



Research and isolation of *Bacillus* genus from different Algerian particular Ecosystems; The study of sporulation potential and the Extracellular enzyme activity

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1. Introduction

Within the past decade, Scientists begin to interest to cave microbiology. Such interest helped them to recognize and understand the importance of cave microbial communities (Barton, H. A, 2006). The vast majority of cave microbes live under extremes of near-starvation or oligotrophy (less than 2mg of total organic carbon, TOC, per liter) (Barton, H. A., and J. Valme, 2015) which promote it a big biotechnological importance.

Algeria is known by its diver ecosystems and by containing different type of caves (karst, lava tubes, sandstones...). Although, cave exploration in Algeria had been stopped for a while, hence, there is a very little documentation that provides cave survey data and notes, cave entrance, cave location and inventories. In addition to that, no one in Algeria was interested by its microbiology.

Bacillus is one of the most diverse and commercially useful groups of microorganisms. Representatives of this genus are widely distributed in soil, air, water (Colin R. H.,1989) and caves (Markos I et al., 2015). Due to their metabolic diversity and their low reported incidence of pathogenicity, *Bacillus* had been used in a wide range of industrial processes (Colin R. H.,1989) such *Bacillus* species have been used as probiotics for at least 50 years with the Italian product known as Enterogermina_ registered 1958 in Italy as an OTC medicinal supplement

Currently, the best-documented probiotic bacteria used in human therapy are lactic acid bacteria. In contrast, studies aiming to characterize the mechanisms responsible for the probiotic beneficial effects of *Bacillus* are rare.

The current work seeks to contribute to such characterization by evaluating their digestive enzyme potentiality,

