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Selection of Carrier Materials for Biofertiliser Application into Seedlings in Organic Rice (*Oryza sativa* L.) Nurseries

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Abstract

Nitrogen (N) is one of the most yield limiting factor of rice, alternative N sources should be supplied especially in organic farming systems. N fixing bacteria in rice rhizosphere show diurnal cycles that mimic plant behaviour, and tend to supply more fixed Nitrogen (N) during growth stages when plant exhibits a high N demand as a biofertiliser. Biofertilisers can be inoculated as seed dipping, seedling root dipping, soil and foliar application and as incorporated to pellets or capsules. As staple food crop in Sri Lanka, rice is growing mainly in submerged conditions, direct contact of inoculant with rhizosphere is more effective and losses can be minimised. Identification of efficient and effective way of inoculation using suitable carrier materials in to the root zone is important and this study was conducted to identify suitable carrier material for N biofertiliser; to be used in parachute method which is an ideal and cheaper seedling broadcasting method in organic rice cultivation. *Azotobacter* sp. was isolated from traditional rice variety: Madathawulu by using Ashby Mannitol media, was inoculated to rice seeds (Bg 250 - a two and half months variety) in parachute trays. Biofertiliser was mixed into carrier materials as rice soil, compared with cattle manure, compost and biochar as carrier materials (T1, T2, T3, T4, T5) and non-inoculated as (T6, T7, T8, T9) were used. The biofertiliser added and non-added treatments had a significant difference ($p < 0.05$) in plant height, dry shoot weight, plant nitrogen percentage and number of tillers per plant over the control (T0). Among three carrier materials, biofertiliser with biochar (T4) gained the highest significant ($p < 0.05$) mean number of tillers per plant (7) and higher average dry shoot weight (2.45g) and mean tissue nitrogen percentage (2.47%) than other treatments. It can be concluded that biochar can be identified as suitable carrier material in parachute for biofertiliser with nitrogen fixing bacteria using parachute seedling trays for paddy cultivation and further field experiments are needed to validate results with growth and yield of rice with economic analysis.

Keywords: Biofertiliser, carrier materials, nitrogen, parachute method, rice