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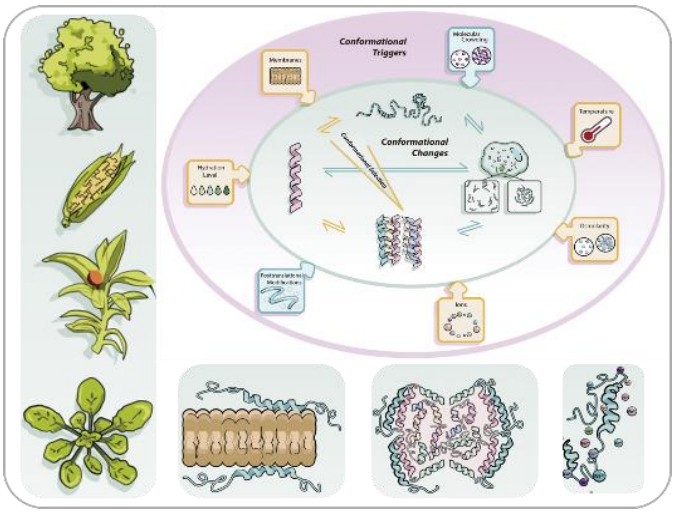
Mechanisms of Biomolecule Stabilization by Intrinsically Disordered Proteins (IDPs) Under Dehydration Stress

Overview



from Hernández-Sánchez 2022

Late Embryogenesis Abundant (LEA) proteins are essential for the tolerance of plants against dehydration-related stress and act as stabilizers for proteins, membranes, and nucleic acids *in vitro*. Dr. Anja Thalhammer's research aims to understand how the dynamic structural properties of LEA proteins orchestrate their protective effects, with a special focus on interactions with metabolites such as sugars. This knowledge is crucial for the development of stress-tolerant plants. Beyond their natural role in plants, LEA proteins hold significant promise as excipients in pharmaceutical formulations. Their ability to safeguard biomolecules under harsh conditions like dehydration or freezing makes them highly valuable for stabilizing drugs and other biological products

Details

- Stability analysis of target structures under water deprivation (target structures: liposomes, supported lipid bilayers, proteins)
- Examination of structural changes in proteins during water deprivation or encapsulation
- Analysis of the interactions between LEA proteins and biomolecules

Methods

- Cloning, expression, and purification of recombinant proteins and peptides (FPLC, HPLC)
- Highly sensitive light scattering equipment (SLS, DLS), UV-, CD-, FTIR-, and fluorescence spectroscopy and microscopy

Literature

- Hernández-Sánchez, *J Exp Bot,* 2022, doi: 10.1093/jxb/erac293
- Hernández-Sánchez, *Prot Sci,* 2024, doi: 10.1002/pro.4989
- Knox-Brown, Int J Mol Sci, 2020, doi: 10.3390/ijms21082794

Applications

- Anhydropreservation of cells, tissues, and biopharmaceuticals
- Development of stress-tolerant plants

Keywords

- Protein aggregation/ Fibrillation
- Biomembranes
- Encapsulation
- Intrinsically disordered proteins
- Water deprivation
- Sustainable agriculture

Interest in cooperation

- Research collaboration
- Contract research
- Industry-supported research

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Date June 2025