



Relationship between Crop Yield and the Aggregate Stability of Organic Manure Amended Red Yellow Podzolic Soils

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Abstract

Soil aggregate stability is identified as an important ecosystem property, which can directly affect the crop yield through facilitating the plant growth. However, some researchers have shown that the aggregate stability is not a useful and reliable predictor of primary productivity of crops. The objectives of the present study were to explore the relationship of stability of soil aggregates to the crop yield and the harvest index of the organic manure amended red yellow podzolic soils. A field experiment was conducted by establishing bush beans (Variety: Thai Bush) in different organic manure amended plots. Each plot was amended with 5% (dry basis) of cattle manure, goat manure, *Gliridicidia sepium* leaves, and recommended chemical fertilizer mixture separately. A non-amended (control) plot was also prepared. Another set of plots were prepared by mixing 2% of *Cassuarina equisetifolia* (CE) leaves with 5% of each manure type separately in order to increase the aggregate stability via hydrophobic effects compared with only 5% organic manure amended plots. At the end of the crop growth, the fresh yield was measured. The harvest index was calculated using the dry matter of shoot and root biomasses. The stability of soil aggregates was determined using the wet sieving apparatus (Eijkelpamp). Data were statistically analyzed using ANOVA. According to the results, the yield of the tested samples showed a positive polynomial relationship ($R^2= 0.67$) with the stability of soil aggregates. The regression output of the two variables were statistically significant at 0.05 probability level. The yield, aggregate stability, and the harvest indices of almost all the samples with 2% CE were significantly higher than those with only 5% corresponding organic manure. This might be because the addition of 2% CE increased the aggregate stability of soils due to its hydrophobic effects as explored by number of previous studies on Sri Lankan soils. The harvest index of the samples also increased with the increasing aggregate stability. It can be concluded that the increased aggregate stability could have a positive influence on the economical yield and it could be a good predictor of yield in the context of organic manure amended red yellow podzolic soils. Further, it is noted that CE is a good agent for promoting aggregates.

Key words: aggregate stability, harvest index, red yellow podzolic soils, yield

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