

# Microbial Diversity of Field and Shore Soil

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## Introduction

- Ecosystems have several parts that contribute to its success. Plants support animals and in turn animals decay and support plant life. However, plants are not often equipped with the proper mechanisms to digest nutrients needed to support themselves<sup>1</sup>. Due to the increased dependency of plant life on bacterium, microbial diversity is needed to digest multiple kinds of nutrients.

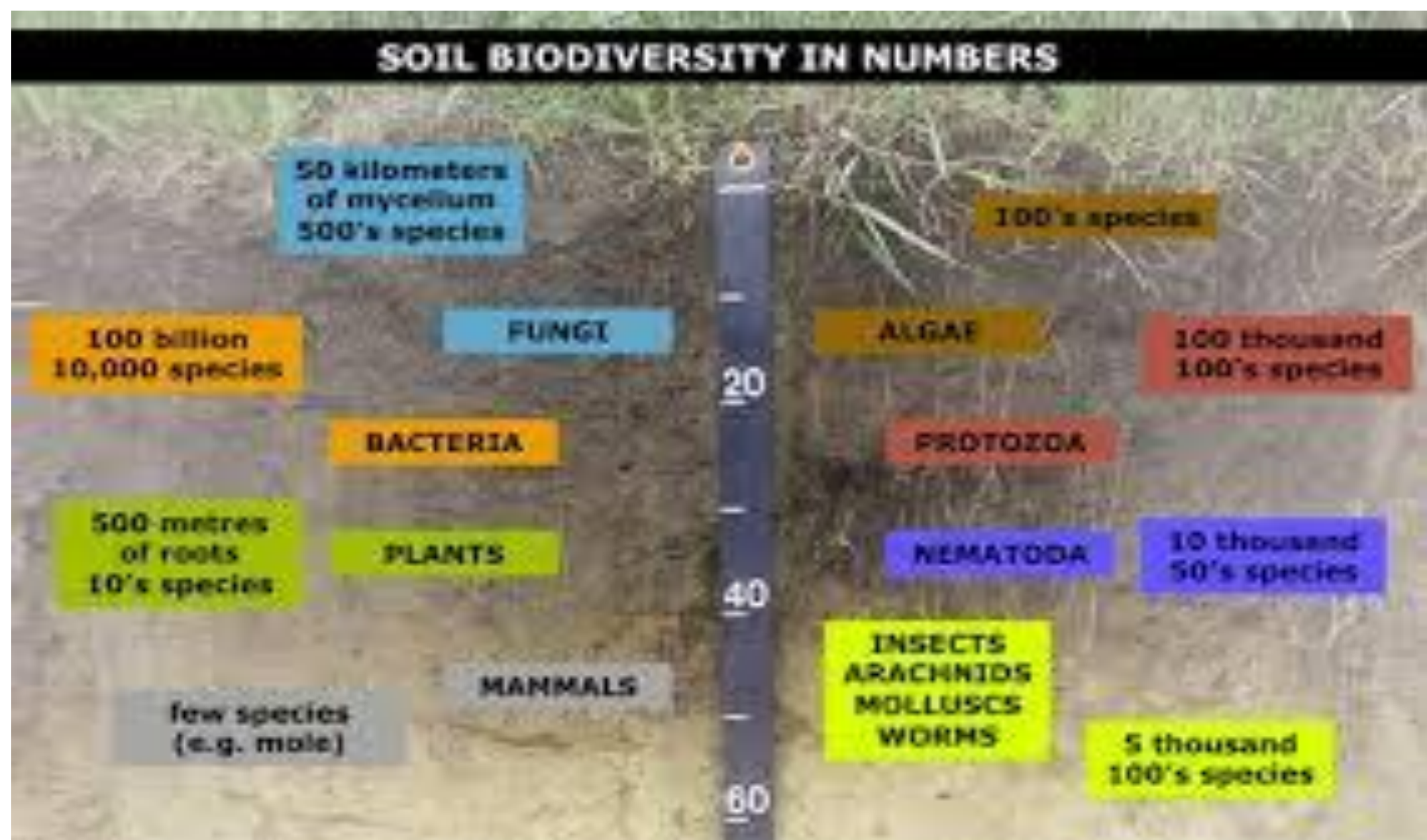
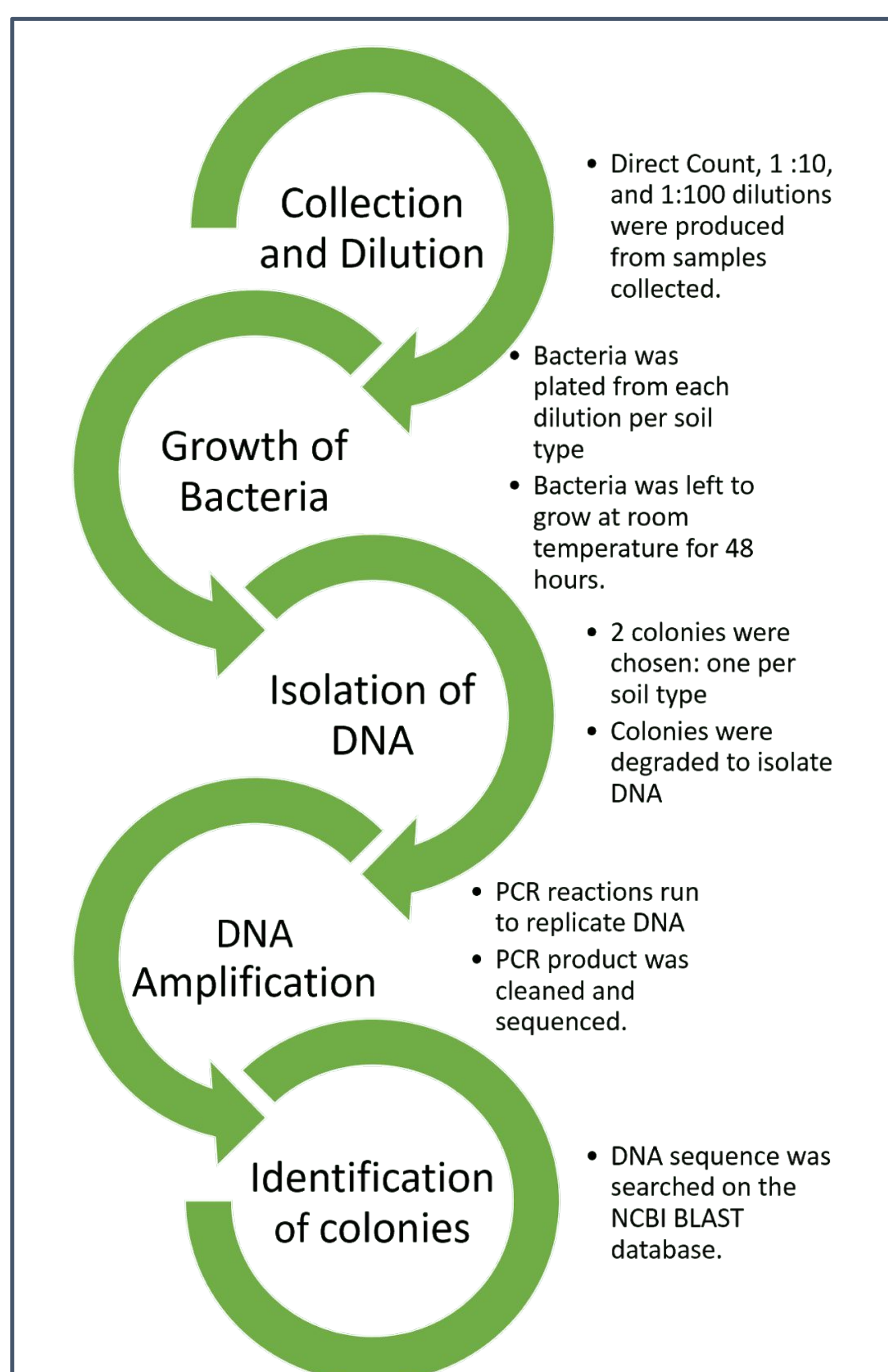


Figure 1. Picture of the biodiversity in soil and their representative numbers

## Specific Aim

- Hypothesis: Due to the increased dependence of plant life on soil, the agricultural field will contain more microbial diversity and microbial density than the soil from the shore of Buffalo Creek..

