



# TOXICROP

## TOXICROP NEWSLETTER 6

February 2024

### CYANOTOXINS IN IRRIGATION WATERS: Surveillance, Risk Assessment, and Innovative Remediation Proposals

TOXICROP aims: to cover knowledge gaps and concerns raised related with the use of raw waters contaminated with cyanobacteria and cyanotoxins in crop irrigation. Research and innovation activities will be developed to (a) assess the risk of use of eutrophic waters in agriculture; (b) development of low-cost technologies of water treatment and (c) improve the detection and quantification of cyanotoxins in water, soil and plant materials

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## TOXICROP II Scientific Missions

### ORGANISED

#### Seville - Spain

Venue: University of Seville

Date: September 2023 - January 2024

The research group led by professor Ana Cameán hosted the PhD student Yasser Essadki from the University of Cadi Ayyad, Morocco for 2 months. The researcher was learning and developing *in vitro* toxicity tests with Jurkat and THP-1 human cell lines. The objective of this research mission was to investigate immunomodulatory and potentially protective effects against cyanotoxins (cylindrospermopsin, microcystin-LR) of natural extracts of various origins (lichens, gymnosperm, angiosperm): HE1, HE2, CA and PA. In addition, a comparative study of the cyanotoxin composition of

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environmental samples of a bloom from a Moroccan lake reservoir was carried out with the supervision of professors Ana Camean and Angeles Jos.



In addition, in November 2023 the researcher Fredy Augusto Duque Duque, from the Universidad Nacional de Colombia was also hosted by the University of Sevilla. The main activities carried out by the researcher were: extraction, detection and quantification of cylindrospermopsin (CYN) in potato plants from Colombia, irrigated with contaminated water with the toxin. For this objective a total of 75 samples of roots, stems, leaves and tubers of potato plants were analyzed by UHPLC-MS/MS. Additionally, another activity carried out was to determine the potential transformations of the CYN molecule in the plant tissues by UHPLC-MS/MS.

### Matosinhos - Portugal

Venue: CIIMAR

Date: November 2023

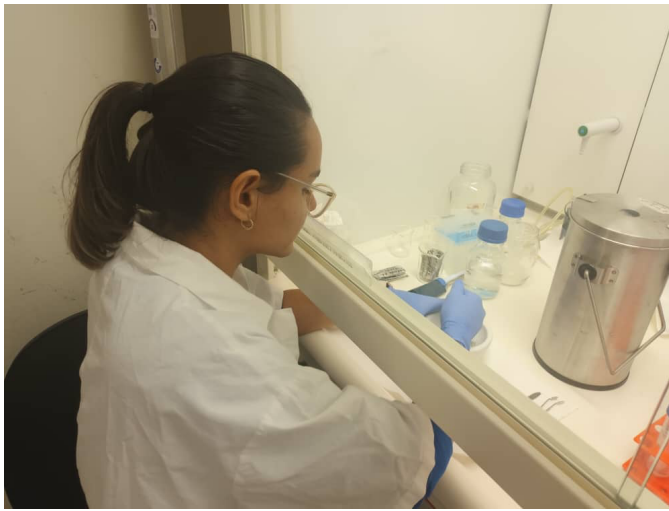
In November 2023 CIIMAR hosted the researchers Aimee Pombrol and Yeliany Martínez from Centro de Estudios Ambientales de Cienfuegos (CEAC), Cuba, in the framework of TOXICROP project. The two researchers were involved in the molecular characterization of environmental samples collected from the region of Cienfuegos,

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Cuba, and in the identification of cyanobacteria. Furthermore, extractions of the biological material were performed to investigate the occurrence of cyanotoxins in the locations where samples were collected. Also in November, the researcher Jürgen Bedoya, from Científica Peruana, Peru, joined CIIMAR for a 3-month period In the framework of TOXICROP. Jürgen Bedoya Is currently working in the identification of several cyanobacteria collected from reservoirs in the region of Arequipa, based on morphological observation (microscopy) and molecular biology.



### Marrakesh - Morocco

Venue: University Cady Ayad

Date: October 2023

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Alexandre Campos from CIIMAR, Carlos Arias and Pedro Carvalho from Aarhus University, visited the colleagues from Biology Department, University Cady Ayad, Morocco from the 23<sup>rd</sup> October to the 3<sup>rd</sup> of November 2023. Several activities were organized and coordinated by professor Brahim Oudra during this period. The researchers from CIIMAR and Aarhus University held meetings with the PhD students to discuss the progress of their work, share opinions and provide inputs regarding the analysis and interpretation of results, manuscript and PhD theses preparation. The team visited the MSL prototype built in the field, which is currently treating water from Lalla Takerkoust reservoir. The researchers discussed several operational aspects of the technology, namely, maintenance, life-time, removal capacity of several water contaminants (organic matter and cyanotoxins). Furthermore, the visiting researchers were actively involved in lecturing with courses to Bachelor, MSc students and PhD candidates. Imparting lectures covering a diverse number of topics including Cellular Biology/Proteomics, Nature based Solutions, Water Contaminants (Persistent and Emergent organic pollutants) and innovative approaches for cleaning and water reclamation techniques. The three researchers also worked on the TOXICROP poster exhibition.