2. Material and methods

1- Sampling sites

All sampling sites had been described, geologically

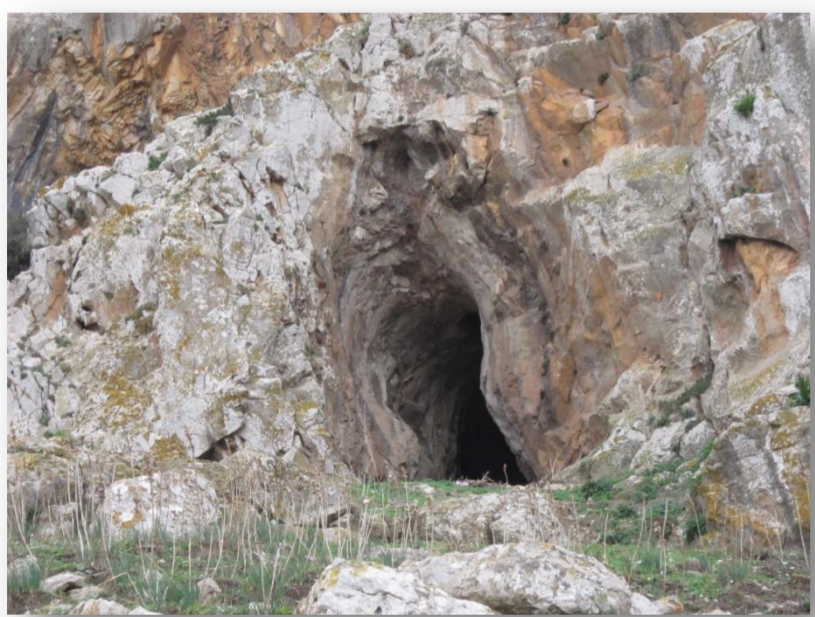
1.1- Mchounech Caves

Mchounech, Wilaya de Biskra



1.2- Ghar Dbaa

IBN Ziad, Wilaya de Constantine



1.3- Ain smara mines

Ain Smara, Wilaya de Constantine



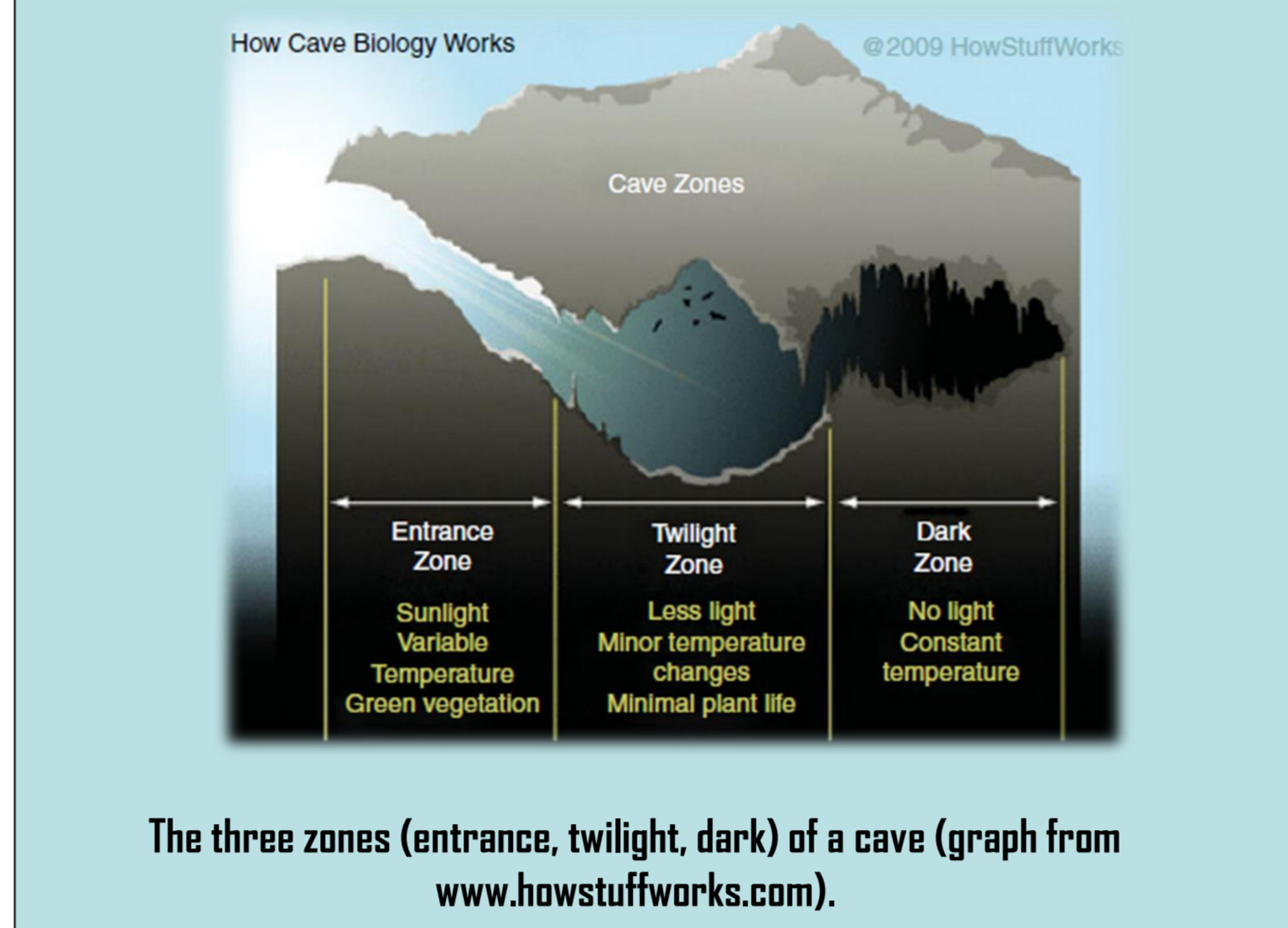
1.4- Anou Bousouil

Djurdjura, Wilaya de Bouira



2- Sampling

The samples were taken from the Dark zone for all the caves only those of Biskra were taken from the Twilight zone

