EMEP Guidebook

„Statement about the proposed synth fert. EF´s from the applied research perspective“

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Outline

- Statement November 2018
- Brief analysis of data set
- Conclusions & Statement

Statement submitted in November 2018

1. In our NIFLUM workshop in Berlin (funded by UBA, Germany) with more than 30 experts, we found that the methods for determining the ammonia flux from agricultural soils require thorough examination and that new methods may need to be developed. Therefore the repeated revision of the methods for the calculation of ammonia emissions is questionable.

2. If I understood correctly, emission data from grassland and arable land have been aggregated into a single statistical population. In my opinion, this is not permissible, as grassland emissions are considerably higher (the reasons for this are described in detail in the literature).

3. In addition, emission data obtained under conditions not usual in practice were used. These data should be identified and eliminated.

4. I cannot ascertain whether and how many recent publications have been used to calculate the new E-factors. Transparency is lacking here. The literature research I conducted in 2017 resulted in only a limited number of recent publications. Based on these, I could not see that the E-factors should be corrected upwards. Rather the opposite is the case.

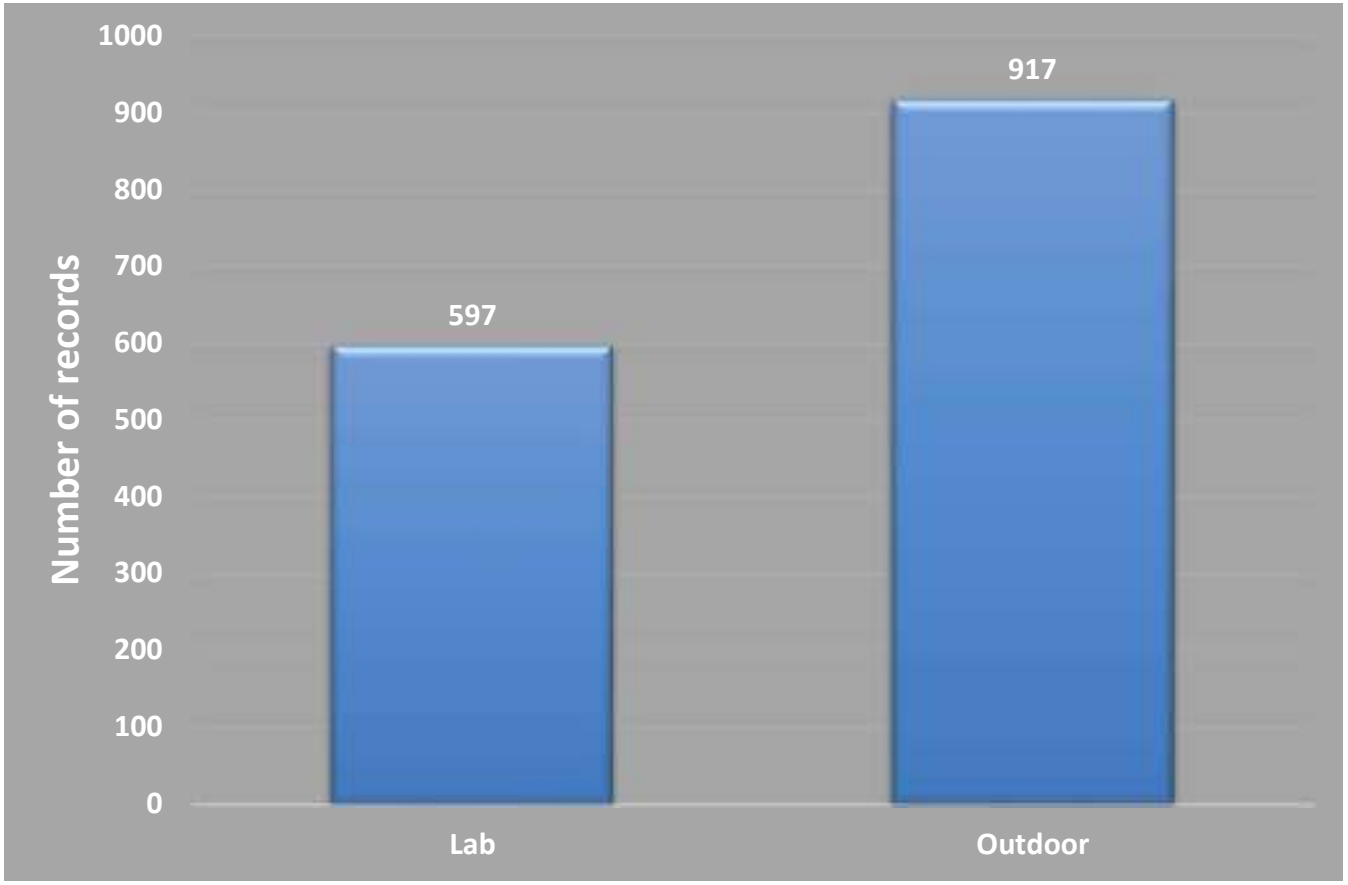
5. The meta-analysis by Pan et al. 2016 comes to an average emission from urea for Europe of 10 - 13 %, although also the warmer climate data flowed into the statistical population. It is therefore not understandable why higher emissions for temperate zones are now reported in the Guidebook.

