

Short-Term Scientific Mission on advanced LC-MS/MS cyanotoxin analysis within CYANOACTION

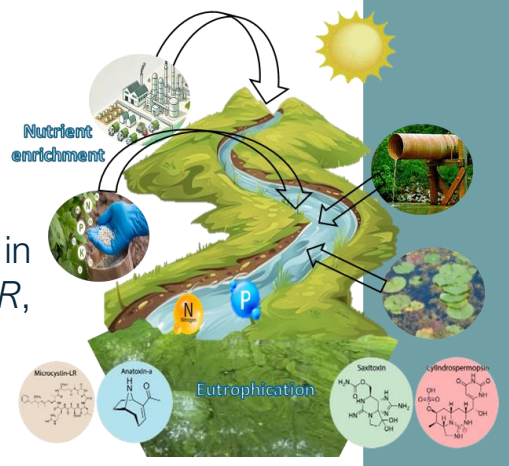
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From: ciimar To: AARHUS UNIVERSITY

Duration (09/01/2026 - Ending date 11/03/2026)

Aim of the STSM

- The Alqueva Multipurpose Project (EFMA) in southern Portugal comprises interconnected reservoirs under Mediterranean climate and intensive agriculture, favouring cyanobacterial proliferation and toxin occurrence.
- This work applies and validates LC–MS workflows to detect and quantify cyanotoxins in reservoirs of the Alqueva system, including *microcystin-LR*, *microcystin-RR*, *cylindrospermopsin*, *anatoxin-a*, *nodularin* and *saxitoxins*.



Methodology



1: Monthly reservoir sampling (March–October), with biweekly sampling during summer.

2: Composite sample (surface – euphotic zone).

3: Direct field analysis and filtration/extraction for intracellular cyanotoxins

4: Sample preparation, HPLC–LC–MS/MS analysis, and QA/QC.

Main Outcomes & Follow-up

Table 1: Occurrence of cyanotoxins: ND = not detected, < LOD (0,01) = Bellow the limit of detection.

Toxin		Field	Filtred	Total
MC.LR	Detected	42 (61%)	58 (92%)	65 (94%)
	ND	27 (39%)	5 (8%)	4 (6%)
	> LOD	11 (16%)	1 (2%)	28 (41%)
MC.RR	Detected	17 (25%)	46 (73%)	47 (68%)
	ND	52 (75%)	17 (27%)	22 (32%)
	> LOD	14 (20%)	22 (35%)	41 (59%)
CYN.	Detected	57 (83%)	42 (67%)	64 (93%)
	ND	12 (17%)	21 (33%)	5 (7%)
	> LOD	9 (13%)	18 (29%)	16 (23%)
ANT	Detected	18 (26%)	18 (29%)	22 (32 %)
	ND	51 (74%)	45 (71%)	47 (68%)
	< LOD	12 (17%)	5 (8%)	16 (23 %)

- MCs were more frequent in filtered samples (intracellular), while CYN predominated in field samples (extracellular). ANT was less common, suggesting a more sporadic occurrence or faster environmental loss;
- NOD was not detected, consistent with its typical occurrence in marine environments, while SAX was detected but not quantifiable due to methodological limitations;
- Direct water analysis may underestimate cyanotoxin risk by overlooking intracellular toxin fractions.
- This study represents the first year of a two-year monitoring programme. Initial results provided a first assessment of toxin occurrence and enabled methodological refinement. The collaboration established between the institutions will continue and supports future cooperative research.

Acknowledgments

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