A new collection of native endophytic and soil microorganisms with potential agricultural and industrial uses: COLMENA

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COLMENA
Colección de Microorganismos Edáficos y Endófitos Nativos

Laboratorio de Biotecnología del Recurso Microbiano

INSTITUTO TECNOLÓGICO DE SONORA
Educar para Trascender

INTRODUCTION

COLMENA (www.itson.mx/COLMENA) is a microbial collection specialized in the preservation, classification, characterization, and transferring of native microorganisms isolated from different agro-systems, and other habitats. The aim of COLMENA is to decrease the loss of microbial diversity associated to land-use changes, diminishing the soil degradation, as well as use of native microbial communities as a sustainable alternative way for contributing to the global food safety.

METHODS

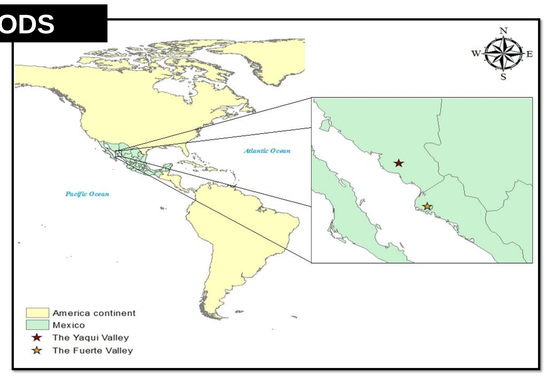
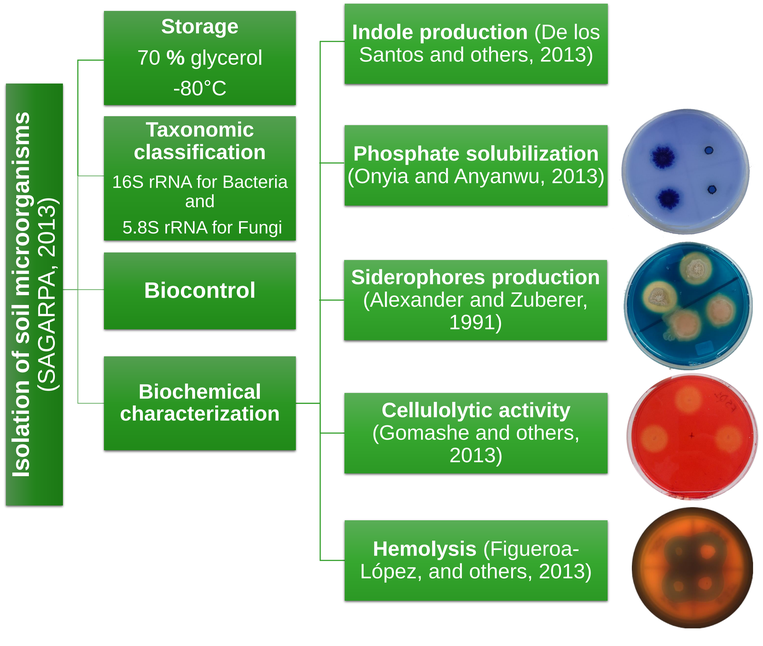


Figure 1. Macro- and micro-localization of the Yaqui Valley (State of Sonora) and Fuerte Valley (State of Sinaloa) in Mexico.

Study sites	Collected samples
Yaqui Valley	63
Fuerte Valley	5



RESULTS

COLMENA preserves about 1,464 soil microbial strains associated to several crops (Figure 2). Until now, we have developed the taxonomic classification of 353 strains, by molecular techniques, the most abundant bacterial (Figure 3) and fungal (Figure 4) genera were *Bacillus* (27%), and *Aspergillus* (8%), respectively. Three percent of this microbial collection produced high level of indole acetic acid (>5 mg/L). In addition, the phosphorus solubilization and siderophore production was observed in 61% and 36% of tested strains (396), respectively. So far, only 3% of the whole collection has been identified as lytic enzymes producers, and 2% presented β-hemolysis (Figure 5).

Figure 2. Proportion of the microbial collection isolated from studied crops.

