

# **Population dynamics and production of toxic compounds by cyanobacteria in Lake Vico (Province of Viterbo, Italy)**

**Emanuele Ferretti<sup>1</sup>, Emanuela Viaggiu<sup>2,4</sup>, Sara Bogialli<sup>3</sup>, Federica Nigro Di Gregorio<sup>1</sup>, Roberta Congestri<sup>2,4</sup>, Luca Lucentini<sup>1</sup>.**

<sup>1</sup>Department of Environment and Primary Prevention, Section of Inland Water Hygiene, Istituto Superiore di Sanità, Viale Regina Elena 299, 00161 Rome, Italy;

<sup>2</sup>Department of Biology, University of Rome ‘Tor Vergata’, Laboratory of Biology of Algae, via della Ricerca Scientifica, 00133 Rome, Italy;

<sup>3</sup> Department of Chemical Sciences, University of Padova, Via Marzolo 1, 35131, Padova, Italy;

<sup>4</sup> AlgaRes S.r.l., University Spinoff of Rome ‘Tor Vergata’, c/o Science Park, via della Ricerca Scientifica, 00133 Rome, Italy; alares@romascienza.it.

## **Abstract**

In aquatic environments that are enriched with mineral nutrients, cyanobacterial populations can present hazards to human and animal health through the ability of many species to produce potent toxins (Codd et al., 2001). Between 2010 and 2016, a routine survey of water quality in the Lake Vico, a volcanic lake situated north of Latium Region (Italy) was performed to study the dynamics and toxins production of toxic cyanobacteria developed in the lake. Water samples were collected at the inlet of the water treatment plant serving the local community and cell counts as well as quantitative toxin determination were carried out. Identification and quantification of microcystin variants, nodularin, anatoxin-a and cylindrospermopsin using HPLC-MS/MS were done on all samples. Beside the toxic cyanobacteria in Lake Vico, four toxic species were observed using light microscopy analyses, i.e. *Chrysosporum ovalisporum*, *Dolichospermum* sp., *Limnothrix redekei* and *Planktothrix rubescens*. The latter was the most abundant toxic cyanobacteria present in almost water samples. This species was also the main toxin producer, showing an increasing toxicity from late summer to winter. The overwhelming dominance of *P. rubescens* had only a short summer break, in concomitance with the development of *C. ovalisporum*. The cyanobacterium *C. ovalisporum* was recorded for the first time in the phytoplankton community of Lake Vico in 2010 when the toxin cylindrospermopsin was detected with the highest value of 0.488 µg L<sup>-1</sup> in December. Over 7 years of monitoring programme, other cyanobacterial toxins were revealed in water samples as microcystin-LR, dem-microcystin-LR microcystin-RR, dem- microcystin-RR and microcystin-LF.

We acknowledge the European Cooperation in Science and Technology COST Action ES1105 CYANOCOST for networking and knowledge transfer support.