## Methods



## Results

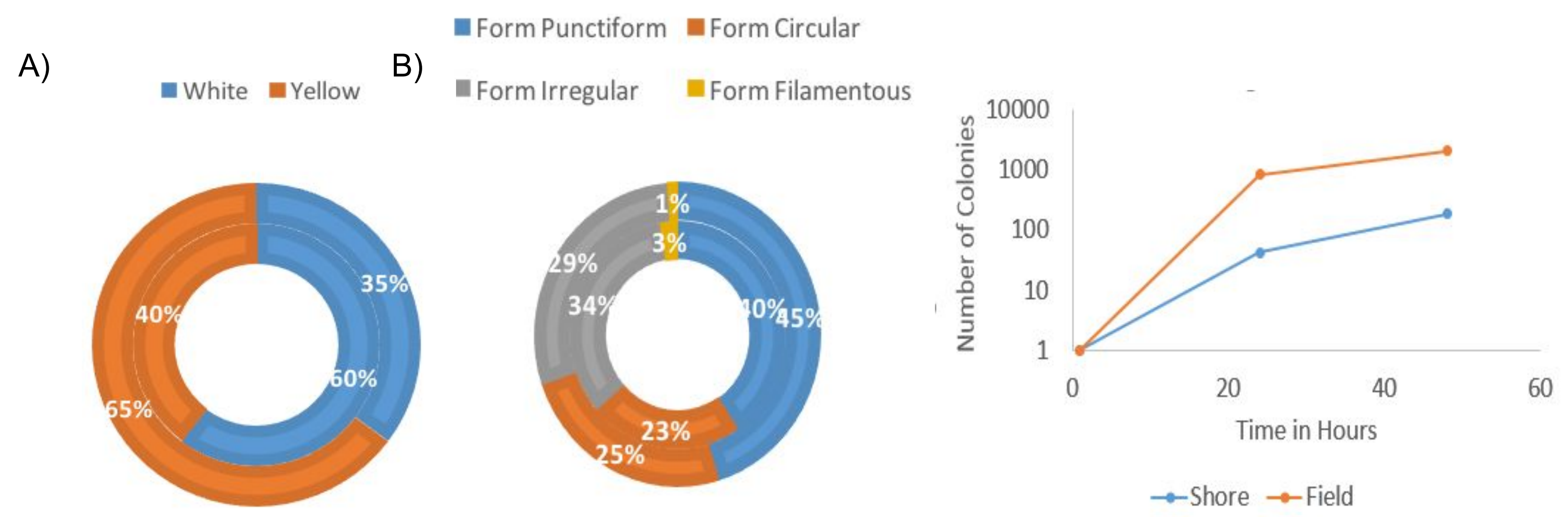


Figure 2. Microbial Community Diversity in Field and Shore Soil. A) Diversity of colony color. B) Diversity of colony form.

Figure 3. Colony growth over time. Blue represents the shore and orange represents the field

