TECHNOLOGY ID#008

UNIVERSIDAD DE CHILE

Chimeric macroalgae to improve production yield

OPPORTUNITY

Brown macroalgae (kelps) are used for human food, alginate, agrochemicals, and cosmeceutical products, as well as for feeding abalone. The biomass comes from aquaculture and the wild harvest of seaweed (e.g. *Macrocystis* and *Lessonia* species), involving numerous workers, processing companies and exporters.

Their global demand is expanding rapidly (2-3% a year) and is expected to continue due to innovative uses in healthcare products and clean energy. Hence, there is a need to increase the production of seaweed biomass.

TECHNOLOGY

This technology is a method used to obtain chimeric plants by coalescence of selected genetic strain, forming a single organism that possesses generic heterogeneity.

Chimeras can be incubated in the laboratory and then transferred to a definitive habitat (hatchery or field habitats).

This innovation has brought several benefits, such as increasing plant survival, growth, pigmentation, genetic diversity, and resilience to rising seawater temperature. Chimeras therefore improve production yield compared to non-chimeric or unitary plants.

Consequently, the use of chimeric plants provides an opportunity for commercial seaweed cultivation, the restocking of kelp areas for sustainable management, as well as the restoration of natural populations disturbed by anthropogenic activities or climate change.

STAGE OF DEVELOPMENT

Prototype demonstration in a relevant environment, field trials (TRL 6).

INTELLECTUAL PROPERTY

Chilean patent application (2017-1827), PCT/CL2018/050053, Peruvian patent application (registration number pending), and EPO patent application (ongoing).

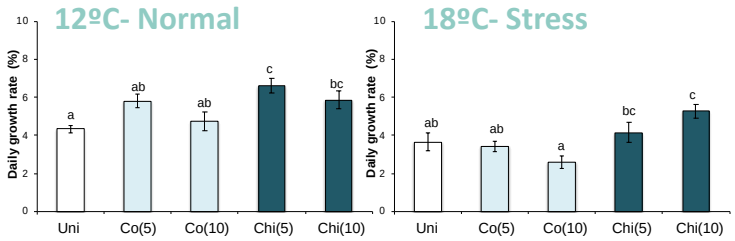

Figure 1. *Lessonia spicata* growth rate (%) under contrasting laboratory temperature regimes. The figure compares unitary plantlet (monogenetic), coalescent plant development with 5 and 10 genetically related strains (Co5 and Co10), and chimeric plant development with 5 and 10 genetically non-related strains (Qui5 and Qui10).

Figure 2. Sporophytes attach to a net and later integrated to a natural environment that use an epoxy putty.

COMPETITIVE ADVANTAGES

- The production of chimeric plantlet with higher rate of survival, biomass, pigments, genetic diversity and environment resistance.
- The use of chimera allows the development of a more robust and resilient plants, without the need for generating a hybrid or even a transgenic organism to increase adaptation capability to the future challenges.
- The higher genetic diversity of chimera for repopulation enhance the ecosystem services (biodiversity and climate mitigation), associated with a higher size of chimera, increasing invertebrate's habitat photosynthetic production, and CO_2 capture.

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