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New Biomonitoring Approaches based on Next Generation Sequencing: a Test for Freshwater Diatom Communities

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► To cite this version:

Lenaïg Kermarrec, Frédéric Rimet, Alain Franc, Philippe Chaumeil, Jean Francois Humbert, et al.. New Biomonitoring Approaches based on Next Generation Sequencing: a Test for Freshwater Diatom Communities. 22nd International Diatom Symposium, Ghent University [Belgium] (UGENT). National Botanic Garden of Belgium, Ghent, BEL., Aug 2012, Ghent, Belgium. 1p. hal-02807004

HAL Id: hal-02807004

<https://hal.inrae.fr/hal-02807004v1>

Submitted on 6 Jun 2020

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Oral presentation

Use of “Species Sensitivity Distribution” for herbicides toxicity assessment on benthic diatom assemblages

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Herbicide presence in lake littoral zones is often characterized by a higher diversity of molecules and higher concentrations than in pelagic zones. The tolerance threshold of benthic diatoms, which represent a great part of the fixed biomass, to herbicides is not well known. With the view of assessing the ecological risk of herbicides for aquatic microorganisms, some models as Species Sensitivity Distribution (SSD) have been developed on phytoplanktonic species of the pelagic zone. Our study is aimed to determine if SSD models are adapted to describe the sensitivity of benthic diatoms to herbicides. In this view, we assessed the sensitivity of 11 benthic diatoms species to 5 herbicides (diuron, isoproturon, terbutryn, atrazin and metolachlor).

First, we constructed a database of sensitivity thresholds for each herbicide and each diatom species through 96h monospecific bioassays based on growth inhibition. From dose-response curves, an effective concentration that inhibits 50% of growth (EC50) was extrapolated for each dose-response curve. EC50 values showed a great variability of sensitivity among diatom species for a same herbicide and between all of them. Then, for each herbicide, a SSD curve was built with EC50 values of each diatom species (SSD-EC50) describing the variation of sensitivity of diatoms. Different groups of diatoms have been defined according to their tolerance level. This observation was more blatant for photosystem II (PSII) inhibitors. For this mode of action, four strains (*Nitzschia palea*, *Craticula accomoda*, *Gomphonema parvulum*, *Eolimna minima*) were always the most resistant out of the 11 tested species. This tolerance could be explained by two life-history traits: the trophic mode and the ecological guild. Indeed, N-heterotroph and motile guild species seemed to be more resistant to PSII inhibitors than N-autotroph and other profile guild species.