

Characterization of potential chalky soil bacteria isolated from rhizosphere of *Acacia spp.* growing in Abardae, Maekel Region of Eritrea

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INTRODUCTION & AIM

The expanding influence of disease-resistant microbes, pollution, and climate change in agriculture, the environment, and public health, has piqued the interest of soil microorganisms, particularly plant growth-promoting rhizobacteria (PGPR). In today's world, discovering soil bacteria with potential for biotechnological advancements is highly significance.

Therefore, the purpose of the current study was to characterize chalky soil bacteria isolated from the rhizosphere of *Acacia spp.* growing in the Maekel region of Eritrea.

METHOD

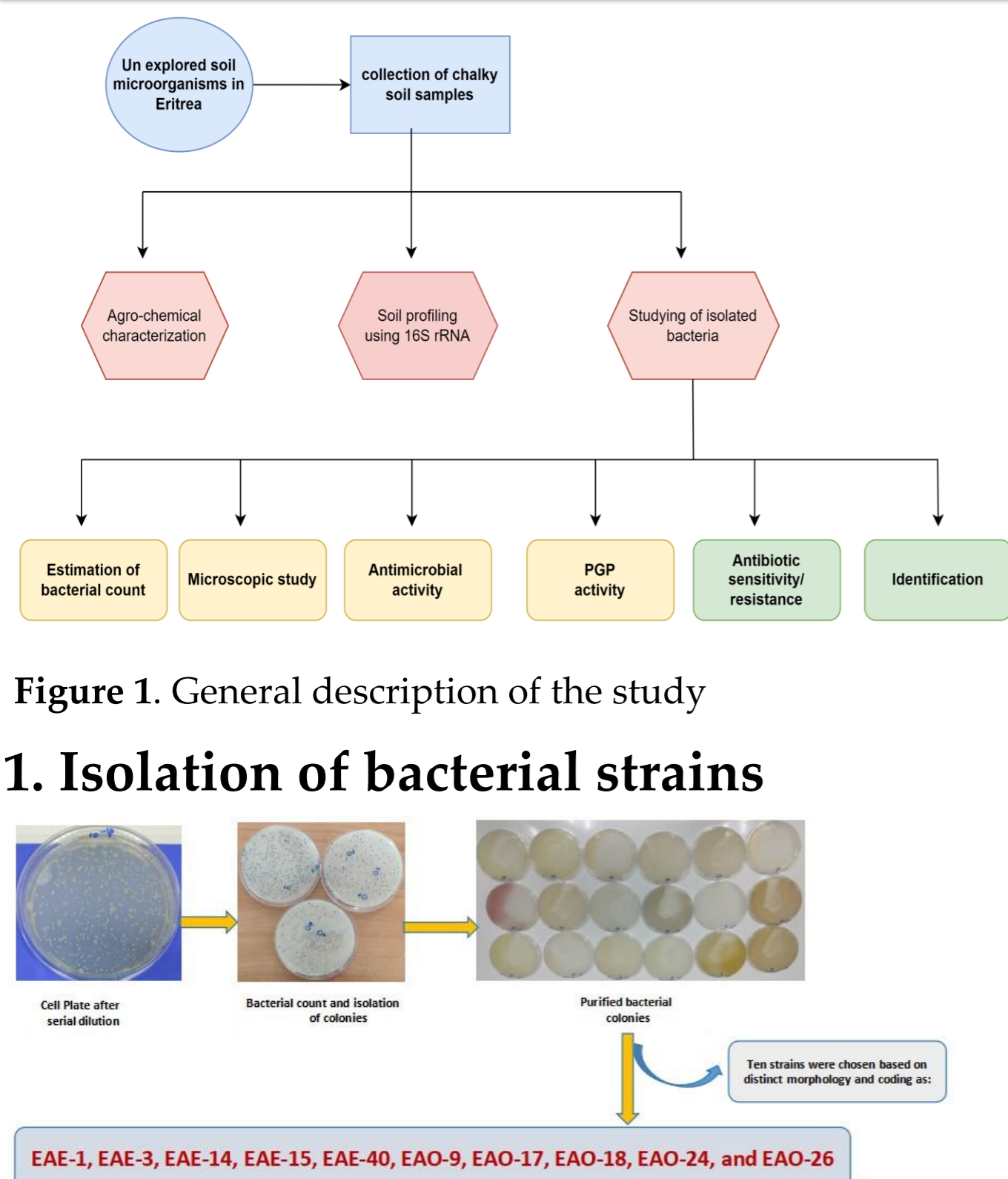
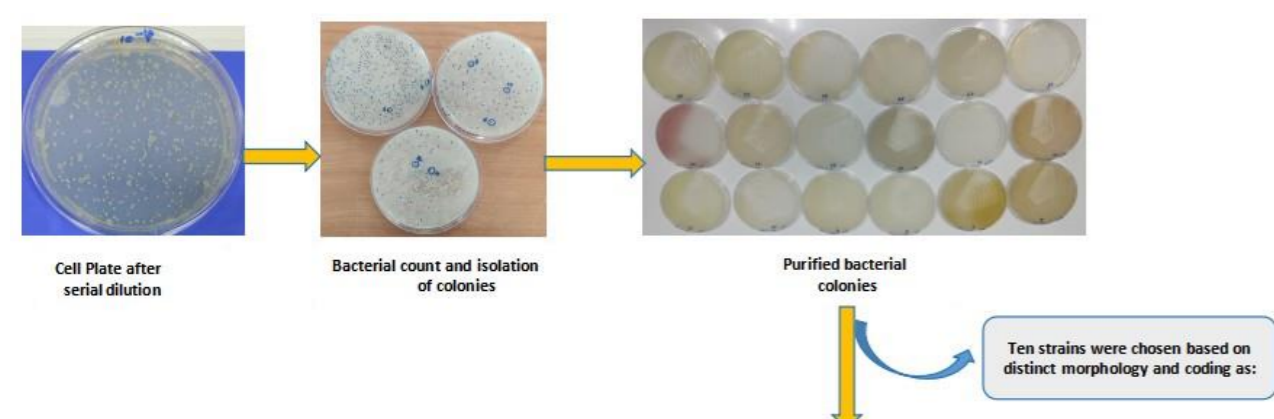


