

Supplementary information :
From the simulation of forest plantation
dynamics to the quantification of
bark-stripping damage by ungulates

Gauthier Ligot, Thibault Gheysen, Jérôme Perin, Romain Candaele,
François de Coligny, Alain Licoppe, Philippe Lejeune

January 17, 2023

Supplementary figures and tables

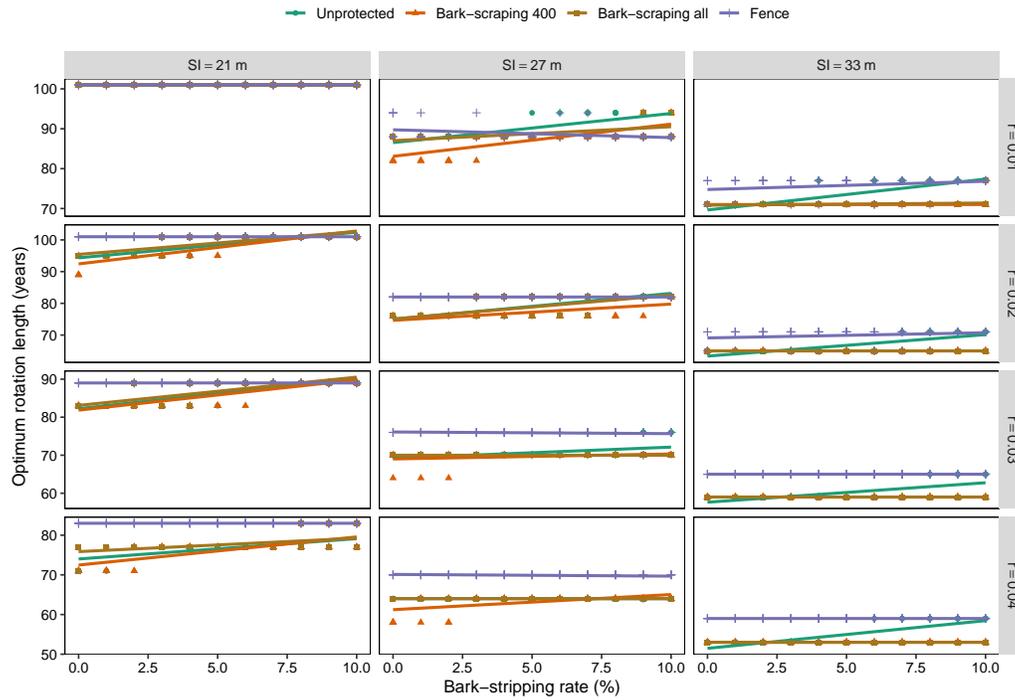


Figure S1: The optimum rotation length depended on the site index (SI), discount rate (r) and bark-stripping rate. For illustrative purposes, the variation of the optimum rotation length is shown for only three site indices ($SI = 21, 27$ and 33 m) and four discount rates ($r = 1\%, 2\%, 3\%$ and 4%).

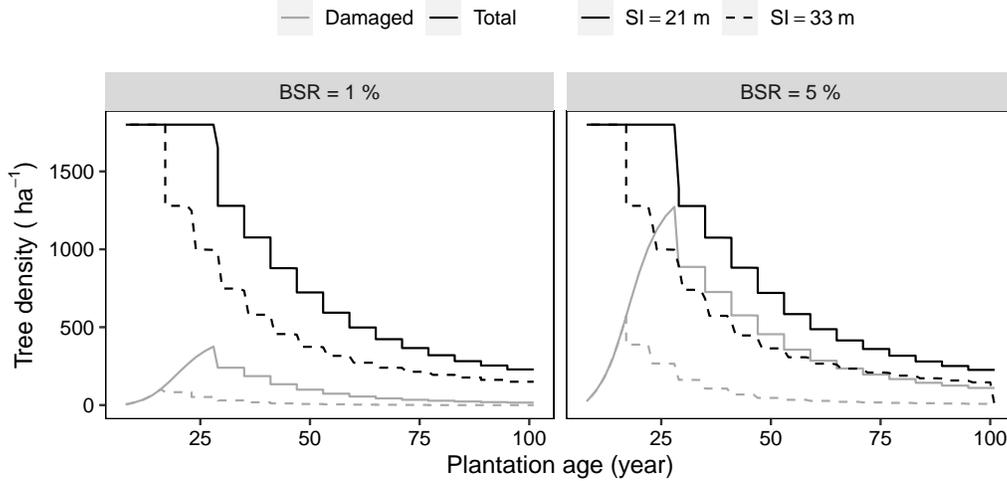


Figure S2: Changes in stand density and density of the damaged trees over time. The model predictions are plotted for two values of bark-stripping rate ($BSR = 1$ and 5%), two site indices ($SI = 21$ and 33 m) and in a site where all trees were individually protected at the first thinning (bark-scraping all trees). The lower the site index, the later thinning started and the more abundant was the bark-stripping damage.

