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EVOLUTION OF INBREEDING DEPRESSION IN SPECIES COMBINING SELF-INCOMPATIBILITY AND ASEXUAL REPRODUCTION

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INTRODUCTION
The origin and maintenance of self-incompatibility systems in angiosperms are still debated questions. The level of inbreeding depression in species that show a self-incompatibility system is a key parameter for the maintenance of the system. Several studies were developed to predict when the system can breakdown. A decrease of inbreeding depression, but also a reduction in the number of alleles at the self-incompatibility locus and outcross polen limitation, are generally associated with that breakdown. Two studies (Chen et al., 1997; Vallejo-Marín & O’Brien, 2007) have suggested that clonality could relieve the main selective pressures favouring the breakdown of self-incompatibility. In this study, we developed a model to simulate the evolution of inbreeding depression in a diploid species that reproduce both asexually and sexually with a self-incompatibility system. Our aim was to answer the following question:

Does clonality allow maintaining self-incompatibility in plants?

RESULTS
1. Effective number of alleles as a function of clonality

The effective number of alleles at neutral loci ($\mu_{A}$) increases with clonality. Our results show that the effective number of S alleles decreases with mutation rate ($\mu_{A}=10^{-1}, \mu_{A}=10^{-4}, \mu_{A}=10^{-4}$) at the S locus but also with clonality.

3. Inbreeding depression as a function of population size and clonality

For low clonality rates (<0.8), inbreeding depression decreases when population size decreases. For c>0.8, inbreeding depression is higher in small populations than in large ones. Inbreeding depression increases with clonality rate (except for N=25 for which it slightly decreases between c=0 and c=0.5).

4. Linkage disequilibrium between the S locus and the viability locus as a function of population size and clonality

Linkage disequilibrium between all pairs of loci increases when clonality increases. The linkage between the S locus and any other locus was higher than the linkage between the other locus (data not shown).

CONCLUSIONS & PERSPECTIVES
Clonality favours heterozygosity at all loci (Balloux et al. 2003). Inbreeding depression increases with clonality rate (except for N=25 for which it slightly decreases between c=0 and c=0.5). A decrease of inbreeding depression, but also a reduction in the number of alleles at the self-incompatibility locus and outcross polen limitation, are generally associated with that breakdown. Two studies (Chen et al., 1997; Vallejo-Marín & O’Brien, 2007) have suggested that clonality could relieve the main selective pressures favouring the breakdown of self-incompatibility. In this study, we developed a model to simulate the evolution of inbreeding depression in a diploid species that reproduce both asexually and sexually with a self-incompatibility system. Our aim was to answer the following question:

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