

Research Paper

Native soil bacteria isolates in Mexico exhibit a promising antagonistic effect against *Fusarium oxysporum* f. sp. *radicis-lycopersici*

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Sinaloa state accounts for 23% of Mexico's tomato production. One constraint on this important crop is the *Fusarium* crown and root rot, caused by *Fusarium oxysporum* f. sp. *radicis-lycopersici*, which has been reported to reduce crop yield by up to 50%. In this study, we set out to identify bacterial populations which could be used to control this disease through natural antagonism. Five tomato rhizospheric soil samples were collected, dried for 1-week, and homogenized. Sub-samples were used to prepare an aqueous solution used to isolate microorganisms in pure cultures. Organisms were purified and grown separately, and used to generate a collection of 705 bacterial isolates. Thirty-four percent from this bank (254 strains) was screened against Forl, finding 27 bacteria displaying *in vitro* Forl growth inhibition levels from 5% to 60%. These isolates belonged to the genus *Bacillus* and their 16Sr DNA sequences showed that they are closely related to seven species and they were putatively designated as: *B. subtilis*, *B. cereus*, *B. amyloliquefaciens*, *B. licheniformis*, *B. thuringiensis*, *B. megaterium*, and *B. pumilus*. One isolate belonged to the genus *Acinetobacter*. Two *B. subtilis* isolates (144 and 151) and one *B. cereus* isolate (171) showed the best antagonistic potential against FCRRT when evaluated on seedlings. Plate and activity assays indicate that these isolates include a diverse repertoire of functional antagonistic traits that might explain their ability to control FCRRT. Moreover, bacteria showed partial hemolytic activity, and future research will be directed at ensuring that their application will be not harmful for humans and effective against Forl in greenhouse or field conditions.

Abbreviations: Forl – *Fusarium oxysporum* f. sp. *radicis lycopersici*; FCRRT – *Fusarium* crown and root rot of tomato

Keywords: Native bacteria / Microorganism collection / Bacterial antagonism / Forl / FCRRT

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Introduction

Tomato agriculture and exporting in Mexico's Sinaloa state represent an annual value of >600 million USD.

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Sinaloa accounts for 23% of the national production (www.siap.gob.mx) and is considered one of the main tomato producing regions in Mexico. One issue concerning this production is that tomato may be severely affected by the fungus *Fusarium oxysporum* Schlechtend: Fr. f. sp. *radicis-lycopersici* (Forl) W.R. Jarvis & Shoemaker, resulting in the *Fusarium* crown and root rot (FCRRT) disease [1]. The disease can strike crops in both greenhouse and field conditions, causing significant loss of production [2]. FCRRT has been reported worldwide in,