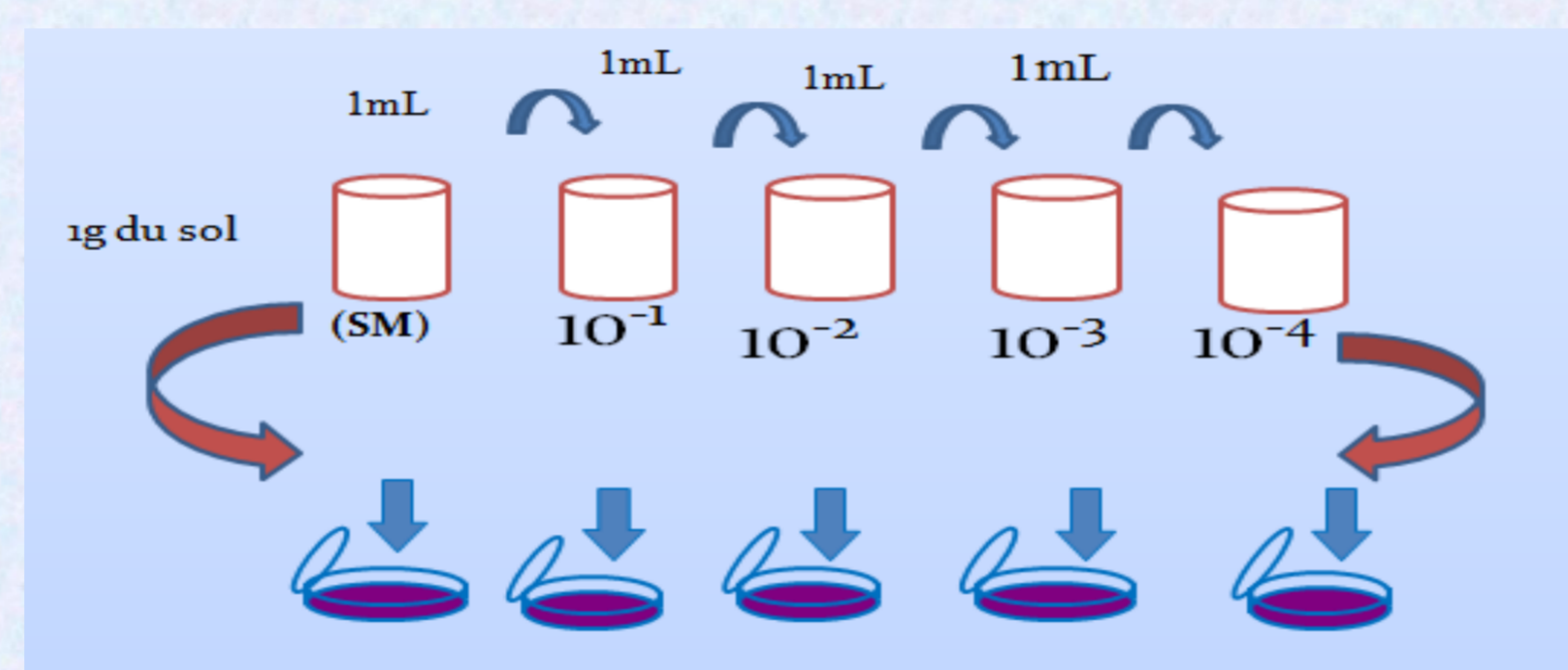


3- Heating treatment

The samples were heated on 80°C in the purpose of isolating only *Bacillus* spores,

4- Isolation and Purification

Heated samples were diluted and then streaked in TSA medium



5- Digestive Enzymatic Tests

5.1- Lipase

Isolated strains were screened for their ability of producing lipases by the use of Tween plates method

5.2- Caseinase

Isolated strains were screened for their ability of producing Caseinase by the use of Beta casein medium.

5.3- Protease

Isolated strains were screened for their ability of producing proteases by the use of skimmed milk plates method,

3. Results and Discussion

1- Sampling sites

1.1- Mchounech Caves

Mchounech, Wilaya de Biskra

Cave	GPS	Bat presence	Other animals	Soil pH	Cave Temperature	Sampling Zone	Sampling	Sampling type	Sampling method
Cave n°1	La : 34.95 Lon : 6.4 Alt : 338.4	/	Reptiles	4.1	23°C	Twilight zone	BMS1	Soil	10cm
Cave n°2	La : 34.95 Lon : 6.00 Alt : 380.9	/	Reptiles	4.5	25°C	Twilight zone	BMS2	Soil	10cm

