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**SUPPLEMENTARY MATERIAL**

**Cyanobacterial blooms in freshwater bodies from a semiarid region, Northeast  
Brazil: A review**

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**Supplementary Tab. 1.** List of the 67 articles showing cyanobacterial dominance events and the dominant species in aquatic environments in the states of northeastern Brazil.

Reference	Reservoir	Year of sampling	Cyanobacteria dominant species
<b>Pernambuco state (n = 35)</b>			
Bouvy <i>et al.</i> (1999)	Ingazeiras	1997 and 1998	<i>Cylindrospermopsis raciborskii</i> (Woloszynska) Seenayya & Subba Raju and <i>C. acuminatocrispa</i> Couté & Bouvy
Domingos <i>et al.</i> (1999)	Tabocas	1996	<i>Aphanocapsa cumulus</i> Komárek & Cronberg
Bouvy <i>et al.</i> (2000)	39 eutrophic reservoirs	1998	<i>C. raciborskii</i>
Huszar <i>et al.</i> (2000)	Chapéu, Algodões, Poço da cruz, Pão de Açúcar and Ingazeiras	1995 and 1996	<i>C. raciborskii</i> , <i>C. philippensis</i> (W.R.Taylor) Komárek, <i>C. catemaco</i> Komárková-Legnerová & Tavera and <i>Phormidium</i> sp.
Carmichael <i>et al.</i> (2001)	Tabocas	1996	<i>Microcystis</i> spp., <i>Anabaena</i> spp. and <i>Cylindrospermopsis</i> spp.
Molica <i>et al.</i> (2002)	Tabocas	1998	<i>C. raciborskii</i>
Bittencourt-Oliveira (2003)	Tabocas, Jucazinho, Duas Unas and Tapacurá	2003	<i>Microcystis</i> spp.
Bouvy <i>et al.</i> (2003)	Tapacurá	1998 to 2000	<i>C. raciborskii</i>
Molica <i>et al.</i> (2005)	Tapacurá	2002	<i>Anabaena spiroides</i> Klebahn, <i>Pseudanabaena</i> sp., <i>C. raciborskii</i> and <i>Microcystis aeruginosa</i> (Kützing) Kützing
Aragão <i>et al.</i> (2007)	Carpina	2006	<i>Raphidiopsis curvata</i> Fritsch & M.F.Rich
Bittencourt-Oliveira <i>et al.</i> (2007)	Carpina, Jucazinho and Tapacurá	2002	<i>Geitlerinema unigranulatum</i> (R.N.Singh) Komárek & M.T.P.Azevedo
Moura <i>et al.</i> (2007a)	Carpina	2001 and 2002	<i>Planktothrix agardhii</i> (Gomont) Anagnostidis & Komárek
Moura <i>et al.</i> (2007b)	Duas Unas	2000 and 2001	<i>Oscillatoria</i> sp.
Moura <i>et al.</i> (2007c)	Mundaú	2005	<i>C. raciborskii</i>
Andrade <i>et al.</i> (2009)	Tapacurá	2006 and 2007	<i>C. raciborskii</i>

Reference	Reservoir	Year of sampling	Cyanobacteria dominant species
Bittencourt-Oliveira <i>et al.</i> (2009)	Tabocas	1997 and 1998	<i>M. protocystis</i> W.B.Crow
Campeche <i>et al.</i> (2009)	Federação	2007	<i>O. splendida</i> Gomont (= <i>G. splendidum</i> )
Bittencourt-Oliveira <i>et al.</i> (2010)	Arcoverde, Botafogo, Carpina, Duas Unas, Jazigo, Mundaú and Tapacurá	2004 to 2006	<i>M. aeruginosa</i> , <i>M. novacekii</i> (Komárek) Compère, <i>M. panniformis</i> Komárek et al., <i>A. constricta</i> (Szafer) Geitler, <i>P. agardhii</i>
