



Maestría en Ingeniería en Diseño de Bioprocesos

**Phosphorus solubilizing fungi isolated from
soils of the Veracruz Altotonga**

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1. Introduction

Phosphorus is vital for life, since it plays important roles in the metabolism of plants. An adequate amount of this element produces a vigorous growth in the plant, but a low availability in the soil causes fall in the productivity of the harvest. For this reason, the phosphorus solubilizing microorganisms are essential for the uptake of this element in the plant [1]. The application of large quantities of phosphorus fertilizers has caused the accumulation of insoluble phosphorus, with large reserves that can not be assimilated by the plant. For the solubilization of said insoluble phosphates, the microorganisms have various mechanisms: i) production of organic acids ii) acidification iii) chelation and iv) oxidation-reduction reactions, in order to be absorbed soluble phosphates. The solubilization of phosphates is through the appropriate microorganisms that will decrease the application of chemical fertilizers and increase productivity [2].

2. Objectives

2.1. General objective

Develop and implement methodologies to maximize the recovery of microbiota with phosphate solubilization activity in plant growth.

2.2. Specific objectives

- Select and characterize phosphate solubilizing microorganisms from rhizosphere and soil.
- Quantify the phosphorus solubilizing activity of the selected microorganisms (fungi).
- To evaluate the phosphate solubilizing activity of fungi by bioassays in plants.