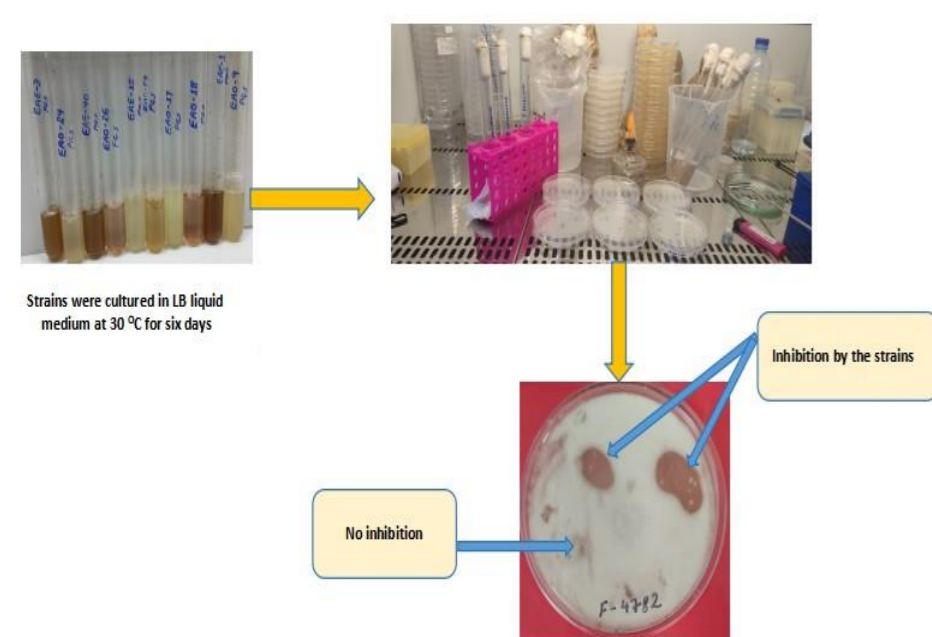
Figure 1. General description of the study

