

Can Dicyandiamide Effectively Suppress Nitrification in Tropical Soils?

K. D. Hansika¹, W. S. Dandeniya^{2*}

¹*Postgraduate Institute of Agriculture, University of Peradeniya, Peradeniya 20400, Sri Lanka*

²*Department of Soil Science, Faculty of Agriculture, University of Peradeniya, Peradeniya 20400, Sri Lanka*

**warshisd@pdn.ac.lk*

Application of a nitrification inhibitor (NI) is a strategy recommended to improve N fertilizer use efficiency (NFUE) in crop cultivation. The effectiveness of NIs to suppress nitrification under tropical soil conditions, especially in relation to climate change, has not been documented. A study was conducted to assess the effects of Dicyandiamide (DCD), a well-known NI, on potential activity of nitrifiers inhabiting soils from different agro-ecological regions. Further the effectiveness of DCD when applied with different N sources and under variable temperatures was also determined. Soil samples were collected from eight locations representing intensively vegetable cultivated fields in *Nuwara-Eliya, Welimada, Marassana, Peradeniya* and *Kalpitiya* in Sri Lanka. Abundance of nitrifiers and inhibition of their potential activity by DCD were determined. Urea, compost and poultry-manure were applied with/without DCD to soils from *Kalpitiya* and nitrate releasing pattern was studied in a leaching-column experiment. Urea was applied with/without DCD to soils from *Marassana* and *Kalpitiya* and incubated under 22, 25 and 28°C to study nitrate release over 0, 24 and 48 h after application of amendments. Abundance and potential nitrification rate (PNR) of nitrifiers and their response to DCD were significantly different ($p < 0.05$) between soils. Abundance of nitrifiers and PNR had no significant correlation. PNR ranged from 10.05 to 72.27 mg kg⁻¹ day⁻¹ while inhibition of PNR by DCD varied from 14% to 69% in the eight soils. Application of DCD resulted in reducing nitrate release from soil from *Kalpitiya* when applied with urea. No significant effect of DCD was observed when applied with compost or poultry-manure. Nitrate release from soil was significantly affected by incubation temperature. Response to DCD was not consistent over different temperatures for the tested soils. It can be concluded that DCD is not successful as a NI under tropical soil conditions because its effectiveness vary based on soil type and N-source it is applied with, and the effectiveness is not consistent over temperature changes.

Key words: Intensively cultivated soil, Nitrification inhibitor, DCD, Potential nitrification rate, temperature

Financial support given by University research grant scheme of University of Peradeniya (Grant No.: URG/2016/10/Ag) is greatly acknowledged.