3. Methodology

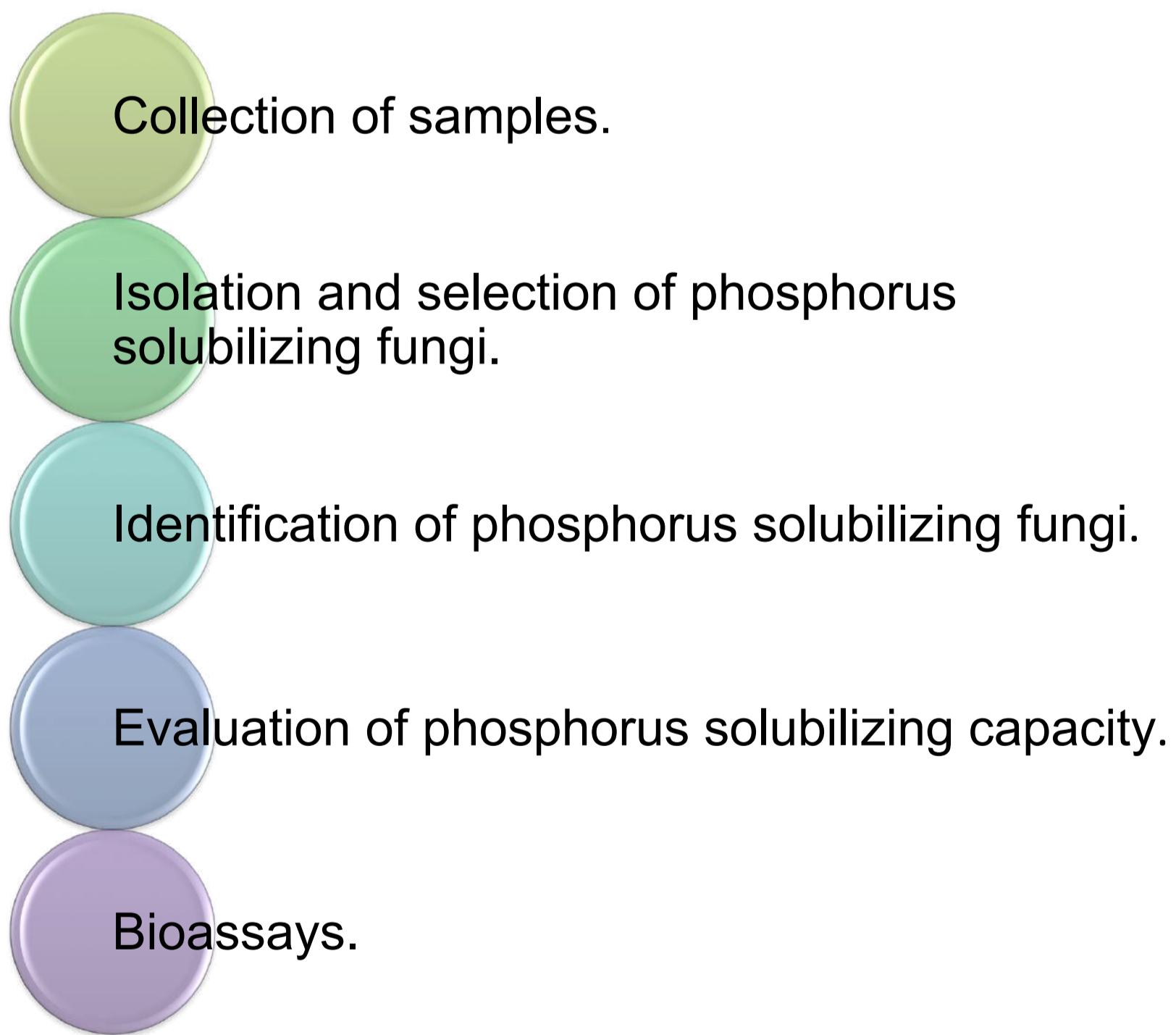


Figura 1. Develop methodology.



Figure 2. Samples collected from rhizosphere and soil.

The samples were collected in Veracruz, from two sites of the Municipality of Altotonga in Veracruz, Figure 3.

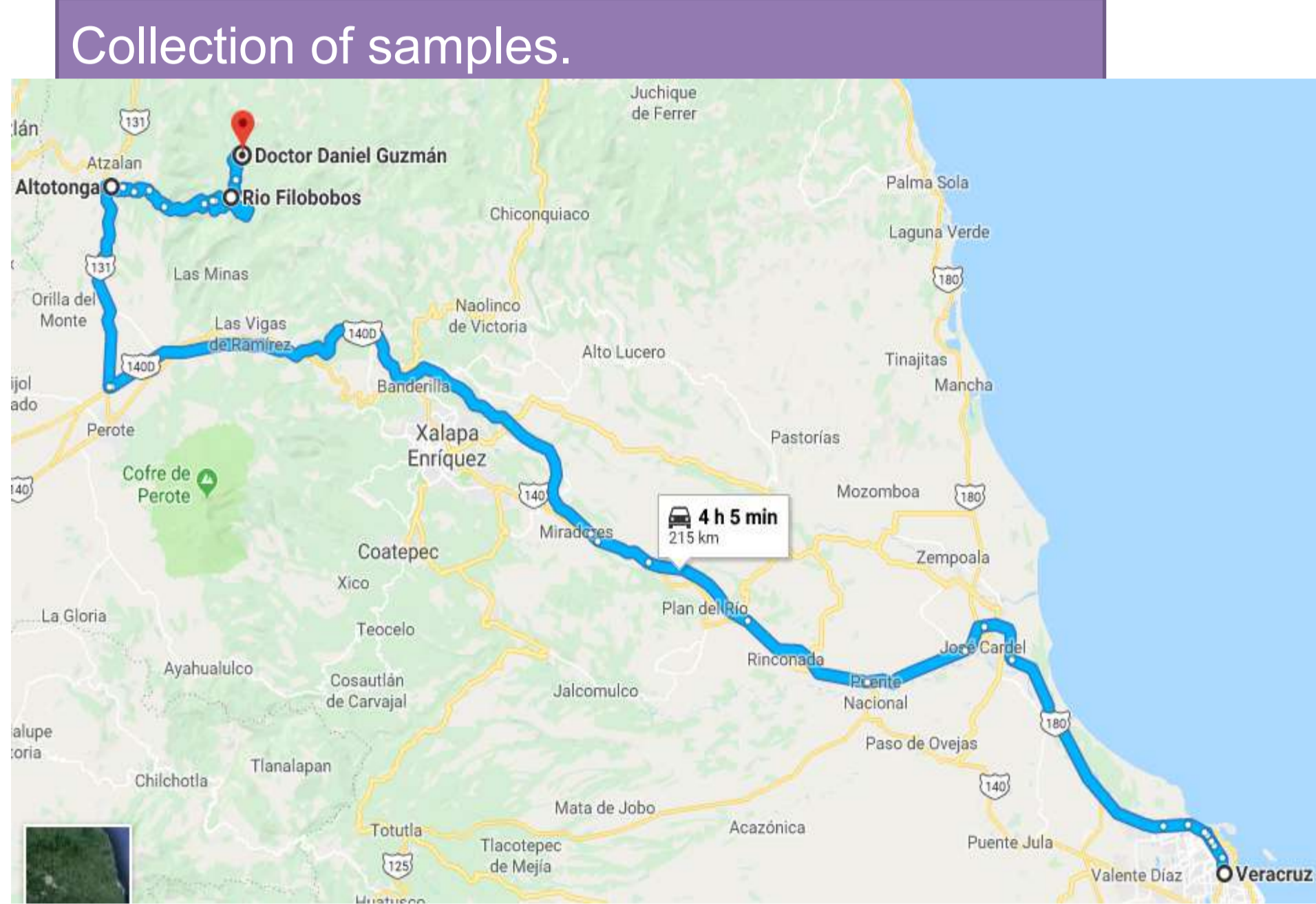


Figure 3. Satellite images of sampled sites of Altotonga, Ver.

