

Effect of organic manure on growth and yield of green soybean

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Green soybean is a major crop in Tsuruoka city of Yamagata prefecture. Organic fertilizers produced in this region are used for improving growth and quality of the green soybean. Difference in the chemical properties of organic manures affects the nutrients provide to the plants. A field experiment was conducted to evaluate the crop growth and green soybean yield using several organic manures produced in this region. In addition, the relationship between nitrogen mineralization and chemical properties in the organic manures was investigated.

Materials and Methods: A) Field experimental site: The farm of Yamagata University, Crop: green soybean (Dadacha-mame). Treatments: cattle manure (CM), poultry manure (PM), soybean residual manure (SRM), organic mixed manure (including soybean meal, rice bran and rapeseed meal, OMM), carbonized sludge (CS), and Control (without manure). Application rate of organic manure: 100 kg matter ha⁻¹. Chemical fertilizer: ammonium sulfate labeled with 15N (2 kg N kg⁻¹. Measurement: 15N absorption and yield of green soybean at harvest. B) Incubation experiment: Treatment same as the field experiment Application rate of organic manure: 20g matter kg⁻¹soil. Conditions: 25t for 90 days. Measurements: KEON (extracted with 2M KCl), PEON (extracted with H₃P₀₄) and KSON (extracted with 0.5M H₂S₀₄) in organic manures, inorganic N in soil mixed with organic manures.

Results: 1) Yield of green soybean was 19.7% and 9.8% higher in PM and OMM than in control, respectively. 2) Recovery rate of 15N was higher in PM and OMM than in control. 3) In the incubation experiment, the amount of inorganic N in soil was significantly higher in PM and OMM than in the other treatments. 4) Positive relationships were observed between the amount of inorganic N in soil and KEON, PEON, KSON in manures, respectively.