

Isolation and Amplification 16S rRNA gene for Metagenomic analysis from Oil Palm Rhizosphere in Different Soil Textures



*Ecological and socioeconomic functions of
tropical lowland rainforest transformation systems
(Sumatra, Indonesia)*

- **Proposed Researcher:**

Name / Title(s) : Hesti Riany / M.Si
University/ Institution :Jambi University (Biology)
Address : Jl.Raya Jambi-Ma.Bulian KM.15 Kel. Mendalo
Darat, Jambi Luar Kota
Tel : +6285274506848
E-mail : hestiriany@unja.ac.id

and

Name / Title(s) : Ummi Mardhiah Batubara/ M.Si
University/ Institute : Jambi University (Biology)
Address : Jl.Raya Jambi-Ma.Bulian KM.15 Kel. Mendalo
Darat, Jambi Luar Kota
Tel. : +6282367924180
E-mail : ummimardhiahbb@unja.ac.id

And

Name / Title(s) : Zulkarnain/ Prof. Dr. Ir
University/ Institute : Jambi University
Address : Jl.Raya Jambi-Ma.Bulian KM.15 Kel. Mendalo
Darat, Jambi Luar Kota
Tel. :+628127478972
E-mail : dr.zulkarnain@yahoo.com

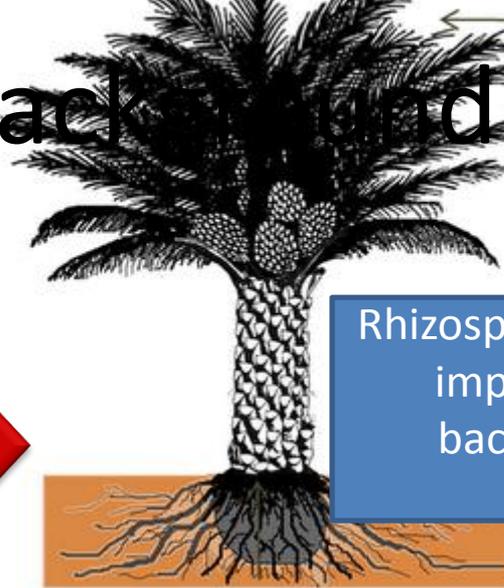
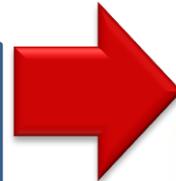
- **Project Partner in Georg August University Goettingen**

Name / Title(s) : Rolf Daniel
Institute : Georg-August-Universität Göttingen
Address : Grisebachstr.8, 37077 Göttingen
Tel./Fax. : +49 (0)551 39 33827
E-mail : rdaniel@gdgw.de
Scientific Project : B02

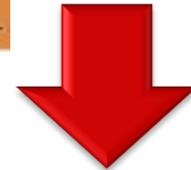
Scientific Background



The soil environment is the most complex habitat on earth
→ **Soil Bacteria**



Rhizosphere (root zone) is an important habitat for bacteria to play their function



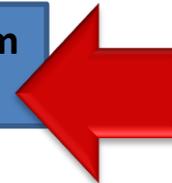
Isolation and Amplification 16S rRNA gene for Metagenomic analysis from Oil Palm Rhizosphere in Different Soil Textures



to explore bacterial diversity and function in the palm rhizosphere by metagenomic analysis



Large area of palm tree plantation in Jambi Province will be good habitat for soil bacteria



