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Biogeosciences Discussions

Interactive comment on "Herbicide weed control increases nutrient leaching as compared to mechanical weeding in a large-scale oil palm plantation" *by* Greta Formaglio et al.

Anonymous Referee #3

Received and published: 23 July 2020

Peer review of, "Herbicide weed control increases nutrient leaching as compared to mechanical weeding in a large-scale oil palm plantation", which was submitted for a possible publication to Biogeosciences (bg-2020-153).

General comments The manuscript deals with the measurements of nutrient leaching in an oil palm plantation, trying to clarify the effects of fertilization rate and weeding methods on various nutrients leaching. The authors have collected data between 2017-2018. Main findings of the authors are described below. The reduced management intensity (e.g., mechanical weeding and less fertilization rates) could effectively reduce nutrient leaching losses. In addition, the nutrient leaching is significantly different in

different management zones, such as inter-row, palm circle and frond-stacked area, in oil palm plantations. These results are very important to researchers and future study, even to the policy makers. I highly appreciate the presented research in this text. The paper is well organized, figures and tables are carefully prepared. The large amount of the field work and interesting results performed by the authors are worthy of publication. However, I found there are a few questions in the manuscript after reading thoroughly. I have several specific comments that should be adequately incorporated and explained by the authors before this manuscript is considered for publication. These comments are detailed below.

Specific comments The abstract should be revised. 1. Line 23-28 Could you consider the specific data (e.g., low solute concentrations, small drainage. . .) should be added, and thus increasing the persuasiveness for the readers? (Maybe it is important in the Abstract)

The introduction is very good. The scientific question is clear. 1. Line 41 The term "e.g" should be "e.g." 2. Line 52-54 Could you provide some references? Thank you. 3. Line 57-63 Indeed, high precipitation rate is a critical driver for surface runoff and associated nutrient losses. Particularly for considerable plantations. However, the leaching losses may be offset by a high nutrient cycling due to the rapid uptake of plants. 4. Line 92 How far the radius of the palm circle? 5. Line 98-99 Could you describe more details about the root distribution of oil palm? I am not sure the roots of palm only grow around the trunk. I think the root biomass between inter-row area may be high in somewhere.

The Materials and methods section is good structure. The content is detailed and makes it easy for readers to understand. 1. Line 159 Replace the "x" between "the 50 x 50 m" with "×". 2. Line 160 Where is the plant materials from the mechanical weeding? Are they transported far away from the plots? 3. Line 232 Is the runoff set to 0? Do you mean "no overland runoff"? 4. Line 243 Soil physical-chemical characteristics. 5. Line 247 See comment 7. 6. Line 265 Please simplify the statistical analyses section.

The results section is well-organized manner. However, some statements are so long that they (e.g., the section “3.2 Differences in leaching losses. . .”) should be simplified to delete some non-key contents. 1. Line 310-311 The drainage flux is low. Do you investigate the stem flow (may be influenced by “funnel effect” of canopy of oil palm?)? Some studies demonstrated that the infiltration was enhanced around the tree trunk. 2. Line 346 Why is different between the various elements leaching?

The discussion section was carefully written and prepared. 1. Line 391 I recommend the ratios of runoff/interception/evaporation/transpiration to precipitation was supplemented in the Table 2 for better understanding. 2. Line 434-438 How to understand the use of organic amendments and slow-release fertilizers? E.g., mulching application? Under the high temperature and precipitation in some tropical areas, the plant materials decompose quickly, and the litterfall may have very short residence time on the ground. Could you provide any information on the standing plant litter in your treatments? Thank you! 3. Line 552-553 Although the mechanical weeding is sustainable way in ecological view, the farmers were reluctant to adopt due to its money-consuming and labour-consuming. Undoubtedly, mechanical weeding is a promising measure to reduce nutrient leaching.

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