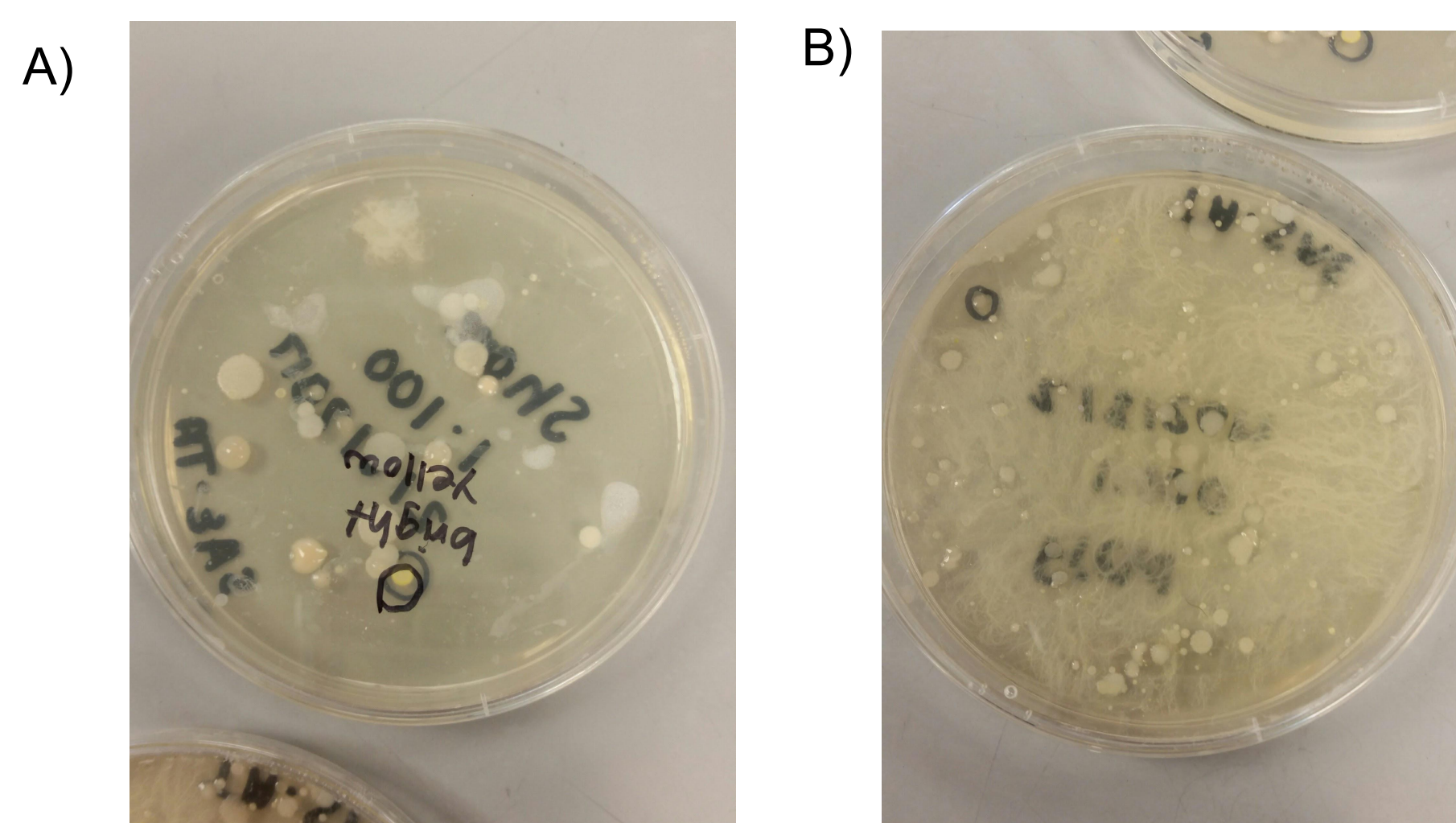


Figure 4. Bacterial colonies isolated for genomic sequencing and identification. Circled colonies indicate ones isolated. A) Shore soil colony. B) Field soil colony.

