From the Field to the Community: Estimating N Gas Emissions on a Village Scale

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Improvements in food security in sub-Saharan Africa are needed urgently. As we look to intensify agriculture in Africa, we must be aware of the full impact of the promoted methods on climate change. This study examines what actual emission changes might look like when a method of intensification is adopted in a community. The rate of emissions of N_2O and NO, a greenhouse gas and a smog precursor, respectively, per amount of mineral fertilizer applied to a crop of maize was determined in the field with experimental plots. The emissions rate was combined with farmers' self-reported fertilizer use in Sauri, Kenya in the first and fifth year of their participation in the Millennium Villages Project. A key project intervention was provision of subsidized fertilizer in the first, second and third years and training famers in its application. Together these data provide an estimate of community-level N gas emissions and emissions per unit food produced, as well as show the impact on emissions of an intensification campaign. The data show a 343% increase in fertilizer application between the first survey and the last. There was an 8% increase in mean N_2O emissions per ha and a 23% increase in mean NO emissions per ha over this time. However, the data also show a 15% decrease in N_2O and a 1% decrease in NO emissions per kilogram of food produced. Although emissions have increased overall through increased fertilizer use, food production has outpaced this increase. This indicates that adoption of mineral fertilizer application at levels currently seen may be an efficient method of crop intensification in terms of global warming potential.