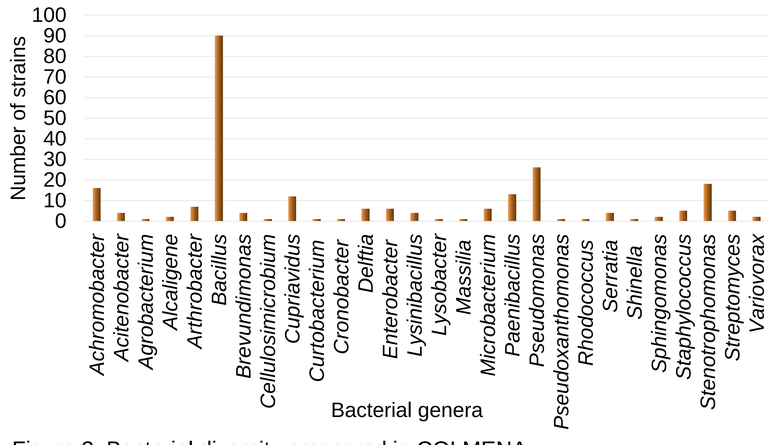


Figure 3. Bacterial diversity preserved in COLMENA.

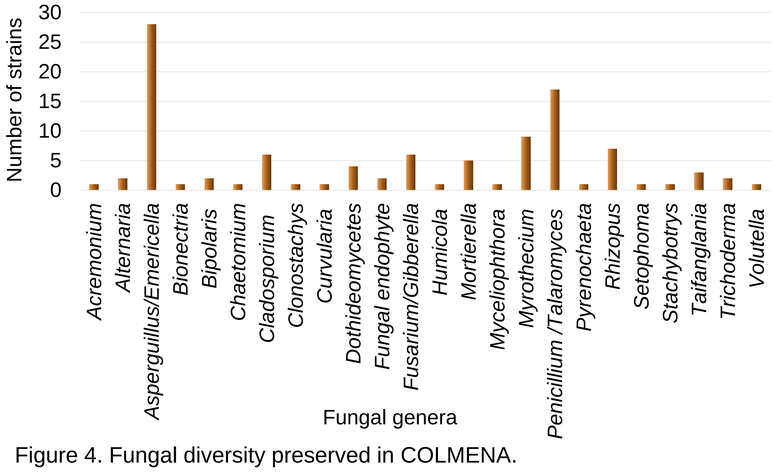


Figure 4. Fungal diversity preserved in COLMENA.

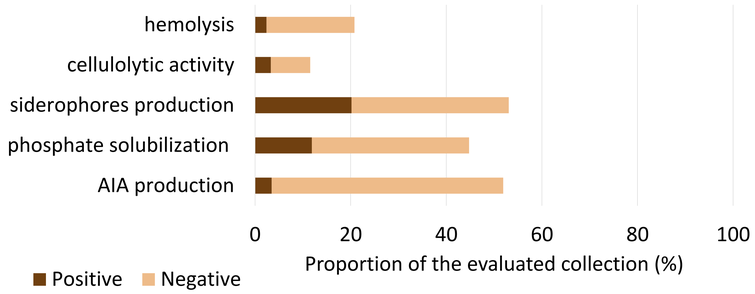


Figure 5. Metabolic characterization of COLMENA members. Strains were positive for AIA production when concentration was > 5 mg/L AIA, siderophores production, phosphate solubilization, and cellulolytic activity was positive when the halo was > 0.5 cm, and the hemolysis indicates β-hemolysis.

So far, we have identified three promissory bacterial strains against *S. sclerotinia*, 19 against *F. verticillioides,* and 14 against *B. Sorokiniana* (figure 6). These pathogens are the causal agents of several diseases in common bean, maize and wheat, respectively.

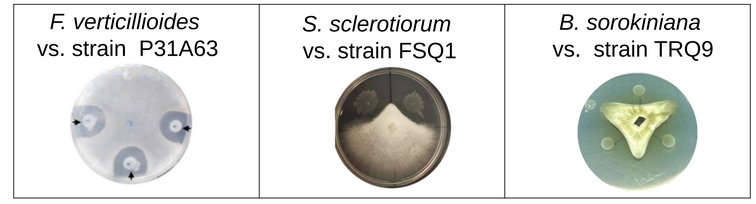


Figure 6. Biological control of COLMENA members against plant pathogens.

CONCLUSION

These results show the versatility of these microbial strains as cost-effective alternatives in agro-industrial practices, focused on contributing to the global food safety, through establishing successful collaborations among scientist, and industrial sectors.

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