Optimization of cryopreservation method for toxin-producing cyanobacteria

By Lalung, J (Lalung, Japareng) [1] ; Mohamad, R (Mohamad, Rohaslinda) [1] ; Rafatullah, M (Rafatullah, Mohd) [2] ; Ismail, N (Ismail, Norli) [1] ; Zainuddin, Z (Zainuddin, Zarina) [3] , [4]

Source MALAYSIAN JOURNAL OF MICROBIOLOGY

View Journal Impact

Volume: 22 Issue: 2 Page: 264-270

DOI: 10.21161/mjm.260035

Published APR 2026

Indexed 2026-05-07

Document Type Article

Abstract Aims: The process of isolating cyanobacteria from various environments and ecosystems can be challenging, consuming a

lot of time and laborious. Therefore, to maintain cyanobacterial culture, including toxin-producing cyanobacteria, for a longer period, the best preservation method should be developed and established. This study was conducted to assess the effectiveness of cryopreservation of isolated toxin-producing cyanobacterial strains from aquatic environments using deep freezing with methanol as the cryoprotectant. Methodology and results: Twelve strains of cyanobacteria were isolated from various locations in Malaysia and inoculated in BG11 media supplemented with 0%, 5%, and 10% methanol and kept in-20 degrees C freezer for one, two and three months. The strains' viability was observed for one month at room temperature after being preserved in the freezer. The evaluated cyanobacteria exhibited different responses to the cryopreservation protocols following their classification and group. Storage in the-20 degrees C freezer was not suitable for the filamentous cyanobacterial strain, Leptolyngbya frigida ANT.L52B.3, while five out of the twelve strains tested were still viable only when cryopreserved in the presence of methanol. Meanwhile, a total of five strains (Synechococcus sp. EO68, Synechococcus sp. M1, Nodosilinea cf. nodulosa LEGE 10377, Cephalothrix komarekiana SAG 75.79 and Oscillatoria sp. OF9) responded well with methanol, showing high post-thaw viability even after three months of preservation. Conclusion, significance and impact of study: Our results demonstrated that methanol is suitable for preserving most toxin-producing cyanobacterial strains tested in this study, offering a practical alternative to costly and time-consuming maintenance processes while conserving valuable genetic resources.

Keywords

Author Keywords: Cryopreservation; effectiveness; methanol; toxin-producing cyanobacteria; viability

Keywords Plus: PRESERVATION METHODS; MICROALGAE

Author Information

Corresponding Address: Zainuddin, Zarina (corresponding author)

Int Islamic Univ Malaysia, Dept Plant Sci, Kulliyyah Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia

Corresponding Address: Zainuddin, Zarina (corresponding author)

Int Islamic Univ Malaysia, Plant Prod & Sustainable Resource Unit, Kulliyyah Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia
E-mail Addresses :
zzarina@iium.edu.my
Addresses :
[1] Univ Sains Malaysia, Sch Ind Technol, Minden 11800, Pulau Pinang, Malaysia
[2] Prince Mohammad Bin Fahd Univ, Dept Math & Nat Sci, POB 1664, Al Khobar 31952, Saudi Arabia
[3] Int Islamic Univ Malaysia, Dept Plant Sci, Kulliyyah Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia
[4] Int Islamic Univ Malaysia, Plant Prod & Sustainable Resource Unit, Kulliyyah Sci, Jalan Sultan Ahmad Shah, Kuantan 25200, Pahang, Malaysia
E-mail Addresses :
zzarina@iium.edu.my

Categories/ Classification Research Areas: Microbiology

Web of Science Categories Microbiology

Funding

View funding text

Funding agency	Grant number
Universiti Sains Malaysia	1001/PTEKIND/811253

+ See more data fields

Journal information

MALAYSIAN JOURNAL OF MICROBIOLOGY

← View Journal Impact

0.09
Journal Citation Indicator ™ (2024)

ISSN	1823-8262
eISSN	2231-7538
Current Publisher	MALAYSIAN SOC MICROBIOLOGY, UNIV SAINS MALAYSIA, SCHOOL BIOLOGICAL SCIENCES, PENANG 11800, MALAYSIA
Research Areas	Microbiology
Web of Science Categories	Microbiology

Citation Network

In Web of Science Core Collection

0 Citations

Create citation alert

28
Cited References

→ View Related Records

How does this document's citation performance compare to peers?

Use in Web of Science

0
Last 180 Days

0
Since 2013

Learn more →

This record is from:

Web of Science Core Collection

- Emerging Sources Citation Index (ESCI)

Suggest a correction
If you would like to improve the