In conclusion, I therefore propose that the emission factors in the 2016 Guidebook should be left as they are, since the values indicated there already tend to be too high.

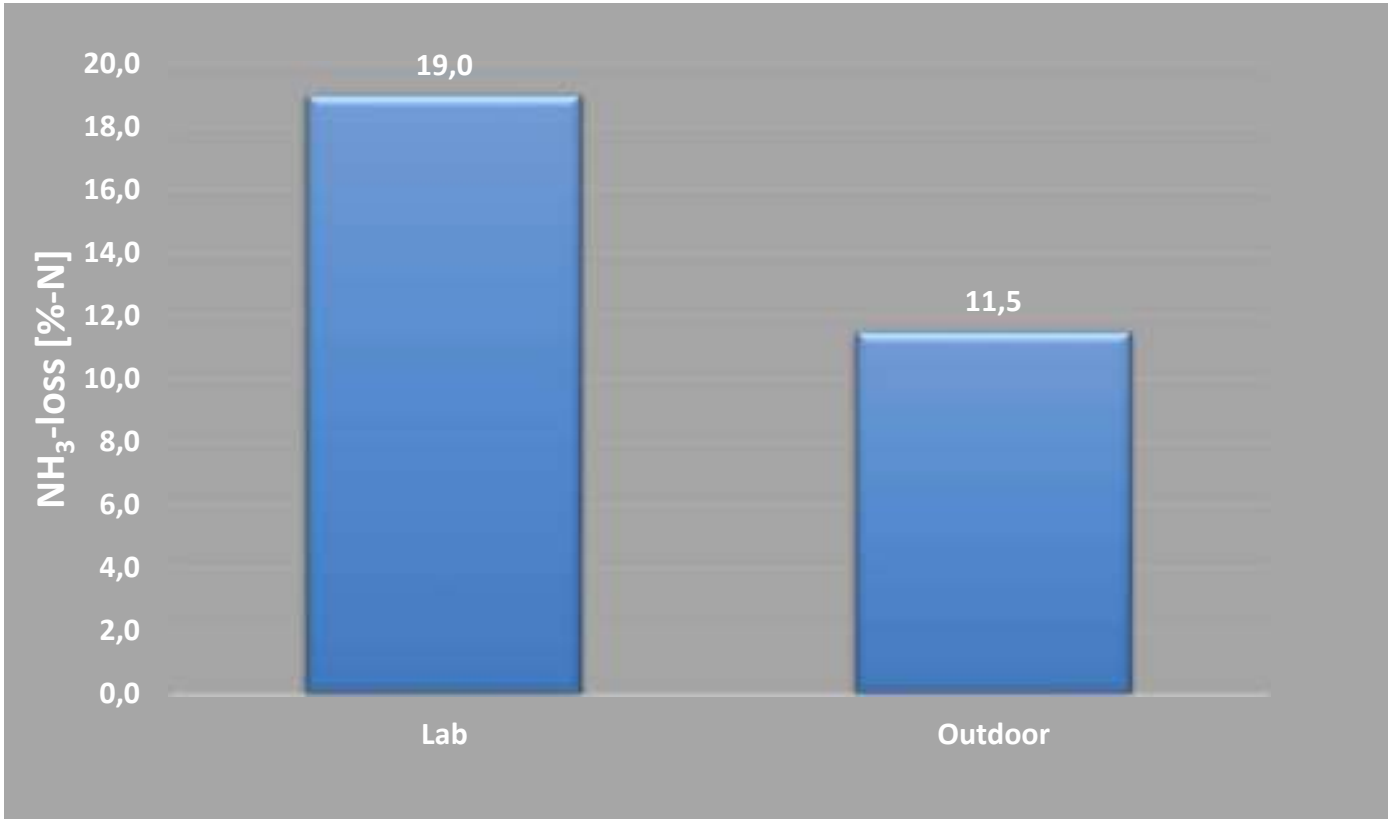
Challenge

- German field (and lab) experiments show moderate, but at most low emissions following synthetic fertilizer application
- High losses for non-urea fertilizers were not recorded
