Údarás na Gaeltachta

SWGROW

Cliodhna Ní Ghriofa

Objective

"Increase economic opportunities in the seaweed industry by developing innovative working practices that can be widely adopted by many SMEs in the NPA region to develop quality seaweed products of a consistent standard that are identifiable and can be clearly branded"

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Work Plan

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DNA Tagging
Clibeáil DNA

+

Cultivation
Saothrú

+

Sustainability
Inbhuanaithe

Branding
Brandáil

Sustainability

- Renewable, heat recovery
- Shared infrastructure
- Waste to Fuel-palletisation of seaweeds for Combined Heat and Power Systems (CHP).

Cultivation

- Sustainability-reduce the pressure on wild populations
- Investigate nutritional quality-cultivated VS wild populations
- Exchange of techniques between academia and SME producers

Branding

- Establishing a unique brand for NPA seaweed will allow SMEs to gain market share throughout Europe - and further afield

Údarás Role

- Intermediator with SME's for Pilots
- Communication & Dissemination
- Organize Seaweed Events

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- Lews Castle College
- Project Lead- Coordination

- TARI- Faroe Seaweed
- Cultivation & piloting

- An Lanntair
- Historical Seaweed Research & Brand Development

- Technical University Of Denmark
- Waste reduction in Seaweed

- Swedish University of Agricultural Sciences
- Carbon, nitrogen, biomass and calorimetric content reports.

- NUI Galway
- DNA tagging of Seaweed
- Development of DNA testing Kit

- University of Iceland
- Seaweed Biofuel

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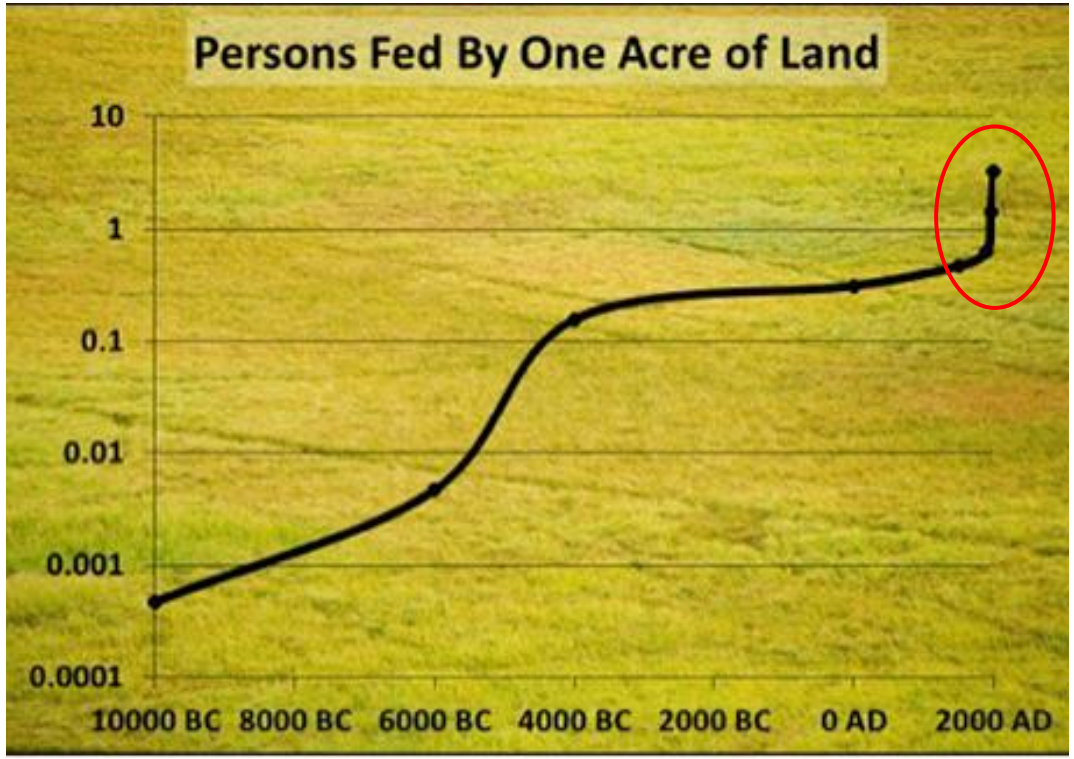
Seaweed breeding and identification: can we develop geographical labels of highly productive seaweeds?

