

Ammonia loss reduction, exchangeable ammonium and available nitrate retention in soil treated with urea mixed with humic acid and acid sulphate soil.

ABSTRACT

Exchangeable ammonium (NH_4^+) could be recovered in soil by the application of humic acid (HA) and acid sulphate soil. The ability of humic acids to retain NH_4^+ has been demonstrated in our previous study. In that study, the effect of both acids on soil exchangeable NH_4^+ , dry matter production and available nitrate (NO_3^-) was investigated. This laboratory study compared the effect of enhancing urea mixtures with HA and acid sulphate soil on NH_3 loss, and soil ammonium and nitrate contents, with loss from surface applied urea and to study the appropriate application ratio. HA, acid sulphate soil, and the mineral soil Nyalau Series (Typic paleudults) used in the incubation studies were characterized prior to the experiment. A closed-dynamic air flow system was used to evaluate the treatments effects with 3 replications in a completely randomized design (CRD). The data obtained were analyzed using Duncan's test with Statistical Analysis System (SAS) version 9.2. Application of urea amended with various amounts of HA and acid sulphate soil and urea with HA alone did not minimize ammonia loss especially at higher amounts (T5, T9 and T10). The application of urea amended with acid sulphate soil however did not reduce ammonia loss even though it delayed the ammonia loss at higher amounts (T13 and T14). The application of acid sulphate-urea-HA mixture (T5) and urea-HA mixtures (T9 and T10) reduced NH_3 loss in acid soil by improving ammonium retention. This study can contribute to improving urea N use efficiency as well as reducing environmental pollution in agriculture and forestry.

Keyword: Humic acids; Acid sulphate soils; Urea; Ammonium; Nitrate; Ammonia loss.