ABSTRACT

Organic resources (ORs) are important nutrient inputs in tropical agriculture. Combined with mineral fertilizers, they form the backbone of integrated soil fertility management. This study was conducted to determine the medium- to long-term influence of OR quality and quantity on maize productivity and to evaluate the occurrence of additive benefits in terms of extra grain yield produced by the combined application of ORs and N fertilizers. Farmyard manure, high quality Mexican sunflower [*Tithonia diversifolia* (Hemsl.) A. Gray], intermediate quality calliandra (*Calliandra calothyrsus* Meisn.) and maize (*Zea mays* L.), and low quality silky-oak (*Grevillea robusta* A. Cunn. ex R. Br.) sawdust were incorporated into the soil at equivalent rates of 1.2 and 4 Mg C ha^{-1} yr^{-1} in Embu (clayey) and Machanga (sandy soil), together with a control to which no OR was added. All plots were split, with one half receiving 120 kg N ha^{-1} $season^{-1}$ as $CaNH_4NO_3$. The ORs, except sawdust and maize, improved maize grain yields compared with the control at both sites. Greatest mean maize yields (i.e., 4.9 and 2.3 Mg ha^{-1} $season^{-1}$, in Embu and Machanga, respectively) over 10 seasons were observed with the high rate of Mexican sunflower, but was not significantly different from calliandra and manure. Generally, maize yields were greater with higher than lower OR rates, except for maize and sawdust. Although N fertilizer additions to the ORs improved grain yields in Embu, the increase was marginal; resulting in negative interactive effects of applying ORs with N fertilizers, especially with high-N ORs. Thus high-N ORs should not be applied in combination with N fertilizers, especially at such high fertilizer N rates.