

**"Qwaterly" drop:** In this issue, we present an aspect of agricultural irrigation with effluent and a brief insight on treatment of wastewater reverse osmosis concentrate. ENJOY!  
*Sincerely, Qwaterly*

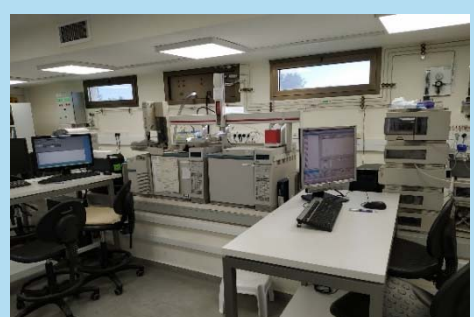
## Agricultural irrigation with effluent – what should we be worried about?

*Published: Avisar, D. and Ronen-Eliraz, G. 2019. Agricultural irrigation with effluent – what should we be worried about? Journal of Basic & Applied Sciences, 14, 32-39.*

Policy regarding effluent water and effluent water reclamation aims to prevent environmental pollution while proposing an alternative water resource. Water makes up 99–99.9% of raw wastewater. Thus, extracting organic and inorganic matter from water is a must. Worldwide, but especially in developed countries, great effort has been made to reuse wastewater, and it is becoming a reliable alternative source. Israel is the world leader in water reuse, allocating 85% of effluent water for agricultural irrigation. As such, it provides a "living laboratory" in which to study the implications of the intensive use of treated wastewater for agricultural irrigation, leading to research and legislation regarding effluent quality and regulation. Effluent produced in Israel is subject to strict regulations and standards and is considered suitable for all uses except drinking water. It is mostly allocated for agricultural irrigation with no restrictions. The irrigated lands are close to natural water sources, and therefore water leaching from the fields infiltrates those sources, becoming part of the water cycle. A group of persistent and toxic nano- and micro-organic contaminants, including pharmaceutical residues, flows to water-treatment plants from hospitals, industry, agriculture, and especially the domestic sector. These contaminants' chemical structure, characterized by aromatic rings and double bonds, makes them especially persistent; they are resistant to the biological treatment conventionally used as a secondary treatment. As a result, the effluent that leaves the treatment plants, which is considered to be of high quality, actually contains pharmaceutical residues. After secondary and tertiary treatment, these persistent chemical residues can still be found in surface water, groundwater and agricultural products. The presence of pharmaceutical residues in effluent allocated for agricultural irrigation is undesirable. Expansion of the monitoring system for those contaminants, improvement of the tertiary treatment, and implementation of advanced technologies for decomposition and removal of pharmaceutical contaminants are thus needed.

### Things are on the move:

Congratulations! Last September, we entered our extensively renovated hydro-chemistry laboratory, thanks to Mr. David Reznik's generous donation.

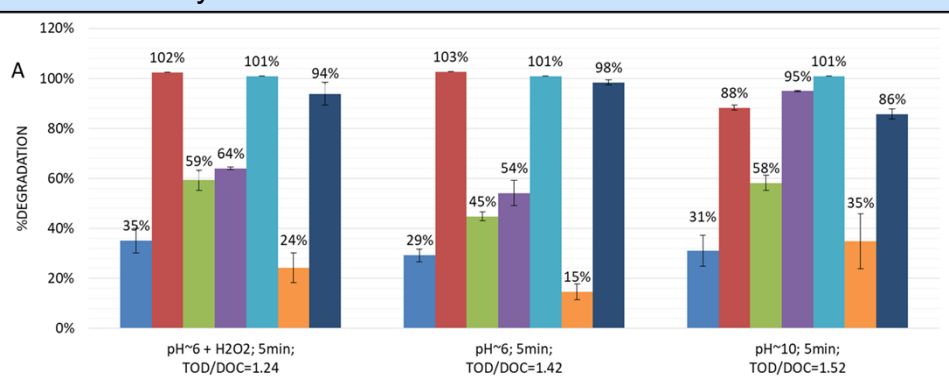


## Conferences & seminars:

November 2019 – AnalytiX-2019 (Europe) is an international conference that serves as a platform for scientists and companies dealing with analytical chemistry; it provides an ideal opportunity to share and showcase any novel findings and technologies. We presented our newest findings regarding the treatment of hospital wastewater, pertaining to persistent and toxic molecules and their degradation products, with two lectures, given by Prof. Dror Avisar and Dr. Igal Gozlan, WRC-TAU, at the Environmental Analysis and Monitoring session (chaired by Prof. Avisar): 1) Degradation of chemotherapeutic drugs derived from the Oncology Center: the treatment concept; 2) Pharmaceutical degradation products as hidden contaminants in the aquatic environment.

## Focus on treatment of wastewater reverse osmosis concentrate:

Wastewater subjected to reverse osmosis is a relatively new potential source of drinking water. However it involves the production of a concentrate that is rich in metal ions, nutrients and organic micro pollutants (TO<sub>OC</sub>s). A recent study evaluated the efficiency of advanced oxidation process (AOP) treatments at removing those TO<sub>OC</sub>s from the concentrate. Combined treatment of O<sub>3</sub>/H<sub>2</sub>O<sub>2</sub> or UV/H<sub>2</sub>O<sub>2</sub> demonstrated high removal efficiency, with a clear preference for the indirect oxidation mechanism by OH radicals.



*degradation by ozone at different conditions for WW RO concentrate*

## New publications:

**Avisar, D., Kaplan, A., Ronen-Eliraz, G., Vered, G., Shenkar, N. and Gozlan, I.** 2019. Validated method for detection of three phthalates derived from marine invertebrates. *American Journal of Analytical Chemistry*, 10, 10.

**Miarov, O., Tal, A. and Avisar, D.** 2019. A critical evaluation of comparative regulatory strategies for monitoring pharmaceuticals in recycled wastewater. *Environmental Management*. <https://doi.org/10.1016/j.jenvman.2019.109794>.

**Prasanna, V. L., Mamane, H., Vadivel, K. V. and Avisar, D.** 2019. Ethanol-activated granular aerogel as efficient adsorbent for persistent organic pollutants from real leachate and hospital wastewater. *Hazardous Materials*, [doi.org/10.1016/j.jhazmat.2019.121396](https://doi.org/10.1016/j.jhazmat.2019.121396).

**Friedman, L., Avisar, D., Chikurel, H., Jekel, M., Chandran, K., Huebner, U., Santo-Domingo, J. and Mamane, H.** 2019. Stimulated nitrogen biokinetics driven by hydrogen peroxide addition to secondary effluent biofiltration. *International Journal of Engineering Research and Applications*. In press.

**Prasanna, V. L., Avisar, D., Vadivel, K. V., Menashe, O., Kurzbaum, E., Cohen Yaniv, V. and Mamane, H.** Implementing an integrated approach: LP-UV-nano MgO<sub>2</sub> pretreated catalysis followed by small platform bioreactor capsules treatment for superior kinetic degradation performance of 17 $\alpha$ -Ethinylestradiol. In press.

## Congratulations:

Congratulations to M.Sc. Graduate **Aviv Kaplan** - October 2019.

Congratulations to Dr. **Lakshmi Prasanna** & Dr. **Vinod Kumar** on the birth of their daughter.



## The Moshe Mirilashvili Institute:

*The institute supports international collaborations and outstanding scientists:*



**Aviv Kaplan** has managed the Hydrochemistry Laboratory for the past 3 years; he is responsible for all analytical instruments and laboratory work. He holds a B.Sc. in Geophysics and Chemistry and has recently received his M.Sc. in Environmental Studies.