

MELATONIN- INDUCED SEED PRIMING IN TWO PEPPER (CAPSICUM ANNUUM) LOCAL VARIETIES

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Melatonin (N-acetyl-5-methoxy-tryptamine) is a mammalian neuro-hormone, antioxidant and signaling molecule that was first discovered in plants in 1995. Recent studies have shown that melatonin is an excellent antioxidant, regulating root and shoot growth, activating seed germination and rhizogenesis (lateral and adventitious roots) and delaying leaf senescence. In addition, its role and ability to induce plant tolerance to abiotic stress, such as drought, cold, heat, salinity, chemical pollutants, herbicides and UV radiation makes melatonin an interesting molecule as a natural biostimulant agent for horticultural crops, cultivated either by direct seeding or by transplanting in open fields. However, more research is still needed to uncover the molecular mechanisms activated in plants by this molecule, endogenously or when exogenously applied.

Here we report that the pre-treatment (48 or 72h) of the seeds with different concentrations of melatonin was effective in improving significantly the germinability of the seeds of two local varieties of *Capsicum annuum* of the Campania region, "Puparulillo" and "Friariello" (in collaboration with the seed company Topseed Srl, Sarno). Melatonin seed pre-treatment induced also a statistically significant promotion of the elongation of the primary root compared to seedlings derived from mock-treated seeds. Seed priming with melatonin was associated with the transcriptional activation of the gene encoding α -amylase (involved in the degradation of secondary reserve starch), superoxide dismutase (required for detoxification of ROS), and MAKR4 and ARF7, two regulatory genes involved in root system development.

Altogether these results pose the base for introducing standard applications of melatonin for seed priming but also during all the stages of seedling growth in plant horticultural nursery, to ensure high seed germination, active root development and seedling growth as well as a higher adaptability of pepper plantlets in open fields.