- High losses from urea only under non-practical conditions up to 40 %
- But under agronomically reasonable conditions far below that, at most 1-5 %, sometimes 10-15 %
- In contrary recently proposed EF end up with 19 % losses
- New EMEP-model seem to significantly overestimate losses

Data set / number of experiments in laboratory and in field



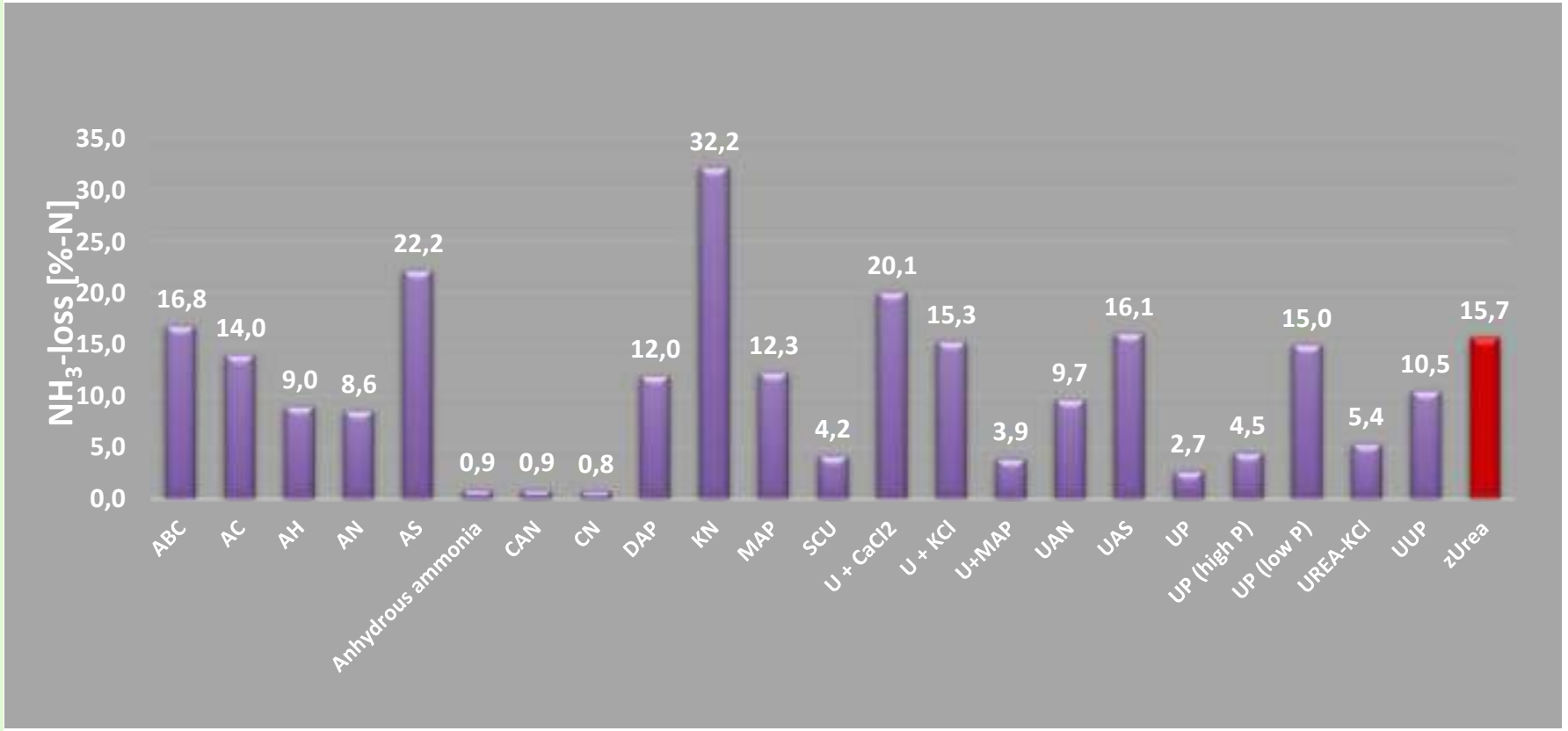
Data set / Ammonia losses laboratory vs field experiment