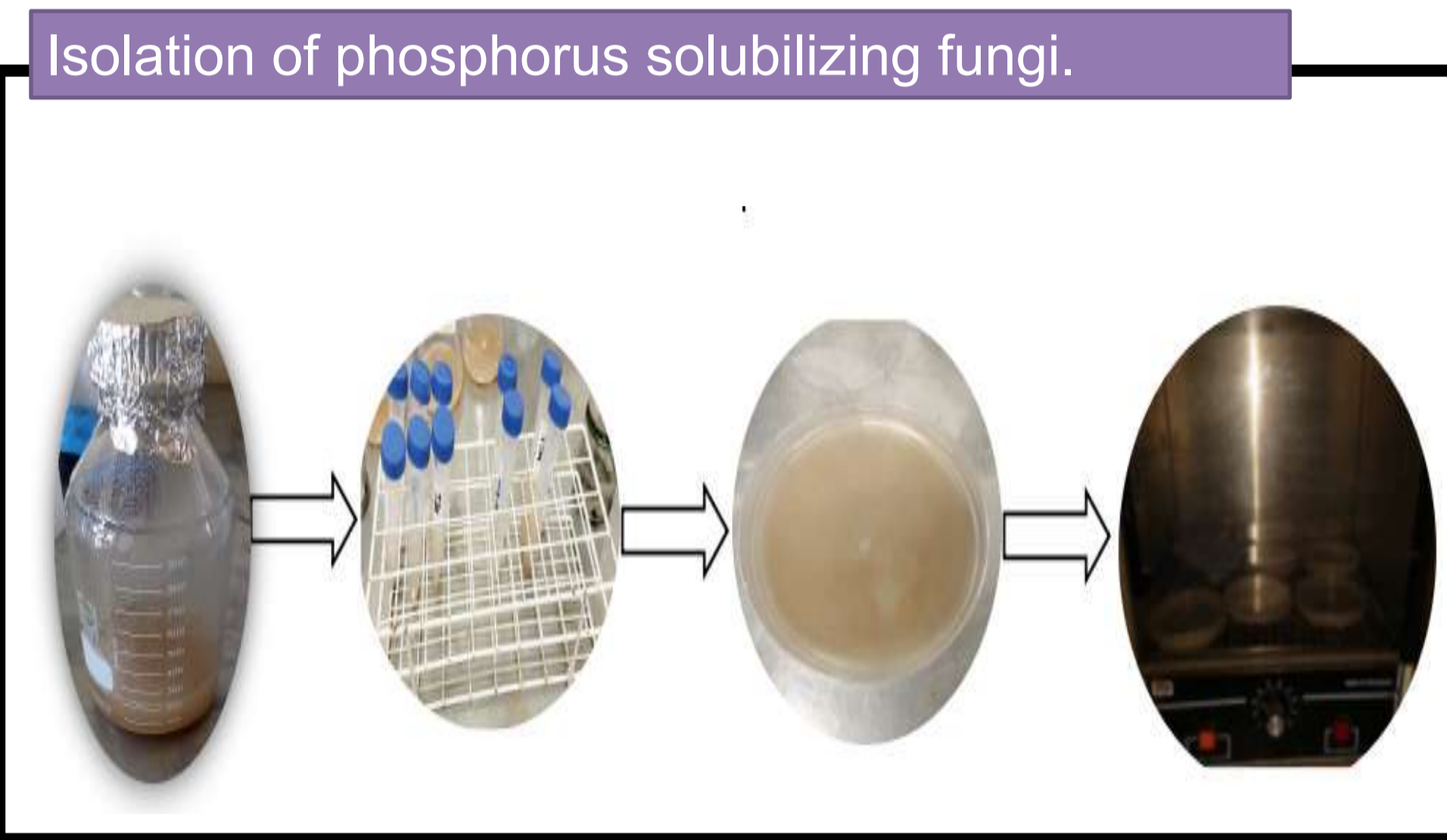


Figure 4. Isolation of fungal strains.

