Colonization of Desert Soil by *Pseudomonas fluorescens* Strains Affected in Gene that are Expressed in a North East Soil

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ABSTRACT

*Pseudomonas fluorescens* is a motile, gram-negative, rod shaped bacterium. This saprophyte colonizes soil and plant surfaces, metabolizes a variety of carbon sources, and is also found in aquatic environments. In addition, *P. fluorescens* possesses a large genome and several two-component regulatory systems, which makes this bacterium an ideal model to study adaptation to diverse environments. Here we hypothesize that *P. fluorescens* genes expressed in a specific soil affect the ability to colonize other soils. To test this hypothesis, we studied *P. fluorescens* strains affected in genes, previously identified to be expressed in soil from the North East, for their ability to colonize Mojave Desert soil. We used a total of seven strains, which consisted of the wild-type (PD0-1), two strains containing antibiotic-cassette mutations (IV212 and IV153), their complemented counterparts (IV12-1, IV12-2, and IV13-1), and a control strain containing the vector used for complementation (IV12-6000). Construction of four strains required trpE complementation which is a form of bacterial conjugation. This involves three strains of bacteria, the donor (IIV12-1), which contains a mobilizable plasmid (pME6000) carrying tetacycline resistant, the helper strain which provides the transfer functions, and the recipient (PD0-1) which is resistant to ampicillin. Transconjugants were selected on ampicillin and tetracycline. Strains were grown overnight and inoculated onto soil as single strain inoculations or in mixtures. We measured soil populations by plating on antibiotics at three different times after inoculation. Our results indicate that genes that are expressed in soil from the North East are important for colonizing desert soil.

INTRODUCTION

- Soils are diverse environments and subject to fluctuating conditions that include changes in availability of nutrients, moisture and changes in pH (Saleh-Lakha et al., 2005).
- *Pseudomonas fluorescens* is an ideal model microorganism to study adaptation to soil (Rocrine et al., 2000).
- It possesses a big genome and many two component regulatory systems and genes that are expressed only in soil environments (Robleto et al., 2003; Silby and Levy, 2004).
- Previous studies identified *P. fluorescens* genes that are expressed only in a soil from the Northeast (Massachusetts) (Silby and Levy, 2004).
- Here, we examine the hypothesis that adaptation to diverse soils requires a core set of genes expressed in soil.
- By this premise, genes expressed in Massachusetts soils would be expressed and required for colonisation of other soils.
- To test this premise we examine colonization *P. fluorescens* strains of a Mojave Desert soil that shows contrasting differences from those observed in Massachusetts soils.

METHODS

Steps in Conjugation (Triplicates Matings)
1. Streak strains on antibiotic plates.
2. Mix aliquots of strains.
3. Incubate at 28°C for 24 hours.
4. Dilution plating.
5. Selection of conjugated cells.

CONCLUSIONS

- Genes that are expressed in soil from the Northeast are important for colonizing desert soil *Pseudomonas fluorescens*.
- The effects of mutations in iv genes are observed in single and mixed inoculations.
- pME6000 affects desert soil colonization by *Pseudomonas fluorescens*.
- Future work includes measuring gene expression in soil conditions.

BIBLIOGRAPHY


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