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Interactive comment on "Opportunities and limitations related to the application of plant-derived lipid molecular proxies in soil science" *by* Boris Jansen and Guido L. B.

Anonymous Referee #1

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The review article "Opportunities and limitations related to the application of plant-derived lipid molecular proxies in soil science" is overall an important and essential contribution to the SOIL community. However, I think some revisions are needed which would improve this review.

General comments:

-The introduction can be more compact. There are far too much direct quotes. You do not need to explain the word biomarker and molecular proxy in so much detail and how they are used for example in clinical studies. Keep the introduction short and simple, stay focused.

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-In general, you should be more specific regarding the different biomarker groups and their strengths and weaknesses (e.g. the chemotaxonomic potential of the different leaf wax groups, see specific comments). Additionally, the chemotaxonomic potential of some plant-derived biomarker groups such as sterols or terpenoids is not discussed.

Specific comments:

Introduction

p3L15-23: Since you are doing your review with a specific focus on soils, this information is not necessary, you can delete it.

p3L24-30: I'm not sure if this information is really useful, but I think that's a matter of opinion.

p6L13-16: As far as I'm aware of, the review of Diefendorf and Freimuth (2017) is only about δ13C, you may also refer to the review of Sachse et al. (2012) concerning δ2H. Or you explicitly refer in line 14 to the stable carbon isotope signature.

p6L21: I cannot find this citation in the reference list. Can you provide at least the title and the journal where this article was submitted to? This would make it a lot easier for the interested reader to find the paper once it is published.

Section 2

p7L2-4: Since you have no intend to focus in your review on the δ2H composition of plant biomarkers you may delete this sentence.

p7L9: Change the first were in where

p7-9 Section 2.2.1:

-You list some important studies that were done and that these studies prove a chemotaxonomic potential, but the section would benefit a lot if you would distinguish between studies that were done on fresh plant material and those done on soils (include some).

-For a soil scientist it would be interesting to know how the chemotaxonomic potential is transmitted to the soil and fortunately there exist some transect studies analysing this. Dig a bit in the literature, I'm quite sure you will find some.

-Maybe you can explain the results of the cited studies regarding the chemotaxonomic potential in more detail, i.e. which chain length represents which vegetation (at least in tendency, shorter chain length represents vegetation x, longer vegetation y). Even if you do not believe in the chemotaxonomic potential of the leaf waxes, you should state the difficulty in more detail that the reader can understand it.

p9L12-15: I think this belongs in the section where the environmental influences on the plant lipids are discussed.

p9L26-30: Here you describe the origin of the cutin and suberin monomers, but you have not stated the origin of the leaf waxes. I recommend to do it either for both or for none.

p10-15 Section 2.3:

-How are these changes transferred to the soil? How pronounced and over what period of time must these environmental changes occur that they can affect the overall leaf wax signal in the soil?

-Are there any environmental factors known to influence the cutin and suberin monomers?

p14L14-17: Good point! That's why from my point of view some studies regarding the chemotaxonomic potential of these compound classes in soils should be included in the section as well!

Section 3

p16L7: Is there a difference in the wax lipid distribution between roots and leaves? I know there is a quite interesting ongoing discussion whether one is able to distinguish

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between root and leaf input using the patterns alone. Maybe you can address to this in more detail, e.g. by mentioning contradicting results of different studies (for example the study of Kirkels et al. (2013) observed general differences in the distribution between roots and leaves with a dominance of shorter chain lengths in roots compared to leaves while the study of Gocke et al. (2014) did not).

Also, is there a difference for different leaf wax groups (straight chain vs. cyclic compounds)? What about sterols and terpenoids?

p18L31: Is this a high input, does this contamination matter?

Section 4

p23L5-7: Why? Is there any explanation?

p23L27: What order are these differences?

p24L31-p25L6: Are there examples where degradation leads to a loss of the dominant compound?

p25L4: There are two Lei et al. 2010 in the reference list. Indicate if this is either B. Lei or G. Lei. Same for table 1.

Table 1

Column “Examples of recent publications”

You define recent as period from 2007-2017, but the publications mentioned in this column are not younger than 2014. Was there really nothing relevant published during the last three years? Either adapt recent or include at least one newer reference.

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