Ronan Sulpice,
Plant Systems Biology lab, Ryan Institute, NUI Galway

Food production per acre of land over the ages



Beginning of agriculture

X1000 of food production / acre in 10,000 years

The large increase in food production over the last 10,000 years is due to the emergence of agriculture

Two aspects of this:

- **Better farming techniques**

- Selection of elite varieties -> **Domestication/ Artificial selection and recently protection of the varieties**

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Context seaweed production worldwide

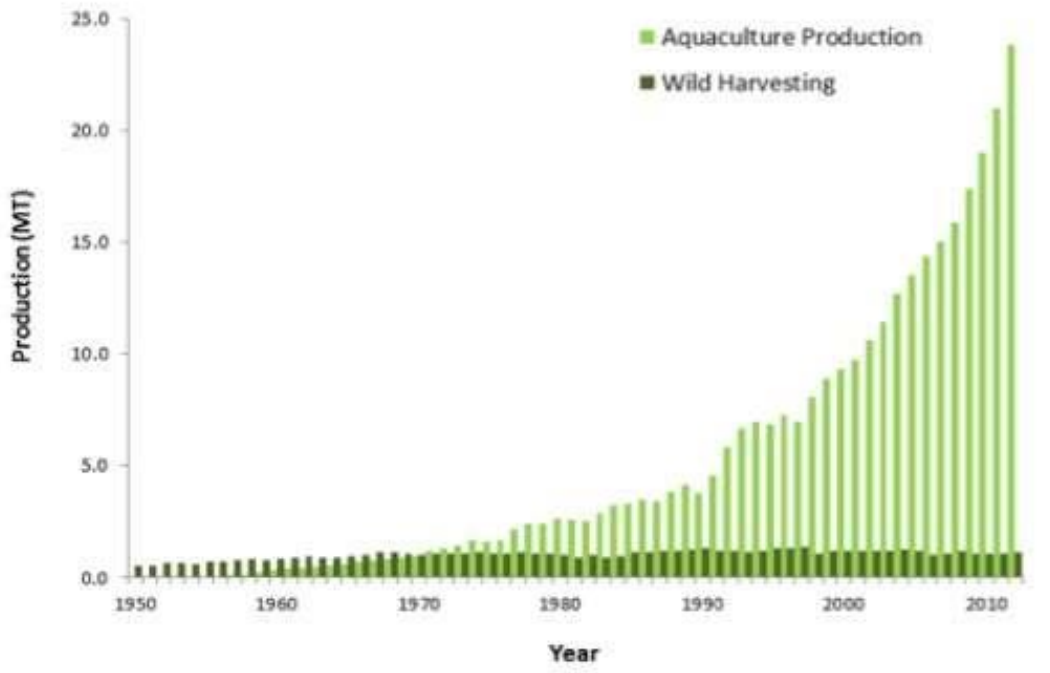
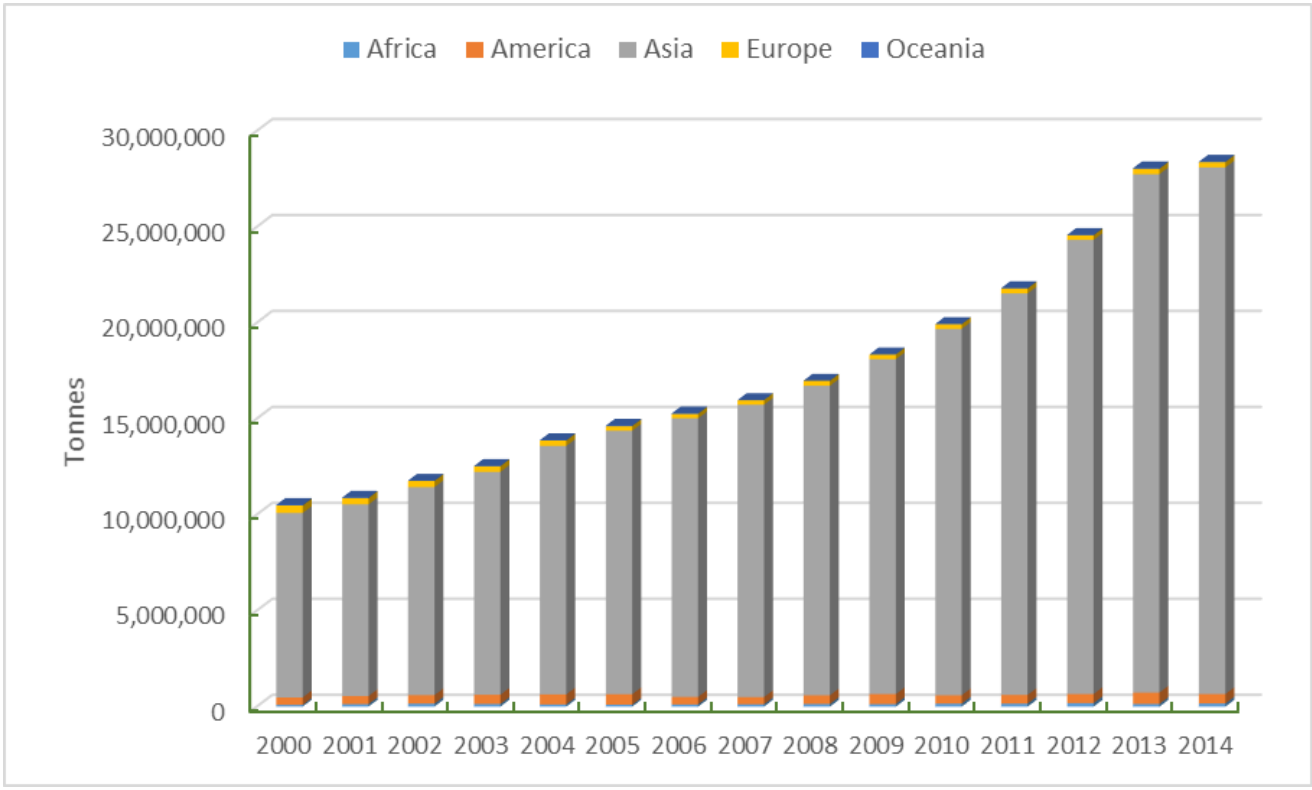