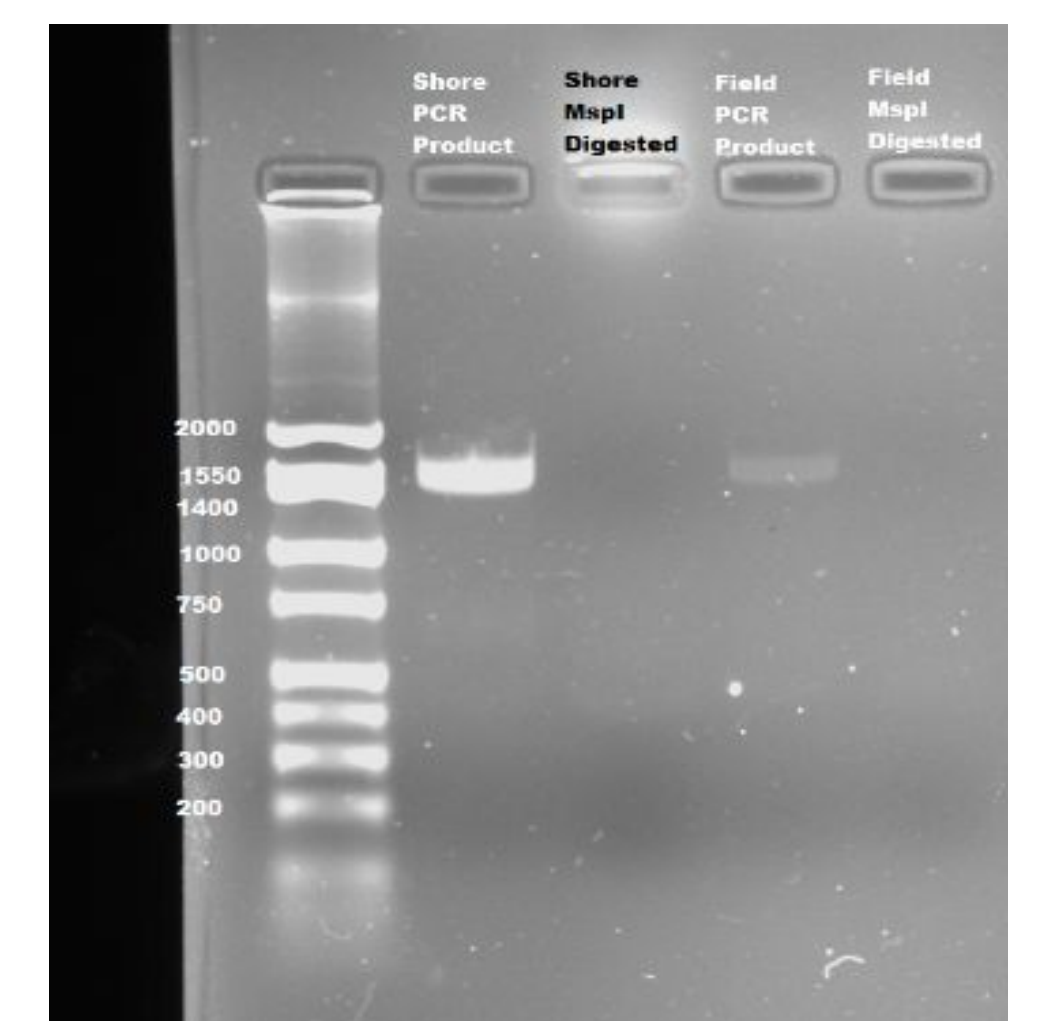


Figure 5. Gel Electrophoresis plate showing MspI digestion in shore and field soil

Name of Bacteria	Percent Identity	Number of Gaps
<i>Bacillus megaterium</i>	99	1/1032
<i>Bacillus aryabhatai</i>	99	1/1032
<i>Bacillus flexus</i>	99	4/1033
<i>Bacillus simplex</i>	98	3/1032
<i>Bacillus qingshengii</i>	98	1/1026

Table 1. The top five BLAST alignments for the unknown isolated bacteria.

## Conclusions

- The hypothesis was supported.
- The field soil contained more microbial diversity than the shore soil based on visual combinations of color and form..
- Bacillus megaterium* plays an important role in promoting overgrowth of roots which is a good explanation for why it was in the shore soil<sup>2</sup>.
- Agriculturally, *Bacillus megaterium* could be useful because it allows for the growth of plants with bigger roots and more access to underground sources of water which would help with farming in drier climates.

## Future Directions

- Further testing is needed because *Bacillus megaterium* could cause overgrowth and leave less than sufficient room for new plants to grow.

## References

- van der Heijden MGA; Wagg C. Soil Microbial Diversity and Agro-Ecosystem Functioning. 2013. Plant Soil. 363:1-5.
- Arkhipova T. N., Prinsen E., Veselov S. U., Martinenko E. V., Melentiev A. I., Kudoyarova G. R. 2007. Cytokinin producing bacteria enhance plant growth in drying soil. 292 (1): 305-315.