SUSTAINABLE MANAGEMENT OF AGRICULTURAL LAND-USES TOWARDS LOCAL AND GLOBAL BENEFITS

Gnanavelrajah, N

Department of Agricultural Chemistry, Faculty of Agriculture, University of Jaffna, Sri Lanka

ABSTRACT

Unsustainable agricultural practices such as cultivation of steep slopes, overgrazing and intensive cultivation without proper soil conservation measures have resulted in loss of biomass and increased carbon dioxide emissions, land degradation, and loss of biodiversity. Agricultural activities are one of the major sources of carbon emission to the atmosphere and C released from biomass burning and soil are principal source of CO_2 emissions during past.

It has been established that sustainability of agricultural land use requires five strong pillars namely; productivity, security, protection, viability and acceptability of the same. Productivity of land depends or linked to land suitability which ultimately depends on different land quality parameters. Security linked to management methods that adopted to secure production. Protection consists of conservation of natural recourses mainly soil and water. Viability is related to economics of production. Acceptability is related to socioeconomic factors. However, climatic conditions should be favourable for a land use to be sustainable. Appropriate soil organic matter management could strengthen the five pillars of sustainability as well as reducing the global climate change by enhancing carbon sequestration. Soil C pools increase productivity of soils by lessening the constraints of nutrient availability, water availability, toxicity and erosion. Nutrient availability is increased through decomposition of organic matter and increased cation exchange capacity of soils. Water availability is increased by organic matter through improved soil structure and water holding capacity. Further, improved soil structure by organic matter also enhances root penetration, aeration and drainage. In addition to reducing toxicity, it also helps the buffering against acidity or alkalinity. Biodiversity maintenance must be integrated with agricultural practices using a strategy that can have multiple ecological and socioeconomic benefits, particularly to ensure food security. Loss of diversity also reduces the resources available for future adaptation. History has shown serious economic losses and suffering from

relying on mono-cultural uniform varieties. As forms of biodiversity are eroded, food security can also be reduced and economic risks are increased. Evidence indicates that such changes can decrease sustainability and productivity in farming systems.

This paper discusses the importance of soil organic matter management in agricultural land uses and its links to sustainability pillars and climate change mitigation. Role of organic matter on land degradation control, water quality, the positive link between soil organic matter, biodiversity and climate change mitigation is also discussed. Usage and importance of geographic information system database for sustainability evaluation is also discussed.