

Effect of organic and inorganic fertilizer on the growth and yield components of traditional and improved rice (*Oryza sativa* L.) genotypes in Malaysia

ABSTRACT

Rice is the most important staple cereal human nutrition and consumed by 75% of the global population. Rice plants need a supply of essential nutrients for their optimal growth. Rice production has increased tremendously in Malaysia insensitive irrigation and the use of inorganic fertilizers and pesticides. However, the effect of using inorganic fertilizers resulted in contamination of ground water and decreased the productivity of soil, which in turn affected the rice production in the long term. The use of organic manure may help to regain the soil health, but that is insufficient for providing the essential nutrients to achieve optimal growth. Therefore, the use of organic manure combined with inorganic fertilizers is applied to obtain optimum yields. This study aims to test the effect of organic and inorganic fertilizers on the growth and yield components of 65 rice genotypes. The pot experiment was conducted at the net house on field 10, University Putra Malaysia, UPM, Malaysia, during the period of February to June 2019 and August to December 2019 in a randomized complete block design (RCBD) with three replications. There were three treatment combinations viz. T1: 5 t ha⁻¹ chicken manure (CM), T2: 2.5 t ha⁻¹ CM + 50% CFRR, T3: 100% (150 N: 60 P₂O₅: 60 K₂O kg ha⁻¹) and chemical fertilizer recommended rate (CFRR). Grain and straw samples were collected for chemical analysis, and physical parameters were measured at the harvest stage. Results showed that most of the growth and yield components were significantly influenced due to the application of organic manure with chemical fertilizer. The application of chemical fertilizer alone or in combination with organic manure resulted in a significant increase in growth, yield component traits, and nutrient content (N, P, and K) of all rice genotypes. Treatment of 2.5 t ha⁻¹ CM + 50% CFRR as well as 100% CFRR showed a better performance than the other treatments. It was observed that the yield of rice genotypes can be increased substantially with the judicious application of organic manure with chemical fertilizer. The benefits of the mixed fertilization (organic + inorganic) were not only the crop yields but also the promotion of soil health, the reduction of chemical fertilizer input, etc.

Keyword: Organic manure; Crop productivity; Rice; Soil health; Nutrient content