A smart-sensing, AI-driven platform for Hydroponic microgreens cultivation

GOhydro develops a smart platform for optimising hydroponic cultivation in home settings, with minimal costs and maintenance needs. In the bigger picture, GOhydro aspires to introduce advanced AI in tools accessible and usable by everyone.

In the global landscape shaped by climate change and the COVID-19 pandemic, alternative forms of agri-food production like vertical and urban farming can prove particularly beneficial for the environment, the food value chain and, ultimately, citizen health and wellbeing.

In this direction, SCiO (https://scio.systems/) coordinates GOhydro, to develop a smart-sensing, AI-driven hydroponic platform for home settings (figure 1).

Figure 1

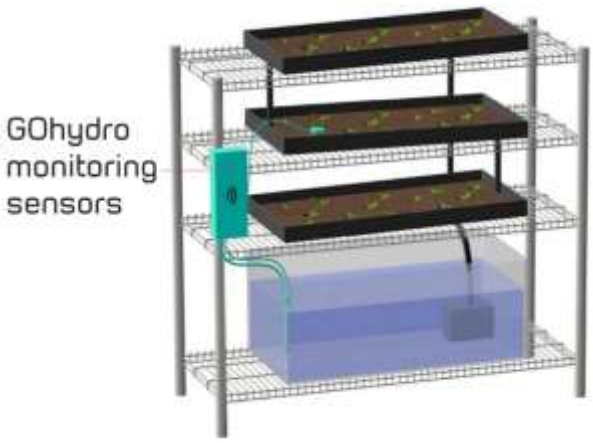

Figure 2

The development of the platform relies on the analysis of factors affecting growth and nutritional value of micro-greens like basil, coriander, and parsley, and their association with environmental and cultivational needs. These factors will inform the process of selecting a set of various sensors (figure 2), as well as the definition of "climate recipes" for optimizing cultivation procedures. The recipes essentially define the protocols to be followed to optimize production and ensure that the final product has high nutritional value.

The recipes will be tested and evaluated in three piloting cycles, incrementally approaching the foreseen usage of the platform in realistic conditions. The first cycle will be carried out in controlled laboratory environments, and specifically in growth chambers and experimental greenhouses. The next piloting cycle will take place in realistic

environments with fully controlled climatic conditions (control rooms). During these two cycles, the AI models developed in the context of the project will be trained over the collected data in order to accurately associate sensor measurements with yield and nutritional value of the cultivated plants.

At the last piloting cycle, the most successful recipes will be applied to uncontrolled environments, with the trained models used for providing guidelines for properly tending the cultivated plants and operating the platform, via a smartphone app (Fig. 3). Essentially acting as an "e-agronomist", the app will allow users to get updates on cultivation status and instructions for possible actions.

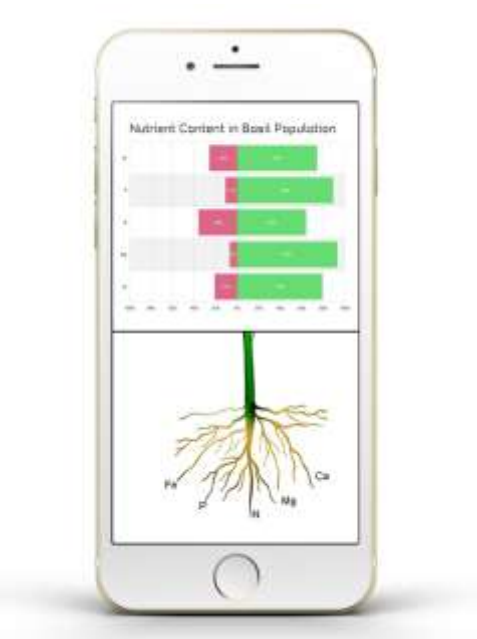

Figure 3

In addition to the benefits that the platform will have at the financial, societal and environmental levels, we envision that the project will propel the further advancement of technologies with broader potential and applications. GOhydro offers an ideal setting for experimenting with novel AI techniques that will produce reliable and targeted recommendations for critical agri-food metrics without having huge data volumes as a strong prerequisite. Such methods can be applied in the future in additional growing settings, including large-scale conventional cultivation.

The GOhydro consortium includes the Department of Plant and Environmental Sciences from the University of Copenhagen, the Institute of Nanoscience and Nanotechnology from the National Centre for Scientific Research "Demokritos" in Greece, the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca from Romania, as well as two SMEs, nr21 DESGIN from Germany and Holisun from Romania.