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Characterization of siderophores produced by the genus Glutamicibacter sp.

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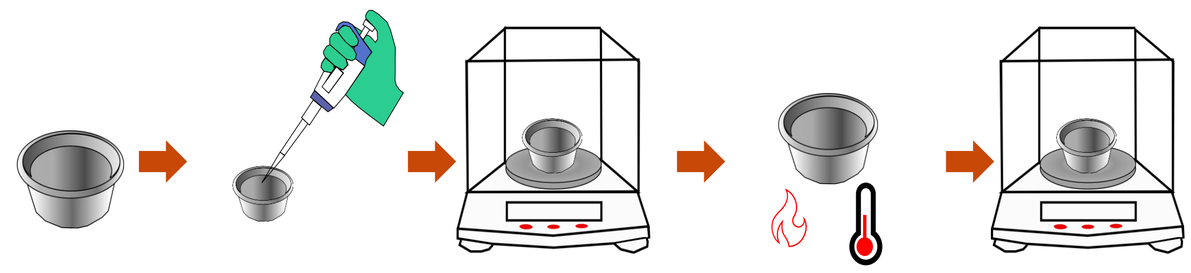
INTRODUCTION & AIM

Sideróforos are low-molecular-weight compounds secreted by microorganisms to scavenge iron from the environment, a micronutrient that is often present in insoluble forms under natural conditions. The genus *Glutamicibacter sp.*, belonging to the Actinobacteria group, has recently gained attention due to its metabolic versatility and potential applications in bioremediation, agriculture, and biotechnology. The characterization of siderophores produced by these bacteria is particularly relevant because they can improve plant growth by facilitating iron acquisition, act as biocontrol agents against phytopathogens through competitive exclusion, and contribute to detoxification processes in contaminated soils. Understanding the type and efficiency of siderophore production in *Glutamicibacter sp.* provides insights into their ecological role and potential use as sustainable bioinoculants in agriculture.

The objective is characterize the siderophores produced by *Glutamicibacter sp.* through biochemical assays and analytical techniques, in order to evaluate their structural diversity and potential applications in agriculture and environmental biotechnology.

METHOD

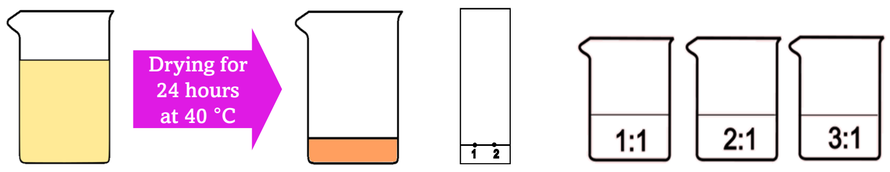
Characterization of supernatants



Sample addition 100, 200, 300, 400, and 500 µL

Weighing and drying

Separation techniques



Samples

Thin layer chromatography

Column chromatography

Material	Characterization techniques
Glutamicibacter sp. AlTeq-24-F2	Gravimetry
ACS grade ethyl acetate	Infrared spectroscopy
Sílica gel	Mass spectrometry
Fluorescent silica chromatography plates	Nuclear magnetic resonance
ACS grade methanol	Electrophoresis
Ferric chloride, ACS grade	Spectrophotometry

