Nitrification Inhibition by Karanja (*Pongamia glabra* Vent) Seed Powder and Its Extract

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Nitrification inhibitors are applied to slow down the conversion of ammonium to nitrate, which will enhance nitrogen availability to crops, and nitrogen use efficiency in farming systems by reducing nitrogen losses. This study aimed to assess the nitrification inhibition potential of Karanja (*Pongamia glabra* Vent) seed powder and its extract. The experiment comprised three phases: incubation study, leachate study, and microbial study, with seven treatments -T1 (Soil), T2 (Soil + Urea), T3 (Soil + Urea + 5% Neem oil), T4 (Soil + Urea + 10% Karanja extract), T5 (Soil + Urea + 20% Karanja extract), T6 (Soil + Urea + 10% Karanja powder), and T7 (Soil + Urea + 20% Karanja powder). Baseline soil properties included pH 6.58, EC 67.73 µS/cm, CEC 67.36 cmol (+)/kg, phosphorus 12.46 ppm, potassium 228.07 ppm, and total nitrogen 0.023%. Karanja powder and Karanja extract contained 0.313% and 0.014% nitrogen, respectively. According to the incubation study the highest nitrification inhibition % was found in T3 (52.4%) followed by T5 (49.8) and T4 (46.2). Treatments T6 and T7 (Karanja powder) exhibited no significant inhibition. Leachate study showed a significant reduction in nitrate leaching loss in T3, T4 and T5 compared to T2, T6 and T7. Microbial analysis confirmed the inhibition by Karanja extract, supporting its role as an effective nitrification suppressor. The study concludes that Karanja extract and neem oil are potent natural nitrification inhibitors, while Karanja powder alone is ineffective in this regard. Further studies under field conditions are suggested to verify the results.

Keywords: Leaching, Nitrate, Nitrification Suppression, Natural Inhibitors