IMPLANTEUS
SUSTAINABLE MEDITERRANEAN AGRICULTURE FOR HEALTH | GRADUATE SCHOOL

MAFEN MASTER **Academic Year 2026 - 2027**

Proposal of M1 tutored project

PROJECT TITLE AND SUMMARY:

Network-based and multi-omics modeling of plant stress memory and resilience

In this tutored project, you will prepare a mini-literature review focusing on how network science, graph theory, and multi-omics integration can be used to model plant stress memory and predict stress resilience. The objective is to explore how biological networks—gene regulatory networks, protein–protein interaction networks, metabolic networks, and multi-layer omics graphs—capture the complexity of priming responses and memory retention. You are expected to search for and critically analyze recent peer-reviewed publications describing graph-based approaches to identify stress-memory hubs, network motifs involved in priming and stress memory, and connectivity patterns that determine resilience. You may also examine multi-omics integration methods (transcriptomics, proteomics, metabolomics, epigenomics) that use mathematical and computational frameworks to reconstruct regulatory modules, infer signaling pathways, and predict stress-tolerance phenotypes. In addition, you can also study and integrate novel AI and ML approaches in this mini-review. The mini-review should include a clear introduction to the topic, a structured synthesis of selected studies, a critical discussion comparing different network-modeling and omics-integration approaches, and a short section outlining future perspectives for applying graph-based and multi-omics models in plant stress biology and agriculture.

HOST UNIT: ERIT – PSII (Plant Sciences Interactions and Innovation), IAgES, Avignon University

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