

[Home](#) > [Journal](#) > [Earth & Environmental Sciences](#) > [JWARP](#)[Indexing](#) [View Papers](#) [Aims & Scope](#) [Editorial Board](#) [Guideline](#) [Article Processing Charges](#)

JWARP > Vol.3 No.4, April 2011

OPEN ACCESS

Increase in Straight and Coiled *Cylindrospermopsis raciborskii* (Cyanobacteria) Populations under Conditions of Thermal De-Stratification in a Shallow Tropical Reservoir

PDF (Size: 460KB) PP. 245-252 DOI : 10.4236/jwarp.2011.34031

Author(s)

Maria do Carmo Bittencourt-Oliveira, Ariadne do Nascimento Moura, Talita Caroline Hereman, Enio Wocylí Dantas

ABSTRACT

In recent decades, there have been frequent occurrences of the cyanobacterium *Cylindrospermopsis raciborskii* in northeastern Brazil. Little is known regarding the response of straight and coiled morphotypes to environmental conditions such as light intensity and water temperature. Samples were collected at the Mundaú reservoir (PE, Brazil) at six sampling depths in the dry and rainy season. Both morphotypes exhibited seasonal and vertical differences in densities. The reservoir was stratified in the dry season, with a predominance of the straight morphotype. The coiled morphotype exhibited greater densities in the lower strata and prove to be more susceptible to light. There was evident thermal de-stratification in the rainy season, with a predominance of the coiled morphotype in the surface layers. Thermal de-stratification favors an increase in both morphotypes by providing adequate conditions for growth, such as low light intensity and milder temperatures, which are characteristic of the winter season in the northeastern Brazil.

KEYWORDS

Cyanophyta, Light, Morphotype, Northeastern Brazil, Mundaú Reservoir

Cite this paper

M. Bittencourt-Oliveira, A. Moura, T. Hereman and E. Dantas, "Increase in Straight and Coiled *Cylindrospermopsis raciborskii* (Cyanobacteria) Populations under Conditions of Thermal De-Stratification in a Shallow Tropical Reservoir," *Journal of Water Resource and Protection*, Vol. 3 No. 4, 2011, pp. 245-252. doi: 10.4236/jwarp.2011.34031.

References

- [1] J. Shapiro, " Current Beliefs Regarding Dominance b Blue Greens: The Case for the Importance of CO2 and pH," *Verhandlungen des Internationalen Verein Limnologie*, Vol. 24, 1990, pp. 38-54.
- [2] A. Niklisch and J. G. Kohl, " The Influence of Light on the Primary Production of Two Planktic Blue-Green Algae," *Archiv für Hydrobiologie, Ergebnisse der Limnologie*, Vol. 33, 1989, pp. 451-455.
- [3] C. S. Reynolds and A. E. Walsby, " Water-Blooms," *Biology Reviews*, Vol. 50, 1975, pp. 437-481. doi:10.1111/j.1469-185X.1975.tb01060.x
- [4] S. B. Watson, E. Mccauley and J. A. Downing, " Patterns in Phytoplankton Taxonomic Composition across Temp- Erate Lakes of Differing Nutrient Status," *Limnology and Oceanography*, Vol. 42, 1997, pp. 487-549. doi: 10.4319/lo.1997.42.3.0487
- [5] V. H. Smith, " Low Nitrogen to Phosphorus Ratios Favor Dominance by Blue-Green Algae in Lake Phytoplankton," *Science*, Vol. 221, No. 4611, 1983, pp. 669-670. doi:10.1126/science.221.4611.669
- [6] A. E. Walsby, P. K. Hayes, R. Boje and L. J. Stal, " The Selective Advantage of Buoyancy Provided by Gas Vesicles for Planktonic Cyanobacteria in the Baltic Sea," *New Phytology*, Vol. 136, 1997, pp. 407-417. doi:10.1046/j.1469-8137.1997.00754.x
- [7] L. Hoffmann, " Geographic Distribution of Freshwater Bluegreen Algae," *Hydrobiologia*, Vol. 336,

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[JWARP Subscription](#)[Most popular papers in JWARP](#)[About JWARP News](#)[Frequently Asked Questions](#)[Recommend to Peers](#)[Recommend to Library](#)[Contact Us](#)

Downloads: 402,239

Visits: 1,009,514

[Sponsors, Associates, and Links >>](#)

