Lab News

ALGAL CAPABILITIES

February 2017

INTRODUCTION

ALGAE are natural components of most ecosystems and live in a wide range of aquatic environments including fresh, estuarine and marine waters. They form the foundation of most aquatic food webs.

Some algae have economic importance as a health food as well as being a useful water quality indicator. Conversly algae can contribute to Public Health concerns due to the toxins they produce, filter clogging issues, taste and odour issues and aesthetics.

ALS Sydney provides high quality NATA/ISO/IEC 17025 accredited enumeration and identification analysis along with prompt service and scientific advice.

PRINCIPLES OF ANALYSIS

The enumeration and identification is conducted on a preserved sample, which is concentrated via Gravitational Sedimentation/Centrifugation or analysed Direct or post-Dilution. An aliquot of the sample is loaded into 'Sedgwick Rafter counting chambers' and viewed under phase contrast microscopy to identify and enumerate the Algal genera/species. The results are expressed as cells/mL.

Biovolume of the blue-green algae are ascertained using phase contrast microscopy at 400X or 1000X (Oil) magnification. The cell dimensions are recorded and the volume of algae are calculated with results expressed as mm^3/L.

METHOD INFORMATION

ALS METHOD CODE

MW024_TOT: Identification and enumeration of Algae

MW024_BGA: Identification and enumeration of Blue green algae

MW024_BIOVOLUME: Biovolume of Blue green algae

MW024_PTOX: Identification and enumeration of Potentially Toxic Blue green algae to species level where possible

MW025: Identification and enumeration of Marine algae

SAMPLE RECEIPT AND HOLDING TIMES

- Sample Volume: 200mL in PET bottles
- Holding time: Samples preserved in 1% Lugol's Iodine, preferably at the sampling site, or at least within 48 hours of sampling
- Sample Transport: Delivered at <22.0°C, under dark condition within 48 hours if preserved or within 24 hours if unpreserved

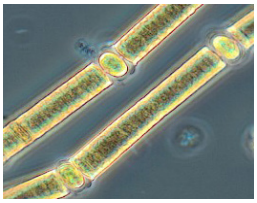
LIMITS OF REPORTING

MW024_TOT and MW024_BGA: 5 cells/mL

MW024_BIOVOLUME: 0.001mm^3/L

Dolichospermum sp. Bloom

Dolichospermum circinale



Nodularia spumigena

Microcystis sp. bloom

Microcystis aeriginosa

Microcystis aeriginosa

IMPORTANCE OF ALGAL MONITORING

Algal blooms can cause water to be unsafe for recreation in both freshwater and marine water environments. Algal populations within awater bodies (e.g. lakes, rivers and reservoirs) are monitored to help protect stakeholders through early detection of toxic algal blooms. Toxic blue-green algal blooms pose serious health risks to humans and a range of terrestrial and aquatic animals and plants. Human health can be at risk through ingestion of contaminated water via drinking or other aquatic recreational activities or through the consumption of toxin laden foods (e.g. fish, shellfish). NSW Health advises that any domestic use (including drinking) of surface water without treatment should be avoided at all times [3].

Monitoring programs developed by water suppliers are typically based on the first instance of detecting the presence of cyanobacteria which is achieved through regular microscopic identification and enumeration of the phytoplankton genus/ species and estimation of the Biovolume of blue-green algae.

ALERT LEVEL DEFINITIONS

Algal alerts, for recreational water use by general public, are issued by Regional Algal Coordinating Committees (RACCs) who are responsible for local management of algal blooms. Reports from water storages, where there is no public access, are issued by water supply authorities [3].

RED

These alert levels represent 'bloom' conditions which should be considered to be toxic to humans and animals. The water will appear green and may have strong, musty or organically polluted odours and the Blue-green algae may be visible as clumps or as scums [3].

AMBER

Blue-green algae may be multiplying in numbers and should be considered as unsuitable for potable use prior to treatment. The water may have a green tinge and musty or organic taste and odour [3].

GREEN

Blue-green algae are first detected in the water at low amounts. At this stage it does not pose a threat to recreational, stock or domestic use. [3].

REGULATORY GUIDELINES

The Australian Drinking Water Guidelines (ADWG) 2011 includes a health based limit for the total concentration of Microcystins in drinking water of 1.3µg/L expressed as microcystin-LR Toxicity Equivalents. Due to a lack of adequate data, the ADWG 2011 has set no guidelines values for concentrations of Cylindrospermopsin (CYN), Nodularin or Saxitoxins. Despite no guideline limit being set, ADWG suggests in all cases that cell numbers detected through traditional microscopy techniques should only be used as preliminary signals and as triggers for toxin testing to enable assessment of potential health risks [1].

ALS-Sydney offer NATA accredited analysis of Cyano-bacterial Toxins, Cylindrospermopsin and the analogue Deoxy-cylindrospermopsin), under Method Code EP248, by LCMSMS from various water sources including dams/ reservoirs, catchments, freshwater lakes and rivers.

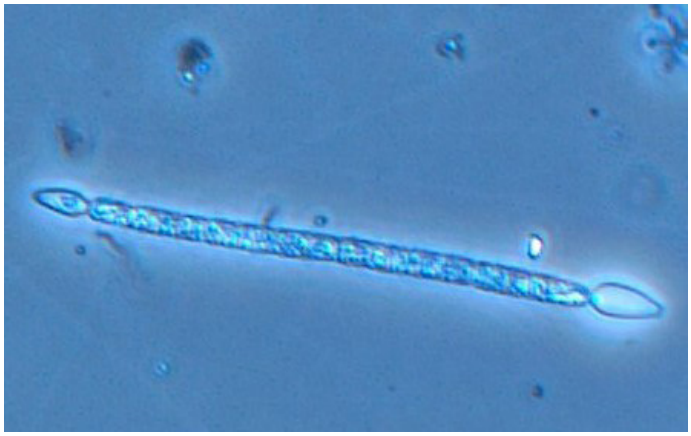
ALS WRG-Melbourne also has capabilities for analysis of Microcystins, Nodularin and Anatoxin-a.

REFERENCES

[1] National Health Medical Research Council, Australian Drinking Water Guidelines 6 2011 – Microorganisms: Cyanobacteria and their toxins

[2] Hotzel G. and Croome C. "A Phytoplankton Methods Manual for Australian Freshwaters" (1999)

[3] Department of Primary Industries - website (updated 6th October 2015)



Cylindrospermopsis raciborskii