

Effect of Granite Herbicide on Paddy Soil Microbiota

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Granite, which is a systemic herbicide formulation, is widely applied by wet zone paddy farmers in Sri Lanka to control weeds during the initial vegetative growth phase of paddy. The active compound, Penoxsulam; 2-(2,2-difluoroethoxy)-N-(5,8-demethoxy[1,2,4]triazolo[1,5c]pyrimidine-2-yl)-6-trifluoromethyl) benenesulfonamide, destroys both grass and broad leaf weeds through inhibiting Aceto Lactate Synthase (ALS) enzyme. Paddy soil inhabiting microorganisms play a vital role in soil fertility management and suppression of diseases. But, a considerable attention has not been paid to see the effect of Granite on non-target soil microbiota. Thus, the present study evaluated the effect of granite on total microbial activity of rice fields inhabiting microorganisms. After basic soil characterization, 25 g uncontaminated soil was amended with the herbicide Granite to prepare a laboratory contaminated soil series (2.5, 5.0, 10, 15, and 20 ppm of Granite kg⁻¹ of soil). The control consisted with no Granite. All treatments were replicated thrice. Three parallel experiments with 24 (T_{24h}), 48 (T_{48h}) and 168 (T_{168h}) h experimental time were carried out. At the end of each experiment, soil samples were taken from the treatments and soil total microbial activity (TMA) was measured. The highest TMA was measured from the treatment 2.5 ppm of Granite kg⁻¹ of soil and T_{24h}, T_{48h} and T_{168h} exposure times for that treatment were 12.5±0.06, 12.1±0.04 and 10.8±0.34, respectively. The lowest values of TMA recorded from the treatment with the highest contamination level (20.0 ppm of Granite kg⁻¹ of soil) with T_{24h}, and T_{168h} exposure times of 9.6±0.33, and 8.1±0.20, respectively. Although, the results imply an increasing trend of TMA at acute exposure to lower concentration, the overall results showed a time and concentration dependent irreversible significant (p<0.05), decrease in TMA of treatments with chronic exposure to higher contamination levels of Granite. The overall results infer the potential of negative impact of Granite on rice field inhabiting microbiota due to repeated exposure at high concentrations.

Keywords: Granite, Total microbial activity, Herbicide concentration, Exposure, Irreversible effect