Bittencourt-Oliveira <i>et al.</i> (2011a)	Jucazinho, Arcoverde and Duas Unas	2009	<i>P. agardhii</i> , <i>M. novacekii</i> , <i>M. panniformis</i> and <i>C. raciborskii</i>
Bittencourt-Oliveira <i>et al.</i> (2011b)	Mundaú	2004 and 2005	<i>C. raciborskii</i>
Dantas <i>et al.</i> (2011)	Arcoverde and Pedra	2007 and 2008	<i>C. raciborskii</i>
Lira <i>et al.</i> (2011)	Carpina	2006	<i>C. raciborskii</i> , <i>G. amphibium</i> and <i>P. agardhii</i>
Moura <i>et al.</i> (2011)	Carpina	2007 and 2008	<i>P. agardhii</i> , <i>C. raciborskii</i> , <i>G. amphibium</i> and <i>P. catenata</i> Lauterborn
Bittencourt-Oliveira <i>et al.</i> (2012a)	Carpina and Mundaú	2006 and 2008	<i>C. raciborskii</i> , <i>M. novacekii</i> , <i>M. panniformis</i> , <i>M. botrys</i> Teiling and <i>G. amphibium</i>
Bittencourt-Oliveira <i>et al.</i> (2012b)	Arcoverde	2007	<i>C. raciborskii</i>
Dantas <i>et al.</i> (2012)	Duas Unas, Tapacurá and Jucazinho	2007 and 2008	<i>M. aeruginosa</i> , <i>M. flosaqueae</i> (Wittrock) Kirchner and <i>Woronichinia botrys</i> (Skuja) Komárek & Hindák
Moura <i>et al.</i> (2012)	Jucazinho	2001 and 2002	<i>P. agardhii</i> , <i>C. raciborskii</i> and <i>P. catenata</i>
Piccin-Santos and Bittencourt-Oliveira (2012)	Carpina and Mundaú	2007	<i>M. panniformis</i> and <i>C. raciborskii</i>
Silva <i>et al.</i> (2013)	Mundaú	2010 and 2011	<i>Synechocystis aquatilis</i> Sauvageau, <i>C. raciborskii</i> , <i>M. panniformis</i> and <i>M. protocystis</i>
Bittencourt-Oliveira <i>et al.</i> (2014)	10 eutrophic reservoirs	2008 to 2010	<i>C. raciborskii</i> , <i>M. aeruginosa</i> , <i>M. panniformis</i> , <i>P. agardhii</i> , <i>P. isothrix</i> (Skuja) Komárek & Komárková, <i>Sphaerospermopsis aphanizomenoides</i> (Forti) Zapomelová <i>et al.</i> , <i>G. amphibium</i> and <i>Merismopedia tenuissima</i> Lemmermann

Reference	Reservoir	Year of sampling	Cyanobacteria dominant species
Góis and Oliveira (2014)	Mororó	2007 and 2008	<i>Cylindrospermopsis</i> spp.
Lira <i>et al.</i> (2014)	Mundaú	2006	<i>C. raciborskii</i>
Oliveira <i>et al.</i> (2014)	Apipucos	2011 and 2012	<i>P. agardhii</i>
Moura <i>et al.</i> (2015)	Mundaú	2008 and 2009	<i>C. raciborskii</i> , <i>M. panniformis</i> , <i>G. amphibium</i> and <i>M. punctata</i> Meyen
Oliveira <i>et al.</i> (2015)	Carpina and Mundaú	2013 and 2014	<i>C. raciborskii</i> , <i>G. amphibium</i> and <i>P. agardhii</i>
<b>Rio Grande do Norte state (n = 17)</b>			
Costa <i>et al.</i> (1998)	Armando Ribeiro Gonçalves	1996	<i>Coelosphaerium naegelianum</i> Unger
Araújo <i>et al.</i> (2000)	Extremoz lake	1996 and 1997	<i>P. fragile</i> Gomont (= <i>Leptolyngbya fragilis</i> (Gomont))
Chellappa and Costa (2003)	Marechal Dutra	1999 and 2000	<i>C. raciborskii</i> , <i>R. curvata</i> , <i>M. aeruginosa</i> and <i>Oscillatoria</i> sp.
