

PENGARUH APLIKASI DOSIS TINGGI JANGKA PANJANG PADA C-ORGANIK, NITROGEN, DAN PERTUMBUHAN PADI DI TSURUOKA, JEPANG

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INTISARI

Padi (*Oryza sativa* L.) merupakan salah satu tanaman paling penting di dunia dan sumber kalori bagi manusia khususnya di Asia. Aplikasi pupuk kandang peternakan pada padi adalah cara efektif dalam menjaga kesuburan tanah dan mengatasi limbah peternakan. Pupuk kandang dosis tinggi secara berkala ditanamkan pada lahan pertanian. Tujuan penelitian ini adalah menentukan pengaruh pupuk kandang dosis tinggi pada pertumbuhan dan hasil, dan perubahan karbon dan nitrogen tanah setelah aplikasi jangka panjang selama tiga belas tahun pada lahan padi di Yamagata, Jepang Utara. Terdapat tiga perlakuan, pupuk kandang dosis tinggi (HCM), pemupukan kimia sesuai rekomendasi (RCF), dan tanpa pupuk dasar (NBF), yang dilakukan di Universitas Yamagata sejak 2006. Pada musim panas, tahun ke-tiga belas, 2018, perubahan parameter diinvestigasi selama musim tanam, yakni pertumbuhan padi, komponen biomasa, serapan N, dan N anorganik, serta residu tanaman pada lapisan bajak. Hasil dan komponennya, C-Organik dan total Nitrogen diukur setelah pemanenan. Hasil penelitian menunjukkan, parameter pertumbuhan padi (tinggi tanaman dan warna daun), dan serapan N pada HCM secara signifikan lebih rendah daripada RCF, cenderung selama enam minggu pertama setelah transplanting, mengindikasikan bahwa HCM menekan pertumbuhan selama periode pertumbuhan awal padi. Terdapat tidak signifikan beda nyata pada hasil padi dan komponennya antara tiga perlakuan (termasuk NBF) saat panen, terindikasi kesuburan tanah dasar, tinggi pada lahan percobaan. Namun, dibanding dengan RCF, C-organik pada lapisan 0-25 meningkat 49,2% dan total Nitrogen meningkat 46,7% pada HCM. Aplikasi HCM selama tiga belas tahun secara signifikan meningkatkan persediaan C-organik dan total Nitrogen, namun tidak pada pertumbuhan dan hasil padi.

Kata kunci : padi, penyerapan C, mineralisasi N, aplikasi jangka Panjang

EFFECT OF LONG-TERM APPLICATION OF HIGH DOSE MANURE ON SOIL CARBON, NITROGEN AND RICE GROWTH IN TSURUOKA, JAPAN

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ABSTRACT

Rice (*Oryza sativa* L.) is one of the most important crops in the world and is the most important sources of calories for human especially in Asia, which accounts for 90 % of the total world rice production area. Livestock manure applying to rice paddy is an effective practice to maintain soil fertility and resolve the waste from livestock farming. High dose manure is frequently incorporated into agricultural lands in the area with high density livestock farming. The objective in this study was to determine the effect of high dose manure compost on rice growth and yield, and soil carbon and nitrogen changes after thirteen years long-term application in paddy rice field in Yamagata, northeast Japan. There are three treatments of high dose manure compost application (HCM), recommended chemical fertilization (RCF), and no basic fertilizer application (NBF), which were set on Takasaka University Farm, Yamagata University since 2006. On the 13th year in 2018 summer, the changes in rice growth parameters, biomass components, and N uptake, and inorganic N and plant residues in plowed soil layers were investigated during rice growth season. Rice yield and its components, and SOC and TN contents were measured after harvest. The results showed that rice growth parameters (plant height and leaf color (SPAD value), and N uptake of HCM treatments were significantly lower than those of RCF treatment in most case during first 6 weeks after rice transplanting, indicated that high dose manure compost application suppressed rice growth during early rice growth period. There was no significant difference of rice yield and its components among 3 treatments (including NBF) at harvest, indicated the basic soil fertility was high in this experimental field. However, compared to recommended chemical fertilization treatment, SOC in the total 0-25 cm layer increased by 49.2% and TN increased by 46.7% in high dose manure compost application treatment. Applying high doses manure for 13 years significantly improved SOC and TN stocks but no significant on rice growth and yield.

Keywords; manure, paddy rice, carbon sequestration, N mineralization, long-term application