Colonization of sustainable nanotissue derived from agricultural waste by kosakonia radicincitans and its potential application as a biofertilizer

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The integration of sustainable materials into biofertilizer production marks a significant advancement in modern agriculture. Plant growth-promoting bacteria (PGPB) are a diverse group of microorganisms recognized for their capacity to enhance plant growth through mechanisms such as nutrient solubilization, phytohormone production, and disease suppression. Notably, *Azospirillum*, *Rhizobium*, and *Bacillus* species have been extensively studied and successfully applied to improve the yield of economically important crops like wheat, maize, and legumes, as well as to enhance soil health. Recently, *Kosakonia radicincitans* has gained attention as a promising PGPB with considerable potential as a biofertilizer, particularly for tomato cultivation. *K. radicincitans* has shown the ability to promote tomato plant growth by enhancing nutrient uptake and producing growth-stimulating compounds, positioning it as a valuable candidate for sustainable agriculture. However, its application as a biofertilizer remains underexplored, particularly concerning its interaction with substrates derived from agricultural waste. This study aims to advance the understanding of *K. radicincitans* by evaluating its colonization and biofilm formation on innovative nanofibrous mats derived from agricultural waste. To achieve this, the biomolecular technique Fluorescence In Situ Hybridization (FISH) was employed to visualize the growth and biofilm formation of *K. radicincitans* on activated nanotissues, which were developed from various agricultural waste materials—including polyhydroxybutyrate (PHB), polycaprolactone (PCL), polyphenols (PF), and lignin—by experimenting with different combinations and structures obtained by electrospinning.

The presentation will report the results obtained so far with the tested materials, highlighting their effectiveness in supporting biofilm growth. Additionally, we will discuss further investigations aimed at enhancing biofilm development, including the potential application of these nanostructured biofertilizers in tomato plant growth experiments.