Costa <i>et al.</i> (2006)	Armando Ribeiro Gonçalves	2000	<i>C. raciborskii</i> , <i>M. panniformis</i> , <i>M. protocystis</i> , <i>M. novacekii</i> , <i>Aphanizomenon gracile</i> Lemmermann, <i>A. cf. issatschenkoi</i> (Usacev) Proshkina-Lavrenko and <i>A. cf. manguinii</i> Bourrelly
Chellappa <i>et al.</i> (2008a)	Marechal Dutra	2003 and 2004	<i>C. raciborskii</i> and <i>M. aeruginosa</i>
Chellappa <i>et al.</i> (2008b)	Cruzeta	2004 and 2005	<i>C. raciborskii</i>
Chellappa <i>et al.</i> (2009)	Armando Ribeiro Gonçalves	2006	<i>A. plantonica</i> Brunnthaler, <i>M. aeruginosa</i> , <i>M. protocystis</i> , <i>M. panniformis</i> , <i>Oscillatoria</i> sp. and <i>P. agardhii</i>
Marcon <i>et al.</i> (2010)	Lucrécia	2007	<i>S. brasiliense</i> and <i>Sphaerotilus</i> sp.
Menezes <i>et al.</i> (2010)	ESEC	2006	<i>Cylindrospermopsis</i> spp. and <i>Aphanocapsa</i> spp.
Eskinazi-Santana <i>et al.</i> (2013)	Armando Ribeiro Gonçalves, Gargalheiras, Boqueirão de Parelhas, Itans, Passagem das Traíras and Sabugi	2002 to 2004	<i>M. protocystis</i> , <i>M. aeruginosa</i> , <i>M. panniformis</i> , <i>C. raciborskii</i> , <i>G. unigranulatum</i> , <i>A. incerta</i> (Lemmermann) Cronberg & Komárek, <i>A. delicatissima</i> West & G.S.West, <i>Aphanocapsa</i> sp., <i>Aphanizomenon</i> sp., <i>A. circinalis</i> Bornet & Flahault, <i>Anabaena</i> sp., <i>P. agardhii</i> and <i>Sphaerotilus brasiliense</i> Azevedo & Sant' Anna
Silva Pinto and Becker (2014)	Extremoz lake	2012 and 2013	<i>Merismopedia glauca</i> (Ehrenberg) Kützing and <i>Planktolyngbya limnetica</i> (Lemmermann) Komárková-Legnerová & Cronberg

Reference	Reservoir	Year of sampling	Cyanobacteria dominant species
Câmara <i>et al.</i> (2015)	Armando Ribeiro Gonçalves	2008 and 2009	<i>M. protocystis</i> , <i>M. aeruginosa</i> , <i>M. panniformis</i> , <i>C. raciborskii</i> , <i>G. splendidum</i> (Gomont) Anagnostidis, <i>A. circinalis</i> , <i>P. agardh</i> and <i>Oscillatoria</i> sp.
Fonseca <i>et al.</i> (2015)	Armando Ribeiro Gonçalves, Passagem das Traíras, Itans and Gargalheiras	2009 to 2011	<i>P. agardhii</i> , <i>M. aeruginosa</i> , <i>M. panniformis</i> , <i>M. protocystis</i> , <i>C. raciborskii</i> , <i>A. circinalis</i> and <i>A. gracile</i>
Medeiros <i>et al.</i> (2015)	Cruzeta	2010 to 2012	<i>C. raciborskii</i> , <i>M. panniformis</i> , <i>S. brasiliense</i> , <i>P. isothrix</i> and <i>A. gracile</i>
Silva and Costa (2015)	Pau dos Ferros and Santa Cruz do Apodi	2011 and 2012	<i>C. raciborskii</i> , <i>P. limnetica</i> , <i>A. gracile</i> , <i>A. delicatissima</i> and <i>A. incerta</i>
Vieira <i>et al.</i> (2015)	Armando Ribeiro Gonçalves	2009 to 2011	<i>P. agardhii</i>
Costa <i>et al.</i> (2016)	Pocinhos and ESEC	2012 to 2014	<i>P. limnetica</i> and <i>C. raciborskii</i>
<b>Paraíba state (n = 7)</b>			
