We sincerely thank the two reviewers for their valuable feedback, and we are especially grateful to the editor for his patience and efforts on our review paper. We have responded to the reviewers' comments point by point and outlined our modification plan to address the corresponding issues as requested.

Responses to Reviewer 2

This paper has a highly worthwhile aim with closing an important gap in the literature by reviewing agricultural VOC emissions. But I unfortunately have to agree with the other referee that the manuscript left me unsure how the overview givencan be useful for modeling and the atmospheric chemistry community in general.

My main concerns are:

- The scope of the review is much narrower than the title suggests. For example, it seems to be focusing purely on field crops that are common in temperate climates. Important BVOC emitters such as fruit trees, or others that are relevant in warmer climates, are ignored.

Reply: Thanks for this comment. We have already stated our main aim in line 6 of the abstract in the original text. In the new revision, we will narrow our title to make the aim of the paper clearer. We propose as a new title: Current Insights into Biogenic VOC Emissions from Arable Crops and the potential impacts of management practices: A Review.

- I think the authors could have done a more thorough job in reviewing the literature and in supporting some of their statements with references.

Reply: Thank you for the comment. We would like to affirm that we conducted a detailed review of the topic we focused on. Regarding the comments about the lack of support for some statements, we will carefully go through the paper again and check them in detail as also highlighted by some of the replies to reviewer #1.

- I am missing a clear direction statement/recommendation of what the numbers given can or should be used/useful for.

Reply: As mentioned by reviewer # 1 and our reply to that, we acknowledge that it is not very clear what is the end use of the numbers given. Our objective is to give orders of magnitude for emissions from arable crops and practices, to collect the data available in the literature today concerning this landuse and to suggest some ideas for using them into models.
We will add the corresponding statements explaining the reasons for showing data as values at the beginning of each section in the revised version. To briefly clarify:
The aim of this paper largely dictates the way we present the data. Our goal is to summarize the current processes related to agricultural arable crops, soil, and management practices, highlighting which research areas remain unclear and require further study. For modeling purposes, we realized that using a single PFT definition (e.g., MEGAN v2.1) and less focus on OVOC (Karl et al., 2009) do not meet the needs or match real environmental situations. Therefore, we present the current knowledge on emission factors for arable crops in Table 5 of our review paper. As mentioned before, we can improve the logical presentation of data in each section in the revised version.

- In conclusion, I am afraid that I cannot recommend the manuscript's publication in its current form. To give the authors more time to revise I would rather reject the manuscript.

Some concrete points:

l. 14 Guo et al. is a modeling study. You could add a reference of actual measurements showing the relevance of BVOCs for urban air quality. But I am not sure if urban biogenics are the best introduction into this paper on agricultural emissions.

Reply: Thanks. We will consider this comment in the revised version.

l. 15 citations are missing for the examples given

Reply: The reference for line 15 was given in line 754.

l. 18-20 for the impact of agricultural BVOCs on atmospheric chemistry, you could also cite

Bsaibes, S., Gros, V., Truong, F., Boissard, C., Baisnée, D., Sarda-Esteve, R., Zannoni, N., Lafouge, F., Ciuraru, R., Buysse, P., Kammer, J., Gomez, L. G., and Loubet, B.: Characterization of Total OH Reactivity in a Rapeseed Field: Results from the COV3ER Experiment in April 2017, Atmosphere, 11, 261, https://doi.org/10.3390/atmos11030261, 2020.

Pfannerstill, E. Y., Arata, C., Zhu, Q., Schulze, B. C., Woods, R., Seinfeld, J. H., Bucholtz, A., Cohen, R. C., and Goldstein, A. H.: Volatile organic compound fluxes in the agricultural San Joaquin Valley – spatial distribution, source attribution, and inventory comparison, Atmos. Chem. Phys., 23, 12753–12780, https://doi.org/10.5194/acp-23-12753-2023, 2023.

Reply: We appreciate and agree with your suggestions.

l. 30 maybe another relevant paper to cite here: Rinnan, R. and Albers, C. N.: Soil Uptake of Volatile Organic Compounds: Ubiquitous and Underestimated?, J. Geophys. Res. Biogeosci., 125, e2020JG005773, https://doi.org/10.1029/2020JG005773, 2020.

Reply: We will add this in the corresponding section.

l. 42: Please also clarify that you exclude emissions from animal agriculture like dairies and openly stored silage, which are a big source of VOCs in some regions, and address the above mentioned scope comment.

Reply: Thank you for this comment. We will add this to make it more clear to the audience.

Table 1: In some regions of the world, citrus and other fruit trees are important for agriculture. They emit large amounts of highly reactive monoterpenes and should therefore be included in this review, I think. Otherwise, the review should specify already in the title and make clear that this is just for "field crops" and excludes fruits and other tree crops.

On citrus monoterpenes: e.g.

