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Preliminary investigation into paddy soil properties and rice growth after humic acid and gypsum applications

HARTINA^{1,2}, PHRUEKSA LAWONGSA^{2,1}, TIDARAT MONKHAM³, PATMA VITYAKON^{1,2},
TANABHAT-SAKORN SUKITPRAPANON^{1,2}

¹*Khon Kaen University, Dept. of Soil Science and Environment, Thailand*

²*Khon Kaen University, Soil Organic Matter Management Research Group, Thailand*

³*Khon Kaen University, Dept. of Agronomy, Thailand*

Abstract

Applying soil amendment can improve soil properties and plant growth in problematic soils in tropical regions. However, knowledge of the combined application effects of humic acid (HA) and flue gas desulfurization gypsum (FGD gypsum) on soil properties and plant growth in tropical regions is still limited. The objectives of this study were to preliminary investigate the effects of HA and FGD gypsum application on some soil properties and rice growth in tropical paddy soil which was classified to be Aeric Kandiaquult (Ultisol). The experiment was conducted using pot experiments and was arranged in a completely randomized design with four treatments and three replications. Four treatments consisted of (1) chemical fertiliser application based on farmer practice (CF), (2) CF and HA, (3) CF and FGD gypsum based on gypsum requirement, and (4) CF with combined application of HA and FGD gypsum. The HA and FGD gypsum were applied at 975 and 636 kg ha⁻¹, respectively. The preliminary result revealed that the application of HA not only increased soil pH (1:5), total organic carbon (TOC), total N, exchangeable K, available P, and cation exchange capacity (CEC) but also increased tiller numbers. The soil incorporated by FGD gypsum contained high concentrations of soil exchangeable Ca and S, but it provided lower tiller numbers. The co-applications of HA and FGD gypsum enhanced soil properties including TOC, total N, CEC, and exchangeable K, but it did not improve tiller numbers. Therefore, this preliminary study proposed that applying CF and HA is a suitable approach to improve soil quality and rice growth in the paddy soil.

Keywords: FGD gypsum, humic acid, rice cultivation, Thailand, tropical paddy soil