RESULTS & DISCUSSION

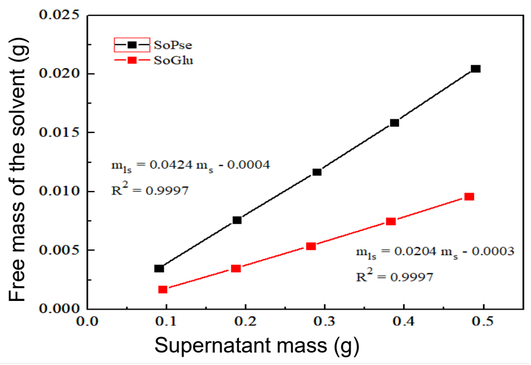


Figure 1. Gravimetry of the supernatants

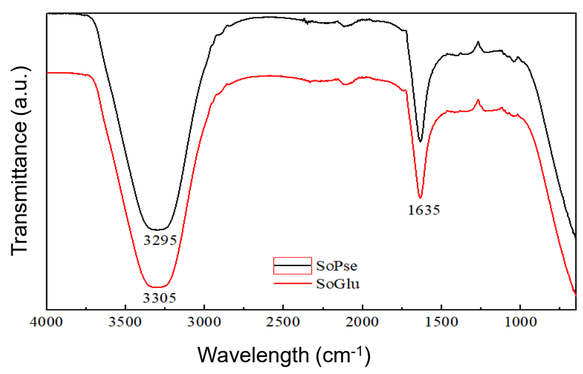


Figure 2 IR spectra of the supernatants

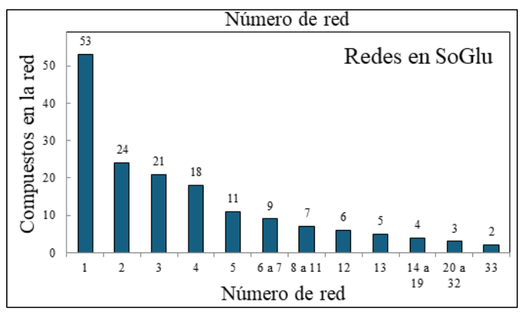


Figure 3. Number of compounds in the networks identified in the supernatant of Glutamicibacter sp. by metabolomic analysis