Almost 40 % Lab measurements /

Lab absolute emission records not applicable for modelling emissions but applicable for describing mechanisms

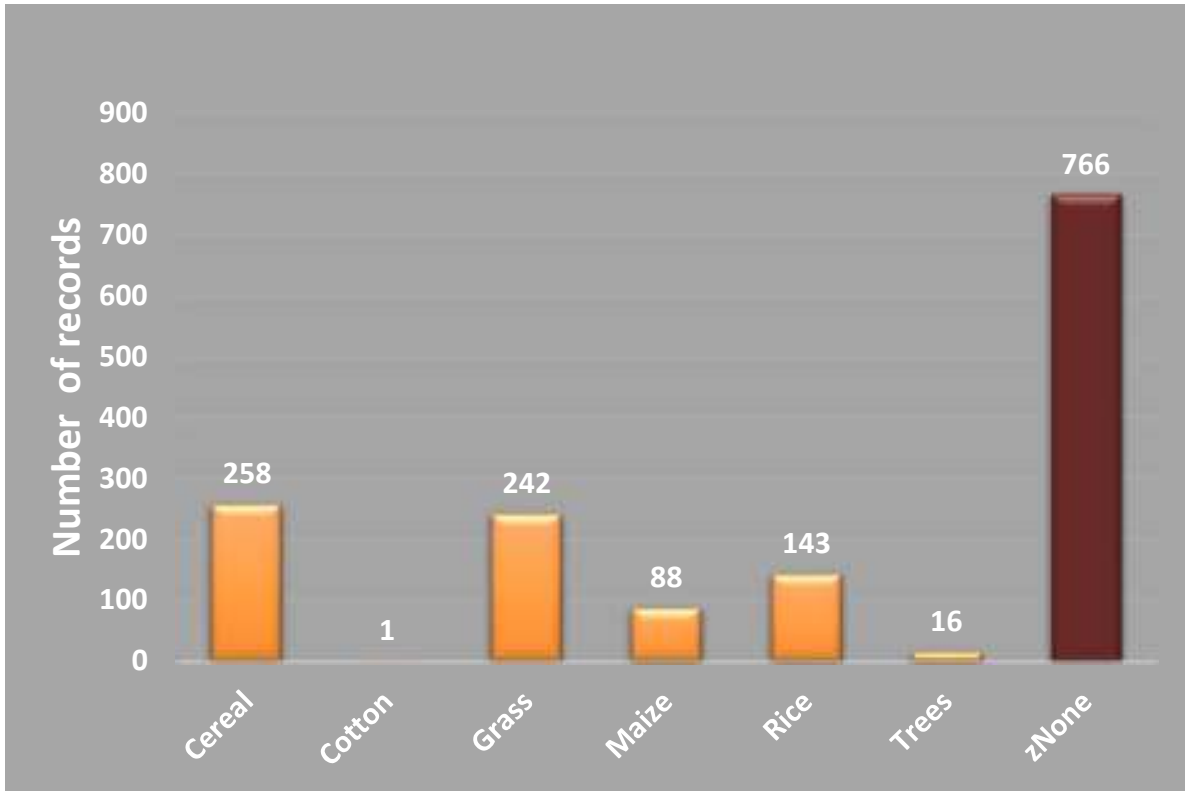
Data set / Ammonia loss from various N fertilizer types



