

**Effect of pine needle leachate (*Pinus roxburghii*) on bedrock weathering and its role in soil development**

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Pine needles, which are the fallen leaves of Chir pine (*Pinus roxburghii*), show slow decomposition due to their lignocellulosic complexities, because of which they are widely accumulated on the forest floor as biomass. The interaction of biomass and water can change the chemistry of water through leaching, which can then percolate through soil and rock and affect both soil and bedrock. The study aims to analyze the effect of pine needle leachate on sandstone bedrock weathering and its effect on soil development. Microscopic analysis, such as petrography and scanning electron microscopy, was used for the mineralogical identification of bedrock. Different samples of Pine needle leachate were prepared in the laboratory under controlled conditions. Electrochemical parameters of leachate, such as pH, Electrical conductivity and salinity were measured. The elemental analysis of leachate was performed using atomic absorption spectroscopy (AAS). After seven days of leaching, colonization by decomposer fungi was observed and identified as *Aspergillus sp.* and *Penicillium chrysogenum*. Sandstone (Bedrock) of Kamlial Formation comprises quartz, plagioclase, orthoclase, muscovite and biotite. Pine needles have made the leachate more acidic, with a pH ranging from 4 to 6, and increased the electrical conductivity and salinity within the fourteen days of the experiment. Leachate has shown the liberation of cations from the sandstone and Pine needles such as k, Na, Ca, Mg, Mn, Zn and Cu. Results show that under controlled conditions, pine needle leachate shows high amount of release of cations as compared to pine needle litter on the forest floor. These cations once accumulated in soils can serve as sources of nutrients and can play pivotal role in the productivity of the soils.