

## Environmental Chemistry 2020- Evolution of organochlorine and organophosphorus pesticides's residues (in « Akkar » region in Lebanon) linked to an evaluation of their toxicity using E.coli K12, Pseudomonas aeruginosa H103 and Salmonella enterica- Roukaya- Poitiers university, France

Roukaya Al Haj Ishak Al Ali  
Poitiers University, France

### Abstract:

#### I. Objective

Lebanon's agriculture represents 2.92% of its economy [1] and it is mainly used to feed the country even if part (potato, cereals, citrus fruits, etc.) is also exported to other countries (Kuwait, Qatar, Saudi Arabia, etc.) . However, intensive and unregulated use of pesticides in the agricultural regions of the Northwest of Lebanon, specifically in Akkar (second agricultural region in terms of surface area) has generated contamination of the water resources adjacent to the cultivation areas

The inhabitants of this region use groundwater as the main source of drinking water but also for irrigation [6]. Thus, the risks associated with this deterioration in the sanitary quality of water induced researchers to try to set up programs to monitor the evolution of the levels of organic pollutants from 2014. The aim of this study was to assess the evolution of groundwater contamination by two classes of pesticides (organochlorines - OCPs, organophosphates - OPPs) in wells in Akkar plain, based on two studies carried out in 2014 and 2016 and on a work currently being carried out, also this study try to evaluate the toxicity of existed pesticides in this wells using three different types of bacteria : E.coli K12, Pseudomonas aeruginosa H103 and salmonella enterica, diffrents tests has done (created) to conclude the effect of those pesticide upon these bacteria.

#### II. Material and methods

Water samples were taken from 14 wells and then conditioned to allow the isolation of pesticides. A methodology implementing a solid phase cartridge extraction (SPE, HLB) followed by an analysis by gas chromatography coupled to a mass spectrometer (GC / MS) was implemented and validated to allow quantification of the pesticide content. As for toxicological evaluation, four commune test were selected to identify the growth of these bacteria with the presence of these pesticides, their mobility, morbidity and ability to form a biofilm, then specific virulent gene for each bacteria were selected to interpret the ..

#### III. Results

The results showed that the levels of organochlorine pesticides identified in Akkar's groundwater exceed the limits set by the Stockholm Convention on Persistent Organic Pollutants. OPPs and OCPs are detected at similar significant levels (from a few  $\mu\text{g} / \text{L}$  to almost  $60 \mu\text{g} / \text{L}$ ). In addition, the concentration of several molecules seems to increase gradually since 2014. Different ratios, including  $\alpha\text{HCH} / \gamma\text{-HCH}$  and  $2,4'\text{-DDT} / 4,4'\text{-DDT}$ , were used in order to identify the main sources and historical use of pesticides. Thus it appears the lindane and the DDT found would be linked to a still recent use. An interesting effects on bacteria growth were seen after being in contact with these pesticides while some of them feed on these molecules while other were tolerated by, add to that their ability to form a biofilm and the variation in the expression of their virulent gene. All of these observations show that changes in the practices of use of phytosanitary products (education and training of farmers; establishment of regulations : eg protection near catchments) are necessary, as is the establishment of more systematic monitoring of these residues, particularly in the case of wells used for water supply.

**Organochlorine:** Chlorinated pesticides will in general be synthetically steady under high-impact surface conditions. Because of their relative insolubility, most OCPs are firmly adsorbed onto suspended particles in water. Their fixed status and determination can lead their gathering in soils where apparently moderate utilizations of pesticides have been applied. Aldrin has been recuperated following six years, both as follows and all the more richly as the metabolite, dieldrin. DDT has been recuperated as long as 30 years after statement. The substance soundness of numerous individuals from the gathering (or of their quick and regularly harmful metabolites) is high on the grounds that their particles are built, totally or to a great extent, from C-C, C-H and C-Cl bonds which will in general be synthetically idle under ordinary natural conditions. In result, hints of organochlorine mixes can be found in air and water all through the world. OCPs are a significant gathering of pesticides, utilized in agribusiness, general wellbeing, industry and the family. OCPs are boundless natural contaminants in different ecological frameworks in light of their ingenuity and

strength. The Cl particles on the natural moieties in the OCPs make these mixes truly stable in the earth.

**Organophosphorus:** Organophosphorus (OP) compound comprise of a gathering of approximately 250 synthetic substances made everywhere throughout the world. Around 140 of these mixes are pesticide, and the remaining are primarily modern synthetic substances utilized as fire retardants, plasticizers and mechanical water driven liquids and solvents. Operations pesticides are significantly less persevering in the earth, yet are harmful to non-target animals, for example, oceanic living beings, winged creatures and some advantageous bugs. Operation mixes can be

considered as subordinates of inorganic phosphorus mixes in which at least one hydrogen particles have been supplanted by natural gatherings. Operation bug sprays are typically esters, amides, or thiol subordinates of phosphoric, phosphonic, phosphorothioic, or phosphonothioic acids. Most are just somewhat solvent in water and have a high octanol/water segment coefficient and low fume pressure. They are by and large among the most intensely poisonous of all pesticides to vertebrate creatures. They are additionally flimsy and in this way separate moderately rapidly in nature.