Losses for urea fertilizers and urea containing fertilizers are moderate – maximum around 15 %

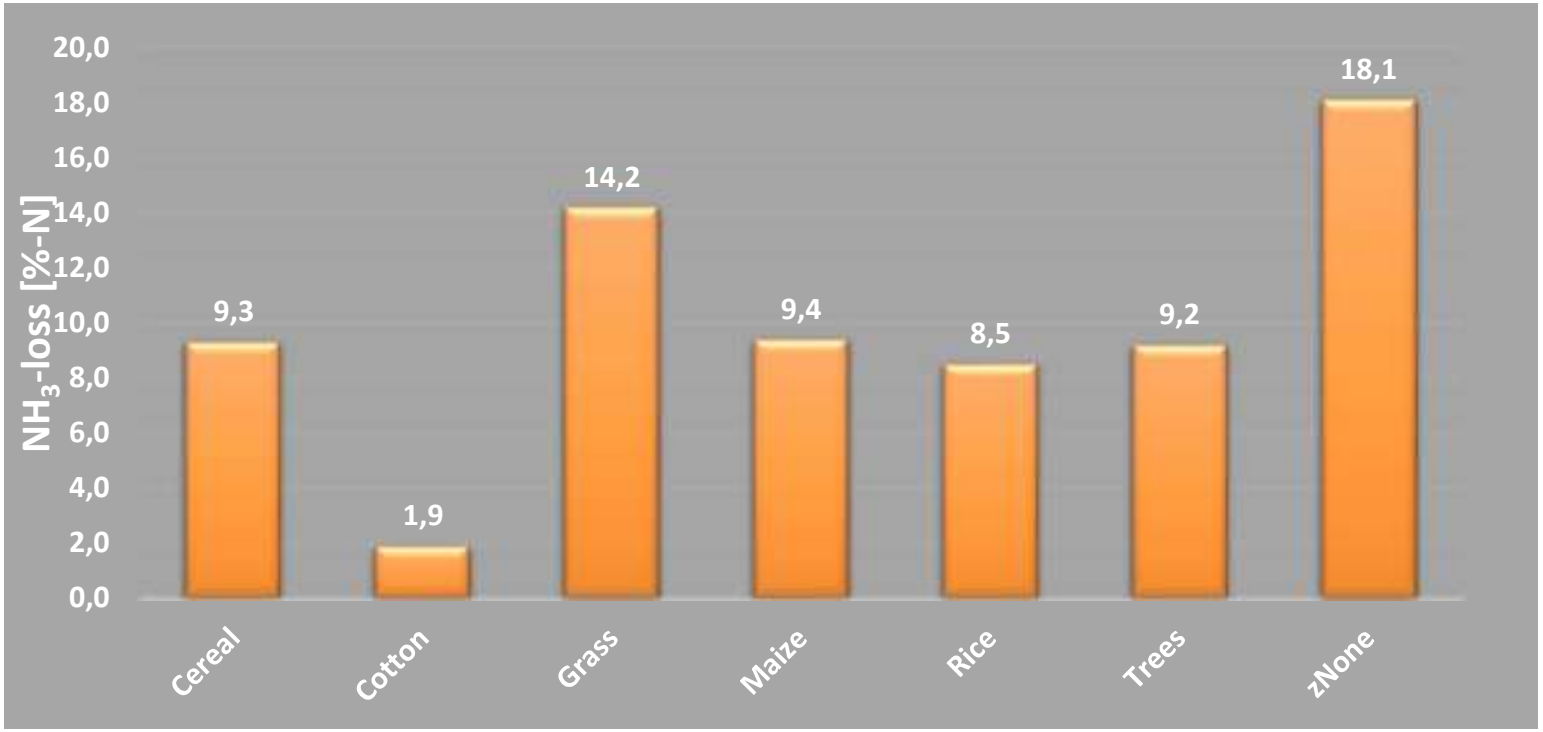
some emission levels hardly explainable (KN, AS,)

