



Combining mineral fertilizers with compost for sustainable maize production and reduction of greenhouse gas

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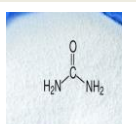
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Introduction



- Increasing crop production without harming the global environment is a major challenge for agricultural sectors in the world

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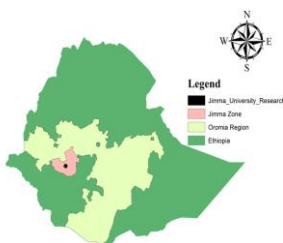
- The combined application of organic and mineral fertilizers has been as a tool for sustainable crop production and mitigating GHGs emissions
- However, interactive effects of fertilizers applied in different ratios on soil GHGs emissions are site specific

Objective

- The current study aimed to analyze and identify the appropriate combinations of organic and mineral fertilizers which increase maize yield, and mitigate GHGs

Materials and Methods

Treatments: Cont: no input; 100 min: 100% mineral fertilizer, 80 min: 80% mineral fertilizer + 1.4 t ha⁻¹ compost; 60 min: 60% mineral fertilizer + 2.8 t ha⁻¹ compost; 50 min: 50% mineral fertilizer + 3.5 t ha⁻¹ compost; 30 min: 30% mineral fertilizer + 4.9 t ha⁻¹ compost, and 100 comp: 100% compost



- Field experiment carried out for two growing seasons in Ethiopia



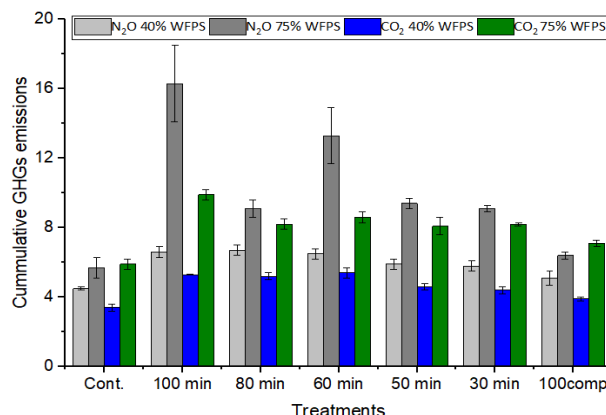
- Lab incubation experiment to measure GHGs at the University of Rostock

- Tow moisture levels were used (40 & 75% WFPS)

Results

Treatments	1 st year	2 nd year	Average yield
	yield		
Mg ha ⁻¹			
Cont.	8.5	7.5	8.0
100 min	9.0	7.6	8.3
80 min	9.0	8.1	8.6
60 min	10.4	9.2	9.8
50 min	10.1	8.6	9.2
30 min	9.1	9.2	9.3
100 comp	9.5	7.6	8.5

- The average maize yield, was significantly ($p < 0.05$) increased by about **12 to 18%** in combined fertilizer compared to mineral fertilizer application alone



The combined fertilizer applications reduced;

- N₂O emission from 22 to 80% and
- CO₂ emission from 16 to 22% compared to the sole mineral fertilizer in wet Nitisol

Conclusions

- The combined application of 30–50 kg N ha⁻¹ of mineral fertilizer and 3.5–4.9 t ha⁻¹ of compost significantly increased maize yields and mitigate GHGs emissions than mineral fertilizer at 100 kg N ha⁻¹ alone