



CYANOCOST – ES 1105 Action

**Cyanobacterial blooms and toxins in water resources:
Occurrence, impacts and management.**

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Researcher



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Bio: PhD student since 2013 on the project «Anatoxin producing cyanobacteria in the large lakes south of the Alps: colonization rates, detection of new producers and molecular identification methods» (CYANO-ID)

Host Organization



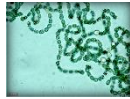
Norwegian Institute for Water Research (NIVA), Oslo, Norway

Group leader: Dr. Andreas Ballot

Short Term Scientific Mission (STSM)

The expansion of *Dolichospermum lemmermannii* to the deep lakes south of the Alps: toxic potential and distribution pattern in the European context

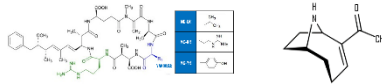
Dolichospermum lemmermannii represents a case of very recent colonization of cyanobacteria in the deep lakes south of the Alps. Indeed it occurred in the form of extended blooms for the first time in Lake Garda at the beginning of the 1990s, and then, in lakes Iseo (second half of the 1990s), Maggiore (2005), and Como (2006).



Objectives

Investigate the expansion of *D. lemmermannii* in the deep subalpine lakes and deepen the phylogeography of this species at a continental level:

- I. Analyze the geographic pattern in the distribution of the *Dolichospermum* populations.
- II. Identify the development of different ecotypes adapted to various European climatic regions (central and northern Europe).
- III. Evaluate the presence of several classes of toxins and cyanotoxins encoding genes in investigated strain.



Methodology

The *D. lemmermannii* populations of the deep subalpine lakes (Garda, Iseo, Como and Maggiore) were compared genetically with strains isolated in Central and Northern Europe and maintained at NIVA.

- DNA extraction from *D. lemmermannii* cultures
- PCR and sequencing (16s rRNA, *rpoB*)
- Sequence analysis
- Phylogenetic analysis (Mega V. 6.0, R)

Results

A phylogenetic analysis on 16s rRNA showed:

- The identity of *D. lemmermannii* as the Nostocales invading the deep lakes south of the Alps.
- The cluster of the deep subalpine lakes is homogeneous and linked by different range of similarity with other taxa isolated in different geographic regions.
- The *D. lemmermannii* clade is compact and detached from other *Dolichospermum* spp.

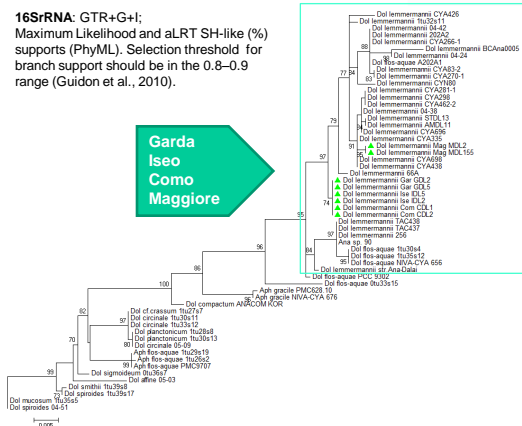
Phylogenetic analysis on *rpoB* gene and information about toxin production (microcystins, anatoxin-a) will be completed in the near future.

Highlights

Despite the genetic differences observed in the *D. lemmermannii* strains, this preliminary analysis did not allow to disclose a geographical distribution pattern driven by latitudinal/climatic gradients. However, the greater genetic homogeneity found in the populations living in the deep subalpine lakes suggest a strong founder effect following the establishment of *Dolichospermum* in this district.



16S rRNA: GTR+G+I;
Maximum Likelihood and aLRT SH-like (%) supports (PhyML). Selection threshold for branch support should be in the 0.8–0.9 range (Guidon et al., 2010).



Garda
Iseo
Como
Maggiore



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REFERENCES

Guidon, S., Dufayard, J. F., Lefort, V., Anisimova, M., Hordijk, W., & Gascuel, O. (2010). New algorithms and methods to estimate maximum-likelihood phylogenies: assessing the performance of PhyML 3.0. *Systematic biology*, 59(3), 307-321.