Applicativo UNIBO x assegni

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**CN Agritech**

**Scheda attività Ente\_ UniBO**

**Spoke\_\_\_1\_\_\_**

**WP\_1.2\_(*Dissecting morpho-physiological and molecular mechanisms of adaptation)***

**Task[[1]](#footnote-1):1.2.3 \_** *Biochemical mechanisms contributing to improved adaptation, production and quality traits* **(M1-M36)**

1. **Contact person (e-mails): stefano.delduca@unibo.it**
2. **Title of the activity: *Biochemical factors involved in plant response to climate change: analysis of molecular factors involved in the adaptation of wheat to abiotic stresses (thermal and water)***
3. **Durata (M 23-M 35)**
4. **Species and/or species classes**

Poaceae

**5**. **Objectives**

Identification of the main molecular actors that support the adaptation of the organism to abiotic stresses and/or contribute to the maintenance of qualitative-quantitative production traits. The biochemical mechanisms underlying the action of molecules essential for stress resilience will be defined. Since plant reproduction is influenced by climate changes that cause morphophysiological and molecular alterations of reproductive organs, the pollen-pistil interaction and the molecular factors involved in the adaptation of wheat to abiotic (thermal and water) stress will be studied, including immunogenic proteins to decipher the effects of global warming on the qualitative and quantitative characteristics of productivity. The molecular factors of the response to abiotic stress will be studied in different wheat genotypes with the aim of identifying the common or specific ones between the tree species (apple tree) and herbaceous species (wheat) in order to decipher the effects of global warming on the qualitative-quantitative characteristics of productivity.

1. **Research activity**

An integrated cytological, biochemical, molecular approach will be applied to decipher the effects of abiotic stress (thermal and water). Abiotic stress will be evaluated on the different genotypes of wheat, through morphological analysis (CSLM microscopy, TEM, ESEM) to observe the structural alterations in the development of anthers, pollen and pistil. Immunohistochemistry and biochemistry for the effect of abiotic stress on the development of reproductive organs and on pollen/pistil interaction. Metabolomics, enzymatic tests for oxidative stress, investigated stress indicator proteins, immunogenic proteins, pollen function parameters and polyamines as stress response factors. In addition to morphological and biochemical analyzes on reproductive structures, on seeds derived from plants subjected to stress, metabolomic analysis will be carried out and their composition in carbohydrates, fats, proteins (including those of gluten), minerals and vitamins will be evaluated.

1. **Key material or collections**

Germplasm collection of apple

**7. (\*)Traits:**

* Drought tolerance
* Heat stress
* Photosynthesis
* Phenology
* Fertility
* Yield
* Seed proteins
* Seed quality
* Biotic resistance
* Reproductive systems

**8. Enabling technologies that you will use and that you would like to highlight:**

* Field trials – challenges
* Microscopy (CSLM, TEM, ESEM)
* Metabolomics
* Immunochemical and biochemical analyses

**9.** **Key collaboration within SPOKE and/or AGRITECH**

UNIBO **Task: 1.1.1, Task:1.1.3, Task: 1.3.1.**

**10. Expected results**

The results will provide information on: (1) the threshold temperatures causing alterations during the reproductive process (M26). (2) On the detailed analysis of the effects of stress on pollen which could be used as a biological indicator of global warming (M29). (3) On the comparison of the effects in male and female gametophytes to evaluate how sterility or abnormal seed production is induced by abiotic stress and what is the effect on productivity of different genotypes (M32). (4) On the effect of abiotic stress on agronomic traits (yield and quality), with the analysis of composition in carbohydrates, fats, proteins (including those of gluten), minerals and vitamins (M35). The acquired data will constitute a fundamental database that will provide the criteria for the selection of temperature resistant varieties for breeding purposes.

1. [↑](#footnote-ref-1)