

The Forest of the Sea: Could Posidonia Become the Food of the Future?

How will we produce food after 2030? More importantly, how will agriculture continue in a world where access to freshwater is increasingly restricted?

Current food systems are largely dependent on land, freshwater, and livestock production. However, climate change is rapidly weakening these foundations through droughts, declining soil fertility, and falling grain yields. Therefore, agriculture is now facing not only a productivity problem but also an urgent sustainability problem.

One of the most important problems agriculture will face in the coming years is water scarcity. Agriculture is the largest consumer of freshwater, and as groundwater reserves dwindle and freshwater demand increases, traditional farming methods are becoming increasingly fragile and expensive. This indicates that food systems that rely almost entirely on terrestrial agriculture may struggle to meet future needs. At this point, the limitations of terrestrial food production necessitate a rethinking of where and how food can be produced. This is where we begin to shift our perspective from land to sea.

Marine environments have long been perceived primarily as a source of seafood and have rarely been considered as part of sustainable food production systems. However, oceans contain organisms that can grow without freshwater, fertilizers, or chemical inputs. Recognizing this possibility raises an important question: Could the future of food lie in the waters surrounding us rather than the land beneath our feet? This project argues that the climate crisis is a structural crisis threatening global food security. Rising temperatures, prolonged droughts, and extreme weather events are destabilizing terrestrial agricultural production systems, impacting food accessibility, price stability, and quality. In response to these challenges, students at Izmir Private Turkish College began researching alternative food sources that could contribute to future food security. The project focuses on *Posidonia oceanica* (also known as Neptune grass), a marine plant that grows in saltwater environments. *Posidonia* meadows are often referred to as the "lungs of the sea" due to their strong root systems and high carbon sequestration capacity. These plants stabilize the seabed, act as natural barriers against hydrodynamic forces, reduce coastal erosion, and store significant amounts of carbon dioxide.

Because of these ecological benefits, *Posidonia* already plays a significant role in combating climate change. However, our project explores another perspective: its potential as an edible resource. Historically, *Posidonia oceanica* seeds were consumed by fishermen as an energy source during long days at sea. When raw, the seeds have a taste similar to peanuts or almonds, while when cooked they resemble sweet potatoes. Besides their taste, they also contain valuable nutritional components. Although the use of *Posidonia* seeds as food is still under scientific research, it offers a promising idea for sustainable food systems based on ecosystem-friendly resource management.

The project team focused on the Karaburun Peninsula, located west of the Gulf of Izmir. Historically, grain obtained from seagrass seeds was an important component of the local Karaburun cuisine and was harvested sustainably without harming the seagrass meadows. During our fieldwork, we met Halide Derya, who lives in Eğlenhoca village in Mordoğan district of Karaburun. She explained how her ancestors learned that seagrasses could be a food source and showed us how they are traditionally harvested without harming the ecosystem. She showed us that only seagrasses washed ashore by the waves should be collected. Pulling them directly from the seabed would damage the ecosystem. After being collected, the seagrasses are

dried in the sun on a threshing mat for several days, and turned regularly to ensure even drying. After drying, they are pounded with a wooden stick to separate the seeds from the plant fibers. This process is slow and labor-intensive. The amount of grain obtained during our fieldwork was only about a bucketful; the flour made from the seeds was quite small. However, it was enough to make enough bread to taste. Halide Derya also explained the cultural significance of this practice:

“Our elders will not always be with us, so we need to take the opportunity to learn about our traditions and our food. Many young people have never tasted these.” Inspired by this experience, our team prepared bread from seagrass and shared it with students and administrators at Izmir Private Turkish College. Through this event, we aimed to introduce the idea of sustainable bread and raise awareness about alternative food sources.

At the same time, in the literature review on the ecological importance of *Posidonia* meadows, the “Determination, Mapping and Transfer of Seagrass Distribution Project” conducted by Dokuz Eylül University between 2023-2024 was examined. According to this report, seagrasses in the Karaburun Peninsula cover an area of approximately 9,725 hectares, making it the largest area in the Gulf of İzmir.

Researcher Barış Akçalı from Dokuz Eylül University shows that the seagrass ecosystem in this region captures approximately 46,000 metric tons of carbon dioxide every year, and that marine plants can store more carbon per hectare than many terrestrial forests. This highlights the multifaceted benefits of *Posidonia* meadows. Our experiences show that the climate crisis may require us to rethink the foundations of our food systems. Agriculture, which is entirely dependent on soil, freshwater and stable climate conditions, is becoming increasingly fragile.

Exploring marine ecosystems as potential food sources could provide a complementary solution for the future. *Posidonia oceanica* is a unique example because it can grow without needing freshwater, support marine ecosystems, sequester large amounts of carbon, and provide an alternative food source. This project started as a local story from the Karaburun Peninsula, but it also raises a global question: Could underwater seagrass farms be a Plan B for humanity in the face of drought, food shortages, and climate change? Exploring sustainable uses while protecting seagrass ecosystems can simultaneously contribute to food security, the preservation of cultural heritage, and climate resilience. Perhaps the forests of the sea will not only protect our oceans but also help nourish the future.

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