MOLECULAR APPROACHES FOR ALGAE IDENTIFICATION: ENSURING ACCURATE SPECIES ASSIGNMENT

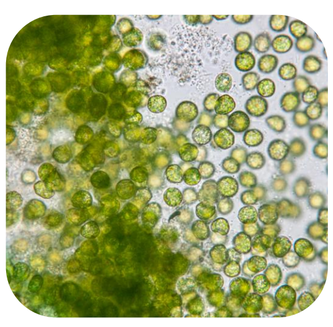
Iris A. L. Silva 1#*, Morgana Angelo 1#, Inês Freitas 1, Raquel Quintã 1, Carole Gonçalves 1, Pedro Pousão-Ferreira 1,2, Cátia Lourenço-Marques 1,2

1 S2AQUA, Olhão, Portugal; 2 IPMA/EPPO, Olhão, Portugal.

*Email: **iris.silva@s2aquacolab.pt** #Contributed equally

Overview

Accurate **species identification** for biobanks, research institutions, aquaculture facilities, and algae related industry





Highly relevant for **morphologically similar** species

Services available for academia and industry

Results in ~ 48h

Methodology



Sample received

Fresh, frozen or dried



gDNA automated extraction

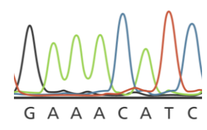
Maxwell® RSC instrument for more reliable and reproducible results



PCR with species-specific primers

its1/cox1 → Macroalgae

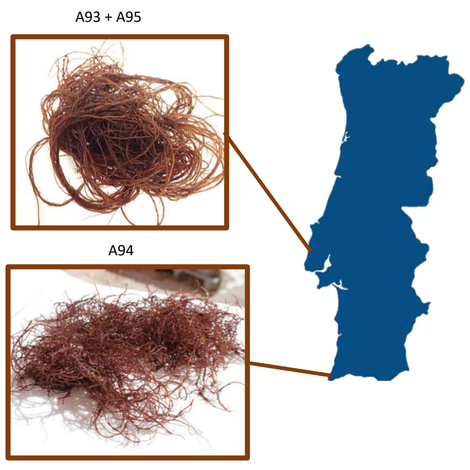
23s → Microalgae



Sanger sequencing of PCR product

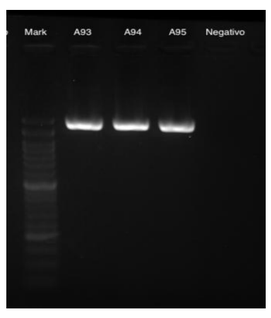
Sequence is compared against reference databases for phylogenetic analysis

Case studies

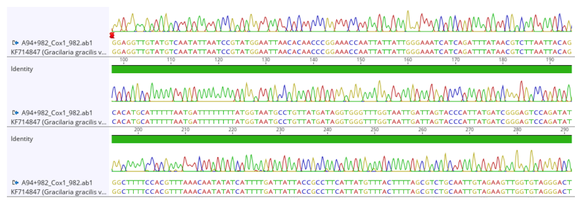


→ Three specimens of ***Gracilaria* sp.** harvested in two different locations in Portugal were selected as expected *Gracilaria gracillis.*

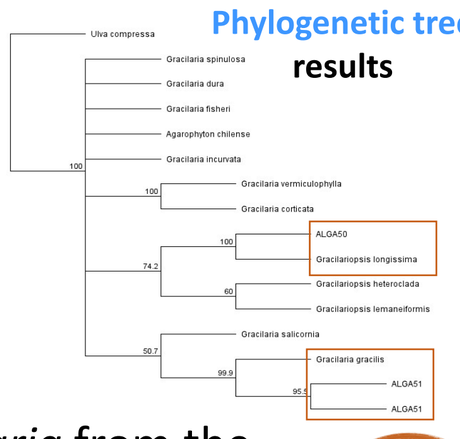
PCR results



Sequencing results compared with NCBI database



Phylogenetic tree results



→ Molecular analysis showed that *Gracilaria* from the Center of Portugal was a **different specie** *(Gracilariopsis longissima)* = different applications = added value!



