

## GENERAL INFORMATION

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<b>year</b>	2010
<b>English title</b>	Patterns of sex ratio variation and genetic diversity in the dioecious forest perennial <i>Mercurialis perennis</i>
<b>original title</b>	
<b>reference</b>	Plant Ecology 206
<b>pages</b>	105 - 114
<b>type</b>	article (a1)
<b>ecosystem service</b>	provisioning – genetic resources
<b>keywords</b>	forest fragmentation – ancient forest
<b>taxa</b>	<i>Mercurialis perennis</i>
<b>project</b>	PhDVandepitte_2009
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<b>document</b>	pdf, hardcopy
<b>data</b>	

## ABSTRACT

In small populations of plant species with separate sexes, it can be expected that besides the local environment also stochastic events influence population sex ratios. Biased sex ratios may in turn negatively affect genetic diversity due to increased genetic drift and, in clonal plants, due to reduced sexual reproductive output. Empirical evidence for these processes is scarce, however. We investigated the pattern of sex ratio variation and the distribution of genetic variation of the dioecious clonal forest herb *Mercurialis perennis* using AFLP markers. Analysis of molecular variance indicated a pronounced genetic structure. Overall within-population genetic diversity was moderate and local sex ratios were slightly male biased. The proportion of male to female plants in large populations slightly increased with increasing light penetration to the herb layer. Small populations, on the contrary, displayed high variability in sex ratios, unrelated to the local light environment. Genotypic diversity decreased with more male-biased sex ratios. We conclude that stochastic events related to small population size and the local forest environment, related to canopy closure, affect the proportion of female plants and indirectly influence local genotypic diversity, likely through the degree of sexual reproduction. This is one of the first studies to report a clear association between gender proportions and genetic diversity of a dioecious plant species in a fairly large survey.

## MATERIALS & METHODS

<b>study area</b>	3b (large population), 3e (small population)
<b>time period</b>	
<b>goal</b>	1. How is genetic diversity partitioned among the studied <i>M. perennis</i> populations? 2. Do small populations display a higher variability in the sex ratio, independent of canopy closure, compared to large populations? 3. Are local sex ratios related to genetic diversity?
<b>set-up</b>	20 populations in 8 ancient forest fragments between Ghent and Oudenaarde - small populations (n = 9) with less than 4000 flowering plants - large populations (n = 11) with more than 12000 flowering plants AFLP genetic markers
<b>data collection</b>	5 m x 5 m plot in each population

	<ul style="list-style-type: none"> <li>- young leaves from 18 shoots at regular distances along perpendicular axes (liquid nitrogen, frozen at -80°C)</li> <li>- percentage of flowering male shoots relative to male+female flowering shoots counted in ten 1 m<sup>2</sup> quadrants</li> <li>- canopy closure (June 2007) LAI-2000 Canopy Analyzer</li> </ul>
<b>remarks</b>	2 populations from the Aelmoeseneie forest (3b nor 3e seem to be ancient forest according to De Keersmaecker et al 2001)

## RESULTS

*Mercurialis perennis* was only found in ancient forests in the study area.

Stochastic events (related to small population size) and the local forest environment (light penetration to the herb layer) seem to affect the local gender proportion in *M. perennis*. Large *M. perennis* populations in shady forest sites are more likely to maintain balanced gender proportions and high genetic variation, probably because of higher levels of sexual reproduction compared to (1) populations under less favourable conditions and (2) small male-biased populations subject to a stochastic sex bias. No sexual recruitment is to be expected in completely male-biased monoclonal populations.