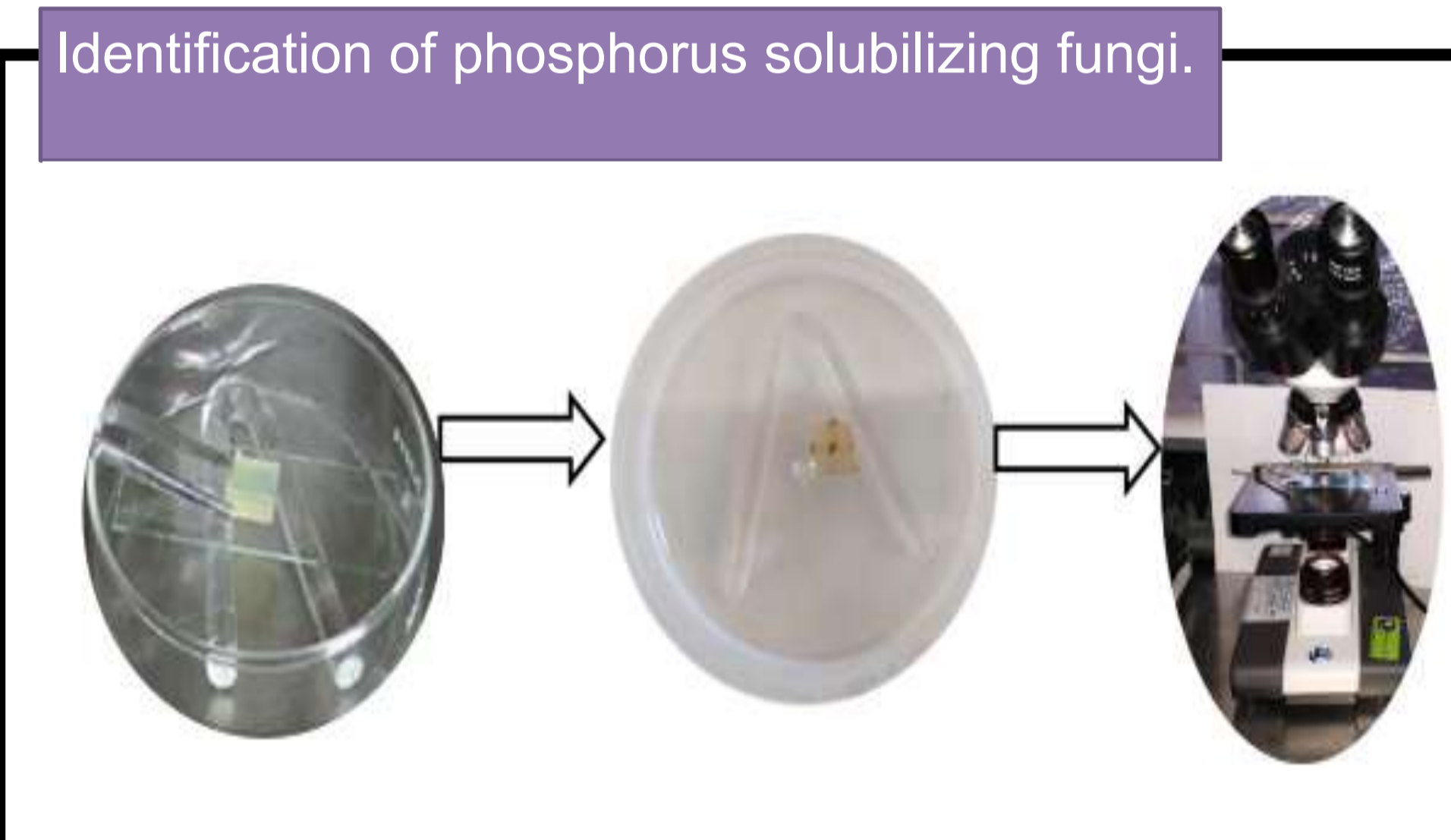


Figure 5. Desarrollo de metodo de microcultivo.