Figure 1. **Global seaweed aquaculture production (1950-2014). FAO (2015)**



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The expanding seaweed industry doesn't rely on modern breeding

The strains used are generally **not domesticated and are largely unprotected**

The growth and nutritional content of seaweed are **still poorly understood**

- What do seaweed use for growth?
- How do they assimilate Carbon?
- How do they assimilate nutrients?
- Which environmental factors most affect growth?
- **Is there genetic variation affecting growth?**
- **Can strains be selected for higher yield?**

DNA: possibility for branding and traceability?

- **Is there genetic variation between geographical locations?**
- **If so, can we develop a cheap method to identify origin of seaweeds?**

> Those points are answered for land plants/crops, but not seaweeds

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Our approach

1. Identify among LOCAL strains fast growing and high quality ones

2. Develop DNA markers to distinguish species and their geographical origin

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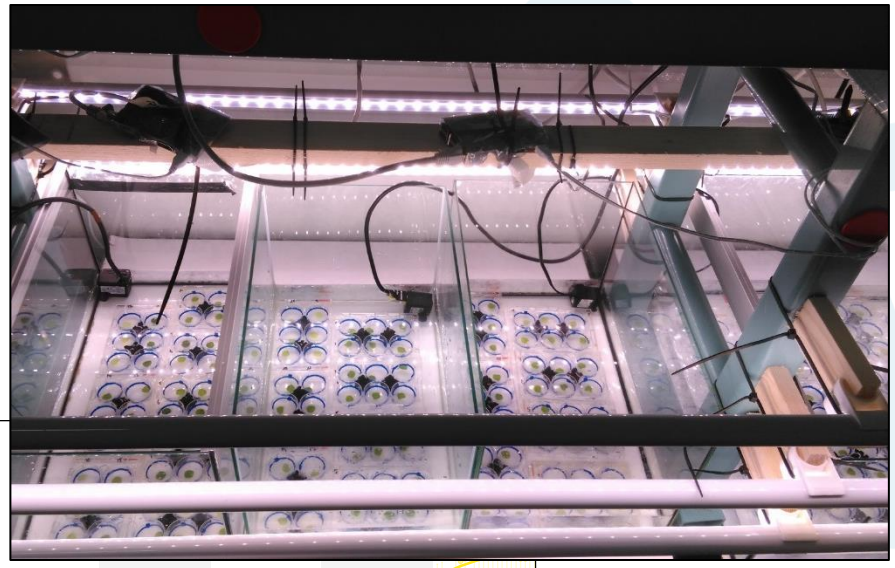
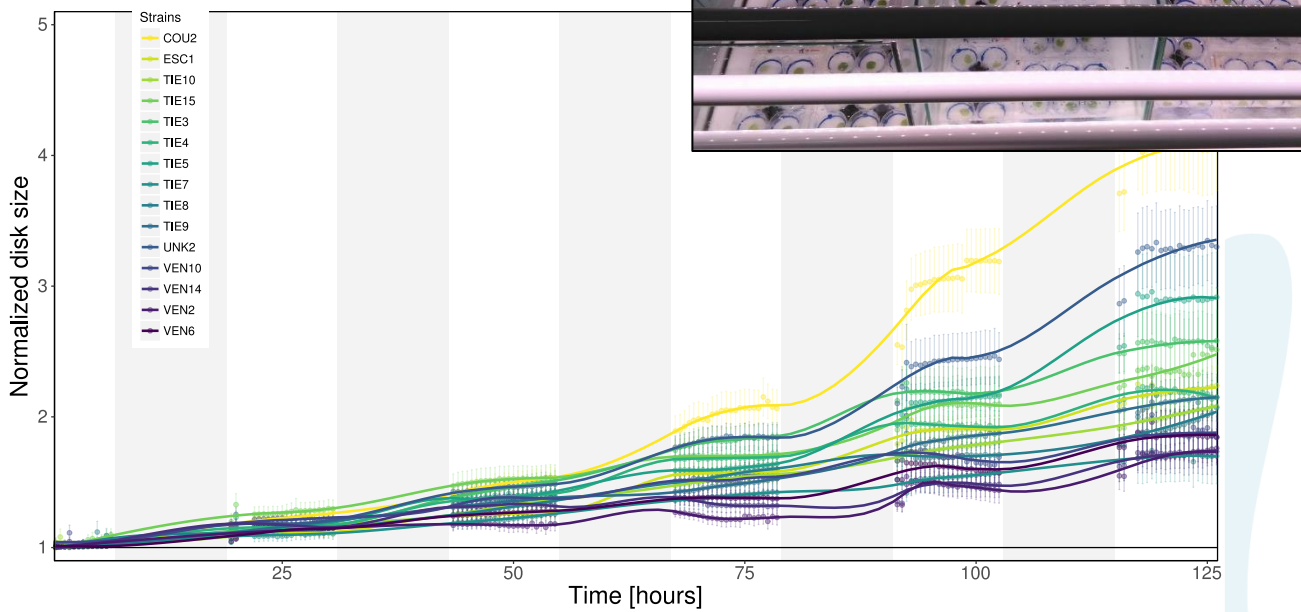
Phenotyping system

Currently:

- 9 remote-controlled Raspberry pi computers
- Image capture every 2 minutes during daylight
- Discs of *Ulva* thallus
- Artificial seawater + nutrients
- Can change environmental conditions





Also applicable for *Sacharina latissimi etc.*.

