

# Nitrified Urine Fertilizer: A Transdisciplinary Approach to Solutions-Oriented Community Development

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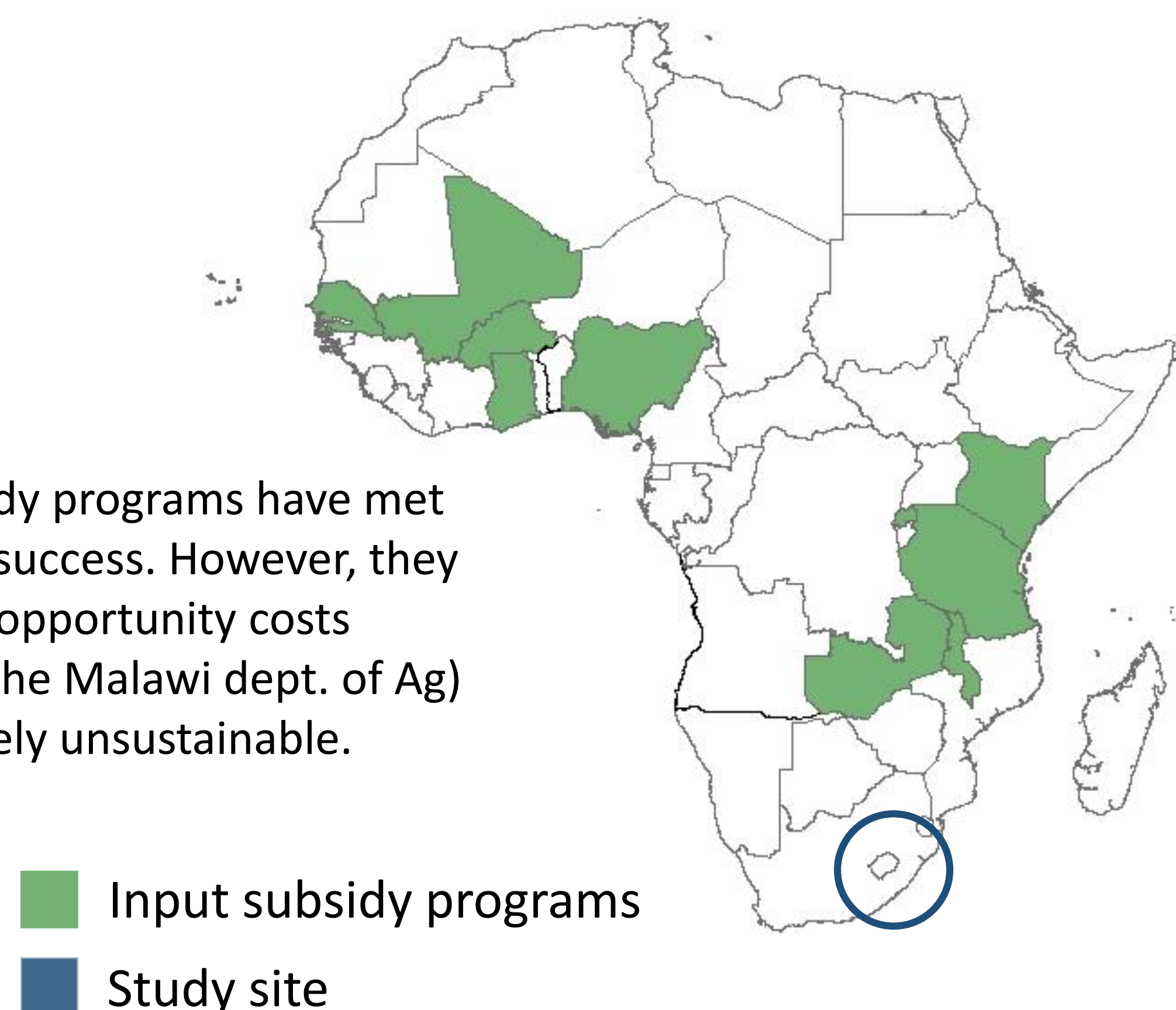
## Food System Relevance

Poor soil fertility is a leading biophysical cause of food insecurity in Africa. This research is focused on assessing the biophysical and social implications of utilizing nitrified urine as a sustainable fertilizer source to ameliorate this development challenge.