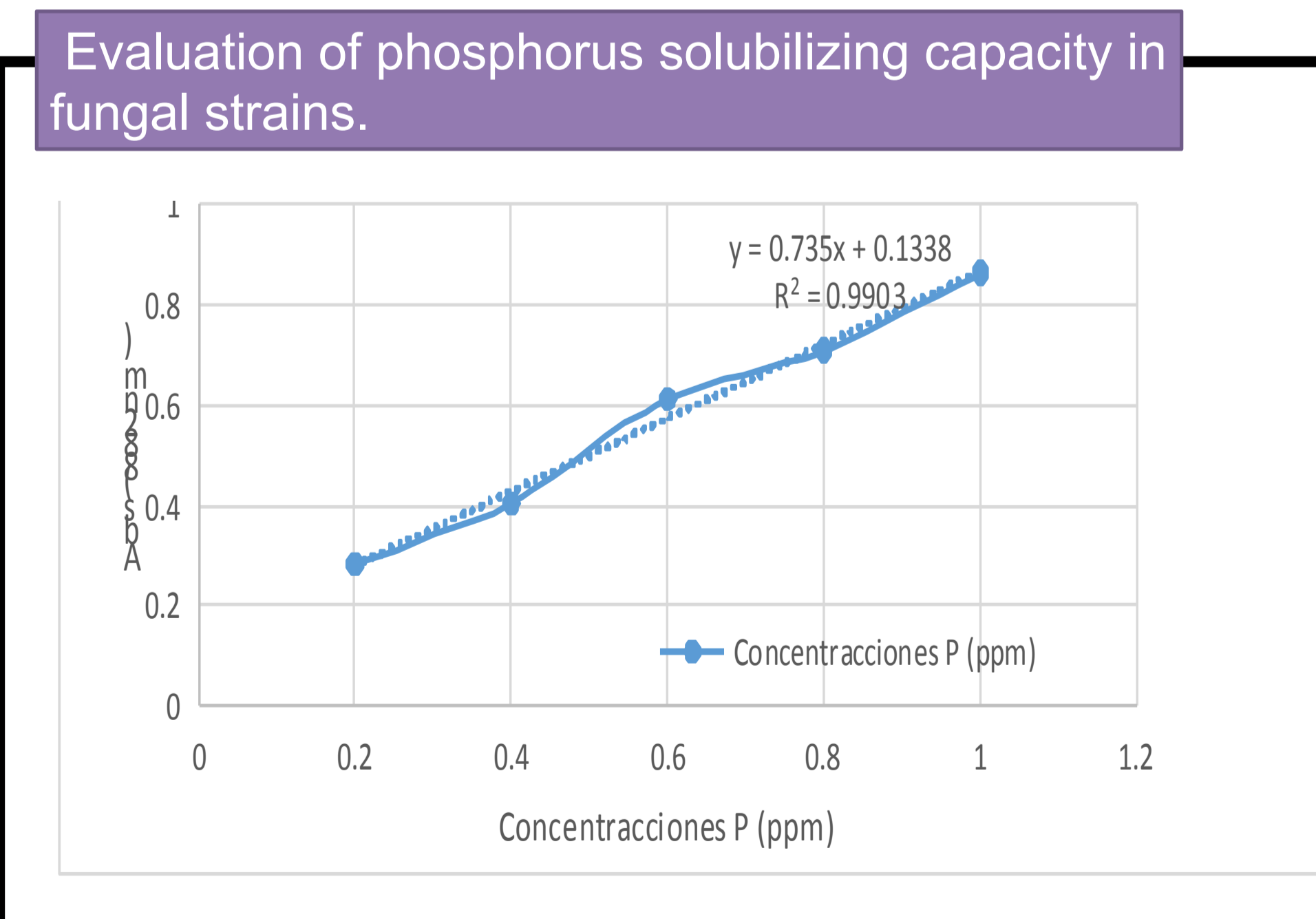


Figure 6. Phosphor calibration curve



Figure 7. Phosphorus concentrations from a standard solution of 5 ppm phosphorus.