- [8] J. Padisák, " *Cylindrospermopsis raciborskii* (Woloszynska) Seenayya et Subba Raju, an Expanding, Highly Adaptive Cyanobacterium: Worldwide Distribution and Review of Its Ecology," *Archiv für Hydrobiologie*, Vol. 107, 1997, pp. 563-593.
- [9] I. Chorus and J. Bartram, " Toxic Cyanobacteria in Water: A guide to the Public Health Consequences," *Monitoring and Management*. E & FN Spon, London, 1999. doi:10.4324/9780203478073
- [10] R. E. Ogawa and N. G. Carr, " The Influence of Nitrogen on Heterocyst Production in Blue-Green Algae," *Limnology and Oceanography*, Vol. 14, 1969, pp. 342-351. doi:10.4319/lo.1969.14.3.0342
- [11] M. L. Saker, B. A. Neilan and D. J. Griffiths, " Two Morphological Forms of *Cylindrospermopsis Raciborskii* (Cyanobacteria) Isolated from Solomon Dam, Palm Island, Queensland," *Journal of Phycology*, Vol. 35, No.3, 1999, pp. 599-606. doi:10.1046/j.1529-8817.1999.3530599.x
- [12] G. B. McGregor and L. D. Fabbro, " Dominance of *Cylindrospermopsis Raciborskii* (Nostocales, Cyanoprokaryota) in Queensland Tropical and Subtropical Reservoirs: Implications for Monitoring and Management," *Lake and reservoir management*, Vol. 5, 2000, pp. 195-205. doi:10.1046/j.1440-1770.2000.00115.x
- [13] M. Bouvy, R. Molica, S. Oliveira, M. Marinho and B. Beker, " Dynamics of A Toxic Cyanobacterial Bloom (*Cylindrospermopsis Raciborskii*) in a Shallow Reservoir in the Semi-Arid Region of Northeast Brazil," *Aquatic Microbial Ecology*, Vol. 20, 1999, pp. 285-297. doi:10.3354/ame020285
- [14] A. C. S. Ferreira, " Dinamica do fitoplankton de um reservatório hipereutrófico (reservatório Tapacurá, Recife, PE), com ênfase em *Cylindrospermopsis raciborskii* e seus morfotipos. Tese de mestrado em Ciências Biológicas (Botânica)," *Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro*, 2002.
- [15] K. M. Wilson, M. A. Schembri, P. D. Baker and C. P. Saint, " Molecular Characterization of Toxic Cyanobacterium *Cylindrospermopsis Raciborskii* and Design of a Species-Specific PCR," *Applied and Environmental Microbiology*, Vol. 66, No. 1, 2000, pp. 332-338. doi:10.1128/AEM.66.1.332-338.2000
- [16] M. Bouvy, D. Falcao, M. Marinho, M. Pagano and A. Moura, " Occurrence of *Cylindrospermopsis* (Cyanobacteria) in 39 Brazilian Tropical Reservoirs during the 1998 Drought," *Aquatic Microbial Ecology*, Vol. 23, No. 1, 2000, pp. 13-27. doi:10.3354/ame023013
- [17] I. A. S. Costa, S. M. F. O. Azevedo, P. A. C. Senna, R. R. Bernardo, S. M. Costa and N. T. Chellappa, " Occurrence of Toxin-Producing Cyanobacteria Blooms in a Brazilian Semiarid Reservoir," *Brazilian Journal of Biology*, Vol. 66, No. 1B, 2006, pp. 211-219.
- [18] R. Panosso, I. A. S. Costa, N. R. Souza, J. L. Attayde, S. R. S. Cunha and F. C. F. Gomes, " Cianobactérias e cianotoxinas em reservatórios do estado do Rio Grande do Norte e o potencial controle das florações pela tilápia do Nilo (*Oreochromis niloticus*)" , *Oecologia Brasiliensis*, Vol. 11, No. 3, 2007, pp. 433-449. doi:10.4257/oeco.2007.1103.12
- [19] N. T. Chellappa, S. L. Chellappa and S. Chellappa, " Harmful Phytoplankton Blooms and Fish Mortality in a Eutrophicated Reservoir of Northeast Brazil," *Brazilian Archives of Biology and Technology*, Vol. 51, No. 4, 2008a, pp. 833-841.
- [20] N. T. Chellappa, J. M. Borba and O. Rocha, " Phytoplankton Community and Physical-Chemical Characteristics of Water in the Public Reservoir of Cruzeta, RN, Brazil," *Brazilian Journal of Biology*, Vol. 68, No. 3, 2008b, pp. 477-494.
- [21] E. V. von Sperling, A. C. S. Ferreira and L. N. L. Gomes, " Comparative Eutrophication Development in Two Brazilian Water Supply Reservoirs with Respect to Nutrient Concentrations and Bacteria Growth," *Desalination*, Vol. 226, 2008, pp. 169-174. doi:10.1016/j.desal.2007.02.105
- [22] L. D. Fabbro and L. J. Duivenvoorden, " Profile of a Bloom of the Cyanobacterium *Cylindrospermopsis Raciborskii* (Woloszynska) Seenayya and Subba Raju in the Fitzroy River in Tropical Central Queensland," *Marine and Freshwater Research*, Vol. 47, 1996, pp. 685-694. doi:10.1071/MF9960685
- [23] Secretaria de Recursos Hídricos de Pernambuco (SRH), " Plano estadual de recursos hídricos do estado de Pernambuco," *Documento síntese*, Recife, 2000, p. 267.
- [24] E. W. Dantas, A. N. Moura, M. C. Bittencourt-Oliveira, J. D. T. Arruda-Neto and A. D. C. Cavalcanti,

" Temporal Variation of the Phytoplankton Community at Short Sampling Intervals in the Mundaú Reservoir, Northeastern Brazil," *Acta Botanica Brasilica*, Vol. 22, No. 4, 2008, pp. 970-982.

- [25] R. R. L. Guillard, " Division Rates," In: J. R. Stein, Ed., *Handbook of Phycological Methods: Culture Methods and Growth Measurement*, Cambridge University Press, London, 1973, pp. 2289-2311.