

# Productivity and Growth in Organic Value Chains (ProGrOV)

## LEGUME INTEGRATION AND APPLICATION OF ORGANIC AMENDMENTS ENHANCES MAIZE AND TOMATO PERFORMANCE

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### Introduction

Maize and tomatoes are important food security crops grown by majority of smallholder farmers in Kenya. However, their production is constrained by declining soil fertility, pests and diseases and adverse effects of climate.

Continuous mono-cropping, as widely practised without application of organic amendments, results in mining of nutrients, depletion of soil organic matter, and declining crop yields. This study was done to determine the effect of cropping systems and organic inputs on soil nutrient dynamics and maize and tomato yields in central Kenya.

### Study approach

Field studies were conducted to examine the effect of maize and tomatoes mono-crops, maize and tomatoes intercropped with chickpea on soil nitrogen, phosphorus and carbon. Farm yard manure (FYM) at 10ton ha<sup>-1</sup> and Minjingu rock phosphate (MRP) at 490kg ha<sup>-1</sup> were applied.



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## Results

### Yields:

- Integrating chickpea with application of farm yard manure led to a 103% increase in maize yields. Additionally, the farmer would harvest two crops from the same piece of land.
- In the case of tomatoes, application of farm yard manure over four seasons increased tomato yield by 84%.
- Whereas application of farm yard manure with chickpea integration doubled the tomato yields.

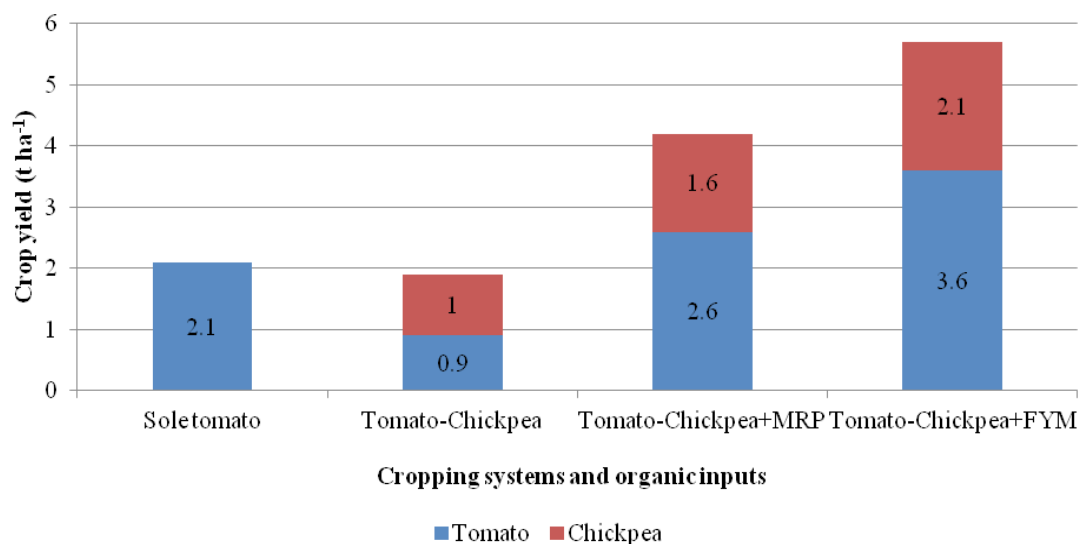
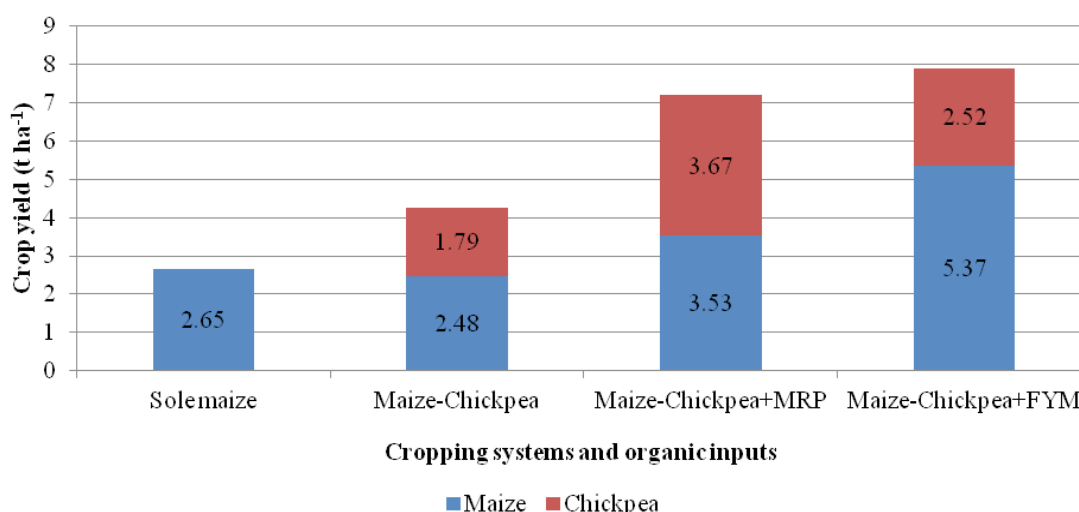


Figure 1a & 1b: Effect of organic inputs and integration of legumes on crop yields

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## Quality attributes:

- Application of FYM increased N by 30% in maize grains.
- With chickpea integration, there was a 44% increase in N content due to nitrogen fixed through BNF. Ploughing of residues from the previous season also contributed to the increased levels of N.
- Phosphorus grain content showed a similar trend to that of N, whereby chickpea integration increased P by 58% in the tomato (Figure 2).

