



“Field-testing and demonstration of Digital and Space based technologies with Agro-ecological and Organic practices in systemic innovation”

# Development of low-cost portable analysers for nutrient monitoring in aquaculture and aquaponics systems



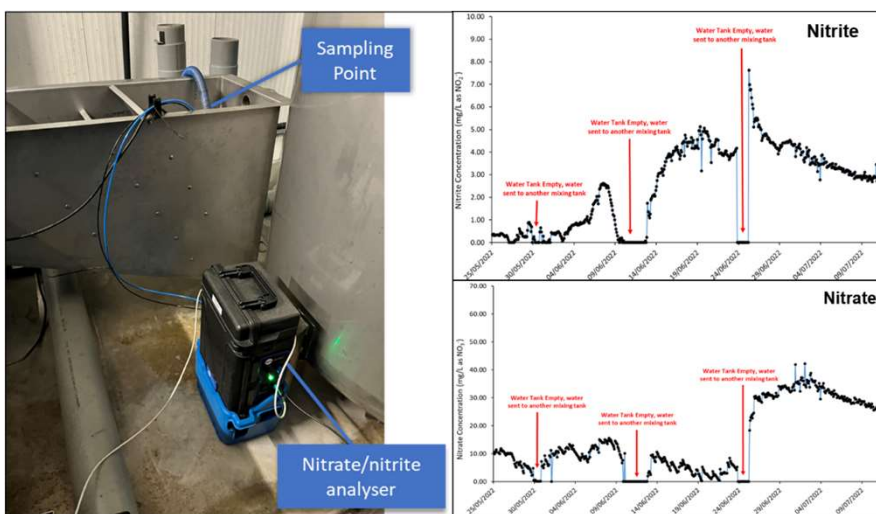
ion chromatography, 3D-printing, Nutrients, Water analysis

Ireland

Effective nutrient monitoring in aquaponics and aquaculture systems is crucial to achieve a profitable production and for complying with environmental discharge regulations. Analysis of nutrients such as nitrate, nitrite, ammonium and phosphate are usually carried out with high-cost analytical instrumentation in external labs that take a few days to report back results so no immediate decision-making is possible for fertiliser dosing and waste discharge. In recent years, a range of various online nutrient monitors have shown promise but remain expensive, deliver poor accuracy and are frequently impacted by the interferences found within the complex sample matrix of aquaculture and aquaponics.

Portable and low-cost nitrate/nitrite, ammonium and phosphate analysers developed by T.E. Laboratories during the PestNu project have achieved high accuracy of results based on ion chromatography and UV-LED detection. The development of these analysers was facilitated by 3D-printing technologies for the manufacture of components specifically tailored to the user and market needs developed in collaboration with CERTH. 3D-printing has revolutionised the industry because of the nearly complete flexibility it allows when developing prototypes, while also maintaining a considerably low price point compared to benchtop analysers.

The analytical systems developed during PestNu will be deployed and tested in real conditions on aquaponics and aquaculture systems from project partners in Greece and Spain.



Nitrate/nitrite portable analyser deployed at Tilmur aquaponics facility (Murcia, Spain) showing variations in nitrate/nitrite concentration over seven weeks.

Practice abstract n.2



Valeria Arenas-Montaño (Tellab), Meritxell Grau Butinyac (Tellab), Simon Bluett (Tellab), Ria Pechlivani (CERTH), Eoin Murray (Tellab)



Eoin Murray ([emurray@tellab.ie](mailto:emurray@tellab.ie))



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