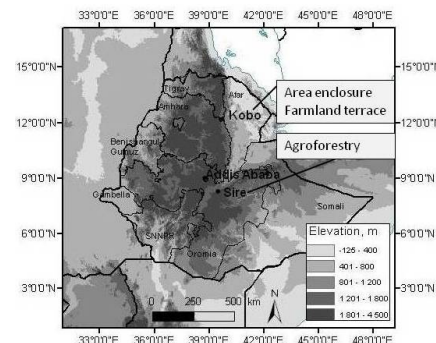


Carbon sequestration by climate smart agriculture in Ethiopia

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Introduction

Climate smart agriculture (CSA) contributes to agricultural production, resilience to climate change and climate change mitigation. The aim of this study was to empirically quantify the soil organic carbon (SOC) sequestration and thus carbon trading potential of agroforestry, area enclosure and farmland terrace in Ethiopia.

Materials and methods

Soil was sampled at plot pairs of traditionally managed field and a field managed by a CSA practice of various ages (Fig.1). Each field plot was divided in three sub-plots for sampling C concentration and bulk density from 0-15 cm. The means of the sub-plots were used to quantify the C stock in each field.

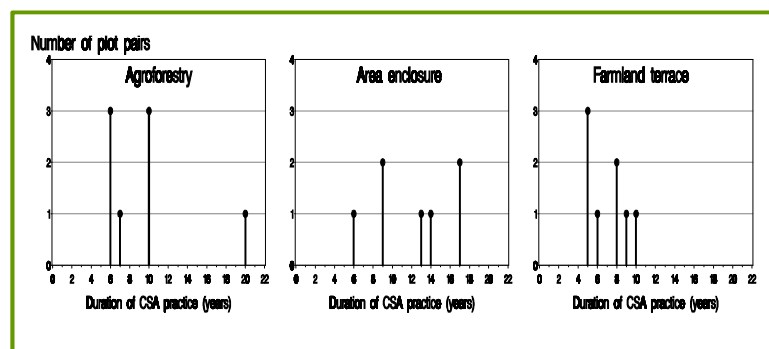
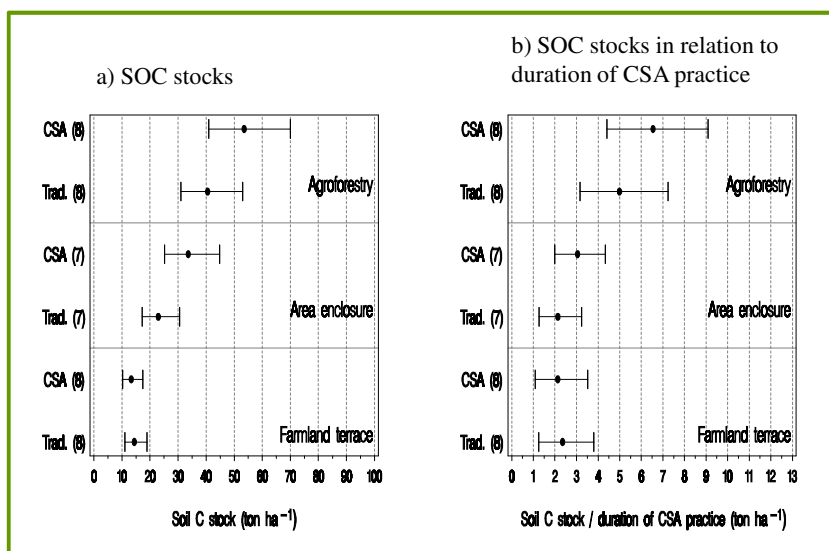


Fig.1. Frequency distributions for duration of various CSA practices

Results

Compared with traditionally managed plots agroforestry resulted in a change of +13 ton ha⁻¹ (p=0.09), area enclosure +11 ton ha⁻¹ (p=0.03) and farmland terrace -1 ton ha⁻¹ (p=0.61) in average SOC stock (Fig. 2a.). The annual changes in SOC stock were +1.6 (p<0.005), +0.9 (p=0.02) and -0.2 (p=0.74) ton ha⁻¹ for agroforestry, area enclosure and farmland terrace, respectively (Fig. 2b).



Conclusions

Agroforestry and area enclosure increased average soil C sequestration compared to traditionally managed fields considerably whereas the effect of farmland terrace was negligible. The results were similar for the average annual changes despite the differences in durations of the CSA practices.

Fig.2. Results for climate smart agriculture practices and traditionally managed practices as averages with 95% confidence intervals. The number of observations in parentheses.