RESEARCH ARTICLE

CARBON AND NITROGEN MINERALIZATION IN SOILS AMENDED WITH MANURES AND FERTILIZERS FROM NINETEEN YEARS: A LABORATORY INCUBATION STUDY

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Abstract: Long-term manure application can alter a soil's ability to sequester nutrients and mineralize C and N. However, knowledge about the decomposition and mineralization of C and N from long-term addition of organic materials in soils is lacking. Therefore, a laboratory incubation study was carried out to evaluate the C and N mineralization in a soil to which three organic manures (15 Mg FYM or 5 Mg poultry manure or 7.5 Mg pressmud per ha^{-1}) and chemical fertilizers were applied alone or in combination. The results revealed that C mineralization rate was found to be increased with application of organic manures and amount of CO_2 evolved was further increased when organic manures were applied in combination with chemical fertilizers. Application of FYM, poultry manure and pressmud along with recommended dose of N and half of P increased the amount of CO_2 evolved by 18.1, 1.7 and 14.0 %, respectively, over application of recommended dose of N and P fertilizers. After 60 days of incubation, the highest (1868.0 mg kg^{-1}) and lowest (1055.4 mg kg^{-1}) amount of CO_2 was evolved in treatment $FYM_{15}N_{150}$ and $N_{75}P_{30}$, respectively. Among the organic manures, amount of CO_2 released followed the order: FYM>pressmud>poultry manure. Carbon mineralization increased with the progress of incubation and rate of increase was higher at initial stages and decreased gradually. Application of FYM_{15}, poultry $manure_5$, $pressmud_{7.5}$ along with recommended dose of N and half of recommended P increased nitrogen mineralization potential by 2.08, 3.22 and 12.69 % over application of recommended dose of NP fertilizers, respectively. Among the organic manures, higher N mineralization potential was observed with application of pressmud as compared to FYM or poultry manure. Application of FYM and poultry manure alone reported lower N mineralization potential as compared to recommended dose of N and P fertilizers.

Keywords: Organic manures, Fertilizers, N mineralization, CO_2 evolution

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