1.2- Ghar Dbaa

IBN Ziad, Wilaya de Constantine

	Zones	Bats	HR%	TC°	
Inferior Part	Room n°1	Dark	Big number	84%	13.5
	Room n°2	Dark	Big number	84%	13.5
Superior part	Room n°3	Dark	Bat excrement + traces	94%	15.8

1.3- Ain smara mines

Ain Smara, Wilaya de Constantine

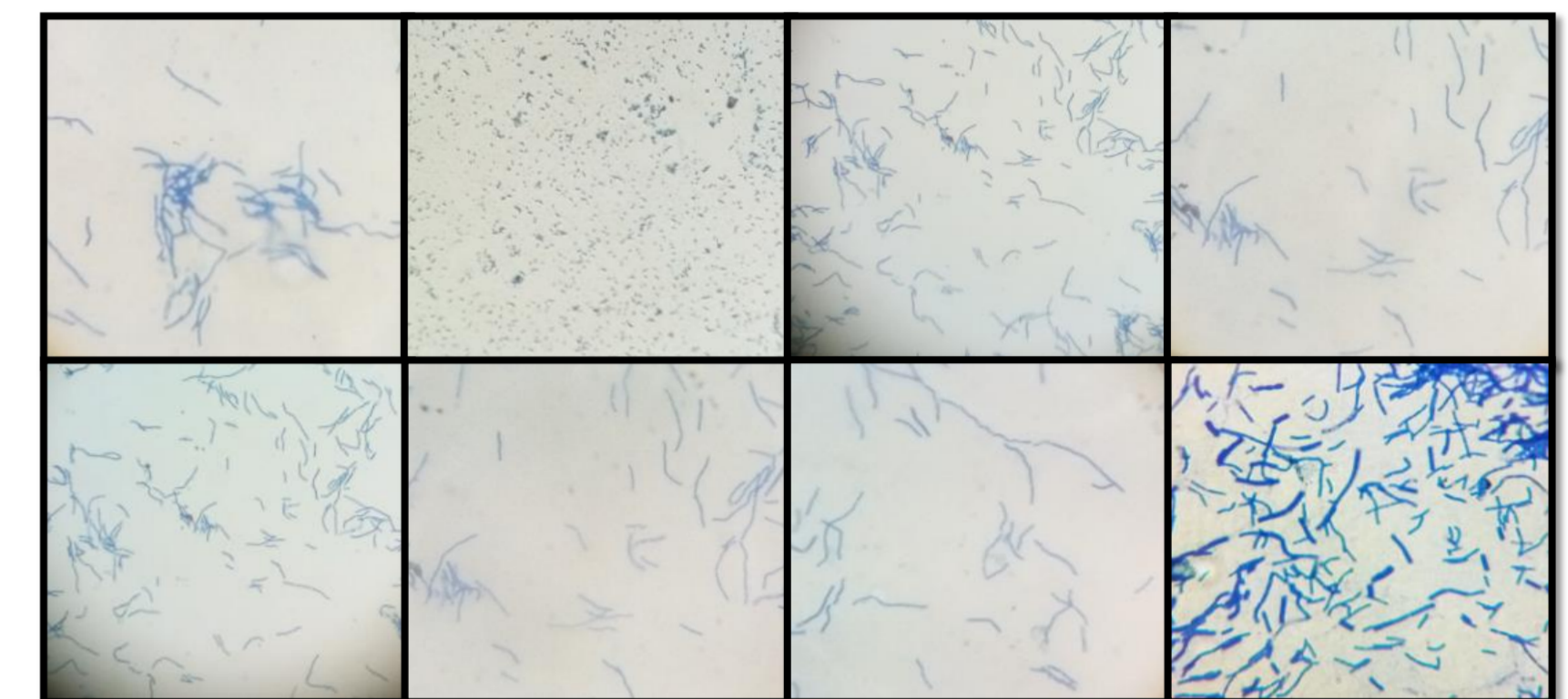
Cave	Bat presence	Other animals	Cave Temperature	Sampling Zone	Sampling type	Sampling method
Cave n°1	Small number	Reptiles	15°C	Dark zone	Soil	10cm
Cave n°2	/	Reptiles	11°C	Dark zone	Soil	10cm