Costa and Dantas (2011)	Solon de Lucena Lake and Águas Minerais reservoir	2009 and 2010	<i>A. nubila</i> Komárek & Kling
Vasconcelos <i>et al.</i> (2011)	20 reservoirs	2006 to 2009	<i>M. aeruginosa</i> , <i>C. raciborskii</i> , <i>P. agardhii</i> and <i>O. tenuissima</i> Gomont
Vasconcelos <i>et al.</i> (2013)	Acauã, Cordeiro and Camalau	2009	<i>C. raciborskii</i> , <i>M. protocystis</i> and <i>P. agardhii</i>
Azevedo <i>et al.</i> (2015)	Poções and Camalaú	2012	<i>C. raciborskii</i>
Felix <i>et al.</i> (2015)	Alagoa Grande	2012	<i>P. agardhii</i>
Lins <i>et al.</i> (2016)	Agemiro de Figueiredo	2007 to 2009	<i>P. agardhii</i> , <i>C. raciborskii</i> , <i>Dolichospermum circinale</i> (Bornet & Flahault) Wacklin et al. and <i>M. aeruginosa</i>
Mendes <i>et al.</i> (2016)	Acauã, Araçagi, Boqueirão do Cais, Cacimba da Várzea and Cordeiro	2012	<i>C. raciborskii</i> and <i>M. protocystis</i>
<b>Ceará state (n = 5)</b>			
von Sperling <i>et al.</i> (2008)	Gavião	1990 to 2006	<i>C. raciborskii</i> and <i>P. agardhii</i>
Molisani <i>et al.</i> (2010)	Castanhão	2006 and 2007	<i>C. raciborskii</i>
França <i>et al.</i> (2013)	Miranda	2012	<i>C. raciborskii</i> , <i>Planktothrix</i> sp. and <i>P. agardhii</i>

Reference	Reservoir	Year of sampling	Cyanobacteria dominant species
Lopes <i>et al.</i> (2015)	Sítios Novos	2010 and 2011	<i>C. raciborskii</i> and <i>P. agardhii</i>
Lucas <i>et al.</i> (2016)	Rosário	2013	<i>Microcystis</i> sp.
<b>Bahia state (n = 3)</b>			
Teixeira <i>et al.</i> (1993)	Itaparica	1988	<i>Anabaena</i> spp. and <i>Microcystis</i> spp.
Fuentes <i>et al.</i> (2010)	Funil	2007 and 2008	<i>P. agardhii</i>
Moura <i>et al.</i> (2013)	Pedra and Funil	2007 to 2010	<i>P. agardhii</i>

## REFERENCES

- Andrade CM, Gomes TS, Aragão NKCV, Silva EM, Lira GAST, 2008. Estrutura da comunidade fitoplanctônica com ênfase em Cyanobacteria no reservatório de Tapacurá-PE. Rev. Inst. Adolfo Lutz 68:109–117.
- Aragão NKCV, Gomes CTS, Lira GAST, Andrade CM, 2007. Estudo da comunidade fitoplanctônica no reservatório do Carpina- PE, com ênfase em Cyanobacteria. Ver. Inst. Adolfo Lutz 66:240-248.
- Araújo, MFF, Costa, IAS, Chellappa, NT, 2000. Comunidade fitoplanctônica e variáveis ambientais na Lagoa de Extremoz, Natal – RN, Brasil. Acta Limnol. Bras. 12:127-140.
- Azevêdo, DSDJ, Barbosa, JEL, Porto, DE, Gomes, AWI, Molozzi, J, 2015. Biotic or abiotic factors: which has greater influence in determining the structure of rotifers in semi-arid reservoirs? Acta Limnol. Bras. 27:60–77.
- Bittencourt-Oliveira M, Dias S, Moura AN, Cordeiro-Araújo M, Dantas E, 2012b. Seasonal dynamics of cyanobacteria in a eutrophic reservoir (Arcoverde) in a semi-arid region of Brazil. Braz. J. Biol. 72:533–544.
- Bittencourt-Oliveira MC, 2003. Detection of potential microcystin-producing cyanobacteria in Brazilian reservoirs with a mcyB molecular marker. Harmful Algae 2:51-60.