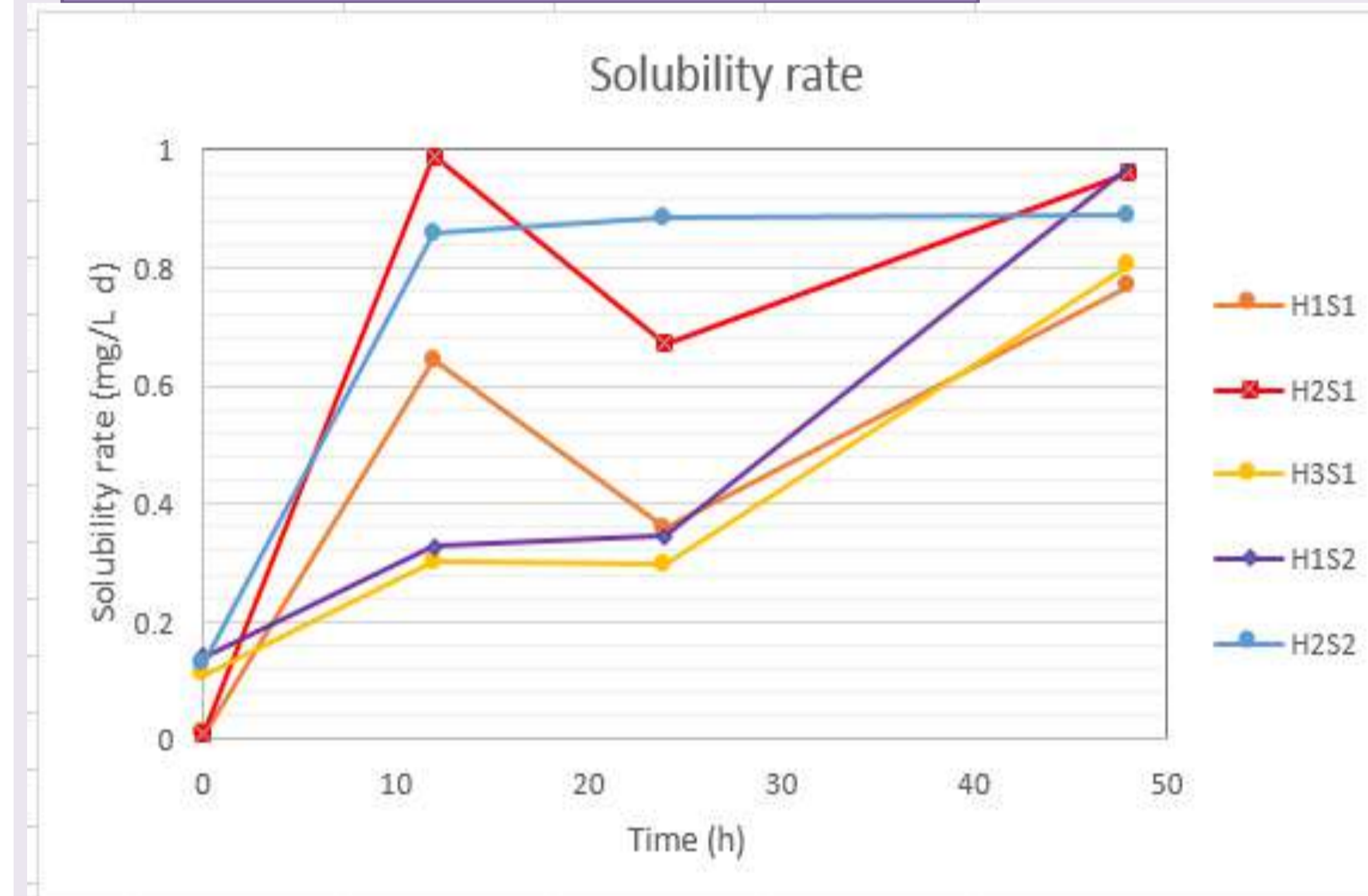
4. Results

Strains of fungi isolated.

Code / Gender	H1S1 <i>Trichoderma spp.</i>	H2S1 <i>Trichoderma spp.</i>	H3S1 <i>Trichoderma spp.</i>	H1S2 <i>Trichoderma spp.</i>	H2S2 <i>Penicillium spp.</i>
Morphology Macroscopic					
Microscopic morphology					

Figure 7. Images of macroscopic and microscopic morphology of fungi isolated in NBRIP culture medium.

Phosphorus solubilization index



Strains	Solubility rate (mg/L d)	b	R2
H1S1	0.013	0.182	0.582
H2S1	0.015	0.346	0.452
H3S1	0.014	0.085	0.922
H1S2	0.017	0.090	0.920
H2S2	0.013	0.421	0.496

Table 2. Phosphorus solubilization rate.

5. Conclusion

They were isolated from rhizospheric soil samples, five fungi capable of solubilizing phosphorus, were identified as belonging to the genus *Trichoderma spp.* and *Penicillium spp.* The isolates that have the best phosphorus solubilizing characteristics were H2S1 (0.015mg / Ld) and H1S2 (0.017mg / L d) belonging to the genera *Trichoderma spp.* y *Penicillium spp.* respectively. While the behavior of the other strains is active their solubilization speed during the first 12 hrs, keeping constant until the next 48hr without increasing its solubilization index.

Acknowledgements

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References

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- [2] Pérez, A., Sierra, J. R., & Montes, V. D.. Revista Colombiana de Ciencia Animal, 2011.
- [3]Élvarez, E., & Martn, M. A. (2011).



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