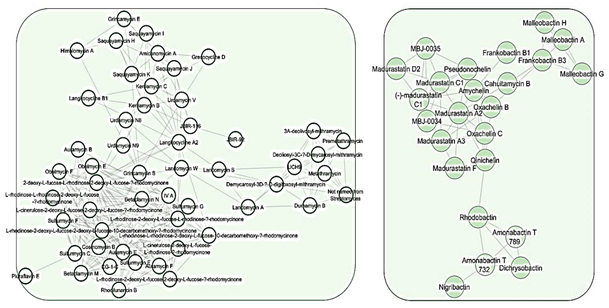


Figure 4. 1st and 2nd largest network of identified compounds

RESULTS & DISCUSSION

Figure 5. ^{1}H and ^{13}C NMR spectrum of SidGlu

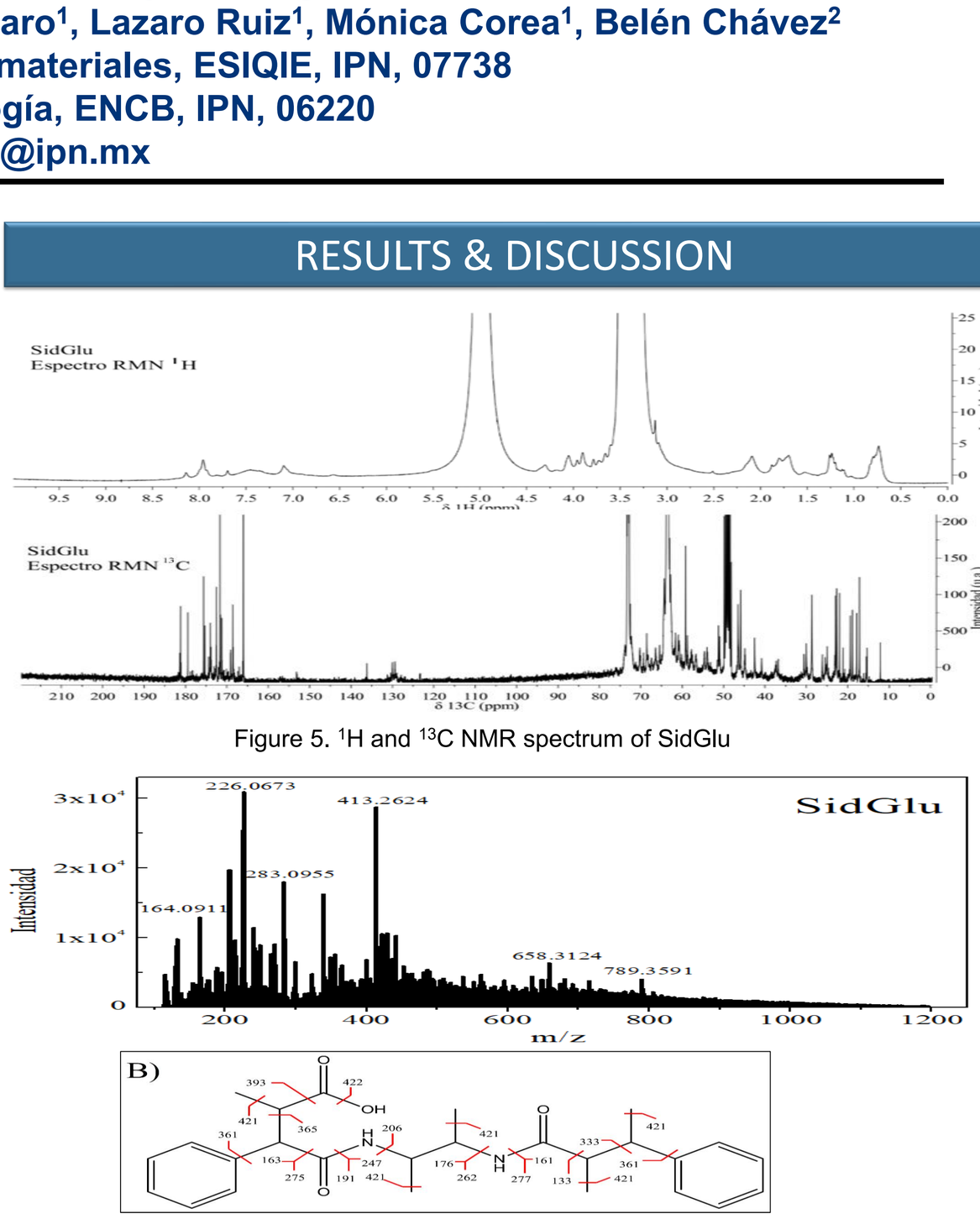


Figure 6. Mass spectrum of the SidGlu fraction and (B) possible fragmentations of the possible siderophore structure

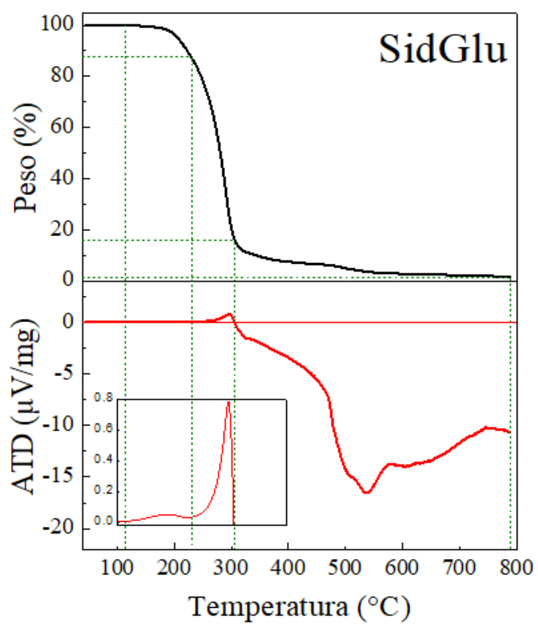


Figure 7. TG-TD analysis of the fractions

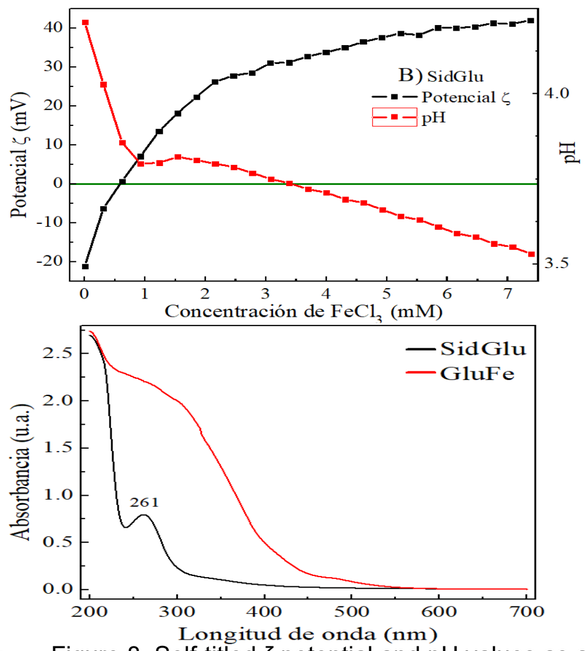


Figure 8. Self-titled ζ potential and pH values as a function of $FeCl_3$ concentration and UV-Vis spectra of the fractions and their complexes

CONCLUSION

A mixture of compounds was obtained, including siderophore, using a mobile phase of ethyl acetate: methanol 1:1. The efficiency was 1.62%p for Glutamicibacter sp.

A chemical structure for the siderophore was proposed based on the results obtained by infrared spectroscopy, nuclear magnetic resonance, and mass spectrometry.

Thermal stability was evaluated using TG-TD analysis, indicating high thermal stability at temperatures below 110 °C.By UV-Vis spectroscopy exhibit a hyperchromic and bathochromic effect when comparing the spectra before and after interacting with iron.

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