Can innovative sanitation technologies play a role in providing alternatives to chemical fertilizer inputs in order to improve soil fertility in Africa?

**Existing Solution:**  
Fertilizer input subsidy programs are employed extensively across Africa to combat food insecurity.

NUFSOC builds on VUNA, a recently completed research project that sought to “develop a new and improved sanitation system that allows for nutrient recovery from urine in order to promote sanitation.” A key product of this research was the successful development of Nitrified Urine Fertilizer (NUF). The final product differs from raw urine in three critical aspects:



- Nitrogen stable
- Hygienically Safe
- Reduced Pharmaceuticals

Ion	Concentration
Nitrogen (N)	50 g/L
Phosphorus (P)	2.1 g/L
Potassium (K)	15 g/L
Sulphur (S)	1.6 g/L
Calcium (Ca)	0.4 g/L
Sodium (Na)	25 g/L
pH	3.7

Input subsidy programs have met with some success. However, they incur large opportunity costs (54.4% of the Malawi dept. of Ag) and are likely unsustainable.

<https://www.eawag.ch/en/department/eng/projects/vuna/>

## Results

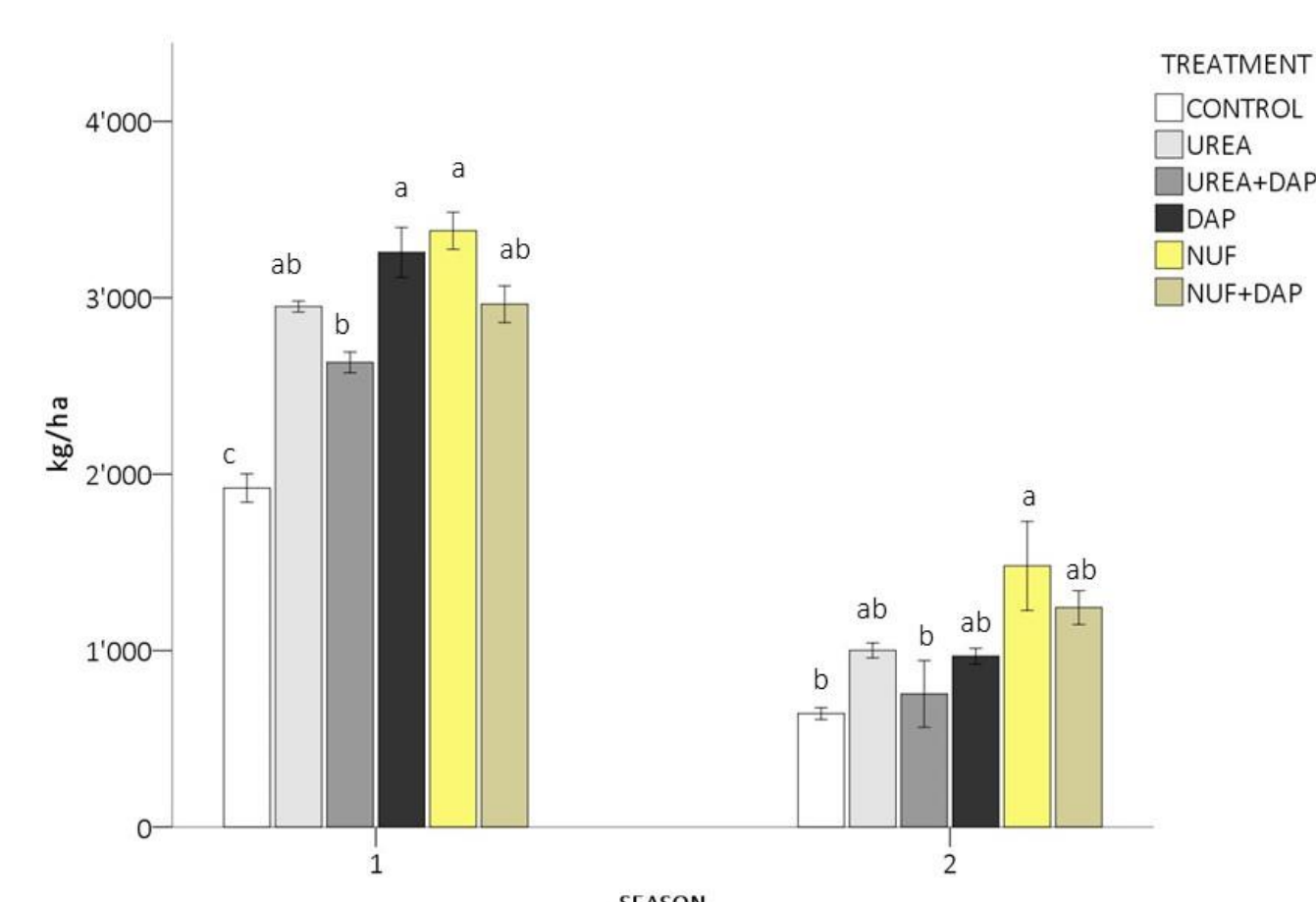
### Biophysical Research

Objective: to assess the field-scale performance of NUF

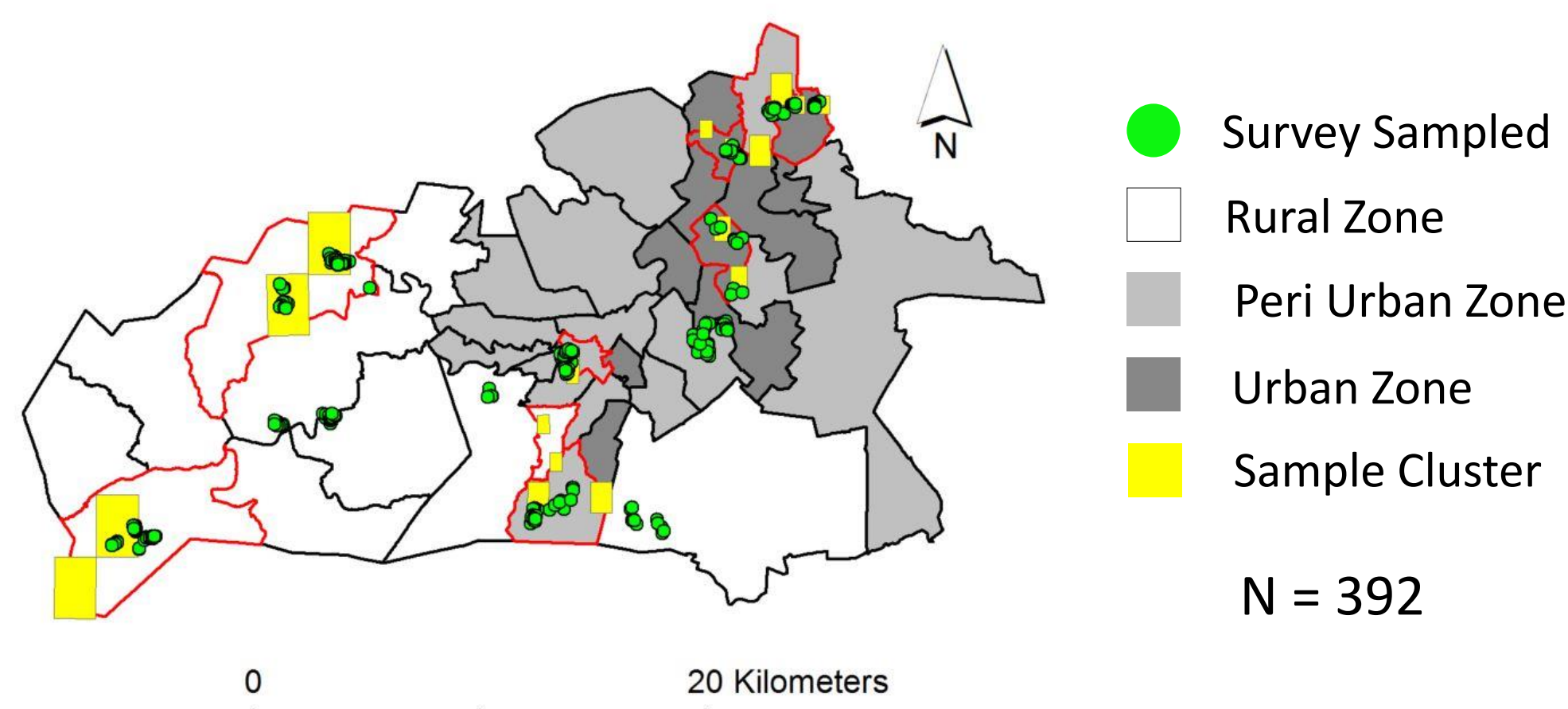
### Social Research

Objective: to assess consumer attitudes towards food grown with recycled nutrients

