Biogeosciences Discuss., 11, C2389–C2392, 2014
www.biogeosciences-discuss.net/11/C2389/2014/

Biogeosciences Discussions
Open Access

Interactive comment on "Short-term effects of biogas digestate and cattle slurry application on greenhouse gas emissions from high organic carbon grasslands" *by* T. Eickenscheidt et al.

Anonymous Referee #2

Received and published: 12 June 2014

The manuscript entitled "Short-term effects of biogas digestate and cattle slurry application on greenhouse gas emissions from high 3 organic carbon grasslands" covers an important aspect of greenhouse gas accounting of agricultural production systems. Drained peatland, in particular used as arable soils, substantially contribute to a large proportion of total organic carbon lost from arable soils. Additional high N2O-emissions from such managed soils may add up a considerable amount of greenhouse gas emissions. More information is needed and the submitted paper aims at giving new insights in this topic. The topic fits well within the scope of 'Biogeosciences'. However, I its present form the paper is not appropriate for publication.

General points: The use of English language is characterized by many odd choice of

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

vocabulary and phrases. The whole manuscript should be revised with help of a native speaker.

There is no field replication of slurry treated plots at each site which is to some degree reflected in the statistical analysis. However, missing field replication of slurry application is a very strong shortcoming of this contribution, due to very uneven distribution of slurry by the chosen machinery. In addition, the way slurry was applied was very imprecise and the authors should give an estimate of the accuracy of the amount of slurry applied. All these aspects should be discussed in some detail in the discussion.

This in particular also applies to the ammonia loss measurements which were only done at one application date. The obtained results cannot be transferred to other application dates as done in this study due to strong effects of temperature and precipitation on emissions. So the obtained cannot be used in the N balance and the authors should find other solutions. The very strong difference between anaerobic digestates and cattle slurry is also startling, also the completely different dynamics of emissions. According to the presented precipitation data there was considerable rainfall at the day of application or the day thereafter. An explanation could lie in the fact that both slurries were not applied at the same time and that the cattle slurry derived emissions were affected stronger by precipitation than those from AD. The authors should discuss this point in detail and probably the comparison between the NH3 emissions from both fertilizers is not possible. In addition one measurement is not sufficient to validate a hypothesis on differences between fertilizer types. So, the conclusions should be drawn more carefully and hypotheses c) should be omitted as the experimental design and testing was by far not sufficient for its testing.

The data presented on N uptake and N balance is rather extensive as compared to the topic of the paper and the presented hypotheses. That makes the paper somewhat unbalanced and not strait to the point. This section should be shortened to a great extent in all relevant sections of the manuscript. The presentation should focus on those aspects which have a high relevance for the interpretation of N2O and NH3

BGD

11, C2389–C2392, 2014

emissions. On the other hand, if the authors to retain these contents, the title should be changed, hypotheses derived and the discussion restructured.

The discussion of comparatively low N2O emissions should be organized more clearly. For example it is argued in line 568 that quick uptake of fertilizer N shall account for such low emissions. However, in cattle slurry there was fertilization in excess of plant demand: why was no effect found in this treatment but on the contrary in the digestate treatment? In addition it is stated in the introduction that grassland is characterized by comparatively higher N2O emissions but this in contrast to generally high N uptake efficiency of grassland (l 84 ff.).

Points in deatail:

18: strong development of biogas plants; rephrase

L 20 ff unclear (substrate = energy crops) give reference

L 29 within a grassland parcel, rephrase

L 53 give actual figures

L 62 rephrase

L 65 not that general, rephrase

L 84 peasent structure (rephrase)

L 88 imprecise

L 102 contradictory as compared to what

L 116 give reference

L 120 higher amounts – imprecise

L 141 what is a grassland parcel?

L 146-148 no true replications

BGD

11, C2389–C2392, 2014

L 325 ff. report rainfall at onset of application

L 447 'content' – 'amount' or 'concentration' according to what is intended

L 484 –the digestates have a very low viscosity/dry matter concentration affecting the infiltration behavior. This is quite different to the usual characteristics of co-fermented slurries. This should be addressed and probably affects the extrapolation of the results to other digestates.

L 509 do not agree: why lower yields of the cattle slurry treatments under such high mineralization rates. It should be discussed in more detail why yield and N-uptake differences occurred.

Interactive comment on Biogeosciences Discuss., 11, 5765, 2014.