



Carbon Sequestration and Nitrogen Mineralization in Soil Cooperated with Organic Composts and Bio-char During Corn (*Zea mays*) Cultivation

Joung-Du Shin (1), Sun-Il Lee (2), Wu-Gyun Park (3), Yong-Su Choi (4), Seong-Gil Hong (5), and Sang-Won Park (6)

(1) National Academy of Agricultural Science, Sewon, Republic Of Korea (jdshin1@korea.kr), (2) National Academy of Agricultural Science, Sewon, Republic Of Korea (silee83@rda.go.kr), (3) National Academy of Agricultural Science, Sewon, Republic Of Korea (park890@rda.go.kr), (4) National Academy of Agricultural Science, Sewon, Republic Of Korea (dydtn2515@naver.com), (5) National Academy of Agricultural Science, Sewon, Republic Of Korea (dewyhong@rda.go.kr), (6) Rural Development Administration, Sewon, Republic Of Korea (swpark@rda.go.kr)

Objectives of this study were to estimate the carbon sequestration and to evaluate nitrogen mineralization and nitrification in soils cooperated with organic composts and bio-char during corn cultivation. For the experiment, the soil used in this study was clay loam types, and application rates of chemical fertilizer and bio-char were recommended amount after soil test and 2 % to soil weight, respectively. The soil samples were periodically taken at every 15 day intervals during the experimental periods. The treatments were consisted of non-application, cow manure compost, pig manure compost, swine digestate from aerobic digestion system, their bio-char cooperation.

For the experimental results, residual amount of inorganic carbon was ranged from 51 to 208kg $10a^{-1}$ in soil only cooperated with different organic composts. However it was estimated to be highest at 208kg $10a^{-1}$ in the application plot of pig manure compost. In addition to bio-char application, it was ranged from 187.8 to 286kg $10a^{-1}$, but was greatest accumulated at 160.3kg $10a^{-1}$ in the application plot of cow manure compost. For nitrogen mineralization and nitrification rates, it was shown that there were generally low in the soil cooperated with bio-char compared to the only application plots of different organic composts except for 71 days after sowing. Also, they were observed to be highest in the application plot of swine digestate from aerobic digestion system.

For the loss of total inorganic carbon (TIC) by run-off water, it was ranged from 0.18 to 0.36 kg $10a^{-1}$ in the different treatment plots. Also, with application of bio-char, total nitrogen was estimated to be reduced at 0.42(15.1%) and 0.38(11.8%) kg $10a^{-1}$ in application plots of the pig manure compost and aerobic digestate, respectively.