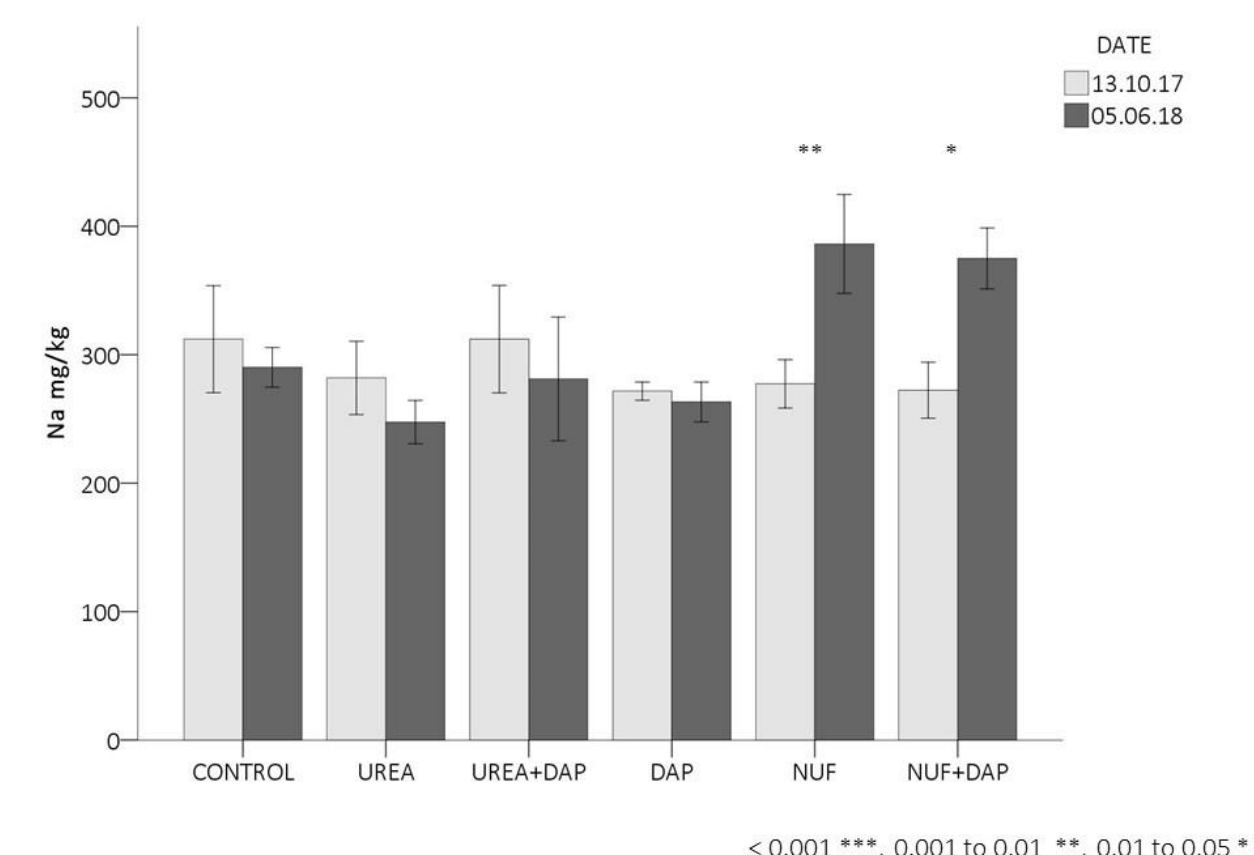
#### Maize Yield



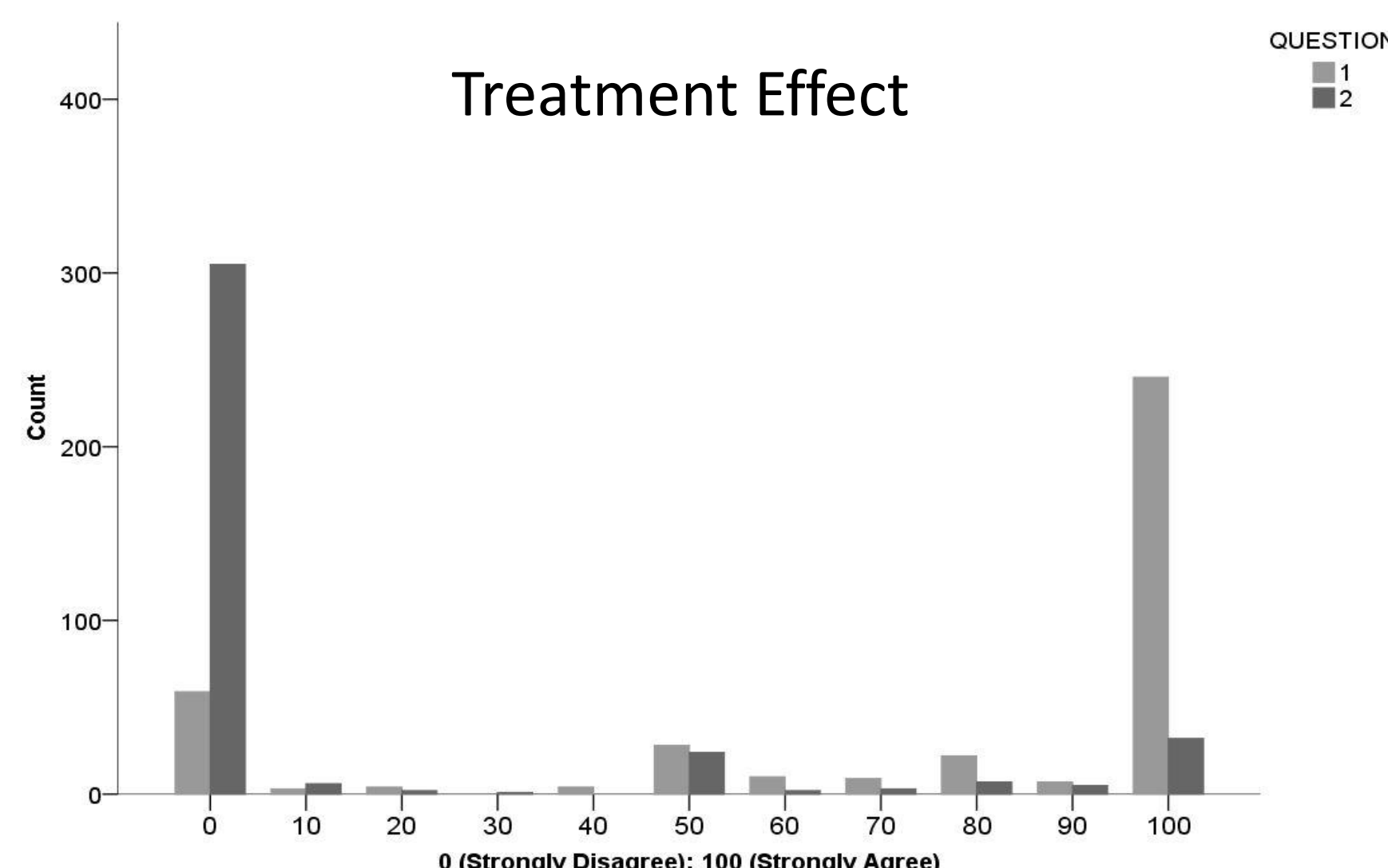
#### Msunduzi Municipality



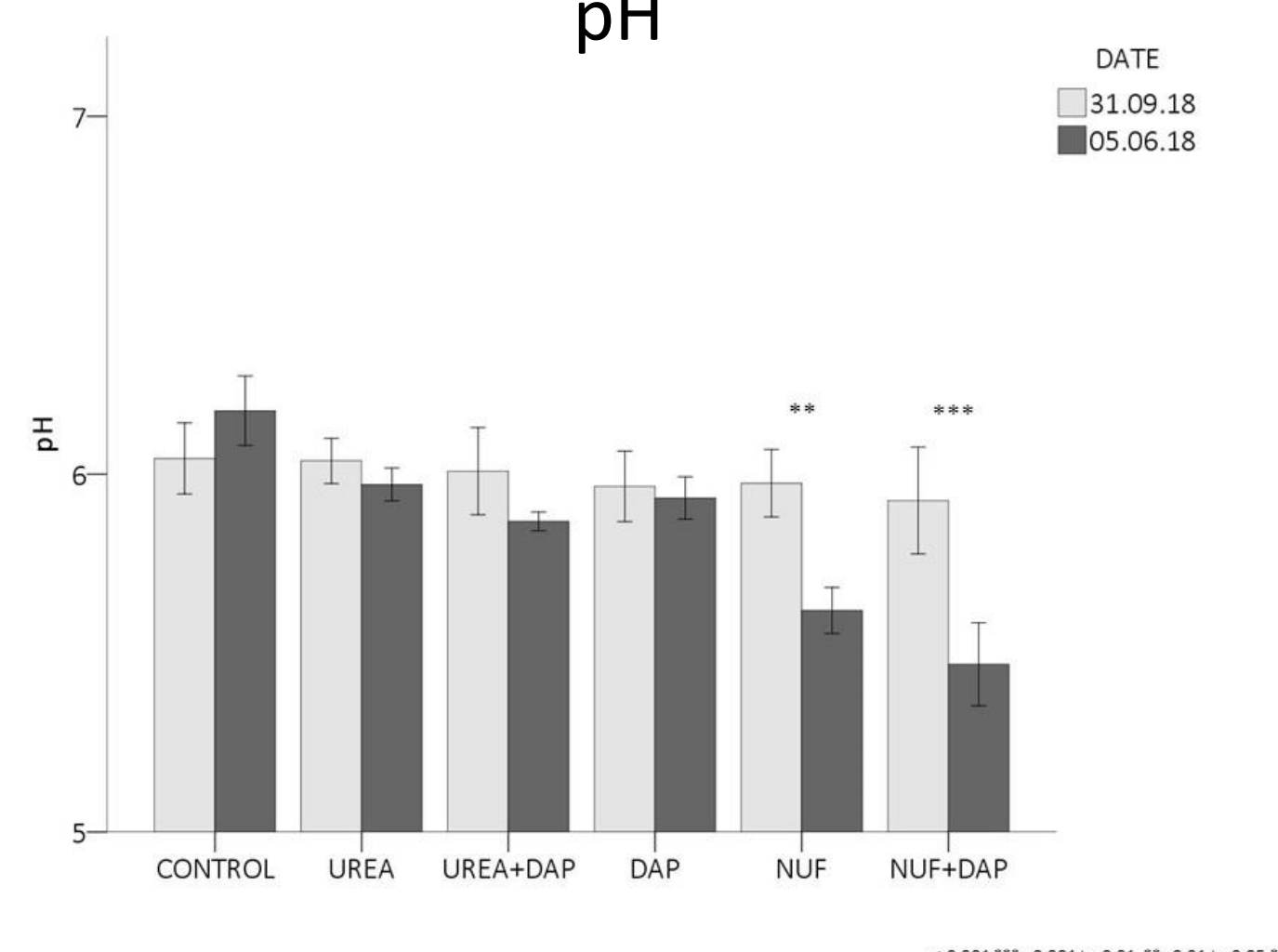
#### Sodium



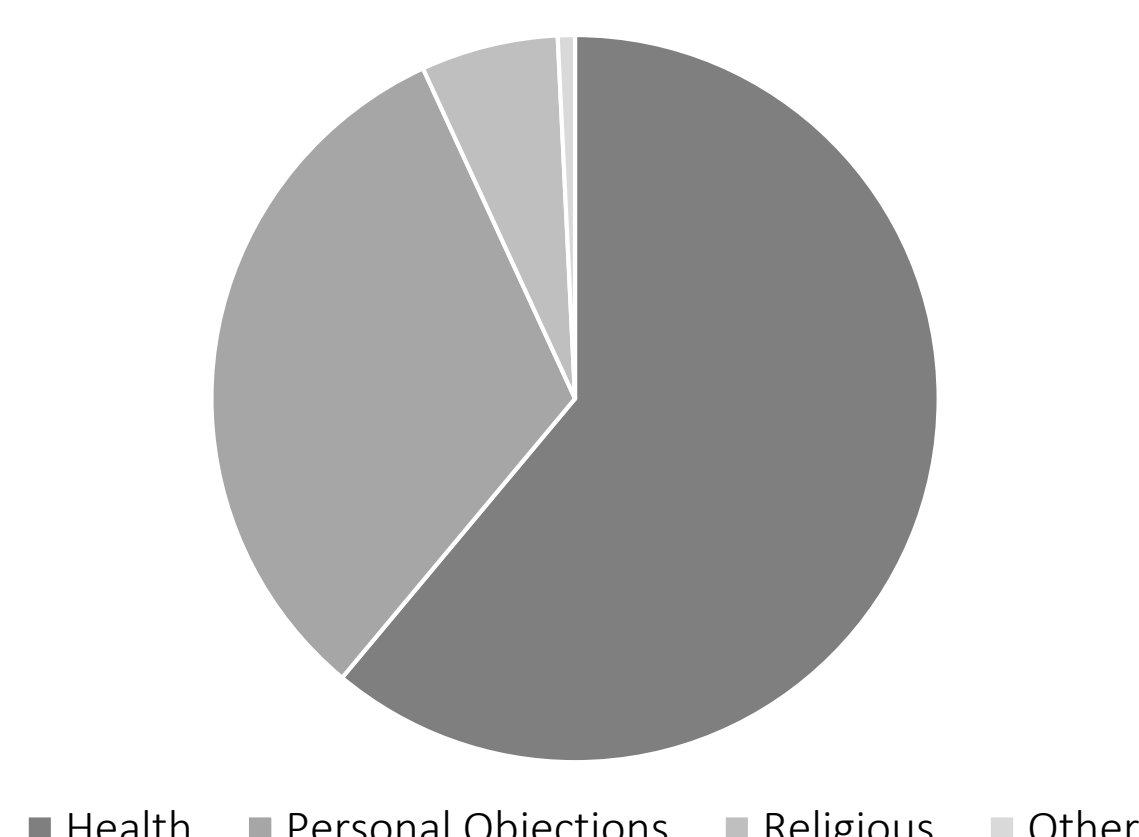
#### Treatment Effect



#### pH



#### SOURCES OF CONTINUED CONCERN



## Conclusions



- NUF improved maize yields by 76 % (S1) and 130 % (S2) compared to the unfertilized control. In addition, NUF performed as well as the chemical fertilizers utilized in this trial, demonstrating the potential of NUF to serve as a replacement to imported chemical fertilizers.
- Sodium accumulation and a reduction in pH were associated with the NUF fertilized plots, indicating that long term application of NUF could have negative consequences for soil health.
- The treatment of raw urine into NUF dramatically improved attitudes towards the use of recycled nutrients, indicating that recycled nutrients are looked upon more favorably than raw waste within Msunduzi.
- Continued concern about adverse health effects was the major reason cited by respondents who did not express a change in attitude due to the treatment process.