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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Nitrate leaching from intensive organic farms to groundwater" *by* O. Dahan et al.

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Reply to interactive comment made by Referee #1 on the manuscript: "Nitrate leaching from intensive organic farms to groundwater" by Dahan et al.

We would like to thank the reviewer for its thorough and constructive comments. All comments were addressed and the manuscript was revised in relevant places.

Reply to specific comments

The reviewer expressed his impression that the discussion regarding the high potential of nitrate leaching from organic farms is "a bit biased" since our results shows that the nitrate leaching is practically related to the fertilization application method (bio-solids

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vs. fertigation) rather than to the general cultivation practice (conventional vs. organic). We fully agree with the reviewer concerns. Therefore we have dedicated a full chapter to this subject, chapter 3.5 Fertilization method and nitrate leaching (page 9926 line 10 to page 9927 line 16, in the discussion paper). This chapter starts with the sentence "Reexamination of the nitrate concentration profiles in the vadose zone under the greenhouses suggests categorizing the potential down-leaching of nitrate according to the fertilization method rather than the general agro-technical regime of organic versus conventional agriculture". Further on we elaborate on the evidences for this conclusion and state in the closing sentence of this chapter that "accurate fertigation methods that synchronize the fertilizer's implementation with the nutrient up-take capacity of the plants, as is commonly practiced in conventional agriculture, dramatically reduce the amount of nitrate leaching through the vadose zone to the groundwater". This statement applies to all types of agricultural practices. Nevertheless, please note that across the entire manuscript, from its title to its final conclusion, we have been very strict in the use of the term "intensive" organic farming in commercial greenhouses.

Unfortunately, today most intensive organic farming in greenhouses relies on solid fertilizers such as composted manure and guano. Only in rare cases, as found in this study, intensive organic greenhouses rely on fertigation methods. We have further elaborated on that in the summary and conclusion chapter (page 9928 lines 20 -25) by stating that application of fertigation methods "in organic farming has been approved in one of the organic farms that practice fertigation methods rather than application of solid compost in the soil". As a results the vadose nitrate profiles characteristics in this organic farm were similar to those observed in conventional farms and significantly lower than those observed in organic farms that rely on compost as the main fertilizer." In our view it is a clear statement that organic farming does not pose a threat on underlying groundwater quality as long as it is based on nitrogen application through fertigation. Unfortunately, today, fertigation is not a very common practice in organic farming.

In order to clarify that application of fertigation methods may dramatically reduce

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potential nitrate down leaching from organic agriculture the following sections were rephrased: Last sentence of the abstract was rephrased to: "It has been shown that accurate fertilization methods that distribute the fertilizers through the irrigation system, according to plant demand, during the growing season dramatically reduce the potential for groundwater contamination from both organic and conventional greenhouses."

The first sentence of the Summary and Conclusion was rephrased as follow: " Comparison of the groundwater pollution potential of greenhouses that grow year round vegetable under intensive regime shows that commercial farms that rely on compost as the main fertilizer source, as commonly practiced in organic agriculture, results in substantial down leaching of nitrate compare with farms that rely on fertigation methods, as commonly practiced in conventional agriculture.

The sentence "Nitrate concentration profiles under the organic farms revealed increased concentration pattern. . ." (page 9927, line 24 in the discussion paper) was rephrased to "Nitrate concentration profiles under the farms that use solid fertilizers revealed increased concentration pattern. . ."in the revised paper.

All the technical corrections suggested by the reviewer were accepted and the manuscript was corrected accordingly

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 9915, 2013.