1.4- Anou Bousouil

Djurdjura, Wilaya de Bouira

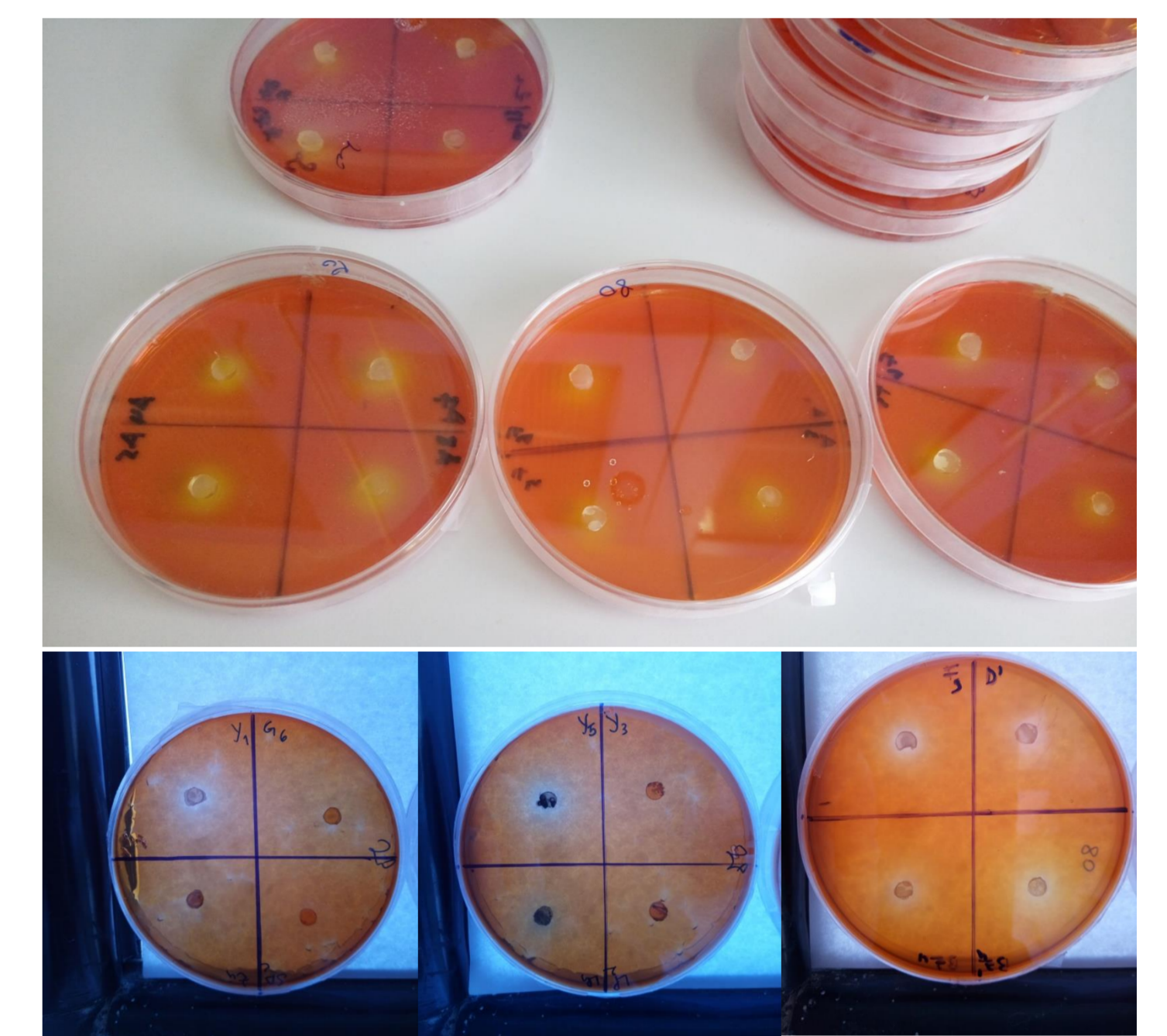
	Sampling	Temperature	Bats	HR%	Soil pH
Sinkhole	50m deep	4°C	-	100%	8
	100m deep	7°C	-	100%	8

