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## ***Interactive comment on “Contributions of agricultural plants and soils to N<sub>2</sub>O emission in a farmland” by J. Li et al.***

### **Anonymous Referee #2**

Received and published: 3 August 2011

The manuscript describes a study of the effect of three soils with different crops on the production and consumption of N<sub>2</sub>O. Contribution of plants to N<sub>2</sub>O emissions is a very interesting issue, however the manuscript didn't show this, mainly because the methodology. Also, the experiments design and data interpretation have not been treated properly.

The manuscript needs to be carefully reviewed and improved before it is considered for publication. Below is a description of the major and minor comments on the manuscript.

Major comments:

1. The experiments were not conducted in the best way, the treatments are not comparable for the following reasons:

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- a. Why was the soybean field not fertilized, is this common practice?
  - b. Why did some measurements in the same field start or finish at different times? (e.g., maize and soybean field).
  - c. The graph showing the experimental results does not allow comparison between treatments in the same experiment.
  - d. The variability among replicates is extremely high, especially in the maize field.
  - e. Nitrification and denitrification are considered processes responsible for N<sub>2</sub>O production. However, no experiments were conducted to elucidate this, but the authors ensure that both processes were enhanced after the fertilization.
  - f. Rain is interpreted as responsible for a secondary peak in the maize field. However, there are no comments on why this secondary peak was enhanced by the rain or why the secondary peak was not observed in the cotton field and soybean field.
2. The discussions are highly speculative about several processes not reviewed methodologically.

#### Specific comments

Page 5507 Line 7-9: The authors mentioned the “hole in the pipe” conceptual model involved in the regulation of N gas production, but they didn’t explain anything about the mechanism.

Page 5509 Line 11: Define LAI.

Page 5510 Line 5-7: What happend with the temperature inside the dark chamber?

Page 5510 Line 25: Change Angilent for Agilent.

Page 5510 Line 26: What is the stainless steel separation cylinder? Is it the liner?

Page 5511 Line 1-4: The authors ensured that the GC showed a linear response between 250 and 1000 ppbv. How can they claim this with only one point in the calibration

curve (320 ppbv)?

Page 5511 (line 21-22) and Page 5512 (Line 1-12): There is a methodological issue.

Page 5513: The fluxes are reported without any variation ( $\pm$ ).

Page 5513 Line 17: The maximum N<sub>2</sub>O flux in the maize field (1271  $\mu\text{g N}_2\text{O m}^{-2} \text{d}^{-1}$ ) does not match with the maximum flux in figure 4.

Page 5513 Line 18-19: "Afterwards, the soil N<sub>2</sub>O emission decreased gradually with time". This is not observed in the figures. A sharp decrease is observed.

Page 5516 Line 11-13: A correlation with 5 points just at the beginning of the experiment is not representative of a good linear correlation.

Page 5516 Line 13-15: What are the implications of beginning the plant flux measurements one month after the beginning of the experiment?

Page 5516 Lines 15-18: Seems a repetition from the point 3.4.

Page 5516 Lines 21-25: The authors compared their results with other reports. However, the soybean field in the study was not fertilized, so no comparison with the other fertilized fields can be done.

Page 5517 Line 4-5: This is not clear to me, because nitrate and ammonium content in the cotton and maize fields look very similar.

Page 5517 Line 10-11: phrase "So did N<sub>2</sub>O production by nitrification and denitrification" ????

Page 5517 Line 14: Please define Q<sub>10</sub> where needed.

Page 5519 Line 1-2: "After fertilization, the significant correlation between soil and plant N<sub>2</sub>O fluxes implied.....". What's the evidence of this?

Page 5523 Line 20-22: Correct Hakata reference.

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Figure 3, 4 and 5: The scale of the graphs doesn't allow to see differences among treatments in the same field experiment.

Figure 3, 4 and 5: Define the units of fluxes. In the text the unit is  $\mu\text{g N}_2\text{O m}^{-2} \text{ h}^{-1}$  while in the figures is  $\text{mg N}_2\text{O m}^{-2} \text{ h}^{-1}$ .

Table 2: What's the meaning of "a"?

Table 4: What's the meaning of the asterisks?

References: Order the references in alphabetical order.

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