Fort et al, Plant physiology 2019

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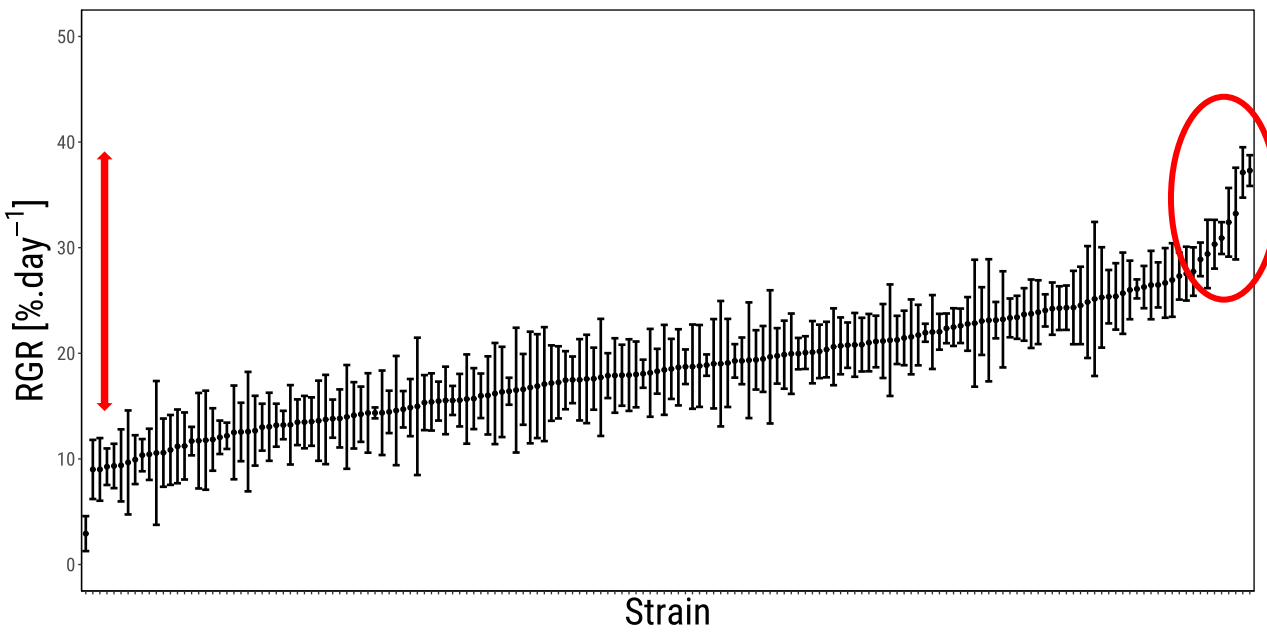
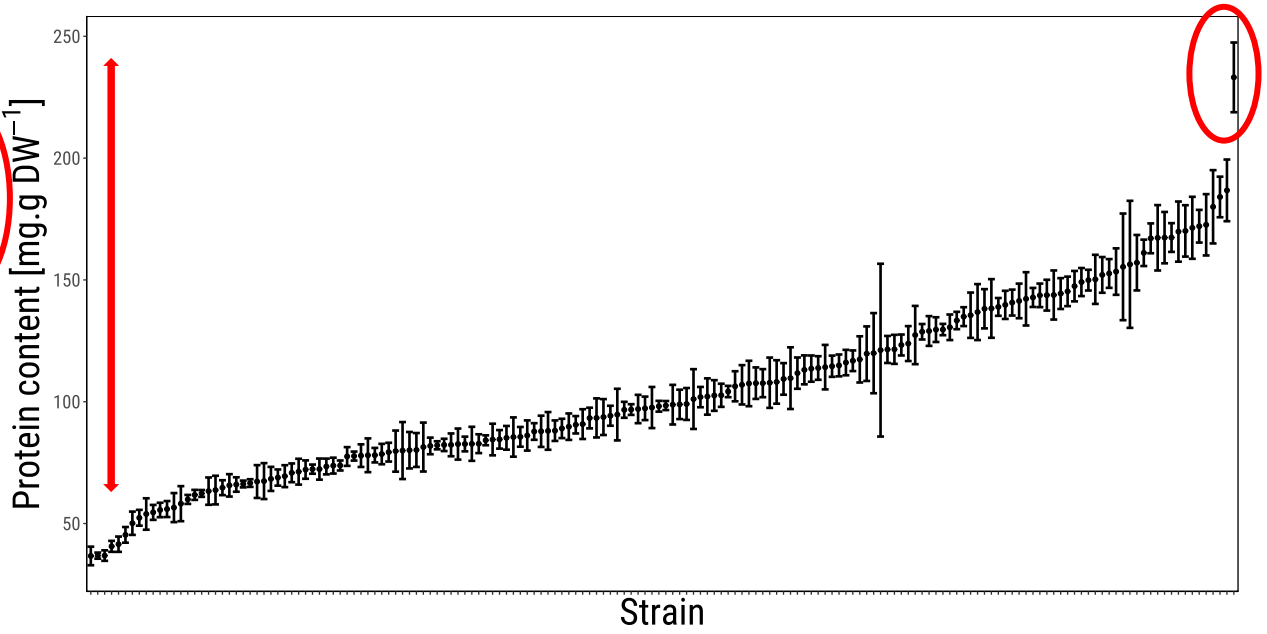
Up to 5 fold differences in protein and growth rates!





