

APPLICATION OF UREA AND MURIATE OF POTASH AS BIOCHAR ABSORBED FORMS TO REDUCE NUTRIENT LOSSES

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Abstract

Though potassium (K) is a cation, it is liable to leaching loss in soils because it is a mono valent one. Considerable leaching of K from applied muriate of potash (MOP) has been reported in soils. Using biochar to absorb MOP may reduce this loss. While urea-intercalated biochar (UIBC) has been studied in Sri Lanka, research on MOP-absorbed biochar is limited. This study aimed to produce potassium-enriched biochar (PEBC) from coir dust and evaluated its potential as a slow-release fertilizer in combination with UIBC, formulated in a previous study. A preliminary research optimized PEBC production under two soaking methods (capillary and direct soaking) and three MOP concentrations (30%, 60%, and 100%) in a two-factor factorial design with three replicates. Statistical analysis (two-way ANOVA, $P < 0.05$) confirmed that direct soaking, 100% concentration, recorded the highest potassium content $50.87\% \pm 0.01$. A leaching column experiment was conducted using ten treatments: T1 – Control, T2 – Department recommendation, T3-100% UIBC, T4- 75% UIBC, T5- 100% PEBC, T6- 75% PEBC, T7-100% UIBC+100% PEBC, T8-100% UIBC+75% PEBC, T9-75% UIBC+75% PEBC and T10-75% UIBC+100% PEBC in a completely randomized design ($P < 0.05$) with four replicates. Over four weeks, the leachate study expressed that all UIBC and PEBC combinations or single treatments significantly reduced the losses of cumulative nitrate and K compared to the department recommendation, indicating their potential as effective slow-release fertilizers.

Keywords

Urea-intercalated biochar; Potassium-enriched biochar; Soaking