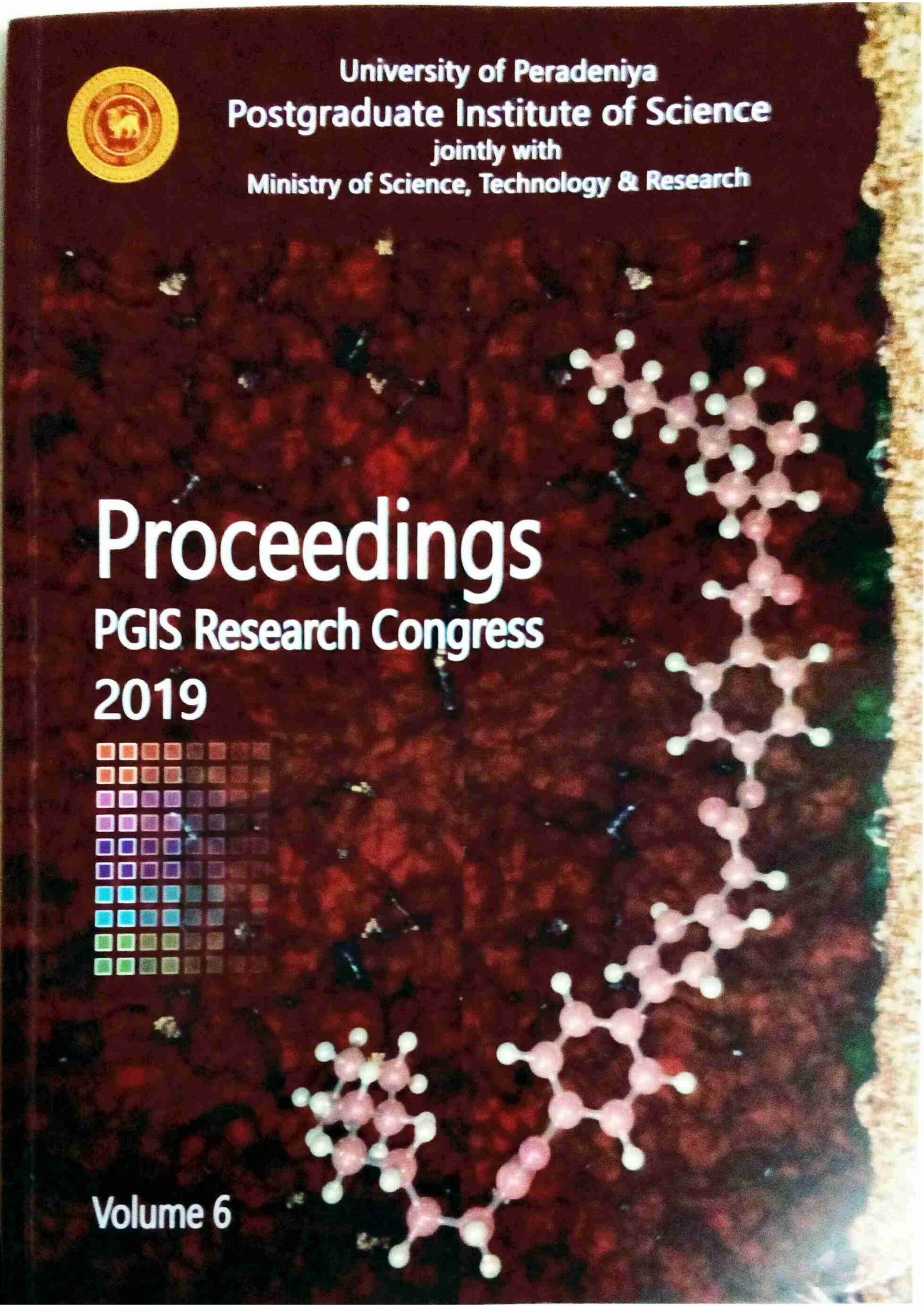
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BIOFILM BIOFERTILIZER: A PROMISING ECO-FRIENDLY ALTERNATIVE TO FUTURISTIC MARTIAN AGRICULTURE

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Human colonization on Mars has been planned as close as 2031. Here, a big question among other things is how we cultivate our food crops on Mars while saving its environment. Martian soils have limitations for plant growth due to high levels of heavy metals, lack of beneficial microbes and deficiency in some macronutrients. Though chemical fertilizer (CF) may be a necessity for plant growth, it is important to investigate methods which use a minimum amount of CF, if Mars is to be kept with limited pollution due to crop production. Here, biofilm biofertilizers (BFBFs) can play a major role in eco-friendly Martian agriculture. This preliminary study assesses plant growth with the application of BFBF using a serpentine soil, which is used widely as a Martian soil simulant in the world. Lettuce was used as the test plant. A pot experiment was carried out with two BFBF dilutions in sterile distilled water; 1:100 and 1:300, BFBF:water (*v/v*), and the control (sterile distilled water). Seed germination percentage and seedling length were measured after four weeks. Soil microbial biomass was determined using MicroResp tool kit. Total soil bacterial plate count was also taken. Soil microbial respiration did not differ among treatments. Total soil bacterial count of the 1:300 dilution was significantly higher than that of the control by 6%, the initial serpentine soil by 12% and the 1:100 dilution by 20% ($P < 0.05$). Thus, the 1:300 dilution seems to be an optimal concentration of BFBF for the soil bacterial growth. Increasing trends of both seed germination and seedling length were also observed at 1:300 dilution. The study concludes that BFBF can increase the microbial action in Martian simulant soil, which is a prerequisite for healthy plant growth. More studies including plant heavy metal uptake are needed to evaluate this further.

Keywords: Serpentine soil, Biofilm biofertilizer, Plant growth, Soil microbes