

## **Alma Balestrazzi**

### **Main Research Topics**

**Molecular mechanisms underlying the plant response to genotoxic stress.** Isolation and molecular characterization of genes encoding DNA repair components of the BER (Base Excision Repair) and NER (Nucleotide Excision Repair) pathways in the model legume *Medicago truncatula*. To this purpose, integrated approaches (transgenic plants carrying gene silencing/overexpression constructs, RNA-Seq, genotoxicity assays) are used. Attention is focused on novel DNA repair genes, among which are *Tdp1* and *Tdp2* (Tyrosyl-DNA phosphodiesterase), essential components of the BER and NER pathways, involved in the removal of topoisomerase-mediated DNA damage. The role of *Tdp* genes in the plant response to genotoxic stress triggered under adverse environments (osmotic stress, heavy metals) has been demonstrated. The molecular characterization of *M. truncatula* transgenic lines carrying altered *Tdp1* and *Tdp2* functions has highlighted the crucial role of nucleolus as stress sensor *in planta*. *National Partners*: CREA-ORL, Montanaso Lombardo (LO). CNR-Istituto per la Protezione delle Piante (Bari). *International Partners*: ICGEB (New Delhi, India). ITQB-NOVA (Oeiras, Portugal). Academy of Science, Czech Republic.

### **Molecular profiling of seed quality.**

The study of DNA repair mechanisms in relation to environmental stresses has been further expanded in the context of seed germination and seed priming. The main goal is the identification of molecular indicators of seed vigor. DNA repair mechanisms are activated during the early phase of germination (imbibition) when the 'pre-germinative metabolism' is triggered. A working system made with imbibed seeds from model plants (*Medicago truncatula*; *Petunia hybrida*) has been established and it is currently used to validate the role of novel DNA repair genes associated with the induction of 'pre-germinative metabolism'. A parallel investigation is performed, as translational research activity, using seeds from horticultural and cereal species of commercial relevance, in collaboration with Seed Companies (ISI Sementi srl), ITQB-NOVA (Oeiras, Portugal), The Czech Academy of Sciences, ICGEB (New Delhi, India).