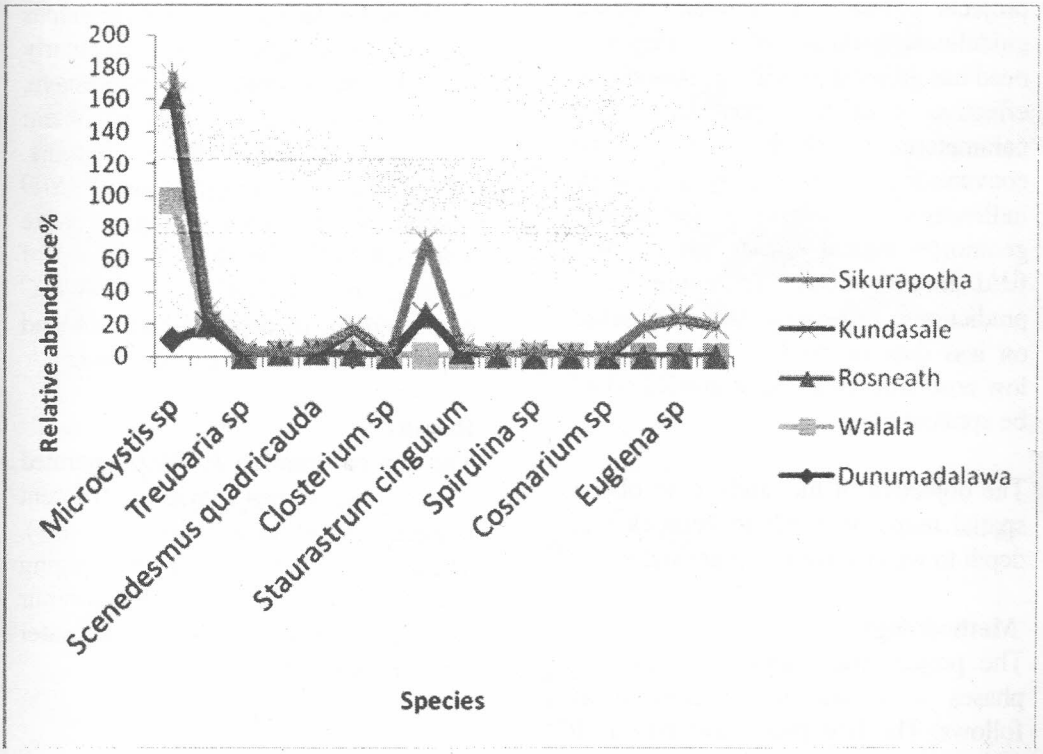

Fig. 1. Relative Abundance of phytoplankton species in the five study reservoirs