Test Planting of Leguminous Crops as Green Manure for Carbon Sequestration: Case Study at Tigray Region in Northern Ethiopia

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Abstract

In the developing countries, agriculture is an important industry that provides many people their livelihood. However agriculture is potentially a major source of greenhouse gases (GHG) emissions. In addition, development of new farmland following deforestation, is pointed out as a cause of increased GHG emissions from agriculture. Northern Ethiopia has farmland developed after deforestation, with hilly terrain and small farms (generally less than 1 ha) being common. Introduction of Green Manure (GM) crops for improving soil productivity and carbon sequestration is being promoted in this region. To evaluate this practice locally, test plantings of legume crops using six species and replicated at 3 sites in the Tigray region were carried out during the rainy seasons in 2013 and 2014. Results showed that Faba bean (*Vicia faba*), Lupin (*Lupinus* sp.) and Vetch (*Vicia villosa*) generated dry matter 21.74 Mg ha^{-1}, 11.51 Mg ha^{-1}, and 11.40 Mg ha^{-1}. Those were more than the other trialed species. Faba bean is widely cultivated as edible species in the area. From the standpoint of introducing GM to farmers, Faba bean has an advantage because it is common species, but farmers will be tempted to harvest it rather than incorporate it into the soil. Lupin is also an edible species and could be utilized as a GM during the dry season in parts of this region. Vetch is most suitable as a dedicated GM crop because of its biomass and longer growth period.

Keywords: Hillside farming, Leguminous green manure crops, Soil carbon, Productivity, Ethiopia