Does plasticity of the aquatic invasive plant, L. grandiflora, to terrestrial environment involve an epigenetic component?

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Abstract

Ongoing global changes and human activities impact ecosystems and open new opportunities for biological invasion (Early et al. 2016). Moreover, the ability of invasive species to adapt rapidly to new environments using phenotypic plasticity represents a relevant model to study short-term adapting mechanisms.
In this context, the aquatic invasive plant, *Ludwigia grandiflora*, is recognized as harmful in rivers and its recent dispersion in wet meadow in France results in the depreciation of their fodder values and losses of financial aids for farmers. Haury et al. (2013) distinguished two morphotypes, one living in submerged environment, the aquatic morphotype, while the other undergoing a seasonality of water level, the terrestrial morphotype. Billet et al. (2018) have shown that both morphotypes responded differentially at morphologic and metabolomic levels to submerged and emerged environments. In addition, this invasive plant mainly exhibiting clonal propagation was shown to adapt rapidly from the aquatic morphotype to the terrestrial one in less than five years. We propose to test the possibility that epigenetics known as a source of flexibility will be involved in the case of *Ludwigia grandiflora* fast adaptation (Richards et al., 2017).

To test the epigenetic hypothesis, we evaluate the variations of global methylation between both morphotypes in both submerged and emerged environments. And we use the DNA

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hypomethylating agent zebularine, to evaluate the impact of variations of methylation on both morphotypes in submerged and emerged environments by analysing their morphology, phytohormones and metabolites profiles. Our first results suggest that DNA methylation variations may play a role in the plasticity processes in *Ludwigia grandiflora*. Altogether our data encourage now realizing a genomic investigation using transcriptomics (RNA-Seq) and methylome analysis using an original approach focused on the gene-rich open chromatin fraction (Lafon-Placette et al., 2013).

Key words: epigenetics, invasive species, *L. grandiflora*, metabolomics, methylation, phytohormones, plasticity.