- Bittencourt-Oliveira MC, Cunha MCC, Moura AN, 2009. Genetic polymorphism in Brazilian *Microcystis* spp. (Cyanobacteria) toxic and non-toxic through RFLP-PCR of the cpcBA-IGS. Braz. Arch. Biol. Technol. 52:901–909.
- Bittencourt-Oliveira MC, Massola Jr SN, Hernandez-marine M, Romo S, Moura AN, 2007. Taxonomic investigation using DNA fingerprinting in *Geitlerinema* species (Oscillatoriales, Cyanobacteria). Phycological Res. 55:214–221.
- Bittencourt-Oliveira, MC, Moura, AN, Hereman, TC, Dantas, ÉD, 2011b. 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 3, 245–252.
- Bittencourt-Oliveira, MC, Piccin-Santos, V, Gouvêa-Barros, S, 2012a. Microcystin-producing genotypes from cyanobacteria in Brazilian reservoirs. Environ. Toxicol. 27:461–471.
- Bittencourt-Oliveira, MC, Piccin-Santos, V, Kujbida, P, Moura, AN, 2011. Cylindrospermopsin in water supply reservoirs in Brazil determined by immunochemical and molecular methods. J. Water Resour. Prot. 3:349-355.
- Bittencourt-Oliveira, MC, Piccin-Santos, V, Moura, AN, Aragão-Tavares, NK, Cordeiro-Araújo, MK, 2014. Cyanobacteria, microcystins and cylindrospermopsin in public drinking supply reservoirs of Brazil. An. Acad. Bras. Cienc. 86:297-310.
- Bittencourt-Oliveira, MC, Santos, DMS., Moura, AN, 2010. Toxic cyanobacteria in reservoirs in northeastern Brazil: detection using a molecular method. Braz. J. Biol. 70:1005-1010.
- Bouvy, M, Falcão, D, Marinho, M, Pagano, M, Moura, A, 2000. Occurrence of *Cylindrospermopsis* ( Cyanobacteria ) in 39 Brazilian tropical reservoirs during the 1998 drought 23:13–27.
- Bouvy, M, Molica, R, Oliveira, S, Marinho, M, Beker, B, 1999. Dynamics of a toxic cyanobacterial bloom (*Cylindrospermopsis raciborskii*) in a shallow reservoir in the semi-arid region of northeast Brazil. Aquat. Microb. Ecol. 20:285–297.
- Bouvy, M, Nascimento, SM, Molica, RJR, Ferreira, A, Huszar, V, Azevedo, SMFO, 2003. Limnological features in Tapacurá reservoir (northeast Brazil) during a severe drought. Hydrobiologia 493:115-130.
- Câmara, F, Rocha, O, Pessoa, EKR, Chellappa, S, Chellappa, NT, 2015. Morphofunctional changes of phytoplankton community during pluvial anomaly in a tropical reservoir. Braz. J. Biol. 75:628–637.

- Campeche, D, Pereira, L, Figueiredo, R, Paulino, R, Alves, MA, Nova, LLVM, Guedes, EAC, 2009. Limnological parameters and phytoplakton in fishponds with tambaqui, *Colossoma macropomum* (Cuvier, 1816) in the semi-arid region. *Acta Limnol. Bras.* 21:333-341.
- Carmichael, W, Azevedo, S, An, J, Molica, R, Jochimsen, E, Lau, S, Rinehart, K, Shaw, G, Eaglesham, G, 2011. Human fatalities fromcyanobacteria - chemical and biological evidence for cyanotoxins. *Environ. Heal. Perspect.* 109:663–668.
- Chellappa, N, Borba, J, Rocha, O, 2008b. Phytoplankton community and physical-chemical characteristics of water in the public reservoir of Cruzeta, RN, Brazil. *Braz. J. Biol.* 68:477–494.
- Chellappa, N, Câmara, F, Rocha, O, 2009. Phytoplankton community: indicator of water quality in the Armando Ribeiro Gonçalves Reservoir and Pataxó Channel, Rio Grande do Norte, Brazil. 69:241–251.
- Chellappa, NT, Chellappa, SL, Chellappa, S, 2008a. Harmful phytoplankton blooms and fish mortality in a eutrophicated reservoir of Northeast Brazil. *Brazilian Arch. Biol. Technol.* 51:833–841.