~4-fold difference in growth rates (10 to 40% biomass increase per day) and ~5-fold difference in protein content demonstrate the potential to **increase yield(s) following strain selection.**

Also large differences in starch, nitrate accumulation, pigments…

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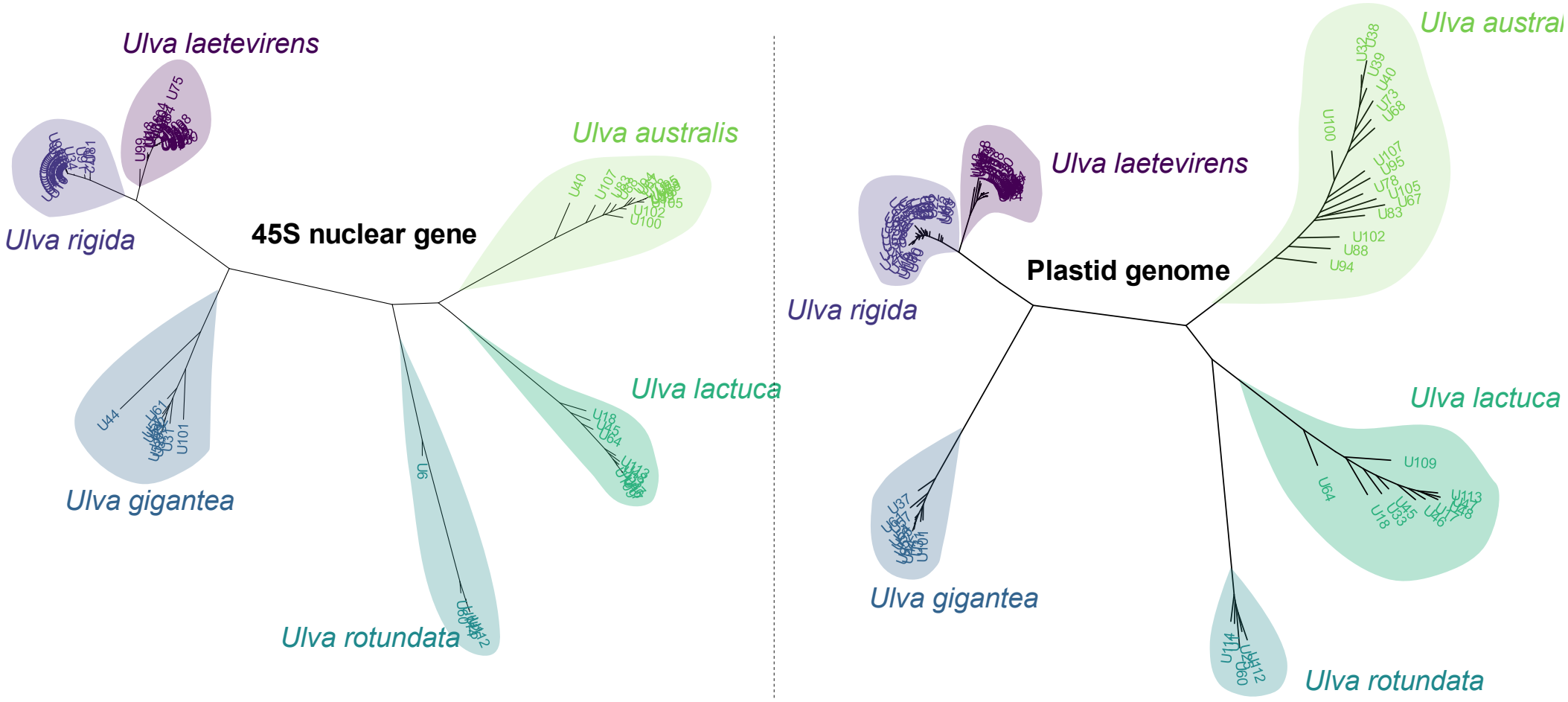
DNA based identification of species



