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Pilar S. Testillano is Scientific Researcher of the Spanish National Research Council (CSIC) at the Biological Research Center (CIB) of Madrid, and Head of the laboratory of Pollen Biotechnology of Crop Plants. She obtained her PhD at Complutense University of Madrid and did research projects at CNRS in Villejuif (France) and Cold Spring Harbor Laboratory in NY (USA). Her group has focused on understanding the cellular processes that drive pollen development, stress-induced cell totipotency and cell reprogramming to embryogenesis, in various crop and forest species, by using cellular, molecular biology, and bioimaging approaches, with special attention to microspore and somatic embryogenesis and their biotechnological applications in agriculture, forestry and industry. She has more than 110 publications in SCI journals (78% Q1 papers in 2012-2018), plus 48 chapters in international books. At present, she is Vice-Director of the CIB-CSIC, and President of the Spanish Society of Palynology (APLE).

“Targeting the determinant factors of stress-induced cell reprogramming and totipotency to improve microspore embryogenesis in crop and forest species”

Stress-induced microspore embryogenesis (SIME) is a biotechnological tool used for rapid production of doubled-haploids (DH) in breeding programs as source of new genetic variability, fixed in homozygous plants in only one generation. We have recently characterized a number of determinant factors regulating SIME in crop and forest species. Upon the inductive stress, autophagy and specific proteases are activated and involved in cell death. Epigenetic mechanisms regulate cell reprogramming and totipotency. SIME initiation involves genome-wide DNA hypomethylation, H3K9 demethylation, and H3/H4 acetylation. Pharmacological treatments with small molecule modulators of autophagy, proteases and epigenetic marks reduce cell death and enhance embryogenesis initiation, opening up new intervention pathways to improve DH production for breeding programs, via microspore embryogenesis.