Impact of reproductive system in dispersal of Ludwigia grandiflora subsp. hexapetala, an aquatic invasive plant

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Résumé

Breeding system influences local population genetic structure, effective size, offspring fitness and functional variation. The worldwide invasive species, *Ludwigia grandiflora* subsp. *hexapetala* (*Lgh*) reproduces using clonal and sexual reproduction and presents two floral morphs: one self-compatible morph (SC) and one self-incompatible morph. To understand the role of reproductive system in *Lgh* dispersal, we first identified the breeding systems of *Lgh* by studying self- and cross-pollen tube elongations and seed production in both floral morphs. We observed that in the self-incompatible flowers, self-pollen tubes were stopped tardily, in the ovarian area, and were unable to fertilize the ovules. This is first formal identification of a late-acting, prezygotic self-incompatible system (LSI) in *Ludwigia* genus. This LSI system is permeable since self-incompatible populations can produce a low rate of seeds varying to 0.2‰ of selfed seeds during the uppermost flowering season to 1‰ at the end of the flowering season. We also showed that fruit set and seed set were controlled by a heteromorphic reproductive system involving a self-incompatible and inter-morph compatible morph (SC), and a self- and inter-morph compatible reverse morph (LSI). Secondly, we developed SNP markers to measure genetic diversity to assess reproductive modes on 53 LSI and SC populations newly colonizing France and northern Spain through the estimation of rates of clonality, selfing and outcrossing. We found that LSI and SC populations reproduced mainly clonally with similar rates of clonality but with a high diversity of genotypes and showed significant different rates of selfing as expected considering their breeding system. We also found evidence of local admixture between LSI and SC populations which questioned management plans of *Lgh*. The overall maintenance of higher genetic diversity, with the possibility to reproduce using clonality, selfing and outcrossing, may explain why LSI populations seem more prevalent in all newly expanding populations worldwide. To conclude, our results emphasize the necessity to consider the variations of reproductive modes when managing invasive plant species.

Mots-Clés: water primrose, invasive species, sexual reproduction, clonal reproduction, dispersal, genetic diversity

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