Data set / fertilized crops and bare soils



Half of experiments on bare soils without crops / (representativeness ?)
Bare soils exp.often used for testing parameters, methodologies, not meant for reflecting agronomic conditions

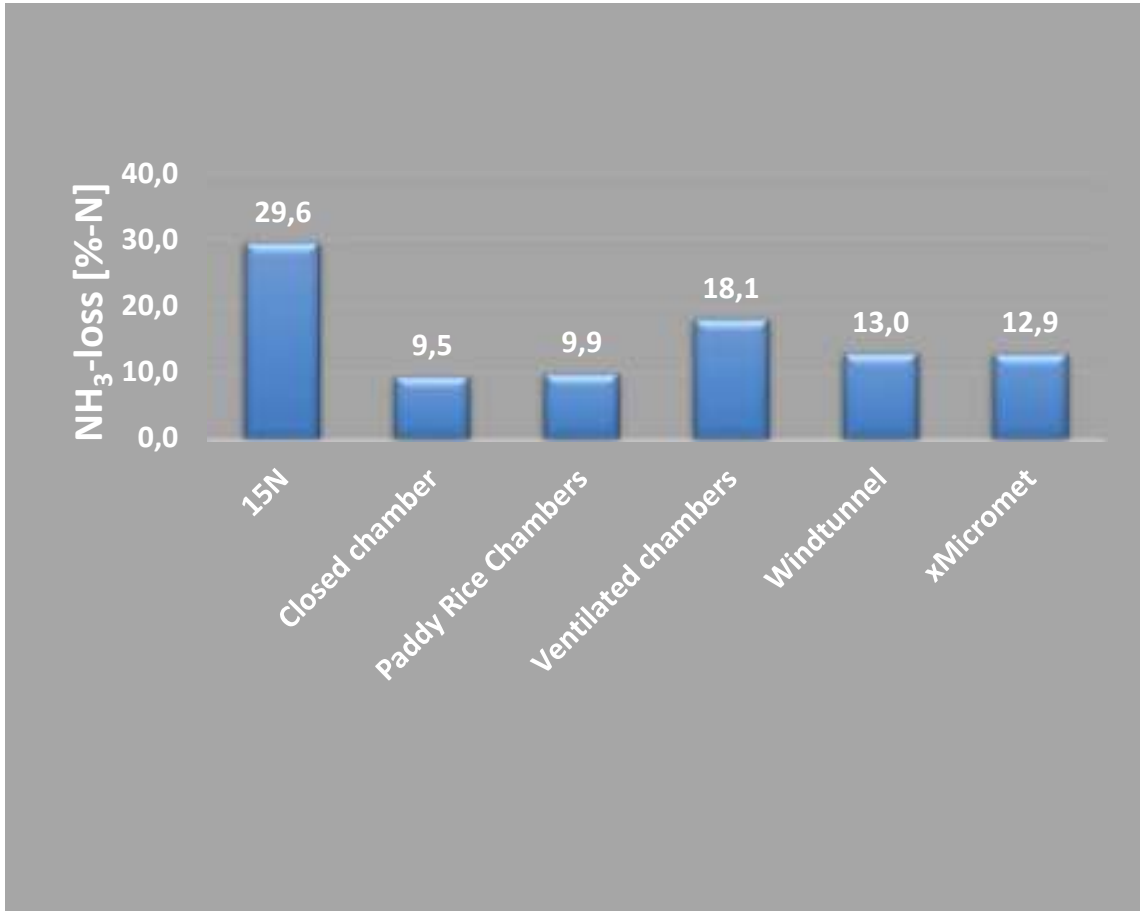
Data set / Ammonia losses from zUrea following application on growing crops



Losses are low for cereals - no records for oil seed rape, which shows lowest losses at all