2- Microscopic Observation

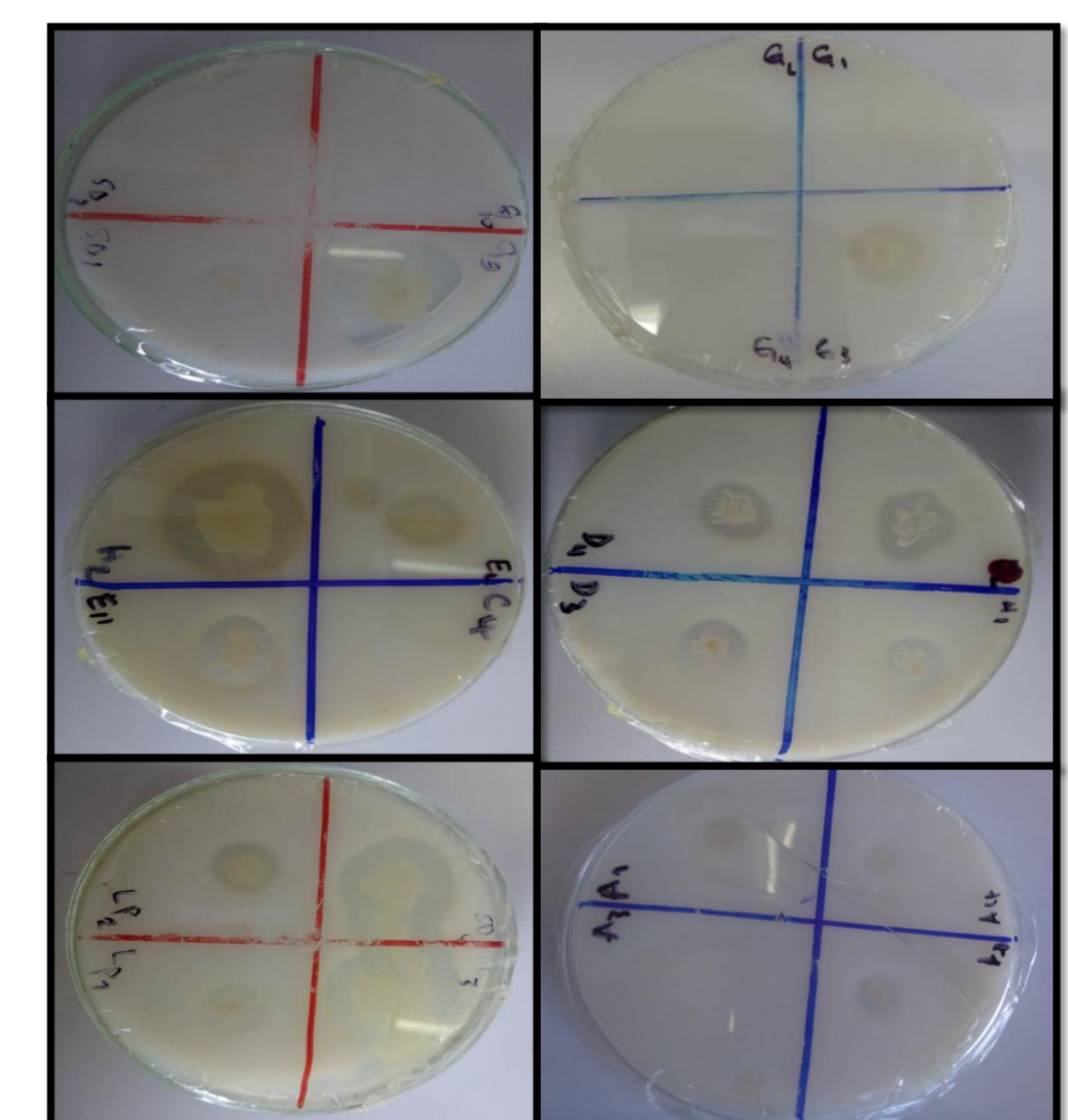


3- Digestive Enzymatic Tests

Lipase activity



Protease activity



4- Conclusion

Other Digestive enzymes tests (Isomaltase, sucrase, Maltase and gliadinase) will be proce in the purpose of screening performed bacillus strains to test them then for their Probiotic Potential.

5- References

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