Fares, S., Gentner, D. R., Park, J.-H., Ormeno, E., Karlik, J., and Goldstein, A. H.: Biogenic emissions from Citrus species in California, ATMOSPHERIC ENVIRONMENT, 45, 4557–4568, https://doi.org/10.1016/j.atmosenv.2011.05.066, 2011;

Gentner, D. R., Ormeño, E., Fares, S., Ford, T. B., Weber, R., Park, J.-H., Brioude, J., Angevine, W. M., Karlik, J. F., and Goldstein, A. H.: Emissions of terpenoids, benzenoids, and other biogenic gas-phase organic compounds from agricultural crops and their potential implications for air quality, Atmos. Chem. Phys., 14, 5393–5413, https://doi.org/10.5194/acp-14-5393-2014, 2014. [This paper's SI has a big table with emission factors for many agricultural BVOC emissions]

Reply: As stated in line 6 of the abstract, arable crops are the key species we focus on in this paper and the title was changed accordingly. For citrus, multiple papers, including the two mentioned by the reviewer, clearly describe their significant contribution. Interested readers can refer to these articles for more details.

Table 2, footnote a: Since there is no publication cited here, the data need to be published somewhere with a doi as specified in the data availability policy of ACP.

Reply The footnote a in Table 2 was published in Open discussion section of EGUsphere, we can added the reference in the corresponding area:

Buysse, P., Loubet, B., Ciuraru, R., Lafouge, F., Durand, B., Zurfluh, O., Décuq, C., Fanucci, O., Gonzaga Gomez, L., Gueudet, J.-C., Bsaibes, S., Zannoni, N., and Gros, V.: First measurements of ecosystem-scale biogenic volatile organic compound fluxes over rapeseed reveal more significant terpenoid emissions than expected, EGUsphere [preprint], https://doi.org/10.5194/egusphere-2023-2438, 2024.

Table 2: It is not clear to me why forest soil emissions are included here (if you wanted to include data from forest soils and not just agricultural soils, there are far more studies of forest soil VOC emissions from many different places that would need to be included). Also, I am not sure if the few studies included in this table are all there is on VOC emissions from agricultural soils. Just a 2-minute internet search gave me more publications that report emission rates from agricultural soils, e.g.

Juan Zhao, Zhe Wang, Ting Wu, Xinming Wang, Wanhong Dai, Yujie Zhang, Ran Wang, Yonggan Zhang, Chengfei Shi, Volatile organic compound emissions from straw-amended agricultural soils and their relations to bacterial communities: A laboratory study, Journal of Environmental Sciences, Volume 45, 2016, Pages 257-269, https://doi.org/10.1016/j.jes.2015.12.036.

And the Abis et al. 2020 paper that the authors cite in other contexts. If there are reasons to exclude such studies from the compilation, it would be helpful if the authors defined the criteria of their selection of data more clearly.

Reply: Section 2.1 focuses on bare soil as the title described, which data presented are without the effects of management practices. The papers mentioned by Reviewer 2 focus on fertilization mixed with soil, which is not what we intend to present here. We will cite Zhao's article in the section on organic fertilization, where Abis et al., 2020 is also cited. The reference to forests will be removed to be more consistent as suggested.

2.3 flowering emissions have also been discussed in some publications on citrus

Reply: As stated above, citrus trees are not included here.

l.95: "emission rates from this period" – do you mean "soil emission rates"?

Reply: Yes this is what is meant. Will be changed.

l. 175: The sentence is grammatically incorrect and content-wise unclear.

Reply: This sentence should read:

> Methanol is the predominant compound emitted from soil following manure amendments, with different types of manure treatments causing distinct changes in soil microbial diversity and structure (Liu et al., 2007). For example, the application of cattle manure has been shown to increase volatile sulfur compound emissions (Woodbury et al., 2016).

Tables 4/5: This paper's SI has a big table with emission factors for many crop BVOC emissions that should not be ignored in this review: Gentner, D. R., Ormeño, E., Fares, S., Ford, T. B., Weber, R., Park, J.-H., Brioude, J., Angevine, W. M., Karlik, J. F., and Goldstein, A. H.: Emissions of terpenoids, benzenoids, and other biogenic gas-phase organic compounds from agricultural crops and their potential implications for air quality, Atmos. Chem. Phys., 14, 5393–5413, https://doi.org/10.5194/acp-14-5393-2014, 2014.

Reply: We will verify this paper and amend accordingly.

Fig. 1 I like the sentiment, but the realization could be improved... where do H2O and CO2 go, for example? it is a bit much information in a small space, making it confusing. Do the animals shown contribute anything? I don't see animal agriculture discussed in the paper.

Reply: CO_2 and H_2O are specific to the chemistry part which is perhaps not the focus of this paper and could be simplified. Animals contribute to manure and slurry production which are then spread on arable crops. Perhaps the cows could be put in a separate part of the figure or greyed.

Fig. 2: I would refrain from using Comic Sans in a scientific figure.

Reply: Noted and will be changed.

- Data availability: upon request is not acceptable according to the data policy of ACP. Please make the data available in a publicly accessible repository.

Reply: We understand the importance of making data readily available and are committed to transparency. While we can publish the data from our own research, some of the data included in this review are sourced from other authors and groups. To respect their intellectual property, we indicated that these data are 'available upon request.' We will clarify this in the manuscript and will gladly assist in facilitating access to the data through the corresponding groups, should any requests arise.