High Sporulation of *Bacillus* XT13, XT14, and XT17 in Submerged medium for Drought-Stress Applications

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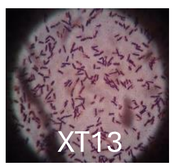
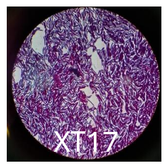
1 INTRODUCTION

Climate change has intensified drought and desertification in Latin America, threatening agricultural productivity and food security (1). Recurrent drought events reduce yields and crop quality while increasing dependency on synthetic fertilizers such as NPK, which contribute to soil degradation and water contamination. Plant Growth-Promoting Bacteria (PGPB) represent a sustainable and environmentally friendly strategy to enhance crop performance under drought stress (2). In this context, AGROSAVIA selected three *Bacillus* strains—*B. subtilis* XT13, *Priestia megaterium* XT14, and *B. amyloliquefaciens* XT17—for their growth-promoting effects and potential to mitigate water deficit stress.

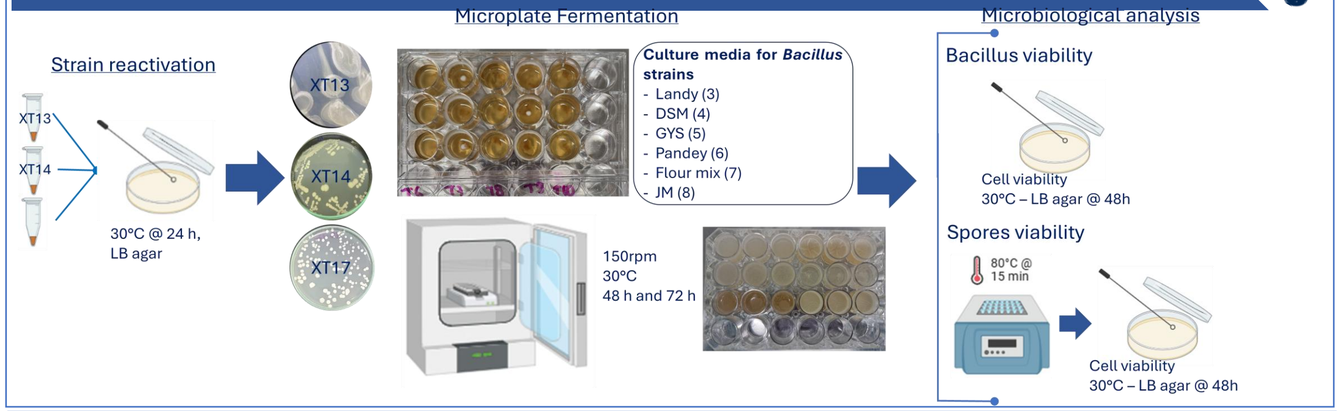




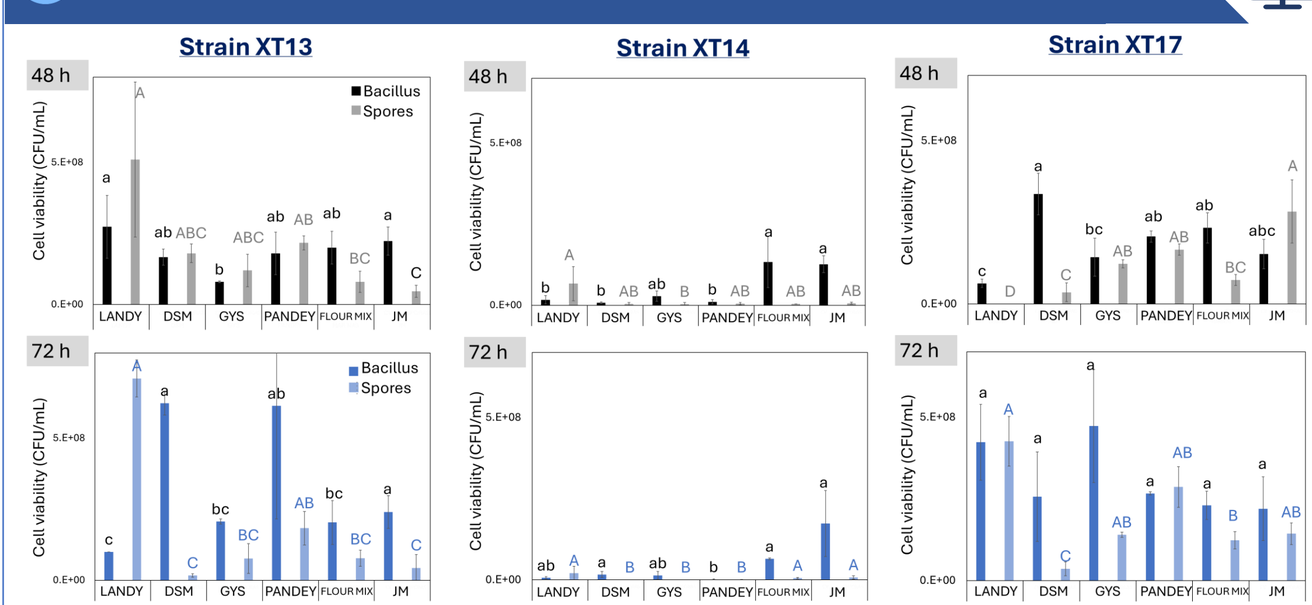
2 OBJECTIVES

This study aimed to optimize the spore production of *Bacillus* strains XT13, XT14, and XT17 in submerged culture for drought-stress mitigation. Six liquid media were evaluated to compare growth and sporulation performance and identify the most productive medium.

3 METHODS



4 RESULTS



The six media tested revealed Landy medium as the most effective for both growth and sporulation of the three *Bacillus* strains.
- **XT13** showed the highest sporulation capacity, reaching **7.1×10^{8} spores/mL** after 72 h.
- **XT17** reached **4.3×10^{8} spores/mL** at 72 h, indicating optimal sporulation after the exponential phase.
- **XT14** presented its highest sporulation earlier, achieving **6.7×10^{7} spores/mL** at 48 h, suggesting faster metabolic activation.

5 DISCUSSION AND CONCLUSIONS

- Optimizing the culture medium was essential to enhance spore productivity and technical scalability. Among the six media evaluated, Landy medium supported the highest growth and sporulation.
- The stability of microbial inoculants is achieved by stress-resistant spores capable of maintaining metabolic activity under field conditions.
- The successful optimization of these strains contributes to the development of sustainable biofertilizers that can reduce dependence on chemical fertilizers and minimize soil and water contamination. This aligns with the growing demand for bio-based agricultural technologies in Latin America, where climate change increasingly threatens food security.

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