

MAIZE CROP RESIDUE AS A CARRIER FOR BIOFILMED BIOFERTILIZER FOR MAIZE (*Zea mays*)

K.N.S. Weeraratne¹, G. Senevirathne² and D.M. Jinadasa¹

¹*Department of Soil and Water Resources Management, Faculty of Agriculture, Rajarata University of Sri Lanka, Anuradhapura, Sri Lanka.*

²*Institute of Fundamental Studies, Hantana, Kandy, Sri Lanka.*

Finely ground maize-crop residue (MCR) was evaluated as a carrier material for a higher order Bradyrhizobial-fungal biofilm in comparison with coir dust, which is the presently used carrier material for Rhizobial Biofertilizer in Sri Lanka. A greenhouse experiment was conducted to assess the ability of carrier material to sustain the biofilm providing plant nutrient requirement of maize crop. The treatments used were Biofilmed Biofertilizer (BB) produced with MCR or coir dust and BB with MCR coupled with 25%, 50% or 75% of the recommended chemical fertilizer (NPK) mixture and a control only with 100% NPK. A biofilm broth of 3.1×10^8 cfu/mL of Bradyrhizobia was inoculated. A plant infection count was taken to assess the survival of Rhizobia in carrier material.

Both carriers showed comparable numbers of 10^7 Rhizobia per gram in infected plants. Soil nitrate and ammonium nitrogen and phosphate availability were comparable among BB with MCR carrier with 50% or 75%, NPK mixture and the control, and superior to the others. Final total soil nitrogen was significantly higher in treatment BB with coir dust carrier, though initial total nitrogen of BB with MCR carrier was greater. BB with MCR carrier showed a higher increase of soil organic carbon (SOC) with respect to the initial SOC, compared to that of BB with coir dust and the control. The initial carbon contents of coir dust and MCR were not significantly different. Soil reaction showed a clear recession with the addition of NPK mixture. Total plant dry weight showed that BB with MCR carrier with 75% NPK mixture and the control were comparable, but were superior to the other treatments. Thus for Maize, MCR can be considered as a suitable carrier for BB, which should be used in combination with 75% NPK mixture.

Key words: Biofilmed Biofertilizers, Bradyrhizobial-fungal biofilm, Carrier materials, Maize crop residue