

Review of the response letter: Comment on “Information arms race explains plant-herbivore chemical communication in ecological communities” by Ethan Bass and Andre Kessler

I really enjoyed reading this response letter by Bass and Kessler; it is rigorous, well-written, relevant, and to the point. This letter is a response to the work presented recently by Zu et al. 2020. Latter authors propose that a “stable information structure explains the evolution towards redundancy of volatile organic compounds in plants”. The results of Zu et al. suggest that the large diversity of VOCs in nature is explained by the ability of the herbivores to “quickly tell all plant species apart by making use of the few most informative VOCs, and plants can, in turn, respond to this potential by adding more VOCs to their profile. Under the same process, herbivores themselves can also be identified using a set of informative VOCs”. Nevertheless, there are several concerns about the assumptions and analyses that Zu et al. present in their work, as the authors of this letter have pointed out. This letter summarizes in relevant and polished manner biases in the results found by Zu et al. 2020.

I would suggest that authors explain what a “stable information structure” is in a few words. Likewise, I would suggest that in the line 33, authors start pointing out their responses in a list manner or with subheadings, although this is just a writing style.

Line 37. Please add a short explanation of what evolutionary principles authors are referring.

Line 38. As I have pointed out, it could be more informative for the readers if authors split the document by concerns/subtitles (e. g., “the null model”, “evolutionary theory of plant-insect interactions”).

Line 65. Please clarify what hierarchical selection is.

Line 67. I would reduce this sentence: Moreover, a model based on this assumption cannot explain the evolution by natural selection, since all plant species are assumed to have identical fitness in the model.

Line 90. Or by convergent evolution, non-related species in the same environment can evolve the same VOCs. Indeed, the very well-supported studies on the diversification of secondary metabolites indicate that they originate from a small group of precursor compounds, which eventually become modified into diverse end-products. For example, all 40 000+ isoprenoid compounds originate from pyruvate and d-glyceraldehyde 3-phosphate entering the methylerythritol phosphate pathway in the chloroplast or from acetyl-CoA entering the mevalonate pathway reviewed in Moore et al. 2013. Another important thing that could be important to remark is what is happening at the genetic/genomic level. Gene duplications can lead to neofunctionalization of VOCs, hence increasing the chemical diversity.