

Soil Nitrogen Fractions, Nitrogen Use Efficiency and Yield of Zea mays L. Grown on a Tropical Acid Soil Treated with Composts and Clinoptilolite Zeolite

ABSTRACT

High nitrogen use efficiency (NUE) is important for improving crop yield. There are many nitrogen (N) fractions in soil and their uptake by crops varies. Most of the N that is taken up by plants is not native to the soil but usually from fertilizer added to the soil. However, the unbalanced use of fertilizers is currently an important issue that needs to be addressed. The objectives of this work were to determine the effects of using the recommended chemical fertilizers together with inorganic and organic amendments on (i) soil organic and inorganic N fractions, (ii) N uptake and use efficiency, and (iii) maize (*Zea mays* L.) dry matter production and ear yield. A randomized complete block design field trial, using maize as a test crop, was done with seven fertilizer treatments, each replicated thrice for two crop cycles. The treatments included different combinations of urea N, clinoptilolite zeolite (CZ), rice straw compost, and paddy husk compost. The variables of the study were soil N fractions, ear yield, and N use efficiency. Generally, the combined use of the recommended chemical fertilizers with CZ and organic amendments resulted in significantly higher soil N fractions, N use efficiency, and ear yield of maize for both crops. The two treatments with a 50% reduction in recommended chemical fertilizers, CZ, and rice straw compost or paddy husk compost (treatments four and six) are recommended instead of the 100% recommended chemical fertilizer treatment (treatment one). The organic materials used for these two treatments are abundantly available and will reduce the economic and environmental costs of applying large quantities of chemical fertilizers alone.