1. CHANGES OF MICROBIAL BIOMASS IN SOIL AFTER INCORPORATION OF RICE STRAW

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Even though, the microbial biomass in soil is a relatively small fraction, it plays a crucial role in various nutrient transformation processes, which control overall nutrient cycling in the soil-plant system. Mineral nutrients in soil are temporarily trapped and immobilised in soil microbial biomass. Subsequently, decaying microbial biomass releases immobilised nutrients such as C, N, P and S to the labile pool of nutrients in soil. The immobilisation and release of nutrients in a given soil is therefore, dependent upon the nature - quality and quantity - of microbial biomass present in soil. The quality and quantity of microbial biomass is affected by various environmental factors such as available oxygen and decomposable organic matter contents in soil.

Main objective of this experiment is to study the effects of organic matter addition (rice straw) on microbial biomass development in soil maintained under arable and flooded conditions. Reddish brown Earth (RBE) soil collected from Mahailuppallama was used. Soil was amended with finely ground rice straw at the rate of 1-% w/w basis. One set of sample was maintained aerobically and other set of sample was maintained in flooded condition to give anaerobic condition. All soil-straw samples filled in glass jars were triplicated and incubated at room temperature in the dark. Sampling was done at 1st day, 2nd, 4th and 8th weeks after incubation. Moist soil equivalent to 20g air died basis from each set of soil samples were analysed for microbial biomass Carbon (C) and Nitrogen (N) by using Fumigation-Extraction method (Brookes et al, 1985 Vance et at, 1987). During the experimental period, CO_2 evolution from the soil samples was also measured after absorption to NaOH solution.

The changes of microbial biomas were monitored in this experiment by determining biomass C and N. Results showed that the application of rice straw markedly increased soil biomass C over the control soil irrespective to the aerobic and anaerobic conditions. Aerobic and anaerobic conditions imposed in this experiment had no affect on biomass C significantly. However, overall increase of biomass C in straw amended soil can be attributed to the supply of carbon source to the microbial biomass. Biomass N also behaved in a similar manner. Only aerobically maintained, rice straw amended soil samples showed a significant increase of biomass N. This means perhaps, in aerobic condition the quality of biomass (in terms of nitrogen) has changed over the anaerobic treatment. It may be due to the development of low C: N ratio biomass components in soil maintained under aerobic condition. Further, microbial activity was measured by CO_2 evolution. In this study, microbial activity has been increased substantially in rice straw amended soils irrespective to both aerobic and anaerobic conditions. However, the increase of microbial activity was more prominent in the rice straw amended soil, which maintained aerobically.

It can be concluded that the addition of organic matter such as rice straw substantially increase the microbial biomass C and N in the early stages of straw decomposition. The aerobic conditions, in contrast to the anaerobic, may also have an affect on the quality of microbial biomass and the activity in the soil.