

DIFAR DIPARTIMENTO

Avviso di Seminario

The Multifaceted Role of Melatonin in Plant and Enzyme Regulation

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26 Marzo 2025, DIFAR, sede di Sturla, Viale Cembrano 4, Aula C, ore 14.30

Melatonin, a highly conserved biomolecule found in both plants and animals, plays a crucial role in antioxidant defense, circadian regulation, and enzymatic modulation. This presentation explores melatonin's protective effects in plants and its interaction with peroxidase enzymes, particularly lactoperoxidase (LPO) and myeloperoxidase (MPO).

In plants, melatonin serves as a key stress mitigator, particularly in medicinal species like lemon balm (Melissa officinalis L.) and valerian (Valeriana officinalis L.), where it enhances resistance to heavy metal toxicity (Zn and Cd exposure). By modulating superoxide dismutase (SOD) and peroxidase (POD) activity, melatonin strengthens the plant's natural antioxidant defenses, reducing oxidative damage and promoting resilience.

Beyond plants, melatonin also interacts with mammalian peroxidases, where it plays a dual role as both a substrate and an inhibitor. Research shows that melatonin inhibits myeloperoxidase (MPO) activity, thereby reducing the production of harmful oxidants implicated in inflammatory diseases such as atherosclerosis, asthma, and arthritis. Similarly, melatonin modulates the catalytic mechanism of lactoperoxidase (LPO) enzyme currently investigated in our group as a natural sustainable and biodegradable alternative to synthetic pesticide

By highlighting melatonin's diverse functions-from enhancing plant stress resistance to regulating oxidative processes in mammalian enzymes-this presentation shows its biomedical and agricultural significance. Melatonin emerges as a natural, multifunctional molecule with potential applications in crop protection, human health, and therapeutic interventions.

Il seminario rientra nelle attività del progetto

EDIRE EQUALITY DIVERSITY AND INCLUSION FOR RESEARCH ENHANCEMENT IN BOSNIA HERZEGOVINA (HORIZON, CORDIS, European Commission) (https://cordis.europa.eu/project/id/101060145/it).

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