1. Isolation of bacterial strains

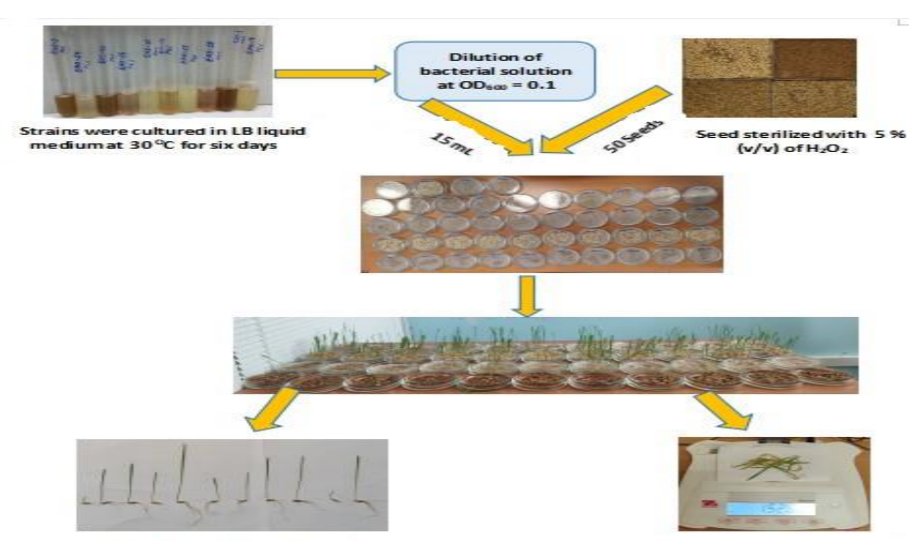


2. Microscopy examination using a Nikon Eclipse Ci microscope

3. Antimicrobial activity



4. Plant growth promotion effect



Reference:

- Asfha Z.A., Suzina N.E., Kocharovskaya Y., Delegan Y., and Solyanikova I.P. isolation and characterization of plant growth -promoting bacteria from the rhizosphere of *Chamaecytisus ruthenicus*(Russian Broom) growing in chalky soil. Eng. proc. 2023,37,121.
- Belgaem H., Benreguiet M., Benabbou T.A., and khoula R. Screening of novel Streptomyces sp. TR 10 from the rhizosphere of Acacia in the Algerian desert and evaluation of their antagonistic potential. Fresenius Environmental Bulletin. 2023. Vol. 32; No. 4; pp. 1983-1994.

RESULTS & DISCUSSION

□ A total of 80 chalky soil rhizospheric bacteria were isolated. The highest number of culturable chalky soil bacteria were recorded from the rhizosphere of *Acacia ethibica* (1.42×10^{10} CFU/g), even greater than that of *Chamaecytisus ruthenicus* (4.25×10^8 CFU/g), which was studied previously.

