CENTRO DE ASTROBIOLOGÍA · CAB
ASOCIADO AL NASA ASTROBIOLOGY PROGRAM

CSIC Consejo Superior de Investigaciones Científicas · INTA Instituto Nacional de Técnica Aeroespacial

Enhancing UV-C and Perchlorate Resistance in *Arabidopsis thaliana* Through the Introduction of Microbial Genes from Hypersaline Environment

Fig.1

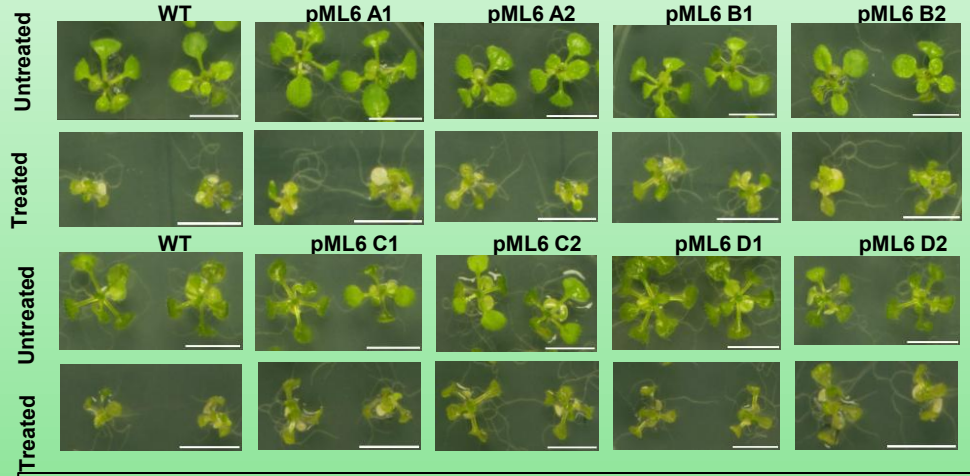


Fig.2

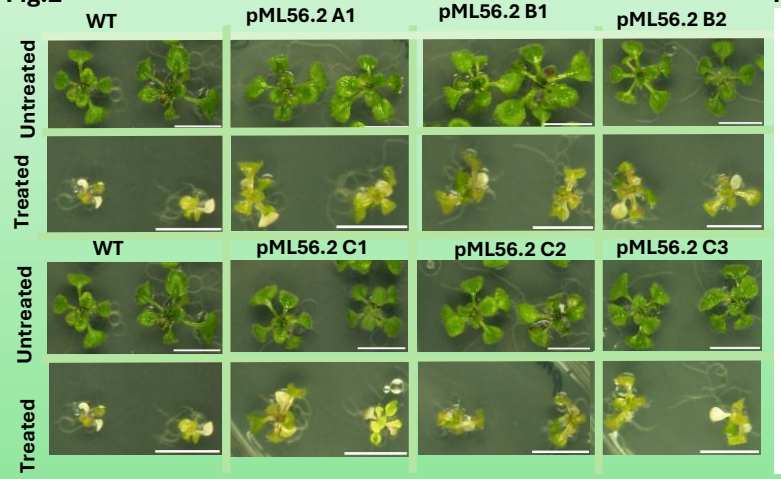
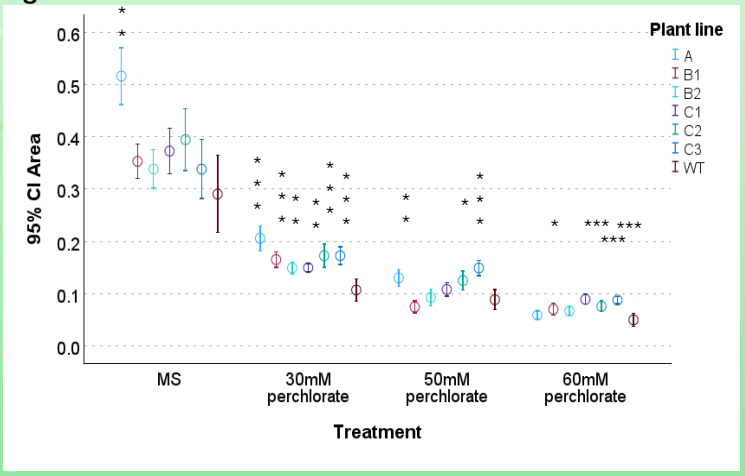


Fig.3



Working in extreme environments using molecular biology provides the opportunity to analyze the genes present in a specific habitat and to identify and select those responsible for the resistance mechanisms that enable life to persist under such conditions.

In our laboratory, four genes were selected from metagenomic libraries derived from high-altitude hypersaline lakes in Argentina (Diamante and Ojo Seco, at 4,589 m and 3,200 m respectively) and from the Es Trenc salt flat (Mallorca, Spain). Based on these promising results, the genes were introduced into Arabidopsis thaliana to evaluate their potential to enhance UV-B tolerance in plants. Two of them promoted the growth of the transformed plants compared to wild-type (WT) plants (hypothetical protein (pML6) and TATA-box binding protein (pML56 orf2), respectively).

The results presented in the article demonstrate that plants harboring these genes are not only capable of withstanding higher levels of UV-C radiation (Fig. 1 and 2), but also exhibit increased tolerance to perchlorate compared to WT plants (indicative of cross-resistance)(Fig.3). This finding may represent a significant advance for crop improvement and phytoremediation on Earth, and it may also have astrobiological relevance, potentially contributing to the development of resilient plant systems for applications in extraterrestrial environments.

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