Genome and Transcriptome Sequencing of Novel *Pseudomonas* sp. NLX-4 Strain Involved in Bio-restoration of Over Exploited Mining Sites

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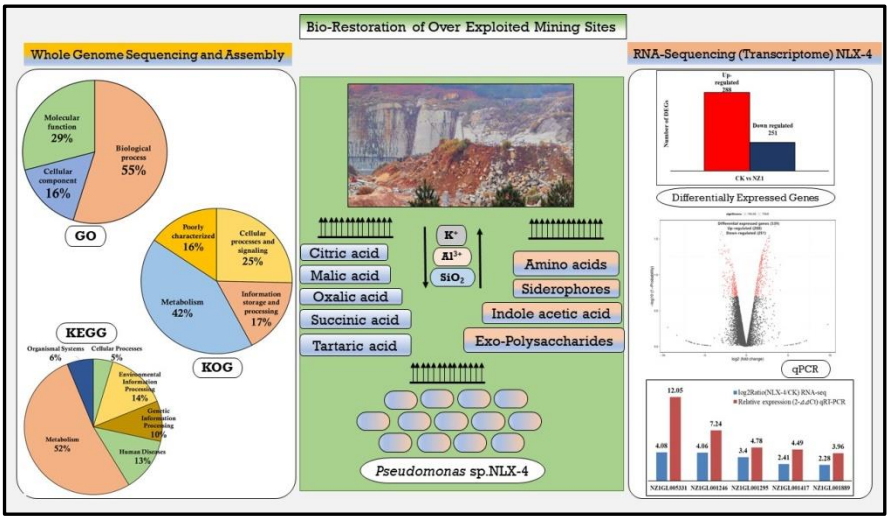
BACKGROUND: Relentless mining operations have destroyed our environment significantly. Soil inhabiting microbes play a significant role in the ecological restoration of these areas. Microbial weathering processes like the chemical dissolution of rocks significantly promote the soil properties and enhance the rock to soil ratio. Earlier studies have reported that bacteria exhibit efficient rock-dissolution abilities by releasing organic acids and other chemical elements from the silicate rocks. However, the rock-dissolving mechanisms of the bacterium remain to be unclear to date.

METHODS: Thus, we have performed rock-dissolution experiments followed by genome and transcriptome sequencing of novel *Pseudomonas* sp.NLX-4 strain to explore the efficiency of microbe-mediated habitat restoration and its molecular mechanisms underlying this biological process. Results obtained from initial rock dissolution experiments revealed that *Pseudomonas* sp. NLX-4 strain efficiently accelerates the dissolution of silicate rocks by secreting amino acids, exopolysaccharides, and organic acids with elevated concentrations of potassium, silicon, and aluminium elements.

RESULTS: The rock dissolution experiments of NLX-4 strain exhibited an initial increase in particle diameter variation values between 0-15 days and decline after 15 days-time respectively. The 6,771,445-base pair NLX-4 genome exhibited 63.21 GC percentage respectively with a total of 6041 protein-coding genes. Genome-wide annotations of NLX-4 strain exhibit 5045-COG, 3996-GO, 5342-InterPro, and 4386-KEGG proteins respectively. Transcriptome analysis of NLX-4 cultured with/without silicate rocks resulted in 539 (288-up and 251-down) differentially expressed genes (DEGs). Fifteen DEGs encoding for siderophore transport, EPS and amino acids synthesis, organic acids metabolism, and bacterial resistance to adverse environmental conditions were highly up-regulated by cultured with silicate rocks.



CONCLUSION: This study has not only provided a new strategy for the ecological restoration of rock mining areas but also enriched the applicable bacterial and genetic resources.