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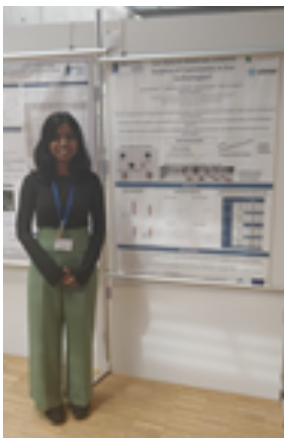
## TOXICROP II Communications

Event: 10th International Symposium On Wetland Pollutant Dynamics and Control

Date: 10-14 September 2023

Venue: Bruges, Brussels

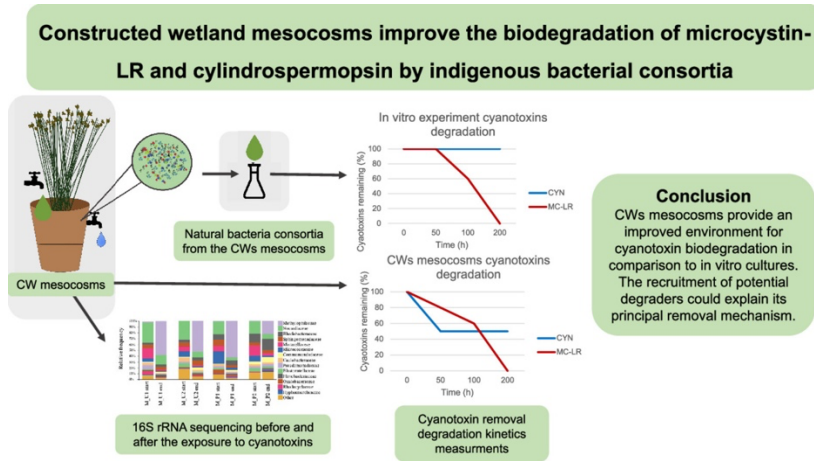
In September TOXICROP project, most specifically work on the topic of water remediation, was presented at the WETPOL conference. The PhD student Guna Bavithra (CIIMAR), had a poster communication entitled "Testing local agro-waste materials as substrate candidates for constructed wetlands treating cyanotoxin contaminated water". The PhD candidate Alba Martinez i Quer (Aarhus University) presented an oral talk entitled "Constructed wetlands for the remediation of cyanotoxins: microbes, transformation products and operational design"



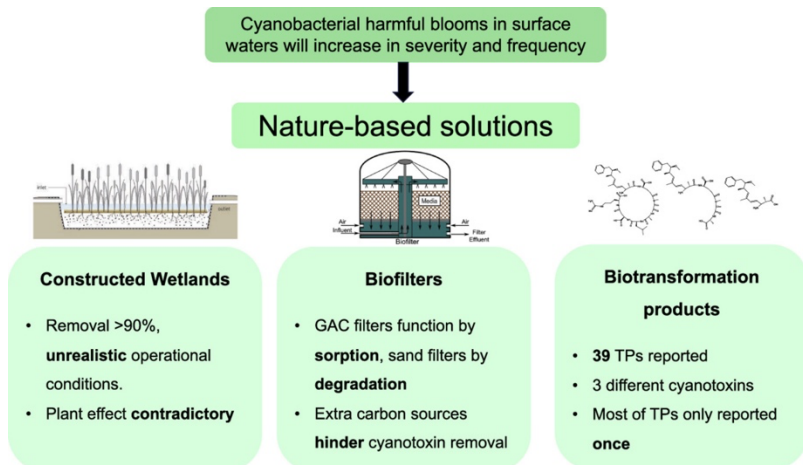
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Thyssen, L. A., Martinez i Quer, A., Arias, C. A., Ellegaard-Jensen, L., Carvalho, P. N., & Johansen, A. (2024). Constructed wetland mesocosms improve the biodegradation of microcystin-LR and cylindrospermopsin by indigenous bacterial consortia. *Harmful Algae*, 131, 102549. <https://doi.org/10.1016/j.hal.2023.102549>



Martinez i Quer, A., Larsson, Y., Johansen, A., Arias, C. A., & Carvalho, P. N. (2024). Cyanobacterial blooms in surface waters – Nature-based solutions, cyanotoxins and their biotransformation products. *Water Research*, 251, 121122. <https://doi.org/10.1016/j.watres.2024.121122>



## TOXICROP II Upcoming Events



The 6<sup>th</sup> Euro-Mediterranean Conference for Environmental Integration (EMCEI-2024) is the key venue in the Euro-Mediterranean region for showcasing and debating cutting-edge environmental science research, on various multidisciplinary topics linked to the evolution and development of the Euro-Mediterranean environment in the past, present, and future. <https://2024.emcei.net/index.php>.



The 8<sup>th</sup> Congress of the International Society of Applied Phycology (ISAP 2024) conference will have a special focus on “Algae 2030: Challenges and Opportunities”, offering an excellent forum for discussions and establishing new partnerships. The event will take place from June 16 to 21, 2024, in Porto, Portugal. <https://isap2024.com/>.

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