Methodology

Collecting sample

Collecting root soil sample



Soil content and analysis

DNA bacteria Isolation

Amplification 16S rRNA gene



analysis

sequencing

phylogenetic analysis

Result and Discussion

- Soil texture

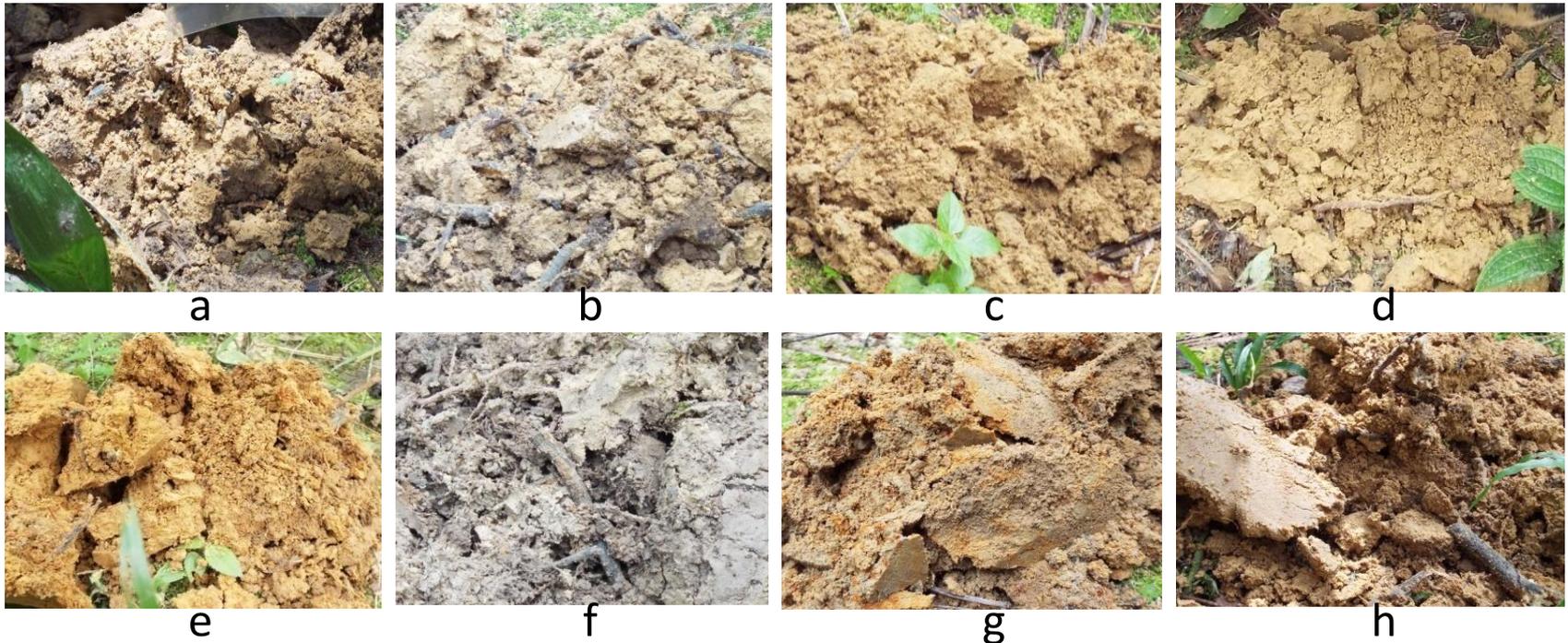


Figure 1. Soil sample in different textures from PTPN VI Batanghari: a) sandy loam, b) sandy clay, c) loamy sandy, d) silty clay loam, e) silty loam, f) clay, g) sandy, h) sandy clay loam

| No. | Soil Texture | Location | pH | Humidity (%) | Temp. (°C) |
|-----|-----------------|--------------------------|-----|--------------|------------|
| 1. | Sandy loam | S01°41.689'/E103°23.121' | 6,1 | 60 | 28 |
| | | S01°41.721'/E103°23.150' | 6 | 50 | 30 |
| | | S01°41.676'/E103°23.394' | 6,9 | 50 | 28 |
| | | S01°43.709'/E103°24.114' | 6,1 | 60 | 28 |
| | | S01°44.998'/E103°23.550' | 6 | 60 | 30 |
| | | S01°41.169'/E103°23.133' | 6,9 | 50 | 29 |
| 2. | Sandy clay | S01°41.689'/E103°23.121' | 6,1 | 60 | 28 |
| | | S01°41.702'/E103°23.132' | 6,1 | 75 | 31 |
| | | S01°43.286'/E103°23.581' | 6 | 60 | 30 |
| | | S01°43.321'/E103°23.597' | 6 | 60 | 30 |
| | | S01°44.558'/E103°24.128' | 6,1 | 75 | 31 |
| | | S01°42.644'/E103°23.069' | 7 | 5 | 28,5 |
| 3. | Loamy sandy | S01°41.721'/E103°23.150' | 6 | 50 | 30 |
| | | S01°41.668'/E103°23.376' | 6,9 | 50 | 29 |
| | | S01°41.676'/E103°23.394' | 6,9 | 50 | 28 |
| | | S01°43.039'/E103°25.485' | 7 | 20 | 29 |
| | | S01°43.075'/E103°25.471' | 6,9 | 30 | 29 |
| | | S01°43.675'/E103°24.131' | 6,9 | 30 | 29 |
| | | S01°42.576'/E103°23.085' | 6,9 | 10 | 26 |
| 4. | Silty clay | S01°41.401'/E103°23.947' | 6,1 | 75 | 31 |
| | | S01°41.329'/E103°24.153' | 6,9 | 50 | 29 |
| | | S01°43.321'/E103°23.597' | 6 | 60 | 30 |
| | | S01°43.185'/E103°25.196' | 6,5 | 65 | 28 |
| | | S01°43.180'/E103°25.215' | 6,5 | 65 | 27 |
| | | S01°44.998'/E103°23.550' | 6 | 60 | 30 |
| | | S01°42.508'/E103°23.082' | 6,9 | 15 | 26 |
| 5. | Silty clay loam | S01°41.401'/E103°23.947' | 6,1 | 75 | 31 |
| | | S01°41.329'/E103°24.153' | 6,9 | 50 | 29 |
| | | S01°43.709'/E103°24.114' | 6,1 | 60 | 28 |
| | | S01°41.724'/E103°23.107' | 6,9 | 60 | 27 |

