

Evaluation of Soil Biota as Bio Indicators of Soil Quality in Organic-Amended Maize Cultivation

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The study was aimed to assess the impacts of different types of organic manure application on the abundance and diversity of soil invertebrates on soil quality in maize cultivation. The research was carried out at Sudumalli in Jaffna district, Northern Province of Sri Lanka. The experiment was laid out in a Randomized Complete Block Design (RCBD) with three replicates and six treatments which included five different types of organic amendments such as cow dung (T_1), goat manure (T_2), poultry manure (T_3), enriched compost (T_4), commercial goat manure compost (T_5) and control (T_6). The maize Sampath F1 hybrid was sown with a recommended spacing of 30 x 60 cm. Soil samples were collected after 45 days of seed germination to a depth of 10 cm to analyze physical and chemical properties of soil in each treatment. The volume of 15 x 15 x 10 cm block of soil was excavated to separate soil macro fauna by hand sorting and soil meso fauna were extracted from soil samples by using a simple handmade Berlese-Tullgren funnel. Soil pH, Electrical Conductivity (EC), Soil Organic Matter percentage (SOM%), total nitrogen (N), exchangeable potassium (K), available phosphorus (P), soil moisture and soil texture were analyzed by following the standard laboratory methods and invertebrate community indices (Shannon (H), Simpson (D), Menhinick (M), Pielou (P)) and soil biological quality index (QBS) were calculated to assess the soil quality. One-way Analysis of Variance (ANOVA) was performed to identify significant differences ($p < 0.05$) among the treatments with respect to the community diversity, density, soil chemical and physical properties. Mean density and taxa richness were significantly higher with organic amendments treated plots compared to the control plot. Further, QBS index were significantly higher and similar in T_1 , T_2 and T_3 and significantly lowest was recorded in control. Therefore, this study found that soil application of organic amendments enhanced the biological quality of the soil. Organic amendments application significantly increased the soil pH, EC, SOM%, total N, exchangeable K, available P, and soil moisture. Changes in soil invertebrates' abundance, diversity and community composition were associated with changes in soil chemical and physical properties.

Keyword: Biodiversity indices, Organic manure, Soil invertebrates, Soil properties, Soil quality