

Presence of pesticide multi-residue in the waters of the Annaba Gulf basin (North-eastern end of Algeria)

Sub-Theme 1

The basin of the Annaba Gulf (Fig. 1) constitutes the ultimate receiver of innumerable chemical substances resulting from various anthropic activities. These telluric discharges are potentially accompanied by biocidal chemical compounds. In order to preserve the quality of coastal waters and limit these flows that are dangerous for the marine environment and human health, seasonal monitoring (year 2009-2010) of the physico-chemical quality of liquid effluents from Fertial (complex for the

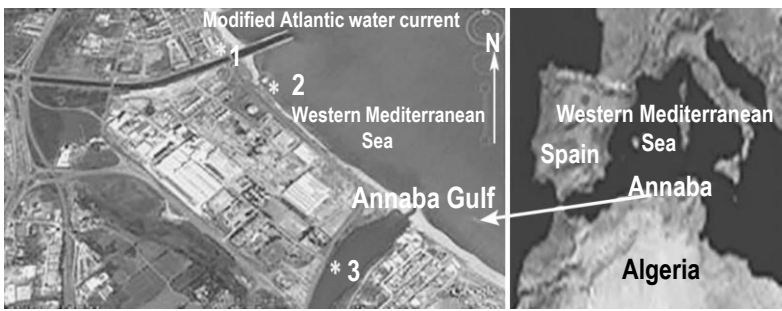


Fig. 1. Study sites in Annaba Gulf basin: 1: Boujemaâ effluent, 2: Industrial effluent (Fertial), 3: Seybouse effluent.

manufacture of phosphate fertilizers and phytosanitary products), as well as the waters of two wadis (Boujemaâ and Seybouse), which are the main sources of water pollution in the bay, was carried out.

The determination of the multi pesticide residues was carried out by GC/MS.

The results (Table 1) show that the Boujemaâ wadi is mainly polluted by organochlorine and organophosphate insecticides, herbicides and fungicides. The Seybouse wadi is mostly altered by organophosphorus insecticides, herbicides and fungicides.

Table 1. Multi-pesticide residues concentrations for water samples

Multi-pesticide residues (µg/L)	Boujemaâ wadi				Seybouse Wadi				Fertial effluent			
	oct 09	feb 10	may 10	augu 10	oct 09	feb 10	may 10	augu 10	oct 09	feb 10	may 10	augu 10
Organochlorine insecticides												
Alpha-HCH	< 0.005	0,005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Lindane	0,062	< 0.005	< 0.005	< 0.005	0,007	< 0.005	< 0.005	< 0.005	0,006	< 0.005	< 0.005	< 0.005
Organophosphorus insecticides												
Dichlorvos	0,084	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Malathion	0,018	< 0.01	< 0.01	< 0.01	0,015	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Herbicides												
Bromacil	< 0.009	< 0.009	< 0.009	< 0.009	0,022	< 0.009	< 0.009	0,022	< 0.009	< 0.009	< 0.009	< 0.009
Dicamba	0,027	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025	< 0.025
Dichlorprop	< 0.002	0,007	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0,005	< 0.002	< 0.002
Dinoterb	< 0.002	< 0.002	< 0.002	< 0.002	0,013	< 0.002	< 0.002	< 0.002	0,010	< 0.002	0,005	< 0.002
Diuron	< 0.003	< 0.003	< 0.003	< 0.003	0,009	< 0.003	0,003	0,010	0,005	0,011	0,007	0,012
2,4-D	0,027	< 0.008	0,029	< 0.008	0,027	< 0.008	0,075	< 0.008	0,008	< 0.008	< 0.008	< 0.008
Flazasulfuron	< 0.002	< 0.002	0,008	< 0.002	< 0.002	< 0.002	0,008	< 0.002	< 0.002	< 0.002	0,009	< 0.002
Fluroxypyr	< 0.006	< 0.006	< 0.006	< 0.006	< 0.006	0,006	0,011	< 0.006	< 0.006	< 0.006	0,009	< 0.006
Iodosulfuron-methyl-sodium	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0,032	< 0.002	< 0.002	0,002	< 0.002
Isoproturon	0,003	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Lenacil	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0,021	< 0.02	< 0.02	< 0.02	0,020	< 0.02
Linuron	< 0.003	0,004	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Mesosulfuron-methyl	< 0.003	< 0.003	0,013	0,054	< 0.003	< 0.003	0,007	0,010	< 0.003	< 0.003	0,010	0,006
Mesotrione	< 0.01	< 0.01	0,039	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0,038	< 0.01
Metoxuron	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	0,005	< 0.002	< 0.002	< 0.002	0,006	< 0.002
Metribuzin	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0,038	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Metobromuron	< 0.003	0,004	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
Nicosulfuron	< 0.01	< 0.01	0,019	< 0.01	< 0.01	< 0.01	0,024	< 0.01	0,010	< 0.01	0,025	< 0.01
Propyzamide	0,005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Terbutryn	< 0.002	< 0.002	< 0.002	< 0.002	0,005	< 0.002	0,004	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Fungicides												
Azoxystrobin	< 0.005	0,013	< 0.005	< 0.005	< 0.005	0,013	< 0.005	< 0.005	< 0.005	0,013	< 0.005	< 0.005
Carbendazim	0,025	< 0.002	0,007	0,046	< 0.002	< 0.002	0,005	0,024	< 0.002	< 0.002	< 0.002	< 0.002
Flusilazole	< 0.01	< 0.01	0,032	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Métalaxyl	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0,017	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Propamocarb HCl	< 0.002	< 0.002	< 0.002	0,016	< 0.002	< 0.002	< 0.002	0,008	< 0.002	< 0.002	0,020	< 0.002
Propiconazole	0,008	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0,011	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005

The quality of the two wadis is very poor to mediocre.

Fertial effluents also contain organochlorine insecticides and fungicides which remain within standards.

In the absence of standards, we cannot make any assumption on the quality of Fertial discharges with regard to herbicides.