Agricultural land-use activities are the leading sources of GHG (greenhouse gas) emissions in Kenya. However, few studies have examined GHG emissions resulting from different soil fertility management practices in small-scale African agricultural systems. The objective of the study was to quantify on-farm GHG emissions under different maize cropping practices in Tharaka-Nithi County, Kenya. The static chamber technique following a randomized rotational commencement pattern between farms and plots during GHG sampling events was used. Annual grain yield was determined from net plots and reported at 12.5 % moisture content. During analysis, analysis of variance (ANOVA) followed by LSD (Least Significant Difference) tests were used to assess treatment effects on grain yield, nitrogen use efficiency, area-scaled, and yield-scaled GHG emissions using GenStat and R procedures ('agricolae' package). The results showed that maize yield was not statistically different between fertilizer and fertilizer+manure treatments. The highest GNU (Grain nitrogen uptake) values were recorded in the fertilizer treatment, followed by fertilizer + manure, sole manure, and the control, which recorded the least GNU. The greatest GHG sinks were observed in sole manure, followed by fertilizer+manure, fertilizer, while the control treatment recorded the least GHG sinks. Additionally, the highest grain yields were obtained in the fertilizer treatment, followed by fertilizer+manure, and sole manure, while the control recorded the least yield. The study concluded that organic manure integration contributed significantly to improved soil fertility and GHG sequestration benefits without compromising maize yields.