□ Cell morphology of strain EAE-1 (Figure 2)

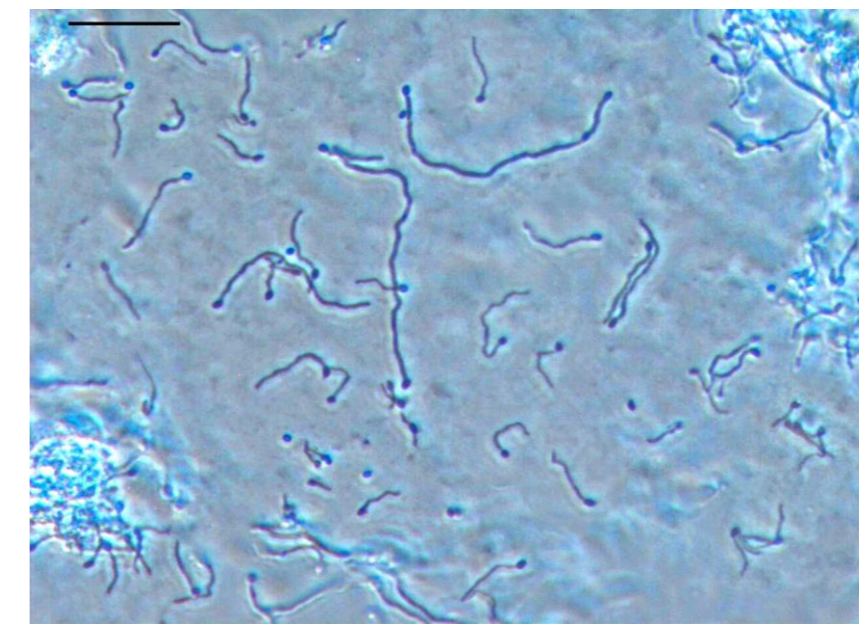


Figure 2. Fragments of monosporous hyphae of aerial mycelium in a colony of cells of EAE-1 strain with single refractory spores at the ends. Phase contrast microscopy. Bar-10

□ Most of the strains exhibited significant effects on the growth of wheat. In addition, strains EAE-40 and EAO-17 exhibited similar effect on the growth of maize (Figure 4)

