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Conservation of soil for sustenance of agriculture

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It is imperative to understand that soil conservation plays a pivotal role in the sustenance of agriculture. Soil is our prime natural and economic resource. Soil supplies essential nutrients required for plant growth. But many nutrients are limited in supply in soils due to chemical, physical or biological reactions and constraints. The soil texture and composition contributing for best soil condition has a determining role in plant growth. The plants absorb nearly all mineral nutrients from the upper layer of soil and this fertile layer has to be preserved. The most fertile soil being loam, which has pores, allows good aeration, drainage and water storage. Inorganic components involve positively and negatively charged mineral ions that forms soil solution which is readily absorbed by roots. In cation exchange, cation minerals attached to soil particles are displaced by H^+. Cation nutrients are better retained in soil than anion nutrients because soil particles are usually negatively charged. Organic components are mainly found within humus, composed of decomposing organisms. Humus provides crumbly soil with pores that can retain water and aerate soil while increasing cation exchange and act as a mineral reserve. In conclusion, soil is a reservoir of nutrients with cation exchange capacity that holds positively charged nutrients such as potassium, calcium, magnesium and ammonium preventing their leaching loss from soil. Hence, in order to sustain agriculture it is crucial to know about soil parameters and also various methods to prevent soil degradation.

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Bio-degradation of acetamiprid from wetland wastewater using indigenous *Micrococcus luteus* strain SC 1204: Optimization, evaluation of kinetic parameter and toxicity

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The fundamental objective of this study is to investigate the feasibility of microbes in removing toxic substances from environment and hopeful consideration that microbial bioremediation can be a cost effective tool for the detoxification of insecticides. Therefore, efforts were made to isolate and characterize indigenous bacteria, capable of degrading the Neonicotinoid insecticide Acetamiprid (ACE) and to optimize different process parameters in order to effectively treat the wetland waste water. The enrichment and isolation was done in minimal salts media enhanced with 50 $mg{\bullet}L^{-1}$ of ACE as sole carbon, nitrogen and energy source, incubated at 40oC on a rotary shaker at 100 rpm for about 7 days. The face centered central composite design (FCCD) was performed to check the significance of the degradation process in a quadratic model. The mathematical model fitting of growth curve of the isolated bacteria was also studied. The indigenous bacterium capable of degrading ACE was observed to be *Micrococcus luteus* strain SC 1204 having a maximum consumption of 69.84% of ACE in 24 hours, quantified using GC-MS. The rate kinetic analysis was investigated using zero-order and three half-order kinetic models. Among the identified metabolites, Benzothiazole, 2-(2-hydroxyethylthio) with a prominent peak at RT 6.99 was found to be the end product of ACE bio-degradation. Further, toxicological analysis on *Pseudomonas aeruginosa* exhibited no inhibition zone suggesting the eco-friendly nature of the degraded metabolite.

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