INFLUENCE OF LAND USE ON CARBON SEQUESTRATION AND CARBON DIOXIDE EMISSION UNDER A HUMID AGRO-ECOSYSTEM

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ABSTRACT

The study determined the emission of CO_2 from four agricultural land use types; namely, cultivated, fallow, secondary forest and control sites and the flux in CO_2 emission with the alteration in land use practice. This was with a view to estimate the effects of management of C sequestration

The study was carried out between July to December, 2004 at the Soil Science Unit of the Obafemi Awolowo University Teaching and Research Farm, Ile-Ife. A static chamber method was used to measure CO_2 flux. The soil moisture content, pH, temperature and the organic matter contents at each point of sampling were also determined. This was repeated at 2-weekly interva1s. The data were analysed using descriptive and inferential statistics.

The results show that the average CO_2 emission was highest on cultivated land (60 mg C $m^{-2}h^{-1}$) followed by fallow (40 mg C $m^{-2}h^{-1}$) lastly by forest (32 mg C $m^{-2}h^{-1}$). This implied that the forest had the greatest capacity to sequestrate CO2. This is responsible for the highest content of soil organic matter under forest (1.88%) followed by fallow (1.21%) and then cultivated (0.44%). Temperature ($r = 0.43$, $p < 0.05$) and moisture content ($r = 0.36$, $p < 0.05$) were significantly positively correlated with CO_2 evolution. Increase in both soil moisture and temperature were found to responsible for the increase CO_2 emissions observed. Furthermore, increased soil bacteria population was found to be directly related to the increased CO_2 emission obtained from the cultivated soil. Hence, forest and fallow soils were found to have the highest potential to serve as sinks for CO_2, thus help reducing CO_2 concentrations in the atmosphere. The soil pH apparently had no effect CO_2 emission.

In conclusion, the forest had the greatest capacity to sequester CO_2 followed by fallow and lastly cultivated land While the conversion of fallow land to arable increased soil CO_2 evolution.