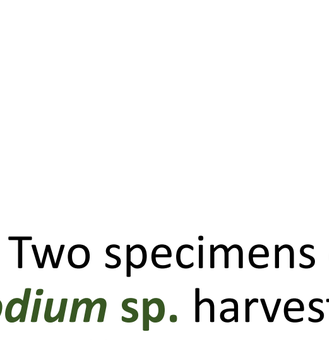


→ Two specimens of ***Codium* sp.** harvested in two different locations in Portugal were selected as expected *Codium tomentosum.*

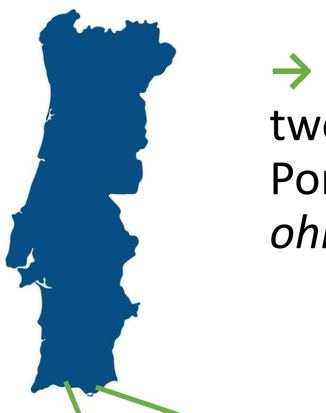
PCR results



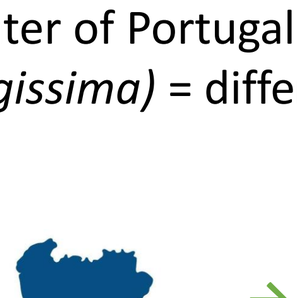
Phylogenetic tree results



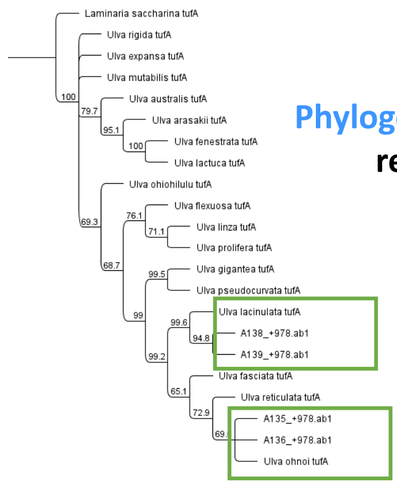
→ Molecular analysis showed that *Codium* from the south was a **different specie** (*C. fragile)* then the specie from the north *(C. tomentosum) = invasive specie = discarded!*



→ Four specimens of ***Ulva* sp.** harvested in two different locations in the South of Portugal were selected as expected *Ulva ohnoi.*



Phylogenetic tree results



→ Molecular analysis showed that *Ulva* from Faro and Olhão was a **different specie** (*U. lacinulata)* then the specie from Tavira *(U. ohnoi) = accurate species ID = more knowledge!*

Species already identified



Ulva sp.
U. ohnoi
U. mutabilis
U. lacinulata



Codium sp.
C. tomentosum
C. fragile
C. decorticatum



Gracilaria sp.
G. gracillis
G. longissima



Chondrus crispus



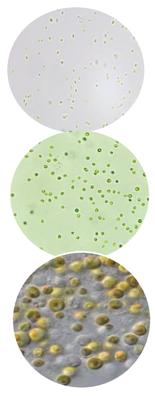
Laminaria ochroleuca



Saccharina latissima



Saccorhiza polyschides



***Microalgae**:*
Dunaliella salina
Rhodomonas salina
Nannochloropsis oceanica
Gymnodinium catenatum
Gambierdiscus excentricus
Isochrysis galbana



***Zooplankton**:*
Brachionus plicatilis
Brachionus rotundiformis
Artemia tibetiana

Take home message

- In this example, three different species were identified by **molecular tools** when morphological analises were unable to differentiate them
- Several species were already identifed with this method, showing **effectiveness and reliability**
- All these analyses can be **tailor-made** upon request
- This method **enhances species traceability** for use in different sectors

Acknowledgments: This study had the support of the projects WP9- Portuguese Blue Biobank under the Blue Economy Pact - Project Nº. C644915664-00000026 and Interface Mission cofinanced by PRR - Plano de Recuperação e Resiliência by the European Union (operation code 01/C05-i02/2022.P148) and Interface Mission cofinanced by PRR - Plano de Recuperação e Resiliência by the European Union (operation code 01/C05-i02/2022.P148).

S2AQUA - Laboratório Colaborativo, Associação para uma Aquacultura Sustentável e Inteligente
Av. Parque Natural da Ria Formosa s/n
8700-194 Olhão
PORTUGAL
Tlf: + 351 289 715 346 | geral@s2aquacolab.pt

PROJETO Nº C644915664-00000026