Sociedad Argentina de Microbiología General

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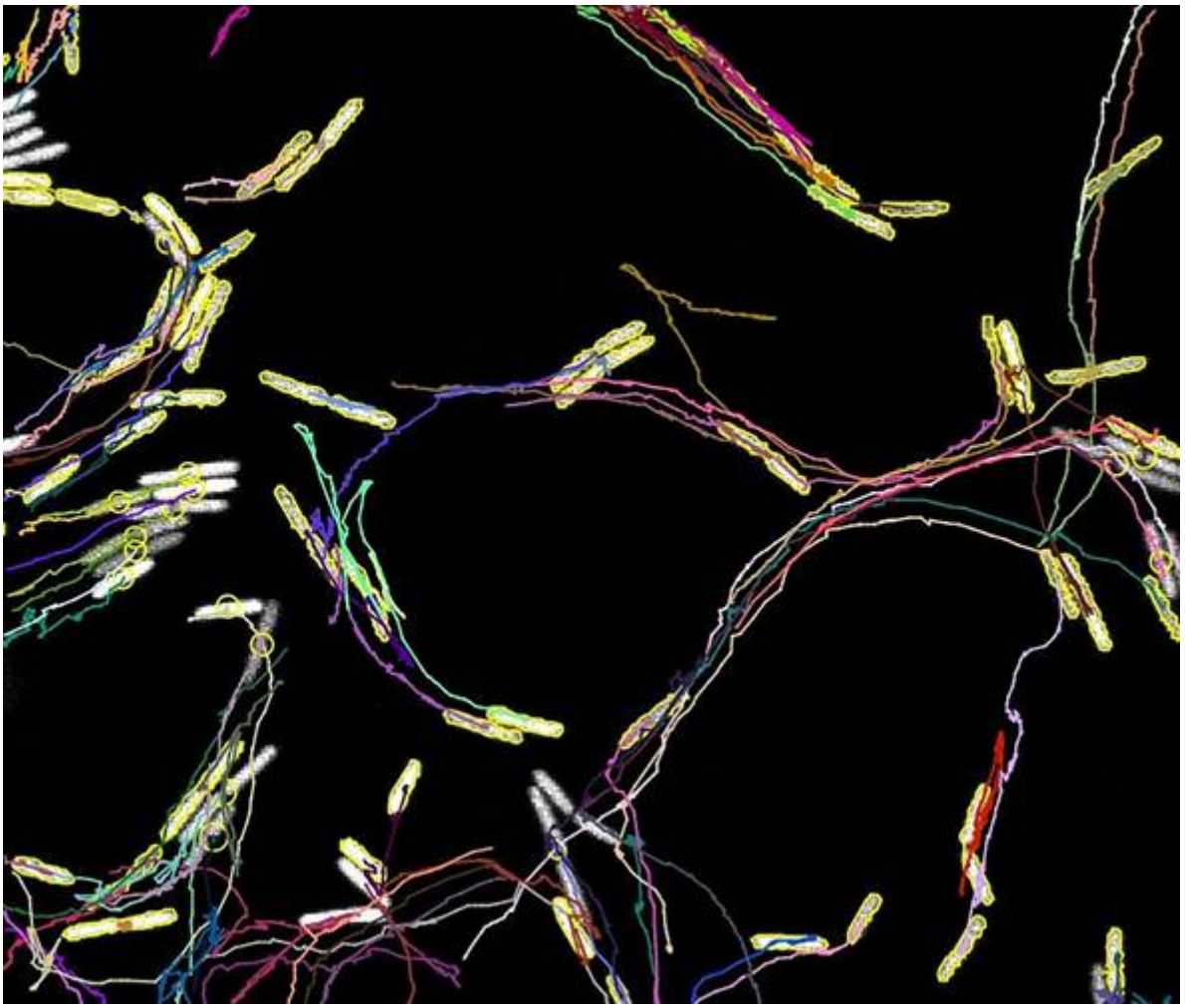

Foto: Se hace camino al andar. Celeste Dea. 1er puesto. Concurso fotográfico SAMIGE 20 años.

ANALYSIS OF MELATONIN PRODUCTION AT DIFFERENT GROWTH STAGES BY ENTEROBACTER 64S1 AND ITS EFFECT OF INOCULATION ON ARABIDOPSIS Thaliana MUTANT PLANTS DEFICIENT IN MELATONIN SYNTHESIS UNDER DROUGHT CONDITIONS

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Global drought conditions lead to significant crop yield losses and severely impact global food security. In this context, one strategy to enhance plant drought tolerance is the use of biofertilizer or bioinoculant formulations containing PGPR (Plant Growth Promoting Rhizobacteria). PGPR is an environmentally friendly alternative that improves crop production by interacting with plant roots and enhancing their performance through various mechanisms, including phytohormone production, atmospheric nitrogen fixation, and solubilization of insoluble phosphate. Although PGPR inoculation offers numerous benefits, it is important to note that the use of commercial strains may alter rhizosphere microbial activity and negatively impact the soil ecosystem. Native PGPR strains are a promising strategy, as they not only enhance plant-bacteria interactions but also reduce adverse effects on soil microbiota. Melatonin (MT), a phytohormone recently discovered to be produced by PGPR, plays an important role in enhancing plant tolerance to abiotic stress. Until now, the production of melatonin by native PGPR and its effect on endogenous melatonin levels in plants have been understudied. *Enterobacter* 64S1, a native PGPR isolated from the roots and rhizosphere of tomato crops in the province of Mendoza, Argentina, can produce melatonin and IAA using L-tryptophan (Trp) as a precursor in culture media. In addition, inoculation with this strain increased endogenous melatonin levels and mitigated the negative effects of drought in Arabidopsis thaliana plants. The aim of this study was to evaluate the production of melatonin by *Enterobacter* 64S1 at different growth stages and to determine the effect of inoculation with this strain on *Arabidopsis thaliana* mutants deficient in melatonin synthesis. To quantify melatonin production at different time points, the strain was grown in NFb medium with Trp added as a precursor for MT synthesis (prior to incubation). Triplicate samples were collected at each growth time point: 12 h, 24 h, 48 h, 72 h, and 96 h, and were analyzed by HPLC-UV. Then, a 5 weeks greenhouse assay was conducted in a randomized design with treatments of 12 plants each. The treatments were: 1) control, 2) synthetic MT and 3) strain 64S1.

Parameters such as plant growth, leaf cell membrane damage, and endogenous melatonin levels under drought and irrigation conditions were evaluated. The inoculated plants under drought stress, increased leaf area and dry weight, decreased MDA content and increased endogenous MT levels in leaves. These results demonstrate a novel mechanism through which PGPR alleviates the effects of drought stress.

Palabras clave: MELATONIN - ARABIDOPSIS - PGPR - DROUGHT - ENTEROBACTER