**Microbiological and physical approaches to reduce post-harvest losses and to improve quality of fruit and vegetables**

Post-harvest losses are related to microbiological spoilage, softening and chilling injuries accounting, in some cases, for fruit waste up to 40% of the production. Currently, few methods are available to reduce post-harvest spoilage and they mainly rely on the use of chemical application (i.e. bioregulators and pesticides) which pose risk to the environment and the consumers. The study aims at developing innovative methods to reduce fruit waste and increase fruit nutraceutical characteristics (e.g. antioxidant content, vitamins).

For this purpose, the following approaches will be implemented:

1. Develop and validate a non-invasive sensor to determine fruit ripening stage to decide the most appropriate post-harvest management (e.g. long-storage, export, 0 Km sale,…). These sensors will be based on visNIRs instruments already patented by UNIBO
2. Characterisation of changes in fruit microbiome to correlate them to dysbiotic conditions leading to pathogen spoilage. Furthermore, microbe colonising fruit will be isolated and functionally characterised to select beneficial microbes to be used as biocontrol agents against pathogens or to enhance fruit quality and aroma
3. Use LED lights at different wavelengths (UV, Red, Blue, Green and their combinations) to increase fruit quality and secondary metabolites accumulation. Furthermore, the effect of LED illumination on fruit and vegetable resistance against pathogens will be assessed.

Applicants should have a background in physiology and post-harvest management of fruit and/or microbiology and plant pathology

Research involves field and laboratory analysis of fruit quality and quantification of fruit yield, The selected candidate will assist the program leader with all aspects of the planning, implementation and management of the research program. The main duties will be collecting and analyzing data, preparing presentations and scientific publications, and supervision of employees.

Position Duties:

30% – Field work (mainly in Latina province). Monitor fruit quality development in pre-harvest with destructive and non-destructive tools (e.g. NIR-spectroscopy) to determine classes of uniform maturation to perform post-harvest trials. Create and validate and harvest index to decide the most appropriate harvest time for long-term storage. Collect and analyse environmental conditions (climatic data) and agricultural inputs (irrigation, fertilisation). Communicate with grower and technicians for the correct management of the experimental plots. The selected applicants will be supported by a senior research assistant

60% – Laboratory analysis (in Bologna). Assess fruit quality attributes, including size, weight, firmness, acidity and sugars and secondary metabolite content (e.g. VOCs). Design and management of post-harvest trials to assess the ripening dynamics of kiwifruit. Design and management of post-harvest trials to incidence and causes of storage losses. Molecular diagnosis of plant disease, gene-expression study of ripening and/or defence related plant genes. NGS description of fruit associated microbiome. Isolation and characterization of predominant fungal and bacterial species. Design of qPCR markers to monitor microbial markers associated with dysiosis. The selected applicants should perform microbiology experiment autonomously. A senior may assist in biochemical and physical fruit analysis

10% – Train and supervise bachelor and master students and trainees. Supervision includes planning, assigning, and approving work. Assist other faculty and technicians in carrying out cooperative experiments.