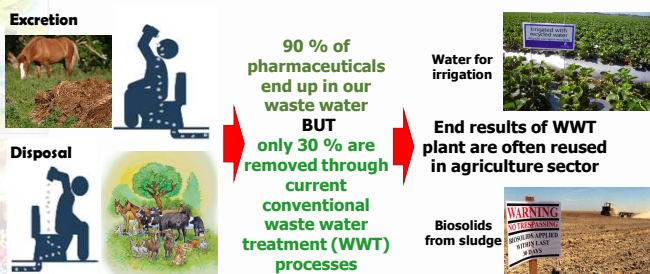


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Abstract: Recycled wastewater reuse for agricultural land irrigation or use of organic manure for agricultural land fertilization are common practices in current agriculture. However, these practices use for crops and vegetables cultivation become a concern due to the potential prevalence of **micro-contaminants as pharmaceutical products** because they **could represent a possible health hazards to consumers**. Through this study it was investigated how a commonly used pharmaceutical product as ibuprofen (a nonsteroidal anti-inflammatory drug which could be consumed without medical prescription) is uptake by tomato. Tomatoes artificial contamination were performed considering contamination of soil, water and air (vaporization), respectively. Contamination level was chose considering the contamination level reported in literature. Tomato samples exposure level at ibuprofen were analyzed on GC-MS and evaluated considering their development stage (Zadok scale) and their anatomic compartments (root, leaf, stem, edible parts). Ibuprofen metabolites profile were also studied through these experiments in order to establish ibuprofen fate and pattern.

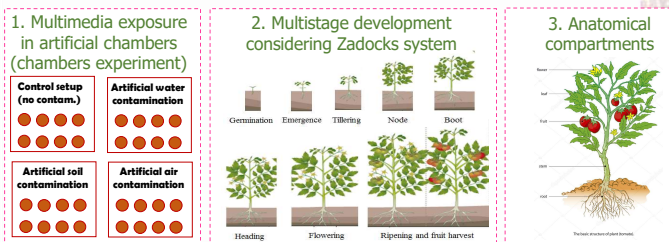
Background and challenges:



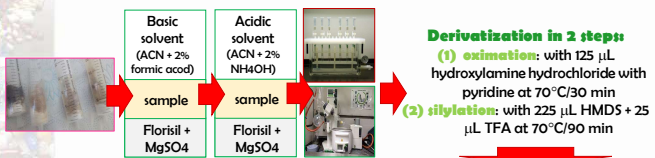
The issue is that we lack a global view of what happens when these medicinal products are discharged into the agricultural environment

Objectives and experimental setup:

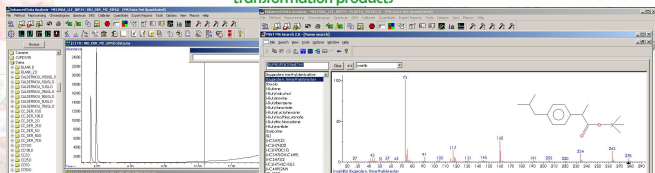
The major objective of this study was to evaluate if **ibuprofen, a commonly used NSAID, could enter in our food web chain as a consequence of use wastewater treatment plants end products in agriculture – treated water for irrigation and sludge/biosolids for soil fertilization.**



IBU and its transformation products profiling:



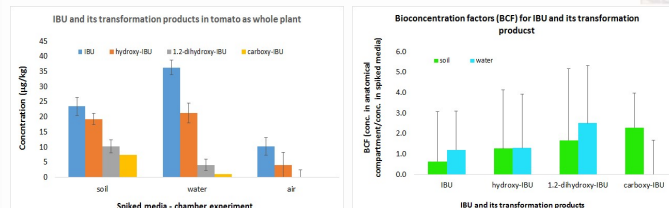
GC-MS analysis of trimethylsilyl(oxime)ester derivatives of IBU and its transformation products



Results:

Table. IBU and transformation products amount in contaminated media samples

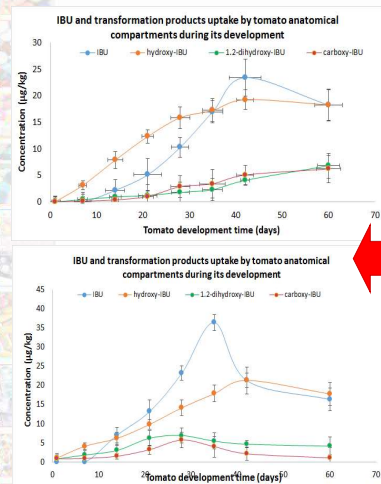
	IBU	SD	hydroxy-IBU	SD	1,2-dihydroxy-IBU	SD	carboxy-IBU	SD
soil	37.28	2.16	15.16	1.88	6.18	3.05	3.28	1.69
water	30.29	1.95	16.51	2.01	1.65	1.55	0.51	1.28



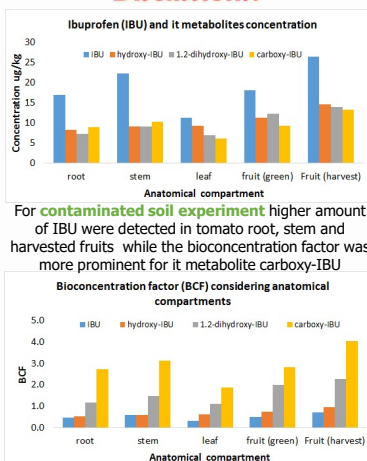
Higher uptake potential of IBU was observed when water was spiked.

This was confirmed also by the obtained bioconcentration factors

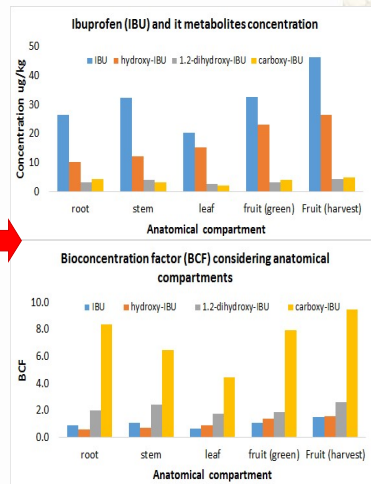
Discussions:



In spiked soil experiment IBU all transformation products present an increases trend during tomato whole development time while in spiked water experiment this trend is not followed by either compounds



Similar behavior was observed even for contaminated water experiment but with more higher values especially for determined bioconcentration factor of carboxy-IBU metabolite



Conclusions:

Tomato present a higher uptake potential from contaminated water media, followed by contaminated soil media than from contaminated air media
IBU and hydroxy-IBU are easily translocated by root, stem and fruit while carboxy-IBU and 1,2-dihydroxy-IBU are easily translocated by all anatomical compartments

Carvalho PN, Basto MCP, Almeida CMR, Brix H. 2014. A review of plant-pharmaceutical interactions: From uptake and effects in crop plants to phytoremediation in constructed wetlands. Environ Sci Pollut Res 21: 11729–11763. DOI 10.1007/s11356-014-2550-3

References:

Walters E, McClellan K, Halden RU. 2010. Occurrence and loss over three years of 72 pharmaceuticals and personal care products from biosolids-soil mixtures in outdoor mesocosms. Water Res 44: 6011–6020. DOI: 10.1016/j.watres.2010.07.051.

Acknowledgment:

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