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# Phosphate Solubilizing Activity of Native Guatemalan Isolates of *Pseudomonas fluorescens*

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**Abstract**

Phosphorus (P) is an essential element in agricultural production. However, due to its complex dynamics, only a small portion of the total present in the soil can be used by plants. This is because most are found in insoluble forms, especially in Andisol soils of volcanic origin. Phosphate solubilising microbes (PSMs) are an alternative to transform this element into soluble forms that can be used by plants; in addition to not generating environmental pollution and representing a low cost compared to the production of fertilisers. The main objective of this research was to identify and evaluate *in vitro*, the phosphate solubilising activity, and stability of native Guatemalan isolates of *Pseudomonas fluorescens* bacteria and its relation with its genetic diversity. The isolates were obtained from regions of Guatemala where Andisol soils represent a limitation to agricultural production due to the high P fixation phenomenon. A total of 35 *P. fluorescens* isolates were identified and confirmed through specific PCR. Subsequently, the genetic diversity of the isolates was analysed with the molecular marker AFLP. Phosphate solubilising activity and stability were evaluated by relating the solubilisation halo to the bacterial growth halo through the solubilisation index. For this, *in vitro* cultures of the isolates were performed in NBRIP medium taking tricalcium phosphate $Ca_3(PO_4)_2$ as the source of insoluble phosphorus. High genetic diversity was identified among the *P. fluorescens* isolates, as well as the isolates with the highest solubilisation index and stability showed greater genetic similarity. The Pf 30 isolate showed the highest solubilisation index, while the Pf 7 isolate was the most stable. Finally, due to the solubilisation potential of *P. fluorescens* isolates observed *in vitro*, future evaluation of the solubilising activity is suggested under field conditions with different soil types and in association with different crops. This in order to identify the isolates with the best solubilisation potential and thus offer a viable solution to agricultural producers affected by phosphorous fixation.

**Keywords:** Andisols, genetic diversity, phosphate solubilising activity, *Pseudomonas fluorescens*

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