PhD School on Agriculture, Environment and Bioenergy

(http://sites.unimi.it/dottorato_aab/)

(XL cycle, 2024-27)

Project draft

1.Field of interest

*Indicare **il/i** settore/i scientifico disciplinari:AGR/03*

2.Project title

Dissection of GxExM interactions for fruit quality traits and environmental adaptation in stone fruit species

3.Tutor

Marco Cirilli

4.Relevance of the topic and state of the art:

Stone fruit production is facing dramatic challenging to cope with a changing environment, particularly in most relevant growing areas. Extreme events, such as late frosts or unpredictable thermal conditions, are affecting crucial reproductive phenological stages, such as flower bud development, fertilization and fruit set. The PhD project aims to dissect genetic, environmental and agronomic management factors affecting tolerance to frost damage in flowers and fruitlets as well as plasticity of thermal requirements, in order to increase molecular, biological and physiological knowledge on adaptation mechanism and the identification of germplasm sources exploitable through breeding activities.

5.Layout of the project (draft)

5.1. Materials & Methods:

A. Plant materials is composed by large peach and apricot collections and segregating progenies from MAS.PES breeding programme

B. Collection of data related to reproductive phenology: chilling requirement, heat requirement, blooming and maturity date, by applying well-established 'forcing' tests methods and thermal models as well developing novel phenotyping tools/approaches for frost tolerance

3. Analyses to dissect the genetic bases of underlined traits (GWAS, QTL mapping, multi-environmental models)

4. Omics approaches to identify genes or variant involved in tree plasticity and adaptation

5.2. Schedule and major steps (3 years):

First year

Implementation of phenotyping and genotyping tools and germplasm characterization

Second year

Genetic analyses accounting for GxExM interactions

Third year

Target omics approaches to clarify adaptation mechanisms and thesis writing

6. Available funds (to support research)

PRIN project IMPEACHMENT

7. Co-Financing (to support the bourse):

No

8. Literature:

Bielenberg DG and Gasic K (2022) Peach [Prunus persica (L.) Batsch] Cultivars Differ in Apparent Base Temperature and Growing Degree Hour Requirement for Floral Bud Break. Front. Plant Sci. 13:801606.

Cirilli, M., Gattolin, S., Chiozzotto, R., Baccichet, I., Pascal, T., Quilot-Turion, B., et al. (2021). The Di2/pet Variant in the PETALOSA Gene Underlies a Major Heat Requirement-Related QTL for Blooming Date in Peach [Prunus persica (L.) Batsch]. Plant Cell Physiol. 62, 356–365

Cirilli, M., Micali, S., Aranzana, M.J., Rossini, L., Bassi, D. 2020. The multisite PeachRefPop collection: A true cultural heritage and international scientific tool for fruit trees. Plant Physiology, 184(2): 632–646.