

## **EFFECT OF SUNN HEMP SEEDING RATES ON SOIL CHEMICAL AND BIOLOGICAL PROPERTIES OF A RICE BASED CROP ROTATION**

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The decline in crop rotation diversity in rice-based cropping systems found to be a great threat to the productivity in the Dry Zone of Sri Lanka. Increased use of agricultural inputs such as inorganic fertilizers and pesticides is one of the consequences of low crop rotation diversity in these systems. Conventionally, farmers leave the land fallow between the two major crop growing seasons due to the inadequacy of water for cultivation. Growing a green manure crop in the fallow period is a sustainable alternative to enhance the soil productivity. Among many potential green manure crops, sunn hemp (*Crotalaria juncea*) is one of the best. However, less is known about the impact of sunn hemp on soil properties. Particularly, the optimum plant density to obtain the maximum soil benefits are unknown. A field experiment was performed at the Research Unit of the Faculty of Agriculture Rajarata University of Sri Lanka, Puliyankulama (DL1a) with different seeding rates of sunn hemp (0, 20, 40, 80 kg/ha) and two levels of residual fertilizer levels (full and half rate of N fertilizer of Department of Agriculture Recommendation) of rice. Soil analysis was carried out before planting of sunn hemp and seven and twelve days after incorporation of sunn hemp using standard soil analytical techniques. Soil chemical and biological properties were not altered with residual fertilizer levels or with different time points after incorporation, but with different seeding rates. Compared to fallow, the incorporation of sunn hemp (20 kg/ha) significantly ( $p < 0.05$ ) enhanced soil biomass carbon, microbial activity, organic matter, soil moisture, available nitrogen, phosphorous and potassium content by 40%, 33%, 18%, 17%, 14%, 37% and 10%, respectively and these properties were further enhanced with the increasing of the seeding rate up to 80 kg/ha by 17%, 14%, 19%, 2%, 12%, 12%, 10%, respectively. This study clearly identified some positive impacts of incorporating sunn hemp as a green manure crop on many soil properties. Interestingly, these benefits were further enhanced by increasing the seeding rate by four times (80 kg/ha) from the recommendation (20 kg/ha) which would be a viable strategy to uplift the degrading rice soils in the region.

**Keywords:** Green manure, Seeding rates, Soil biological properties, Soil chemical properties