

## Section 1 - Contact details

<b>Organisation Name</b> (full name)	NG s.r.l. SOCIETA' BENEFIT
<b>Type of organisation</b>	Small or medium-size enterprise
<b>City</b>	Legal: Milan, Operational: Sant'Olcese (Genoa), Noli (Savona)
<b>Country</b>	Italy
<b>www address</b>	<a href="http://www.nemosgarden.com">www.nemosgarden.com</a>
<b>Contact person</b> (name and surname)	Eleonora Venezia
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## Section 2 – Sector of interest

<b>Work programme</b>	Cluster 6: Food, Bioeconomy, Natural Resources, Agriculture, and Environment; EIT Food; EIT Water; Horizon Europe – European Partnership for a Climate-Neutral, Sustainable, and Productive Blue Economy (SBEP); European Maritime, Fisheries and Aquaculture Fund (EMFAF); EU Mission: Restore Our Ocean and Waters by 2030; LIFE Programme; BlueInvest Initiative; ESA
<b>Topic according to the work programme</b>	Agriculture, Agritech innovation, Agroecology, Marine biodiversity, Biospheres technology, Blue economy, Climate change, Climate resilient agriculture, Food security, Hydroponic cultivation system, Innovation, Leisure, Marine life monitoring, Marine life repopulation, Nemo's Garden, Ocean observation technology, Pesticide-free agriculture, R&D, Renewable energy integration, Self-sustaining farming, Social impact, Sustainability, Sustainable agriculture, Underwater farming, Underwater greenhouses, Water conservation and management

## Section 3 - Description of the expertise and/or project idea

<b>Description of the expertise</b> (max 2.000 characters)	<p>Nemo's Garden (as NG s.r.l. SOCIETA' BENEFIT) is a pioneering initiative leveraging innovative biosphere technology to grow crops hydroponically beneath the ocean's surface. Established in 2020 as a spin-off of Ocean Reef Group, the innovative start-up NG s.r.l. merges marine science, sustainable agriculture and advanced engineering to develop an alternative farming solution.</p> <p>With years of expertise in underwater system production and engineering, combined with Mestel Safety's extensive experience in safety equipment and life-support systems, Ocean Reef Group has established itself as a leader in marine technology and sustainable innovation. This expertise has been further expanded through Nemo's Garden, which revolutionize the concept of agriculture using controlled-environment biospheres anchored at the seabed to enable climate-resilient crop production. Key expertise includes:</p> <ul style="list-style-type: none"> <li>- Underwater agriculture and sustainable food production: NG has pioneered submerged, ad hoc-designed biospheres to grow crops in a multi-sensors-controlled environment under the ocean level, offering a climate-resilient, water-efficient and space-saving solution for plants production; additionally, expertise in hydroponics have been cultivated over the years to optimize the plants growth in marine environment.</li> <li>- Marine engineering and diving technology: Ocean reef group is specialized in the production of diving and snorkelling equipment, including full-face masks and underwater communication system used worldwide in technical and recreational applications; moreover, it boasts a strong expertise in the design of submerged structures, pressure-</li> </ul>
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	<p>resistant materials and in general marinization of various equipment, applicable to marine research and underwater farming;</p> <ul style="list-style-type: none"> <li>- Safety, Life-Support Systems &amp; Military Applications: Mestel Safety, parent company of Ocean Reef Group, develops high-performance personal protection equipment for military and civil uses, underwater communication systems and R&amp;D in material science. Innovation in full-face respirators, air circulation systems, and emergency response solutions, with potential applications in extreme environment agriculture and space research.</li> </ul>
<b>Description of the project idea</b>	<p>Nemo's Garden is the world's first underwater cultivation system for terrestrial plants. It represents a sustainable, innovative and cost-efficient alternative farming solution to help meet the future food demands. This pioneering approach addresses global challenges such as food security, climate change, and the need for alternative cultivation methods in coastal or lacustrine regions with limited arable land and scarce clean water. The garden consists of a series of 'Biospheres', transparent polymethylmethacrylate domes, anchored to the seafloor at depth between 5 and 12 meters. The stable temperature of the surrounding water and the natural desalination process – thanks to the salty water evaporation and condensation into fresh water on the dome internal walls, creates an ideal "underwater greenhouse". The hydroponic system installed in each biosphere is composed of a network of tubes, water circulation pumps, and fans for air movement and it is refilled by using the condensed fresh water. The biospheres are equipped with cameras and IoT sensors to register and monitor internal parameters such as temperature, lumen, humidity, CO<sub>2</sub> and O<sub>2</sub> levels. A communication system enables data sharing with a land-based control unit, allowing constant supervision of biosphere parameters and the divers working in the garden. Thanks to the harness of solar energy and the natural desalination of seawater, Nemo's Garden is self-sustainable system. The microclimate and thermal conditions within the biospheres are optimal for plant growth and crop yields, similar to a conventional greenhouse, yet requiring no external energy input. Moreover, Nemo's Garden is fully integrated in the surrounding environment. Indeed, the underwater farm has a very minimal, if any, interaction with the marine environment and related ecosystems. On the contrary, it creates a positive shelter-like effect, encouraging marine biodiversity and habitat repopulation.</p> <p>The natural isolation of the underwater farm permits the production of pesticide-free - and therefore organic - plants with potential application in culinary, cosmetic, pharmaceutical and medicinal fields. A variety of aromatic herbs, leafy greens, flowering plants and a variety of crops have been successfully seeded and grown within the unique environment of the underwater biospheres. Tests and chemical analysis on Nemo's Garden basil plants revealed several key findings: fastest growth if humidity and air temperature are properly controlled; a distinct essential oil content composition and different volatile emissions, likely due to lightning factors, absence of pollinators, and unique underwater environmental conditions; higher chlorophyll and carotenoids contents, possibly an adaptation to low-light underwater conditions.</p> <p>In conclusion, Nemo's Garden represents an alternative agricultural method that can help increasing food production in areas where traditional farming is difficult; it reduces water consumption, land use and eliminate the need for pesticides; it also contributes to the blue economy and acts as a laboratory for high-value crops cultivation for both food production and scientific research; it can serve as an eco-tourism attraction, engaging local communities and creating job opportunities in sustainable agriculture, advance technology, research and recreational diving sectors.</p>

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