

RESCUING THE POTENTIAL OF ZOSTERA MARINA PLANT FOR FOOD AND ENVIRONMENT IN SPAIN

Since 2017, chef [Ángel León and the Gastronomic Research Laboratory Aponiente](#) in Cádiz (Spain) have been carrying out a pioneering study that has managed to grow in a controlled way the aquatic plant *Zostera marina*, producing a marine cereal and generating great benefits for the environment and the local economy.

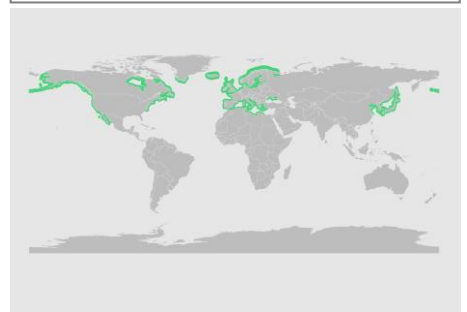
The extraordinary research laboratory Aponiente presents the [characteristics of the project and its results](#).



In 2017, having discovered the presence of *Zostera marina* during regular underwater expeditions in the Bay of Cadiz to identify different types of seagrass, the Aponiente team initiated a study to evaluate the possibility of harnessing its potential for a human diet. Chef Angel León was inspired by a 1973 Science magazine article documenting that the native Seri peoples, hunter and gatherers of Sonora, Mexico, have eaten seagrass for generations. Following an elaborate cultivation process in the sea, threshing, roasting and pulverizing, they produced a cereal that was cooked with water and ate with condiments.



Zostera marina is a type of aquatic plant with flowers, fruits and seeds. It is one of four marine phanerogam species that grow naturally along most of the coastland wetlands of the northern hemisphere. *Zostera marina* wild meadows provide crucial ecosystem services but are dying at an alarming rate due to human activities in the marine environment. In Cádiz Bay too, *Zostera marina* flourishes in its natural state, as a currently threatened aquatic plant.



Recovering areas that had been abandoned decades ago and restoring old salt marshes and fish farms, the Aponiente Laboratory in collaboration with the University of Cadiz, has implemented *Zostera marina* plantations to produce the marine cereal. The Laboratory cultivates this native species in an experimental and regulated manner in an area of 3,000 m², located within the Natural Park of the Bay of Cádiz, near the municipality of Puerto Real. Growing the new cereal is sustainable because it requires no fertilizers, additional nutrients or other chemicals, just seawater constantly circulating.



Above all, the Laboratory is creating for the first time a seed bank of *Zostera Marina* that will be used to repopulate other coastal wetlands for their restoration and management. The cultivation of *Zostera marina* and the production of the marine cereal provide significant benefits for food, for the environment and local economy.

Nutritional contribution of the marine cereal

[The comparative analysis with 5 other common cereals](#) (barley, wheat, oats, corn and rice) showed that the sea cereal has a great nutritional value: it is an important source of high-quality proteins and carbohydrates. It also contains vitamins A and E, not found in any other



kind of grain, as well as high concentrations of various B vitamins. It is a cereal of great interest for human nutrition because it presents high gastronomic organoleptic properties and a complete nutritional spectrum.

- **Macronutrients:** it is a much more balanced food in terms of percentages of proteins, carbohydrates and fibres than a conventional cereal.
- **Micronutrients:** It contains more plant-based fatty acids and amino acids than other grain commonly eaten, high quantities of vitamins, minerals and a significant proportion of glucose.

Crop production with low technical requirements

Yields are similar to those of other cereals, moreover it is a crop with few technical requirements and low maintenance costs:

Yield estimates in wild settings are of 5-7 tons per hectare, which is similar to the production of other kinds of grain.

- The results point to a high productivity and a potential for up to 20 seed pods per generative shaft.
- It is a perennial plant and it is not necessary to replant the crop annually. It has an exponential root reproduction and every year 5 heads will be obtained from each plant sown.
- No pesticides or fertilisers are required. It only requires seawater that is constantly circulating.

Contribution to the environment and mitigation of climate change

Controlled restoration of *Zostera marina* provides countless environmental benefits. Coastal wetlands provide fundamental ecosystem services for the balance of the planet and phanerogam meadows are real ecosystem engineers, very effective carbon sinks, protecting against extreme weather events that are increasing (storms, floods). In addition, by recovering ecosystems of plant and animal communities, terrestrial, aquatic, coastal and marine, to generate different products, marine biodiversity that had disappeared is restored. In particular, the controlled restoration of *Zostera marina*:

- Captures blue carbon, generates oxygen and regulates the carbon cycle.
- Mitigates tidal effects and rising sea levels.
- Prevents underwater erosion and provides habitat for valuable underwater wildlife.

Contribution to local development

The cultivation of the sea cereal can be productive and profitable, bringing economic wealth to depressed areas, recovering habitats of high ecological, landscape, social and environmental value. By restoring former salt pans and fish farms to create sea cereal plantations, a traditional primary activity is strengthened by promoting seafood with high added value (fish, crustaceans). Sea grain is multipurpose: it can be consumed as it is, transformed into flour and its by-products, while its leftovers can be dried for straw. By absorbing carbon, these plants can be used to implement further reforestation projects, generating a large demand for seeds. In addition, the Aponiente Restaurant, through its cuisine specialized in enhancing the whole value chain of marine species of the territory, with its identity hallmark, shows another important aspect of these projects for a sustainable local economy.

For more than a decade, chef Ángel León and the team at the Aponiente Laboratory have been researching possible new seafood products to incorporate them into the human diet, as the new gastronomic applications for marine phytoplankton and zooplankton. Since 2010 the [Aponiente](#) Restaurant has been recognized with several Michelin stars for its seafood cuisine and for its discoveries.

The marine cereal is a new superfood because of its unique nutritional qualities and its ability to thrive in a salty environment. Considering that



97.5% of the water on earth is found in the oceans and salt water seas and only the remaining 2.5% is fresh water, the marine cereal opens the way for an absolutely innovative crop. The Aponiente team stresses that there is still much to discover in the great pantry of the sea. By making new commitments to nature, rebuilding degraded marine ecosystems and generating greater biodiversity, it is possible to create sustainable development perspectives that benefit everyone.

To know more

[Cereal marino website](#)

[Presentación Cereal marino](#)

[Article in time.com](#)

[Article in interestingengineering.com](#)

[Article in thedailyaficionado.com](#)

[Article in efeagro.com](#)

[Article in gastronomiaycia.republica.com](#)

[Article in laalimentaciondelfuturo.wordpress.com](#)

[Article in cuerpomente.com](#)

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[Article in repubblica.it](#)

[Article in gamberorosso.it](#)

[Article in ilgiornaledelcibo.it](#)

[Zostera marina in Wikipedia](#)

[Aponiente website](#)

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