

EFFECT OF NEEEM (AZADIRACHTA INDICA A. JUSS) MATERIALS ON
NITRIFICATION, NITROGEN LEACHING AND NITROGEN RESPONSE OF
APPLIED UREA AND AMMONIUM SULPHATE IN SELECTED SOILS OF SRI LANKA

BY

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SRI LANKA

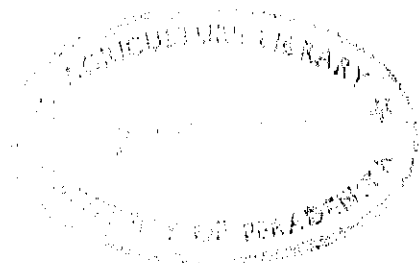
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ABSTRACT

Use of nitrification inhibitors is one measure of improving the efficiency of nitrogen fertilization. However, due to the high cost, farmers in the developing countries are unable to use such chemicals. Therefore, identifying locally available materials with nitrification inhibitory properties is essential. The main objective of this study was to find whether *neem* materials (cake/extract) could be used as nitrification inhibitors to improve the fertilizer efficiency of urea and ammonium sulphate in different soils of Sri Lanka, namely, Reddish Brown Earth (RBE - *alfisol*), Reddish Brown Latosolic (RBL - *ultisol*), Red Yellow Podsollic (RYP- *ultisol*) and Low Humic Gley (LHG - *alfisol/ultisol*) soils.

Laboratory incubation experiments were conducted using RBE, RBL and RYP soils, to find whether blending urea or ammonium sulphate with *neem* alters the forms of N in soil, rate of nitrification and general microbial activity. The treatments used in these experiments were urea/ammonium sulphate (T1), urea/ammonium sulphate + 20% *neem* cake (T2), urea/ammonium sulphate + 30% *neem* cake (T3), urea/ammonium sulphate + 20% *neem* extract (T4) and control without *neem* or fertilizer (T5). Laboratory experiments were conducted using undisturbed soil columns to investigate the effects of blending urea or ammonium sulphate with *neem* on leaching losses of N in RBE and RBL soils. All treatments except *neem* extract (T4) were used in this experiment. Green house pot experiments were conducted to investigate the effect of *neem* blended urea or

ammonium sulphate on the yield of an upland crop, radish (*Raphanus sativus*), using RBE and RBL soils, and a lowland crop, rice (*Oryza sativa* L) using LHG soils from Maha Illuppallama and Dodangolla.

The results of incubation experiments indicated that all *neem* treatments increased ammonium content and reduced nitrate content compared to urea or ammonium sulphate alone treatments, up to eight weeks in RBL soil and up to twelve weeks in RBE soil. In RYP soil, *neem* treatments increased nitrate content and reduced ammonium content up to six weeks of incubation. Retardation of nitrification was observed at most time intervals in all *neem* treatments in both RBE and RBL soils though percent inhibition of nitrification reduced with time. In contrast to the results of the above two soils, inhibition of nitrification was not observed with any *neem* treatments in RYP soil. The rate of nitrification was very low compared to other two soils, probably due to the acidic nature of this soil. In all three soils general microbial activity measured as CO₂ evolution was not negatively affected by any of the *neem* treatments, indicating that application of *neem* cake or extract does not hinder normal microbial activity.

Results of leaching experiments indicated that, the *neem* cake treatments significantly reduced leaching losses of nitrate, up to six weeks after application in RBE soil and up to eight weeks after application in RBL soil with both fertilizers. *Neem* cake treatments reduced total N leaching losses by 18 - 20% in RBL soil, and by 12 - 14% in RBE soil.

Blending *neem* with fertilizer increased yield of radish significantly compared to unblended urea and ammonium sulphate in both soils. However there was no significant difference in yield within the *neem* treatments. In LHG soil from Maha Illuppallama, both *neem* blended urea and ammonium sulphate significantly increased straw and grain yield of rice. Even though *neem* blended urea increased grain and straw yield of rice the increase in grain yield was not statistically significant. However, *neem* blended ammonium sulphate treatments increased the grain and straw yield of rice in LHG soil from Dodangolla, significantly.

Results therefore, indicate the possibility of using *neem* cake and extract as a means of retarding nitrification, in order to increase the efficiency of nitrogen fertilization, in RBE, RBL and LHG soils.