

Thematic area

Agro-food Value Chain



Section II

Topic - Extending shelf-life of perishable Mediterranean food products



Budget

666,332 €



Duration

36 months



Project 27/ Section II

Nano4Fresh

Nanomaterials for an environmentally friendly and sustainable handling of perishable products

Context

The large part of fresh products in the UE are produced in Mediterranean countries due to their favourable climatology. Thus, the economic, environmental and social impact of agriculture and the derived agri-food sectors have a strong importance in many areas of these countries that depend on the export of agri-food products to different EU countries, North Africa and America. The problem is that many of these products are perishable. Basically, products classified as climacteric (e.g., tomatoes, avocados, pears and apples) present a continuous postharvest ripening, that occurs evolving respiration gases and the production of Volatile Organic Compounds - VOCs like ethylene that works as a natural ripening hormone. This leads to undesirable and progressive ripening and senescence during the storage / transportation steps. The biochemical changes associated to ripening also causes physiological alterations (changes of colour, softening, decay, loss of firmness and crunch, rind breakdown, internal disorders and finally putrefaction) not allowing its commercialization and leading to significant economic loss and waste generation. Therefore, one of the main challenges in the agri-food chain is the optimization of perishable products handling for maximizing their freshness, organoleptic characteristics, quality, and shelf life allowing extension of post-harvest life and transportation to new markets.

Objectives

Nano4fresh aims to extend the shelf-life of perishable products, reducing post-harvest chemical treatments, food losses and wastes. This will be achieved by developing nanomaterials (carbons, zeolites, MOFs and PCPs) with innovative and versatile characteristics, in terms of adsorption, catalytic photoactivity and antibacterial/fungi performances, to surpass the current state-of-the-art approaches for prevention of the ripening processes of food products. In practical terms, novel filters and photoreactors will be developed and opti-

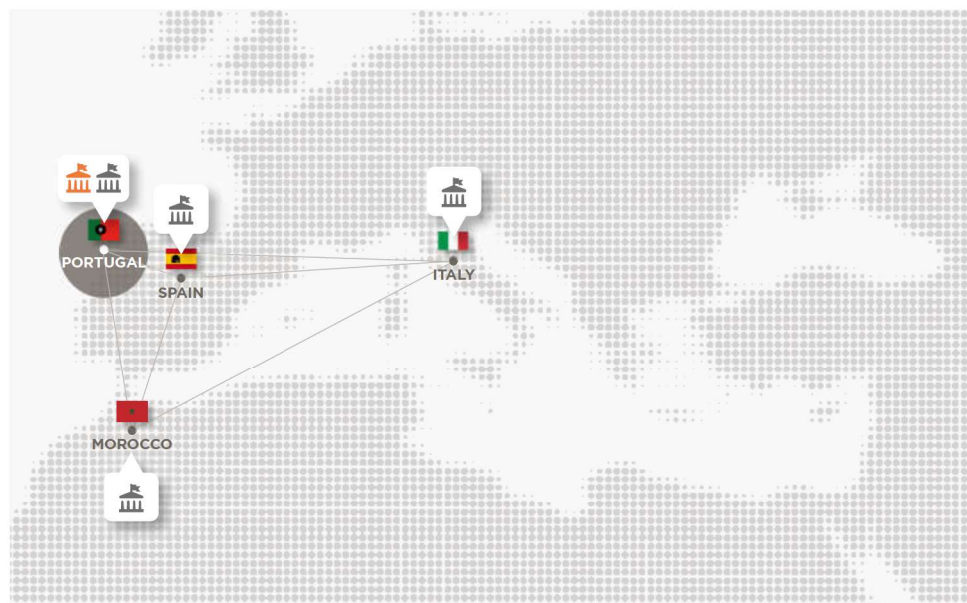
Coordinating country

Portugal

Participating countries/ 4



Research Units/ 5



Coordinating institution

Universidade de Lisboa - PU



Instituto Superior Técnico, IST
Scientific Coordinator:
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mitted for the storage (atmosphere control) during the ripening process. This approach comprises the ethylene removal, both during long storage, transportation and at the retail stores, leading to eradicate the use of chemicals as a post-harvest strategy to prevent the ripening process. The developed technology will be tested, and the performances validated in a laboratory-controlled and real-life environment to supply fruit quality parameters (colour, compactness, sugar content, enzymatic activity) in the presence and absence of developed devices.

Expected impacts

Nano4Fresh targets to increase the shelf-life of the fruit by removing harmful/toxic substances (e.g., ethylene inhibitors and antibacterial/antifungic) during the transport and storage period. All the actors engaged in the Agri-food value chain will benefit and the society will earn in terms of food safety and reduction of harmful substances both for health and the environment. Moreover, reducing food waste also constitute economic benefits that contribute to the increase of sustainability.

This project presents an innovative and interdisciplinary working plan based on the experience of the Agri-food companies (stakeholder knowledge) regarding the necessity to improve the performances of actual devices and the optimization of the handling processes. The project will start at a TRL 3 and has potential to reach TRL 5-6.



SPECIFIC BENEFITS

- ✓ The producer will earn by reducing the quantity of goods returned and local waste during collection, storage and transportation and by a greater appreciation of these products by the final consumers;
- ✓ The retailer will have positive economic benefits since the storage periods are lower and therefore products available are fresher and with more quality;
- ✓ The final consumer will have safer fruits with good organoleptic characteristics and an optimal maturation level reducing food spoilage and waste.

