

Mineralisation pattern of neem coated urea products in different soils

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ABSTRACT

Fertilizers in general and nitrogenous fertilizers in particular have made a major contribution towards agricultural productivity. Recovery per cent of applied nitrogen is only less than fifty per cent. The factors that contribute to the poor recovery of nitrogen by plants are as a result of rapid dissolution of the applied fertilizer materials and release of more mineral nitrogen than what is used by the plant or conserved by the soil in the available forms. Urea is the least efficient among the nitrogen sources. High loss and low nitrogen use efficiency demand and the factors responsible for such wastage of expensive input has to be studied. The dynamics of release of N from these fertilizers is likely to be studied. The dynamics of release of N from these fertilizers is likely to be influenced by soil characteristics as well as moisture condition. Hence, an attempt was made to compare the mineralization pattern of newly developed neem coated urea products in different soils under submerged condition. An incubation experiment was conducted with two soil series viz., Noyyal series (Heavy textured) and Madukkur series (Light textured). The soil was incubated for 10 days with 200 ppm of nitrogen using different N carriers (9 Treatments viz., control, 0.1, 0.2 and 0.3% neem oil and neem gold coated urea, indigenously prepared neem coated urea and prilled urea). Soil samples were collected and analysed for urea, ammoniacal and nitrate nitrogen. The results revealed that three neem coated urea products viz., 0.3% neem oil, 0.1% and 0.2% neem gold coated urea were equally effective in prolonging urea release up to 10 days compared to indigenously prepared neem cake coated urea and prilled urea. Ammoniacal nitrogen release peaked at 5 DAI (days after incubation) in all neem coated urea products compared to prilled urea (peaked at 4 DAI). The lowest nitrate nitrogen content was recorded under neem coated urea products. Thus, use of neem coated urea products prolonged the nitrogen availability for the crop growth thereby minimized the losses of nitrogen and improved the nitrogen use efficiency.

Key words : Neem coated urea, Soils, Mineralisation, Neem gold.

INTRODUCTION

Fertilizers in general and nitrogenous fertilizers in particular have made a major contribution towards agricultural productivity. However, there is a continuous need to improve the efficiency of nitrogenous fertilizer in order to achieve more productivity of crops and to minimize the fertilizer related environmental problems. Results of several studies showed that only 50-60 per cent of the fertilizer nitrogen is usually recovered by crop plants. The recovery per cent of applied nitrogen to rice is generally lowers than fifty.

The factors that contribute to the poor recovery of nitrogen by plants are as a result of rapid dissolution of the applied fertilizer materials and release of more mineral nitrogen than what is used by the plant (or) conserved by the soil in the available forms. Urea is the least efficient among the ammonium containing nitrogen sources. High loss and low nitrogen use efficiency demand and the factors responsible for such wastage of expensive input has to be studied. Among the strategies explored to increase the nitrogen use efficiency, development of controlled released nitrogen carriers is one. This method aims to deliver nitrogen to the crop in a more timely and effective manner and at the same time be less susceptible to leaching, volatilization, denitrification and other mode of nitrogen loss.

Recently in Tamil Nadu, Southern Petrochemical

Corporations Ltd. (SPIC) has evolved such a strategy by bringing slow release N fertilizers, which are new formulations containing N source as neem coated urea products with neem oil and neem gold. The dynamics of release of nitrogen from these fertilizers is likely to be influenced by soil characteristics as well as moisture condition. Hence, the present investigation was designed to compare the mineralization pattern of neem coated urea products in different soils under submerged condition.

MATERIALS AND METHODS

Two soil series representing the major rice growing soils viz., Noyyal (Vertic Ustochrept) and Madukkur series (Udic Haplustalf) were taken up for the study. The basic properties of soils are presented in Table 1.

Table 1 : Basic soil characteristics

Soil properties	Noyyal series	Madukkur series
Textural class	Clay	Sandy loam
Taxonomy	Vertic Ustochrept	Udic Haplustalf
Organic carbon (%)	0.70	0.61
Total N (%)	0.063	0.053
Available N (kg ha ⁻¹)	200	195
Ammoniacal N (ppm)	35.8	30.5
Nitrate N (ppm)	8.12	7.56
CEC (c mol (p ⁺) kg ⁻¹)	21.4	10.4