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منظمة الأغذية والزراعة للأمم المتددة

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# **COMMISSION ON GENETIC RESOURCES** FOR FOOD AND AGRICULTURE

# **INTERGOVERNMENTAL TECHNICAL WORKING GROUP ON** AQUATIC GENETIC RESOURCES FOR FOOD AND AGRICULTURE

**Fourth Session** 

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# **OUTLINE OF GUIDELINES FOR EX SITU IN VITRO GENE BANKING OF AQUATIC SPECIES**

The Intergovernmental Technical Working Group on Aquatic Genetic Resources for Food and Agriculture (Working Group), at its Second Session in 2018, recommended the development of voluntary guidelines and frameworks on a series of issues including on gene banking.<sup>1</sup>

This document presents the outline of guidelines on ex situ in vitro gene banking. Content development for these guidelines is underway and is part of FAO's activities in follow-up to the adoption of the Global Plan of Action for the Conservation, Sustainable Use and Development of Aquatic Genetic Resources (Global Plan of Action). The guidelines aim to specifically support countries in implementing strategic priority 2.4 of the Global Plan of Action as summarized in the document Status of the Implementation of the Global Plan of Action for the Conservation, Sustainable Use and Development of Aquatic Genetic Resources.<sup>2</sup>

The guidelines currently being developed on the basis of the outline will support countries and relevant stakeholders in making decisions on: when to adopt ex situ in vitro conservation; which resources to conserve and how; cost implications and strategies for long-term maintenance of a gene bank; and regulating access to conserved AqGR. The guidelines cover techniques across a range of taxa (including finfish, crustaceans, molluscs, seaweeds and microalgae) in the context of their use in aquaculture and their conservation. While cryopreservation is the main technology considered, other approaches are also addressed. The guidelines are primarily addressed at: policy-makers, resource managers and aquaculture producers.

<sup>2</sup> CGRFA/WG-AqGR-4/23/3, paragraph 16.

<sup>&</sup>lt;sup>1</sup> CGRFA/WG-AqGR-2/18/Report, paragraph 25.

# Outline

#### Executive Summary

#### Glossary

#### 1. Introduction

Introduction on scope and objectives of the guidelines in terms of: field of applications; targeted stakeholders; and taxonomic coverage.

#### 2. Background

Brief overview of main sector developments that have shaped the gene banking options currently available to the aquaculture sector.

#### 3. Why and when to use *ex situ in vitro* conservation

Overview of reasons for adopting *ex situ in vitro* conservation and examples of cases of applications.

4. **Repositories: information management, interactions and networking** Description of a gene bank structure and its main operational processes.

# **5.** Technical overview of *in vitro ex situ* gene banking Introduction to:

- Cryopreservation principles
- Existing ex situ in vitro conservation methods, including non-cryopreservation methods

A detailed description of existing *ex situ in vitro* conservation methods is provided in separate subsections related to the main taxonomic groups, as follows.

#### 5.1 Finfish

- Germplasm and tissues that can be preserved and related advantages and disadvantages for each of them
- Cryopreservation methods
  - Current methods (steps, factors affecting the success of each method and examples of applications)
- Non-cryopreservation methods
  - Current methods (steps, factors affecting the success of each method and examples of applications)

#### 5.2 Shellfish

- Germplasm and tissues that can be preserved and related advantages and disadvantages for each of them
- Cryopreservation methods
  - Current methods (steps, factors affecting the success of each method and examples of applications)
- Non-cryopreservation methods
  - Current methods (steps, factors affecting the success of each method and examples of applications)

#### 5.3 Algae

- Germplasm and tissues that can be preserved and related advantages and disadvantages for each of them
- Cryopreservation methods

- Current methods (steps, factors affecting the success of each method and examples of applications)
- Non-cryopreservation methods
  - Current methods (steps, factors affecting the success of each method and examples of applications)

#### 6 Practical considerations

Overview of practical aspects concerning:

- Costs and funding
- International and national regulations on moving and using genetic material
- Access and benefit-sharing
- Training and sustainability
- Future directions

#### 7 Appendices

#### 7.1 Protocols for key commercial species and/or taxonomic groups

#### 7.2 Case studies

- Conservation of aquatic species in a national gene bank
- Recent advances in the conservation of endangered Brazilian fish species with *in vitro* germ cell conservation and transplant: the case of the National Center for Research and Conservation of Aquatic Biodiversity
- Cryopreservation methods and repository development for corals and other cnidarians
- Cryogenics: lessons learned in two decades of experience
- *Ex-situ in vitro* conservation and gene banking at the Fish Genetic Resource Repository and Museum of the Indian National Bureau of Fish Genetic Resources
- Use of cryotechnologies for conserving AqGR in the Russian Federation
- The dream and the reality: two decades of running an independent fish gene bank