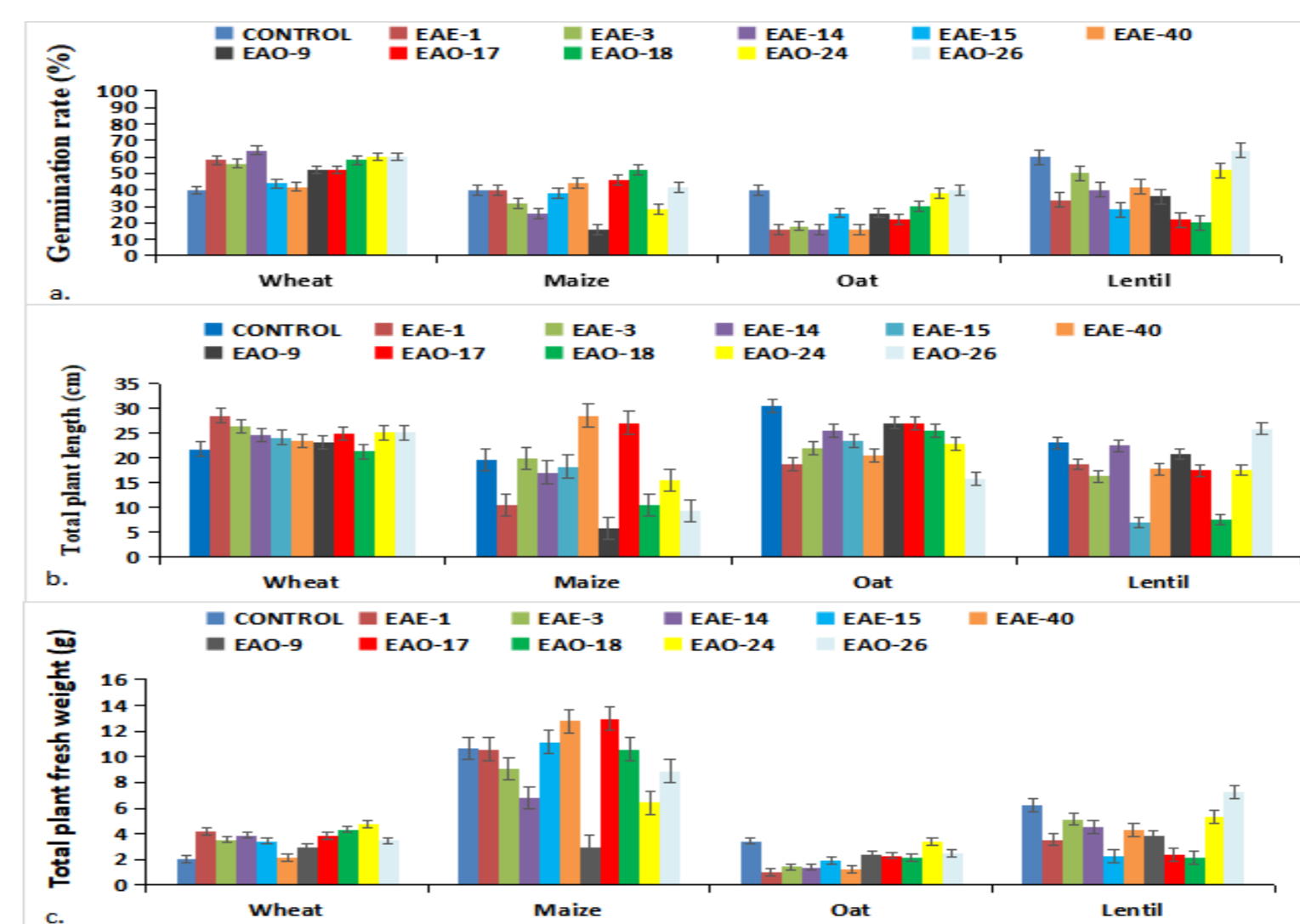


Figure 4. The growth promotion effect of bacterial strains on the germination rate (a), total plant length (b), and total plant fresh weight (c)

□ Strains EAE-1, EAE-3, EAE-14, EAE-15, EAE-40, and EAO-24 exhibited wide-ranging antimicrobial effects on the phytopathogenic microbes analyzed (Table 1 & Fig. 3)

Table 1. Antimicrobial activity of chalky soil rhizospheric bacteria against phytopathogenic microbes

S. n	Bacterial strains	Host plants	Gram stain	Phytopathogenic Bacteria				Phytopathogenic Fungi					
				Micrococus	E. herbicola	P. caratowora	F-132	F-895	F-1193	F-1754	F-1864	F-4006	F-4782
1	EAE-1	<i>Acacia ethibica</i>	+	+	-	-	+	+	+	-	+	+	+
2	EAE-3	<i>Acacia ethibica</i>	+	+	-	-	+	+	+	+	+	+	+
3	EAE-14	<i>Acacia ethibica</i>	+	+	+	+	-	+	+	+	+	+	+
4	EAE-15	<i>Acacia ethibica</i>	+	+	-	-	+	+	+	+	+	+	-
5	EAE-40	<i>Acacia ethibica</i>	+	+	-	-	-	+	+	+	-	+	+
6	EAO-9	<i>Acacia origina</i>	-	-	-	-	-	-	-	-	+	+	-
7	EAO-17	<i>Acacia origina</i>	+	-	-	-	-	-	+	+	-	+	-
8	EAO-18	<i>Acacia origina</i>	+	-	-	-	-	+	-	-	+	+	-
9	EAO-24	<i>Acacia origina</i>	+	-	-	-	-	+	+	+	+	+	+
10	EAO-26	<i>Acacia origina</i>	-	-	-	-	-	-	+	+	+	+	+

CONCLUSION

- Bacterial strain EAE-1 would probably be a novel and previously undescribed bacterial strain.
- This study represents the first comprehensive analysis of the microbial composition of Eritrean soil.

FUTURE WORK / REFERENCES

Additional research on these strains, with a particular focus on strain EAE-1, will be conducted in the future