THESIS TITLE A STUDY ON THE INFLUENCE OF NITRIFICATION INHIBITORS ON THE UPTAKE OF FERTILIZER NITROGEN BY RICE IN SANDY PADDY SOIL.

AUTHOR MR. CHATCHAI CHAICHUAY

THESIS ADVISORY COMMITTEE

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(ASSOCIATE PROFESSOR DR.WITTAYA MASAYNA)

.....Pongsiri Patcharapreecha.....

(ASSOCIATE PROFESSOR DR.PONGSIRI PATCHARAPREECHA)

.....Patcharee Saenjan.....

(ASSISTANT PROFESSOR DR.PATCHAREE SAENJAN)

ABSTRACT

This fertilizer experiment was carried out during June to December 1991 to study the effect of three inhibitors namely : Dicyandiamide; Thiourea, and Sulfathiazole on the uptake of nitrogen in rice grown on sandy paddy soil with the application of ^{15}N isotope technique. The rice variety was RD-6. The experiment was carried out under a supplementary irrigation system of a farmer's paddy area at Ban Non, Tambol Nonton, Amphur Muang, Changwat Khon Kaen, Thailand. The soil series was Roi-et. The design used was a randomized complete block with four replications. The treatments used were : (1) chemical fertilizer alone, (2) chemical fertilizer with Dicyandiamide, (3) chemical fertilizer with Thiourea and (4) chemical fertilizer with Sulfathiazole, each of the four treatments was applied with 4 kg

P_2O_5 and 2 kg K_2O per rai as basal fertilizers. The source of ^{15}N used was a 10.3 atom per cent urea isotope and the amount being used was 6 kg N/rai. This amount was applied twice i.e. 4 kg at the time after transplanting, and 2 kg at 42 days after transplanting. The ratio between nitrification inhibitor and nitrogen fertilizer was 1:10. The plant samples were taken three times throughout the experimental period i.e. during tillering stage (0-42 days after transplanting), panicle initiation stage (43-84 days after transplanting) and harvesting stage (85-126 days after transplanting). The plant samples were separated into shoot and root and they were oven dried at 72°C for three days. The plant samples were ground and analyzed for total nitrogen content and nitrogen derived from fertilizer (NdfF).

The results showed that total nitrogen contents in the plant tissues throughout the growing period were ranging from 9.27-12.93 kg N/rai. The amount of N uptake was highest the tillering stage followed by panicle initiation stage and the lowest was with the harvesting stage. The highest amount of N content in the plant tissues was with those applied with chemical fertilizer together with inhibitor Dicyandiamide followed by Thiourea and Sulfathiazole, respectively. This was found throughout the growing period. The lowest N content in the plant tissues was found with those applied with chemical fertilizer alone. This result was true with the case of ^{15}N content in the plant tissues. The amounts of nitrogen content in the plant tissues derived from fertilizer were ranging from 1.82-2.66 kg

N/rai (19.63-21.78%) and the amounts of nitrogen content in the plant tissues derived from soil were ranging from 7.45-10.27 kg N/rai (78.22-80.73%). The fertilizer nitrogen recovery percentages as a result of the addition of inhibitors were found to be 30.33, 36.67, 40.33, and 44.33 for the treatments chemical fertilizer alone, Sulfathiazole, Thiourea and Dicyandiamide, respectively. The production of grains of rice was highest with those applied with Dicyandiamide (520 kg/rai) followed by Thiourea (514 kg/rai) and Sulfathiazole (475 kg/rai) and the lowest was with those treated with chemical fertilizer alone (417 kg/rai).

To sum up, the results indicated that the rice plants were able to attain the highest amount of nitrogen content in the plant tissues resulted in the highest amount of both growth and grain yield by the application of Dicyandiamide followed by those applied with Thiourea and Sulfathiazole, respectively. Therefore, the application of Nitrification Inhibitors controlled nitrate formation by inhibiting nitrifiers activities so that nitrogen from soil and fertilizer can be maintained in the form of NH_4^+ for a longer period of time. The results implied that nitrifiers were not able to convert NH_4^+ to NO_3^-, hence, the rice plants were able to perform better growth and produced high seed grains.