Impact of Different Controlled, Released and Stabilized Urea-Based N Fertilizers on Productivity and Nitrogen Use Efficiency of Maize (*Zea mays* L)

S.M.P. Senevirathne[1]*, M. Gunawardena[2] and S.P. Nissanka[1]

[1]*Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Peradeniya 20400, Sri Lanka*
[2]*SLINTEC, Nanotechnology and Science Park, Pitipana, Homagama 10200, Sri Lanka*
**prabaath92@gmail.com*

Nitrogen use efficiency (NUE) of irrigated maize ranges from 25-50% due to the heavy losses of applied nitrogen (N). These losses raise significant threats to the environment as well as to the human health. Hence, mitigation of these losses and enhancing the NUE of maize is vitally important. Use of controlled released fertilizers (CRF) and urea stabilizers are commonly adopted methods to enhance the NUE. A field experiment was conducted at the Dodangolla Field Experimental Station (soil type – Reddish Brown Earth [RBE]), Sri Lanka to evaluate the performance of 2 CRFs types with respect to the agronomic efficiency of N (AE_N) in irrigated maize (variety – Pacific 984). A total of 10 fertilizer treatment combinations were used in the study. They were, two CRFs (single polymer coated and double polymer coated), used with and without DCD (Dicyandiamide) and NBPT ([N-(n-butyl) thiophosphorictriamide]), under 2 rates of urea (100% [325 kg/ha] and 50% [162.5 kg/ha] of Department of Agriculture [DOA] recommendation, and a no nitrogen applied control. DCD and NBPT rates were 10% and 1% of urea nitrogen amount (weight basis), respectively. Experimental design was randomized complete block design (RCBD) with three replicates per treatment. Plant height, leaf area, leaf chlorophyll level and yield components were measured. Results showed a 31.5% increase in AE_N of coated, 50% N + stabilizer treatments compared to 100% N treatments. Yields of the 50% N treatments were 20.3% lower compared to 100% N treatments ($P \leq 0.05$). There was no significant difference among the 2 CRF types regarding the yield and AEN. In conclusion, compared to uncoated urea, the use of CRFs in combination with urea stabilizers could improve the NUE of maize. The findings show a promising way of reducing urea application for Sri Lankan maize cultivations resulted by less N losses.

Keywords: Agronomic efficiency of nitrogen, Controlled released fertilizer, DCD, NBPT, Urea stabilizers