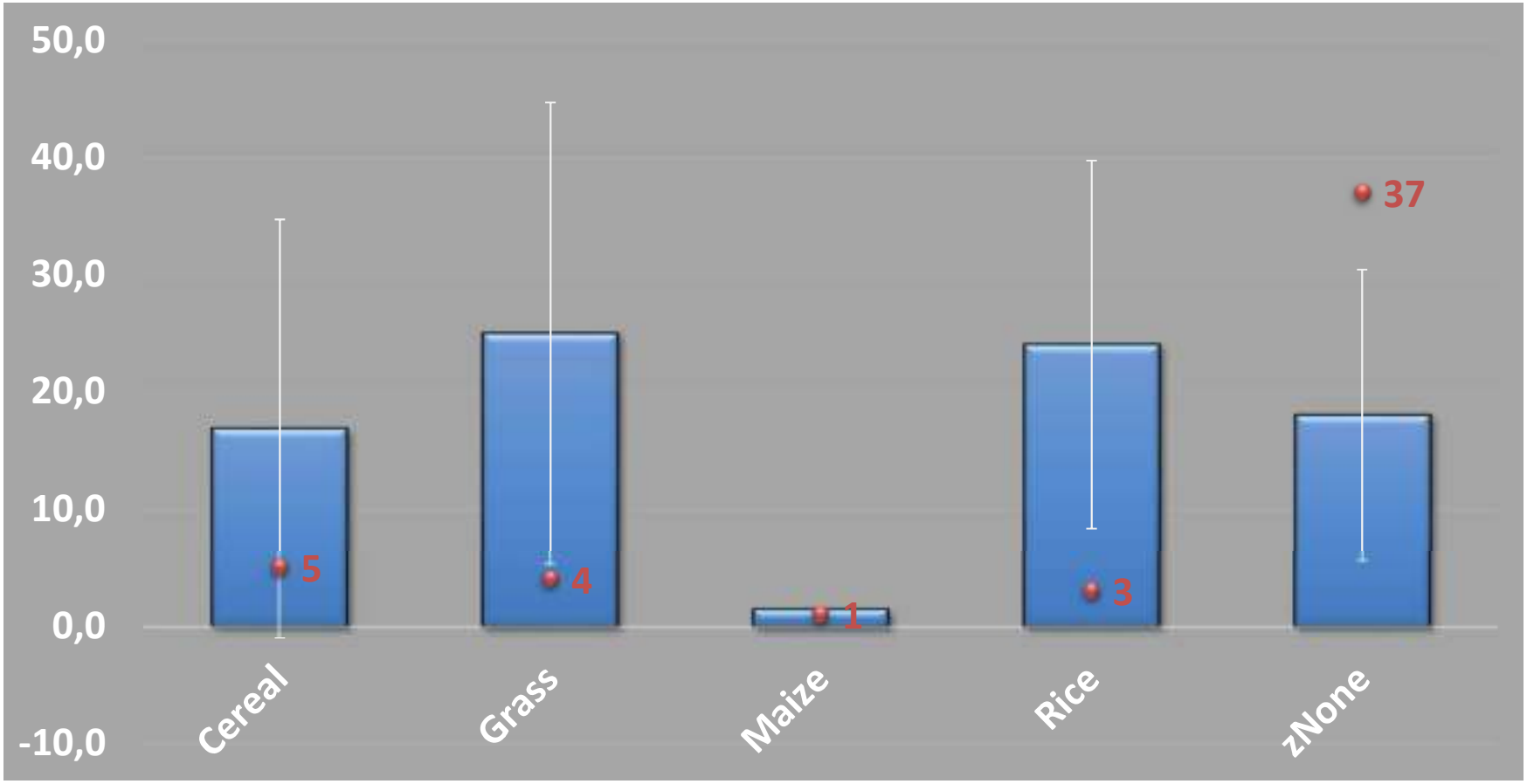
Losses of grassland are typically higher – not comparable with arable since hydrolysing of urea occurs often above soil in the turf / sward