- Chellappa, NT, Costa, MAM, 2003. Dominant and co-existing species of Cyanobacteria from a Eutrophicated reservoir of Rio Grande do Norte State, Brazil. *Acta Oecol.* 24:S3-S10.
- Costa, DF, Dantas, ÉW, 2011. Diversity of phytoplankton community in different urban aquatic ecosystems in metropolitan João Pessoa, state of Paraíba, Brazil. *Acta Limnol. Bras.* 23:394–405.
- Costa, IAS, Araújo, FF, Chellappa, NT, 1998. Estudo do fitoplâncton da barragem Engenheiro Armando Ribeiro Gonsalves, Assu/RN. *Acta Limnol. Bras.* 10:67-80.
- Costa, IAS, Azevedo, SMFO, Senna, PAC, Bernardo, Costa, SM, Chellappa, NT, 2006. Occurrence of toxin-producing cyanobacteria blooms in a Brazilian semiarid reservoir. *Braz. J. Biol.* 66:211–219.
- Costa, MRA, Attayde, JL, Becker, V, 2016. Effects of water level reduction on the dynamics of phytoplankton functional groups in tropical semi-arid shallow lakes. *Hydrobiologia* 778:75–89.
- Dantas, ÉW, Bittencourt-Oliveira, MC, Moura, AN, 2012. Dynamics of phytoplankton associations in three reservoirs in northeastern Brazil assessed using Reynolds' theory. *Limnologica* 42:72–80. doi:10.1016/j.limno.2011.09.002
- Dantas, ÉW, Moura, AN, Bittencourt-Oliveira, MC, 2011. Cyanobacterial blooms in stratified and destratified eutrophic reservoirs in semi-arid region of Brazil. *An. Acad. Bras. Cienc.* 83:1327–1338.
- Domingos, P, Rubim, TK, Molica, RJR, Azevedo, SMFO, Carmichael, WW, 1999. First report of microcystin production by picoplanktonic cyanobacteria isolated from a northeast Brazilian drinking water supply. *Environ. Toxicol.* 14:31–35.
- Eskinazi-Santana, EM, Menezes, R, Costa, IS, Araújo, M, Panosso, R, Attayde, JL, 2013. Zooplankton assemblages in eutrophic reservoirs of the Brazilian semi-arid. *Braz. J. Biol.* 73:37–52.
- Felix, TR, Oliveira Neto, TS, Nascimento, IN, Lucena, RB, Barbosa, LG, Rodrigues, ML, Guerra, RR, 2015. Eutrophication and Effects Under Fish Histology in Shallow Lake in Semiarid of Brazil. *Aust. J. Basic Appl. Sci.* 9:668–673.
- Fonseca, JR, Vieira, SPC, Kujbida, P, Costa, IAS, 2015. Cyanobacterial occurrence and detection of microcystins and saxitoxins in reservoirs of the Brazilian semi-arid. *Acta Limnol. Bras.* 27:78–92.
- França, J.M.B., Wachholz, F., Carneiro Neto, J.A., Paulino, W.D., 2013. Comportamento das variaveis qualitativas do Açude Pereira de Miranda - Pentecoste/CE, no período de estiagem. *Geociencias* 32:586-599.

- Fuentes, EV, Oliveira, HSB, Cordeiro-Araújo, MK, Severi, W, Moura, AN, 2010. Variação espacial e temporal do fitoplâncton do Rio de Contas, Bahia, Brasil. Rev. Bras. Eng. Pesca 5:13-25.
- Góis, JS, Oliveira, FHPG, 2014. Variação sazonal das cianobactérias como parâmetro para análise da qualidade da água do reservatório Mororó, no Município de Pedra/PE. Revista Brasileira de Geografia Física 7:1015-1023.
- Huszar, VLM, Silva, LHS, Marinho, M, Domingos, P, Anna, CLS, 2000. Cyanoprokaryote assemblages in eight productive tropical Brazilian waters. Hydrobiologia 424:67–77.
- Lins, RPM, Barbosa, LG, Minillo, A, Ceballos, BSO, 2016. Cyanobacteria in a eutrophicated reservoir in a semi-arid region in Brazil: dominance and microcystin events of blooms. Rev. Bras. Bot. 39:583-591.