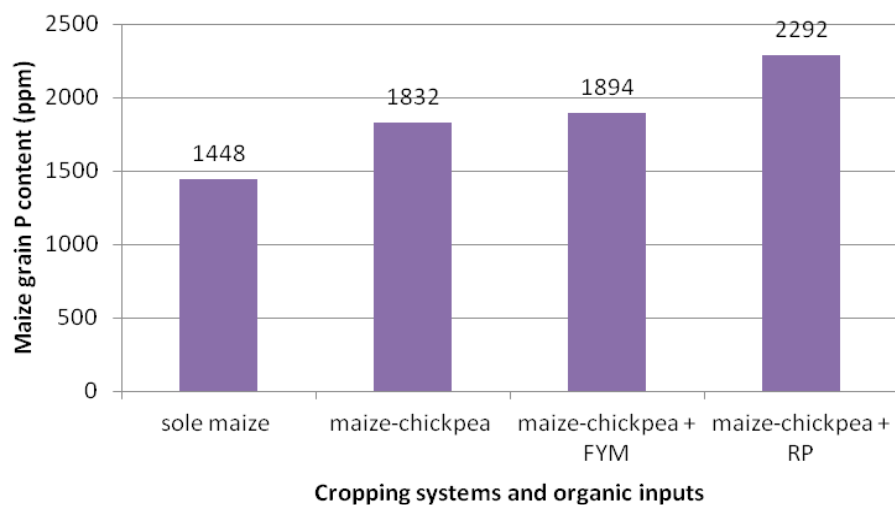
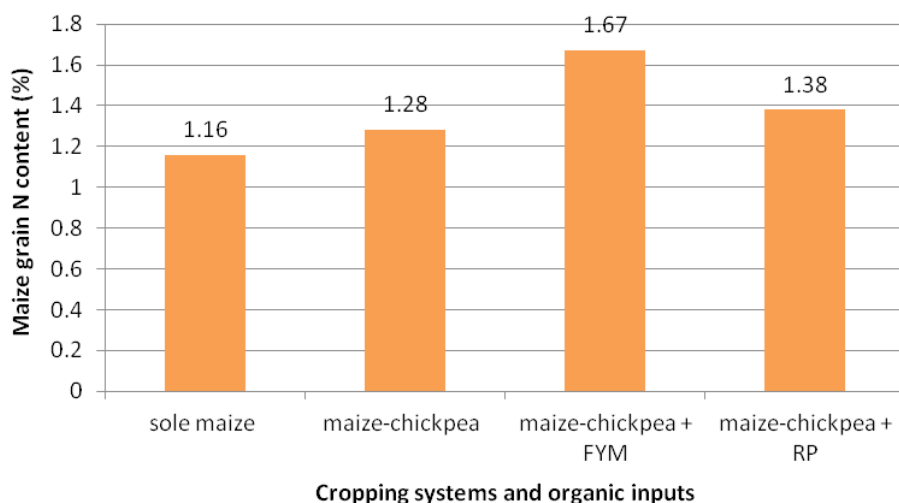


Figure 2a & 2b : Effect of organic inputs and integration of legumes on maize N and P content- supporting literature on the increase of Nutrient content



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## Conclusions/Recommendations

- Application of FYM and MRP and integration of chickpea over growing seasons doubles maize and tomato yields- make specific recommendations based on this study.
- Chickpea integration and application of FYM and MRP increases N and P values of maize grain make specific recommendations based on this study.
- FYM and MRP application and legume integration in cropping systems improves soil fertility resulting in improved maize and tomato productivity make specific recommendations based on this study.



### Partners

Makerere University, Uganda  
University of Nairobi, Kenya  
Sokoine University of Agriculture, Tanzania  
Aarhus University, Denmark  
University of Copenhagen,  
Denmark  
International Centre for Research in Organic Food Systems  
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### Associated partners

National Organic Movement of Uganda (NOGAMU)  
Kenya Organic Agriculture  
Network (KOAN)  
Tanzania Organic Agriculture Movement (TOAM)Project

### Duration

January 2011-December 2016

### Further reading:

The project 'Productivity and Growth in Organic Value Chains (ProGrOV)' is funded by the Danish Ministry of Foreign Affairs.

### For more information visit:

<http://icrofs.dk/en/research/international-research/progroov/>

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