

## ***Interactive comment on “HESS Opinions: Agricultural irrigation with effluent – Pharmaceutical residues that we should worried about” by Dror Avisar and Gefen Ronen-Eliraz***

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Referee#2:

(Q2-1) There are so many papers on this same topic that it is very hard to state something that goes beyond general statements (and we all do that). I learnt basically nothing. It is a nice (very nice) summary of many things that we already know, so, in my opinion, there is no novelty included. It reads like a proposal, introducing the problem (which is of course very relevant) but not yet producing any new scientific advance, rather than a promise to make it (new elements, metabolites, risk). For example, the introduction. What is the state of the art? Why do you write a paragraph such as the

C1

one lines 3-9, page 2? There are two paragraphs with just introduction to the problem, not to the literature. Then, pharmaceuticals appear in page 3, with the sentence: “Investigations of the occurrence, influence and toxicity of common organic contaminants, such as fertilizers and oil compounds, among others, have also been published. Exactly, this is what the paper is about, and I would like to see the relevant literature on the topic. And it goes well beyond pesticides. There are papers on the fate of drugs, UV filters, livestock antibiotics, illicit drugs, caffeine, in surface water, groundwater and wastewater bodies. And there are hundreds of those. So, if I were a reader, I would expect a good state-of-the-art report that can help me understand the magnitude of the problem.

(A2-1) The review on the manuscript arise some points that probably missed and therefore thank you for this referee, while according to the above remark we focus our manuscript as follow. We rewrite the introduction to lead to the main topic of this manuscript including background of the problem, and the state of the art of this topic (Page 1, Lines 25-31; Page 2, lines 1-12). We also added relevant literature and references. Along the text, we focus on the pharmaceutical residues, their sources, fate and where are they found in the environment.

(Q2-2) All three figures are irrelevant. The first is just plotting UN data; the second is local (Israel) case. None of them talk about pharmaceuticals (the title of the manuscript). The third one seems like writing again something from the literature, published by Golan et al (twice).

(A2-2) We accept this comment and remove the figures.

(Q2-3) Now, for the specific questions you pose. I would definitely be very interested in a paper that addresses one (just one) of these questions thoroughly. It would probably look like an encyclopedia, though. But see how you deal with them: - What other components are present in effluents? The text talks only about carbamazepine and diclofenac. There are hundreds of organic molecules, with very varying concentration,

C2

and these concentration values depend on the degree of treatment (partially). Yes, carbamazepine is the most recalcitrant one, this is true.

(A2-3) Thank you for the remark. We added some more examples for other pharmaceutical found in treated wastewater and their references (Page 3, Lines 4-6; page 3, lines 13-20).

(Q2-4) At what concentrations? There is only one sentence, and it could not be more general: "only a few Nano grams to micrograms per liter". All of them? Everywhere? Is it relevant then?

(A2-4) As it described in the manuscript, the concentrations found is varied and it depend on the specific physico-chemical properties of the specific pharmaceutical residue as well as on the wastewater-treatment plant operation and technology (Page 3, Line 14). Yes, it is very relevant because in this manuscript we asked to present the complication of this subject which part of it is due to the variety of the products and their concentration specifically in treated wastewater.

(Q2-5) What are their degradation products? I believe that this question is not answered by looking at just one specific substance, that is already available in the literature. Plus, you do not explain what are the variables that condition the degradation paths that would really occur in a given case.

(A2-5) The manuscript we introduced is an opinion and though on many of the point we present we gave an example but did not reviewed all of the possibilities. However, in order to make the point clearer we highlight the complexion arise from this example (Page 3, Lines 21-32).

(Q2-6) How chemically stable, and how toxic are these degradation products? You do not address this problem, but only in one line saying a very general statement.

(A2-6) Than you for your comment. We rewrote the paragraph and gave more example and references (Page 4, Lines 8-13; page 4, lines 20-27).

C3

(Q2-7) How do these components and degradation products impact the irrigated environment? So, how much gets into the plants eventually, how much remains sorbed in the soil, and how much goes to groundwater (where it mixes with billions of liters and further degrade due to the presence of soil biofilms that retain them and by the changes in redox conditions that degrade them).

(A2-7) Thank you for this comment. It is a big issue and study by different groups around the world deeply discuss this subject. For our point of you, we present the possible impacts of the pharmaceutical residues and their degradation products on the irrigated environment generally and add references that discuss the implications of specific compound or environment (Page 5, lines 5-25). We did not discuss the mechanisms or the diversion of the impact on the environment since this is behind the scope of this manuscript.

(Q2-8) What are the regulated parameters in water regulation? Do they provide any parameters in the context of recycled water? Do the regulated parameters indeed define high-quality effluents? This part I know nothing, and found the text very interesting, but it will not be enough to make it the core of the paper.

(A2-8) The parameter that are regulated in water regulation including BOD, COD, TSS, Soluble sodium percentage, Turbidity, N Total, NO<sub>3</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup>, Oil and Grease, etc., are examine in the context of recycled water in the same manner (Page 6, lines 1-5). The meaning is that when effluent is checked for those parameters and the results are in the range of regulations, the effluent consider "high quality effluent".

Please also note the supplement to this comment:

<https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-411/hess-2018-411-AC2-supplement.pdf>

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C4