- Lira, GAST, Araújo, EL, Bittencourt-Oliveira, M do C, Moura, AN, 2011. Phytoplankton abundance, dominance and coexistence in an eutrophic reservoir in the state of pernambuco, Northeast Brazil. An. Acad. Bras. Cienc. 83:1313–1326.
- Lira, GAST, Moura, AN, Vilar, MCP, Cordeiro-Araújo, MK, Bittencourt-Oliveira, MC, 2014. Vertical and temporal variation in phytoplankton assemblages correlated with environmental conditions in the Mundaú reservoir, semi-arid northeastern Brazil. Braz. J. Biol. 93:93-102.
- Lopes, IKC, Barros, MUG, Pestana, CJ, Capelo Neto, J, 2015. Prevalence of paralytic shellfish poison-producing *Planktothrix agardhii* and *Cylindrospermopsis raciborskii* in a Brazilian semi-arid reservoir. Acta Limnol. Bras. 27:238–246.
- Lucas, FHR, Rangel Junior, A, Amorim, CA, Costa, ARS, Cavalcante, FC, Lacerda, SR, 2015. Variação temporal da comunidade fitoplanctônica no Reservatório Rosário/CE. Cad. Cult. Ciênc. 14:35-43.
- Marcon, A.E., Ferreira, D.M., Moura, M.F.V., Campos, T.F.C., Amaral, V.S., Agnez-Lima, L.F., Medeiros, S.R.B., 2010. Genotoxic analysis in aquatic environment under influence of cyanobacteria, metal and radioactivity. Chemosphere 81:773-780.
- Medeiros, LC, Mattos, A, Lürling, M, Becker, V, 2015. Is the future blue-green or brown? The effects of extreme events on phytoplankton dynamics in a semi-arid man-made lake. Aquat. Ecol. 49, 293-307.
- Mendes, CF, Barbosa, JEL, Nery, JF, 2016. Microcystin Accumulation and Potential Depuration on Muscle of Fishes of Fish Farm: Implications to Public Health. Int. J. Innov. Stud. Aquat. Biol. Fish. 2:2454–7670.
- Menezes, RF, Attayde, JL, Vasconcelos, FR, 2010. Effects of omnivorous filter-feeding fish and nutrient enrichment on the plankton community and water transparency of a tropical reservoir. Freshw. Biol. 55:767-779.
- Molica, R, Onodera, H, García, C, Rivas, M, Andrinolo, D, Nascimento, S, Meguro, H, Oshima, Y, Azevedo, S, Lagos, N, 2002. Toxins in the freshwater cyanobacterium *Cylindrospermopsis raciborskii* (Cyanophyceae) isolated from Tabocas reservoir in Caruaru, Brazil, including demonstration of a new saxitoxin analogue. Phycologia 41:606–611.
- Molica, RJR, Oliveira, EJA, Carvalho, PVVC, Costa, ANSF, Cunha, MCC, Melo, GL, Azevedo, SMFO, 2005. Occurrence of saxitoxins and an anatoxin-a(s)-like anticholinesterase in a Brazilian drinking water supply. Harmful Algae 4:743–753.
- Molisani, MM, Barroso, HS, Becker, H, Moreira, OMP, Hijo, CAG, Monte, TM, Vasconcellos, GH, 2010. Trophic state, phytoplankton assemblages and limnological diagnosis of the Castanhão Reservoir, CE, Brazil. Acta Limnol. Bras. 22:1–12.
- Moura, AN, Bittencourt-Oliveira, MC, Chia, MA, Severiano, JS, 2015. Co-occurrence of *Cylindrospermopsis raciborskii* (Woloszynska) Seenaya & Subba Raju and *Microcystis*

- panniformis* Komárek et al. in Mundaú reservoir, a semiarid Brazilian ecosystem. Acta Limnol. Bras. 27:322-329.
- Moura, AN, Bittencourt-Oliveira, MC, Dantas, ÉW, Arruda Neto, JDT, 2007c. Phytoplanktonic associations: a tool to understanding dominance events in a tropical Brazilian reservoir. Acta Bot. Bras. 21:641-648.
