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The Effect of Nitrogen-Enriched Partially Burnt Paddy Husk on Growth and Yield of Rice (*Oryza Sativa*)

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Paddy husk can be defined as a material that can be easily accessed by small-scale, resource-poor farmers in Sri Lanka. It is being produced in large quantities during the production of milled rice as by-products. Currently, most paddy husk is underutilized or left unused due to their intrinsic properties. Partially burnt paddy husk (PBPH) is an organic material that is prepared by incomplete combustion of paddy husk. The use of PBPH as a soil amendment to fix soil fertility problems has been well recognized. It contains a higher porous structure and an enhanced adsorption capacity, therefore, has the ability to slow down nutrient leaching by capturing nutrients in its porous structure. In the present study, a farmer-friendly, biochar-based organic nitrogen fertilizer was developed by nitrogen-enriching PBPH using nitrogen-rich liquid fertilizers in order to determine its effect on the growth and yield of rice. A pot experiment was conducted at the Rice Research and Development Institute, Bathalagoda based on a Completely Randomized Design (CRD) with eight treatments and five replicates.The treatments included T1 (Gliricidia extract+PBPH), T2 (cow urine+PBPH), T3 (poultry manure+PBPH), T4 (fish tonic+PBPH), T5 (compost tea+PBPH), T6 (urea+PBPH), T7 (PBPH only) and T8 (no treatment). Nitrogen (N) content of raw materials, liquid fertilizers, N-enriched PBPH, and N uptake of plants were determined using Kjeldahl method. Phosphorus (P) and potassium (K) contents of PBPH were determined by using UV-Visible Spectrophotometer and Flame Photometer, respectively. Plant height and greenness (SPAD results) were recorded as growth parameters and finally, number of tillers, panicles, grains per pot and grain weight per pot were obtained as the yield parameters. Significantly, the highest N content was found in urea liquid fertilizer (3.42%) whereas the lowest was found in Gliricidia extract (0.35%). Significantly, the highest N content (1.735%) of N-enriched PBPHs was found in T6 (urea+PBPH), while the lowest (0.058%) was found in T7 (PBPH only). Significantly, the highest N uptakes (1.98% and 1.86%) of rice plants were found in T6 (urea+PBPH) and T4 (fish tonic+PBPH) respectively while the lowest (0.56%) was found in the T8 (no treatment). SPAD readings, the number of panicles, tillers and grain yield, and biomass were significantly increased in all treatments over T7 (PBPH only) and T8 (no treatment) treatments. The overall study concluded that the application of N-enriched PBPH has improved the growth and yield of rice, therefore it can be used as a farmer-friendly, sustainable, and organic nitrogen source in paddy cultivation in Sri Lanka.

Keywords: Nitrogen, Partially burnt paddy husk, Nitrogen enrichment