Data set / Flux measurement methodologies

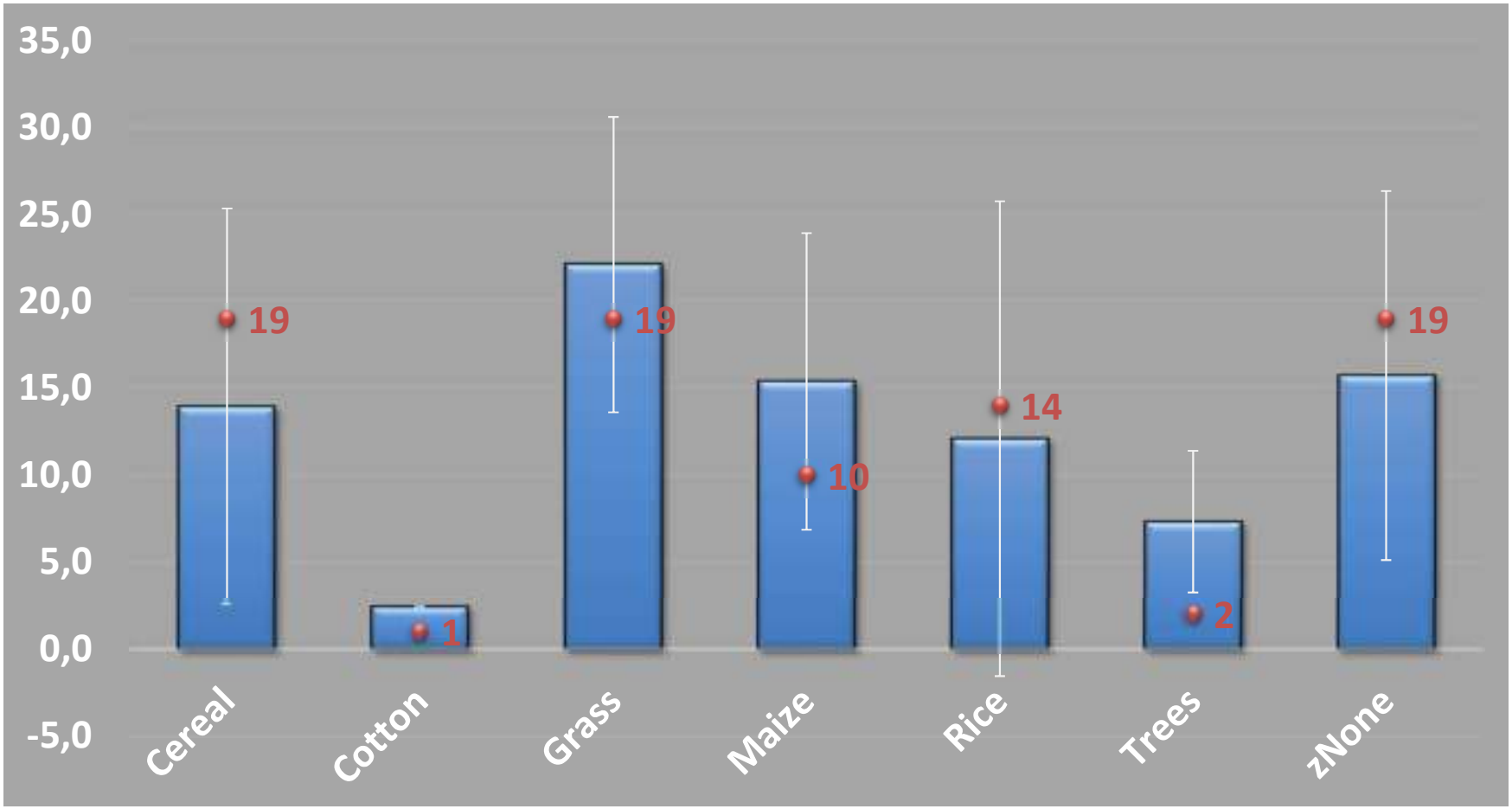


Closed chambers and 15N questionable !
Applicable for parametrization, mechanisms ….

Data set / Ammonia loss zUrea (% N) : Laboratory experiments



Data set / Ammonia loss zUrea (% N) : field experiments



zUrea losses below 15 % in arable crop field experiments !

Conclusion & Statement

Reconsider the statistical population from the agronomy applied research perspective

- Group in Grassland and arable
- analyse experiments i.p. on bare soils (often for testing the methodology without need to take care of practical relevance)
- look at plausibility of losses from certain fertilizers
- Group the statistical population more towards agronomic issues

Model development

- Focus on field experiments with practical conditions
- Use Lab experiments only for parametrization
- Differentiate pH influence in urea and non urea fertilizers
- Find solution for the „bare soil“ issue

Finally: More discuss with agronomists / which platform to be used ?