- Moura, AN, Bittencourt-Oliveira, MC, Mendonça, DFP, Oliveira, HSB, Dantas, ÉW, Pimentel, RMM, 2007b. Microalgas e qualidade da água de manancial utilizado para abastecimento público localizado na Região Metropolitana da Cidade do Recife, PE, Brasil. Revista de Geografia 24:154-178.
- Moura, AN, Dantas, ÉW, Bittencourt-Oliveira, MC, 2007a. Structure of the Phytoplankton in a Water Supply System in the State of Pernambuco - Brazil. Brazilian Archives of Biology and Technology 50, 645–654.
- Moura, AN, Dantas, ÉW, Oliveira, HSB, Bittencourt-Oliveira, MC, 2011. Vertical and temporal dynamics of cyanobacteria in the Carpina potable water reservoir in northeastern Brazil. Braz. J. Biol. 71:1-9.
- Moura, AN, Nascimento, EC, Dantas, ÉW, 2012. Temporal and spatial dynamics of phytoplankton near farm fish in eutrophic reservoir in Pernambuco, Brazil. Rev. Biol. Trop. 60, 581-597.
- Moura, AN, Severiano, JS, Aragão-Tavares, NKA, Dantas, EW, 2013. The role of a cascade of reservoirs and seasonal variation in the phytoplankton structure in a tropical river. Braz. J. Biol. 73:291–298.
- Oliveira, FHPC, Ara, ALSC, Moreira, CHP, Lira, OO, Padilha, MDRF, Shinohara, NKS, 2014. Seasonal changes of water quality in a tropical shallow and eutrophic reservoir in the metropolitan region of recife (pernambuco-Brazil). An. Acad. Bras. Cienc. 86:1863–1872.
- Oliveira FHPC, Silva JDB, Costa ANSF, Ramalho WP, Moreira CHP, Calazans TLS, 2015. Comunidade de cianobactérias em dois reservatórios eutróficos e tropicais no nordeste do Brasil. Acta Sci. - Biol. Sci. 37:169–176.
- Piccin-santos V, Bittencourt-Oliveira MC, 2012. Toxic cyanobacteria in four Brazilian water supply reservoirs. J. Environ. Prot. 3:68–73.
- Silva Pinto T, Becker V, 2014. Diel dynamic of phytoplankton functional groups in a tropical water supply, Extremoz Lake, northeastern Brazil. Acta Limnol. Bras. 26:356-366.
- Silva AP, Costa IAS, 2015. Biomonitoring ecological status of two reservoirs of the Brazilian semi-arid using phytoplankton assemblages (Q index). Acta Limnol. Bras. 27:1-14.
- Silva EM, Gomes CTDS, Ramos CPDS, Bricio SML, 2013. Occurrence of cyanobacteria in Mundaú Reservoir, in Pernambuco State during January 2010 to November 2011. Vigilância Sanitária em Debate 1:35–42.
- Teixeira MGLC, Costa MCN, Carvalho VLP, Pereira MS, Hage E, 1993. Gastroenteritis Epidemic in the Area of the Itaparica Dam, Bahia, Brazil. Bulletin of PAHO 27:244-253.
- Vasconcelos JF, Barbosa JEL, Diniz CR, Ceballos BSO, 2011. Cianobactérias em reservatórios do Estado da Paraíba: ocorrência, toxicidade e fatores reguladores. Boletim ABLimno, 39:1-20.
- Vasconcelos JF, Barbosa JEL, Lira W, Azevedo SMFO, 2013. Microcystin bioaccumulation can cause potential mutagenic effects in farm fish. Egypt. J. Aquat. Res. 39:185-192.
- Vieira PCS, Cardoso MML, Costa IAS, 2015. Vertical and temporal dynamics of phytoplanktonic associations and the application of index assembly in tropical semi-arid eutrophic reservoir, northeastern Brazil. Acta Limnol. Bras. 27:130-144.

von Sperling E, Ferreira ACS, Gomes LNL, 2008. Comparative eutrophication development in two Brazilian water supply reservoirs with respect to nutrient concentrations and bacteria growth. Desalination 226:169-174.