

# **Efficiency of Nitrification Inhibitors from Plants on Reducing Nitrous Oxide Emissions under Soil Incubation and Enhancing Maize (*Zea mays* L.) Growth, Yield and N Uptake in Pot Experiment**

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## **Abstract**

This study investigated the effects of nitrification inhibitors (NIs) from plants for retarding soil nitrogen (N) transformation to reduce greenhouse gas emissions and, subsequently, promote N fertilizer use by plant. Selected plants for this study included commercial neem [*Azadirachta indica*] oil, peppermint [*Mentha cordifolia*], sweet basil [*Ocimum basilicum*] and hoary basil [*Ocimum africanum*]. NIs from these plants were applied at a rate of 10% of fertilizer. Result from the incubation showed that application of N fertilizer with hoary basil tended to have the best efficiency in retarding nitrification process, compared with the application of N fertilizer only ( $p < 0.05$ ). This was due to retarding soil  $N_2O$  emission up to 21 days, and significantly reducing cumulative soil  $N_2O$  emission ( $P = 0.0084$ ) by 29.33% when compared to the treatment with only N fertilizer. Pot experiment was also conducted to study the NI efficiency on maize (Suwan 4452) growth and N use efficiency. The result showed that NIs tended to enhance maize growth, and seemed to increase maize yields (biomass and grain). N content and N uptake by maize in the treatment of urea fertilizer and hoary basil were significantly higher when compared to the urea treatment ( $P < 0.0001$ ), but no NI effect was found in maize yield. These findings support that NIs from plants can retard N transformation of fertilizer, which subsequently may reduce fertilizer losses and greenhouse gas emission, and increase plant N use efficiency and crop productivity.