**Innovative tools to enhance fruit quality and storage of kiwifruit (*Actinidia chienensis* var. *chinensis*)**

Kiwifruit [*Actinidia chinensis* Planch. var. *chinensis* and *Actinidia chinensis* var. *deliciosa* (A. Chev.)] is one of the most valuable temperate fruit crops and it is a strategic sector for several Italian Regions.

Kiwifruit production, which is mostly concentrated in China, Italy and New Zealand, generates a significant agricultural value of over three billion euros annually, with a retail market value worth over ten billion euros (FAO data, 2017). Kiwifruit production is threatened by several biotic and abiotic stress reducing both fruit quality and storability. Pre- and post-harvest diseases causes severe losses during the production chain. In addition, a substantial number of fruits is discarded during the selection due to sub-optimal quality traits. Therefore, a A sustainable way to increase fruit production is the minimisation of fruit losses caused by stresses or inadequate quality.

The aim of the project is to develop new tools to either reduce fruit losses or increase quality and storability.

The successful candidate is expected to develop innovative tools to achieve I) a high production of excellent quality fruit in the field and II) minimise quality decay during post-harvest-

Experiments will be performed in controlled conditions or in pilot trials to evaluated the new methods to increase fruit quality in preharvest. In parallel, field experiments will be performed to validate, in practical conditions, already developed methods to increase fruit productivity and quality. Among the latter, a special focus will be paid on the use of **girdling**, **foliar fertilisers** and **plant bioregulators**.

In Kiwifruit industry **girdling** has proved to be one of the most effective management techniques for increasing both fruit size and dry matter (DM). It also has the distinct advantage of eliminating the use of agrochemical stimulants. Current work is focused on optimizing and refining the use of girdling, not only to improve quality and orchard gate return (OGR), but to also ensure that the practice is sustainable for the plant. This includes investigating how the management of the vine effects the health and yield of the vine in the subsequent season. Thus, current trials on girdling include: timing of application, multiple girdles within a season, return bloom, cost effectiveness, and sustainability. Girdling is a method that is being used to stop the phloem connection between the upper part of the plant and the root system increasing the concentration of carbohydrates and phytohormones in the canopy. The results of this operation on fruits could be increased fruit set, size and early maturity. It is still to be investigated how girdling affects fruit quality and growth through the above mechanisms.

**Bioregulator and foliar fertilisation** represent alternative strategies to increase fruit production and quality. Despite the high interest in these practices, the current information on their mode of action and efficacy is limited. The research will compare the effects of these two alternative methods (girdling and bioregulators) in influencing kiwifruit production, ripening and storage

Concerning the post-harvest trials, fruit will be group at harvest in different classes of uniform maturity. Fruit selection will be performed by non-destructive analysis based vis-NIR spectroscopy (Kiwi-meter, patent: MO2005000211). Fruit will be subjected to different physical and microbiological treatments aiming at prolonging storage. Sensorial (e.g. sugar and starch content, colour, acidity, fruit texture) and biochemical (e.g. antioxidant capacity, carotenoid and vitamin content, VOCs emission) parameters will be monitored during post-harvest and shelf-life. Furthermore, the effect of the treatments of the population dynamic and virulence of selected post-harvest pathogen will be evaluated by means of classical microbiological and molecular tools.

Research involves field and laboratory analysis of fruit quality and quantification of fruit yield, as well as assessment of effects of girdling, plant growth regulator application, and nutritional or irrigation practices. 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.

Applicants should have a background in fruit tree management/plant physiology and/or plant pathology/microbiology

Position Duties:

50% – Field work (mainly in Latina province). Apply trunk girdling and plant growth regulators. Assess physiological and productivity performances of tree (bud differentiation, fruit set, trunk diameter, shoot length and canopy development, yield, root development, starch allocation in different organs). 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

40% – 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 breakdown (SBD). Molecular diagnosis of plant disease, gene-expression study of ripening and/or defence related plant genes. The selected applicants will be supported by a senior research assistant

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.

The position has a duration of 12 months with the possibility of renewal for other 24 months