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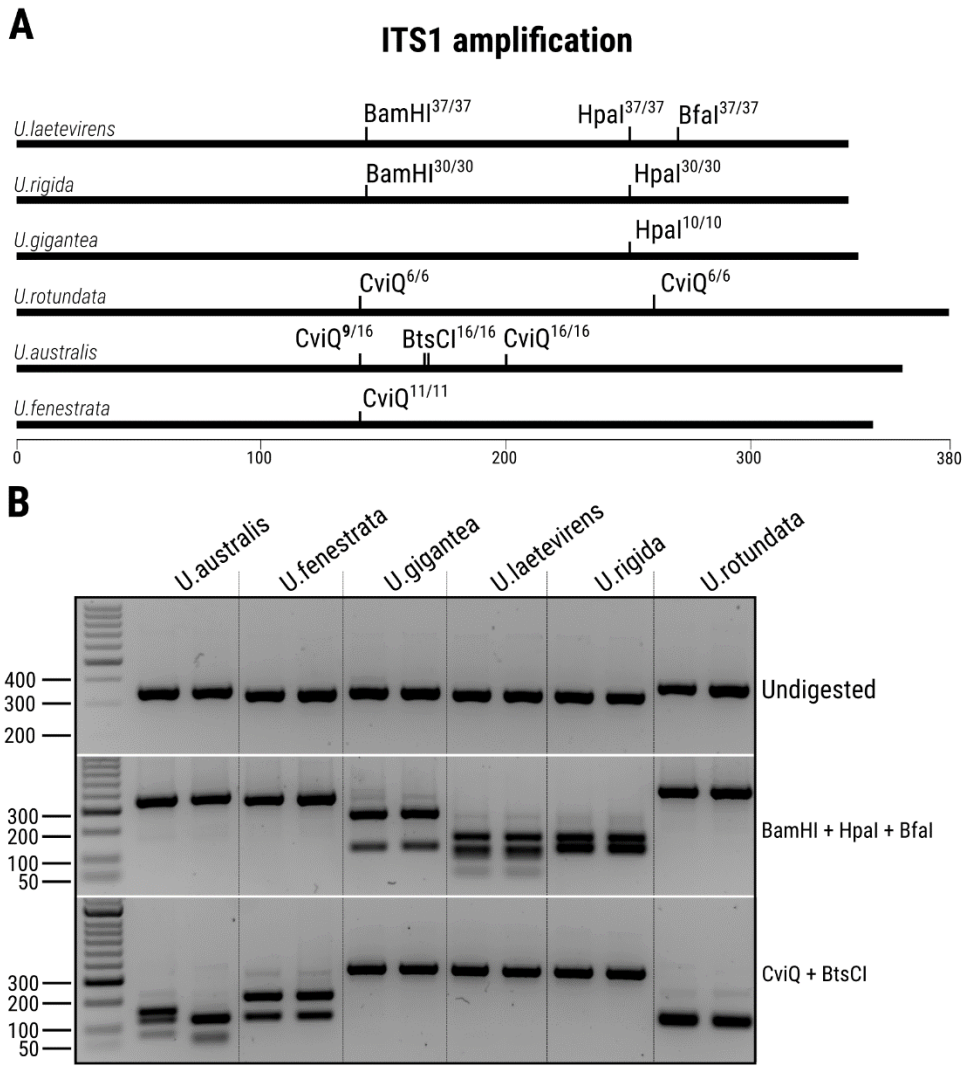
DNA based identification of species – can we go up to geographical origin??



Known it is possible

WORK IN PROGRESS..

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