HOCHSCHULE OSNABRÜCK

UNIVERSITY OF APPLIED SCIENCES

THE EFFECT OF THE SLURRY ADDITIVE NH3RELIEF COMPARED WITH SULFURIC ACID ON THE NITROGEN UPTAKE OF WINTER WHEAT

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Introduction

To prevent **eutrophication of semi-natural ecosystems**, **indirect N_2O emissions**, **particulate matter formation** and **soil acidification** the agricultural NH_3 emissions have to be reduced [1][2][3].

By reducing NH_3 emissions, the N fertilizing effect and N use efficiency of the slurry is also improved.

The product **NH3relief** is an NH_3 sorbent based on **carboxylic acid derivatives**.
In a field experiment, this sorbent was used as a slurry additive to improve the N fertilization effect of the treated slurry and compared with the effect of sulfuric acid.

Material and Methods

In the field experiment, winter wheat was fertilized two times using fattening pig slurry with a trailing hose system. The additives were added to the slurry before application.

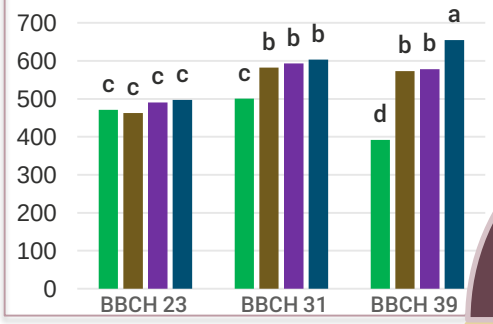
The following treatments were established::

1. **Control without fertilizer,**
2. **Slurry without addition,**
3. **Slurry + NH3relief (24 l/m³) and**
4. **Slurry + sulfuric acid (6 l/m³, pH 5,2).**

At three development stages (BBCH 23, BBCH 31 and BBCH 39) measurements with a **YARA N-Tester** were made, plant samples were taken and **N contents** of the plant samples were determined. At the final harvest, both the **yield** was measured **and** the **N content of the grain** was determined.

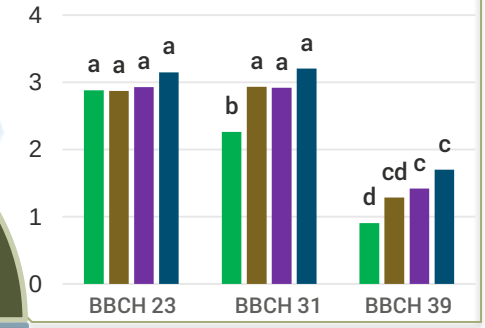
YARA N-Tester value

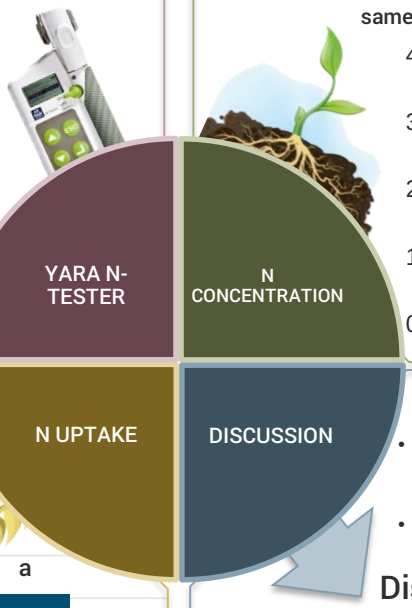
at three development stages, n = 4,
same letters -> no significant differences (p < 0,05)



N content (%, dry weight)

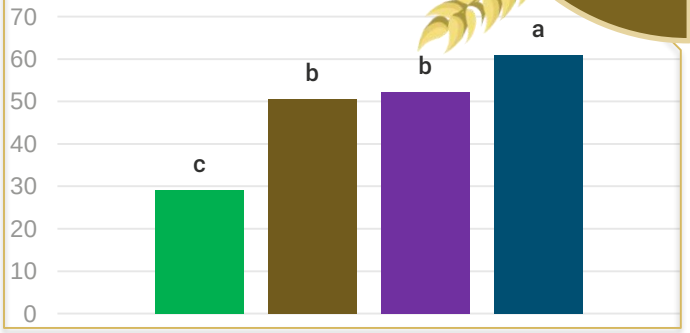
whole plant, at three development stages, n = 4,
same letters -> no significant differences (p < 0,05)





N removal (kg/ha, dry weight)

yield * N content of corn, n = 4, same letters
-> no significant differences (p < 0,05)



Results

- **significant higher YARA N-Tester value** at BBCH 39, higher N content at all three development stages
- and significant **higher N removal** for treatment of **slurry + sulfuric acid**

Discussion

- **Lower NH_3 emissions** and therefore a **higher supply of NH_4^+** due to the use of the sulfuric acid and the effective acidification of the slurry.

or

- **Reduced N availability** of the **slurry + NH3relief**, because the NH_4^+ is **bound to the carboxylic acid derivatives** and thus **not directly available** to plants.
- Further research on availability of N bound to carboxylic acid derivates necessary

More information on our homepage (https://www.hs-osnabrueck.de/de/ammonmind)

REFERENCES
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[2] Mosier, A. R. (2001): Exchange of gaseous nitrogen compounds between agricultural systems and the atmosphere. Plant and Soil 228.1.
[3] Spirig C. and Neftel, A. (2006): Ammoniakemissionen aus der Landwirtschaft und Feinstaub. Agrarforschung Schweiz 13 (9), 392–397.

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