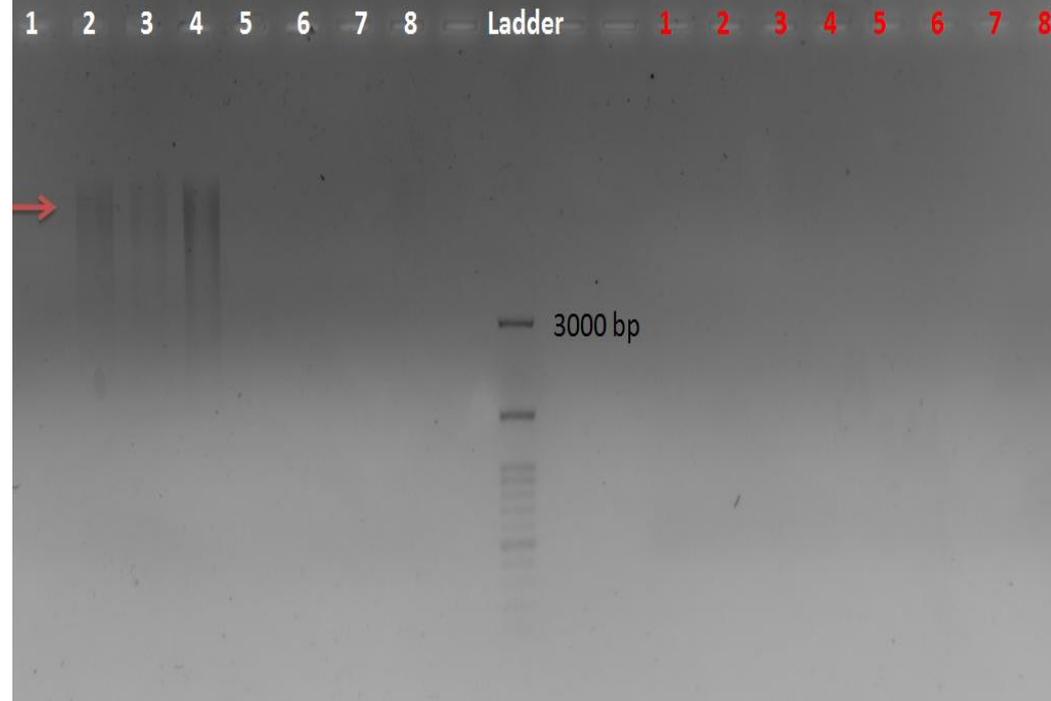
Table 1. Sampling location based on soil texture and environmental factors in oil palm plantation PTPN VI Batanghari Regency Jambi

• DNA genomes Qualities and Quantities

Table 2. DNA (purity) ratio in $\lambda 260\text{nm}$ and $\lambda 280\text{nm}$ wavelength of bacterial genomic DNA from oil palm rhizospheres

| No | DNA Sample from different soil textures | Ratio $\lambda 260\text{nm}/\lambda 280\text{nm}$ |
|----|---|---|
| 1. | Sandy loam | 1,17 |
| 2. | Sandy clay | 1,18 |
| 3. | Loamy sandy | 1,17 |
| 4. | Silty clay | 1,17 |
| 5. | Silty clay loam | 1,18 |
| 6. | Sandy clay loam | 1,75 |
| 7. | Sandy | 1,18 |
| 8. | Clay | 1,18 |

Figure 2. Electrophoresis DNA genomes bacteria from different soil texture and result of amplification 16S RNA genes: 1) silty clay, 2) silty clay loam, 3) loamy sandy, 4) sandy loam, 5) clay, 6) sandy clay, 7) sandy clay loam and 8) sandy, (white number: DNA genomes, Red number: 16 S rRNA gene amplicons)



- The purity of genomic DNA were measured shown ratio value around 1,2-1,7 (Table 2) and denoted low DNA quality except DNA of bacterial from Sandy clay loam. The purity below 1,8 of DNA indicated that to high protein contaminant or influenced by pyrimidine and purine bases conjugation bond
- electrophoresis gel agarose confirmation (Figure 2) shown different pattern. It displayed visualization of DNA from silty clay loam, loamy sandy and sandy loam soil samples but did not from others.
- Contaminated genomic DNA caused 16S rRNA genes did not appear in electrophoresis visualization and cannot be processed to next method (sequencing and metagenomic analysis)

Conclusion

- In this study was obtained eight class of soil textures those were sandy loam, sandy clay, loamy sandy, salty clay, salty clay loam, sandy clay loam, sandy and clay. And some of genomic DNA purity were about 1,2-1,7 and they were obtained in electrophoresis visualization with more than 3000 bp in size. But 16S rRNA genes didnot obtain yet therefore it need more optimal procedure to continue to sequencing and metagenomic analysis.

THANK YOU