Parameter	Effect	Estimate	Std. Error	p
β_1	BSR	$7.20 \cdot 10^4$	$2.19 \cdot 10^3$	< 0.001
β_2	$BSR \cap r$	$-2.22 \cdot 10^6$	$2.87 \cdot 10^4$	< 0.001
β_3	$BSR \cap SI$	$1.00 \cdot 10^3$	$7.57 \cdot 10^1$	< 0.001

Table S1: Parameter estimates, standard errors and p-values of the fitted linear model of the opportunity cost of bark-stripping damage (Equation 19) in response to bark-stripping rate (BSR), site index (SI), and discount rate (r). The opportunity cost is computed over a single rotation and, so does not assume that the same management scenario is repeated indefinitely.

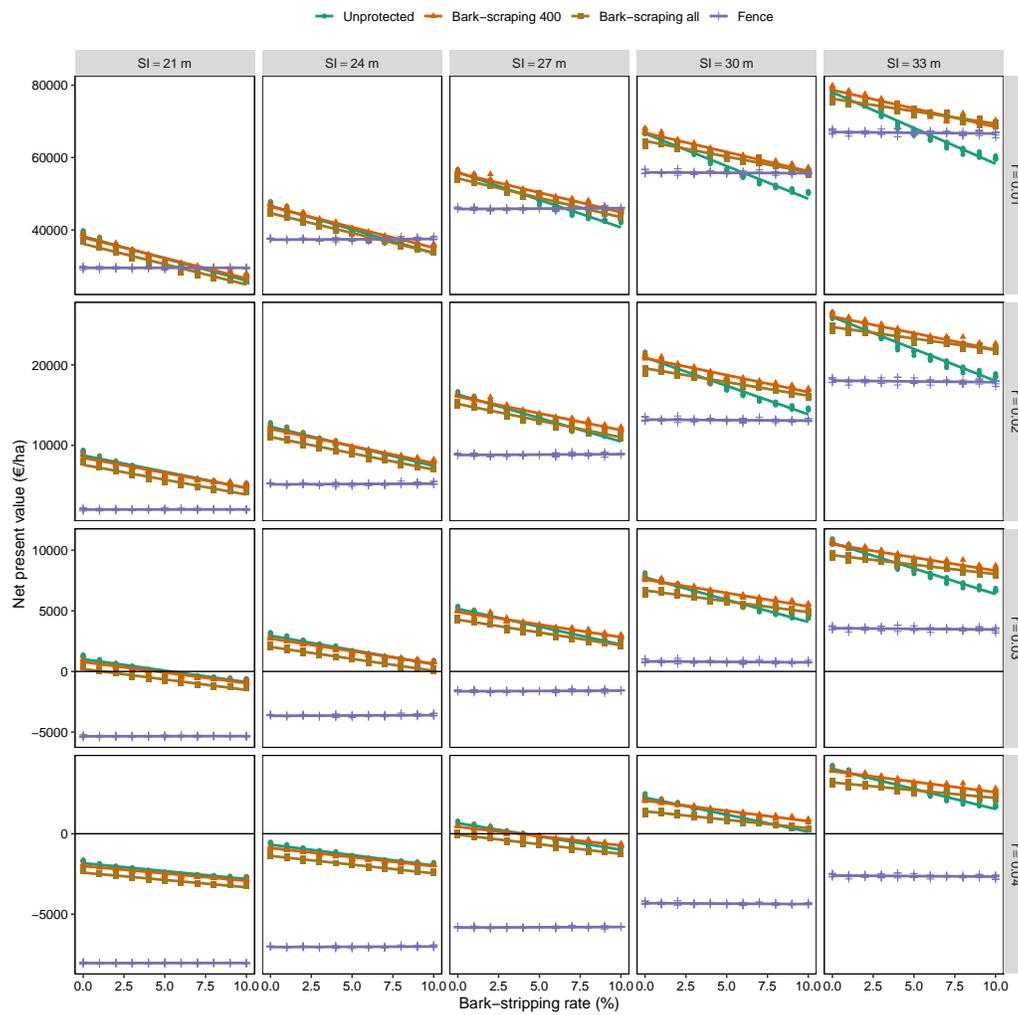


Figure S3: Variability of the net present value of the different scenarios across bark-stripping rates, discount rates, and site indexes.

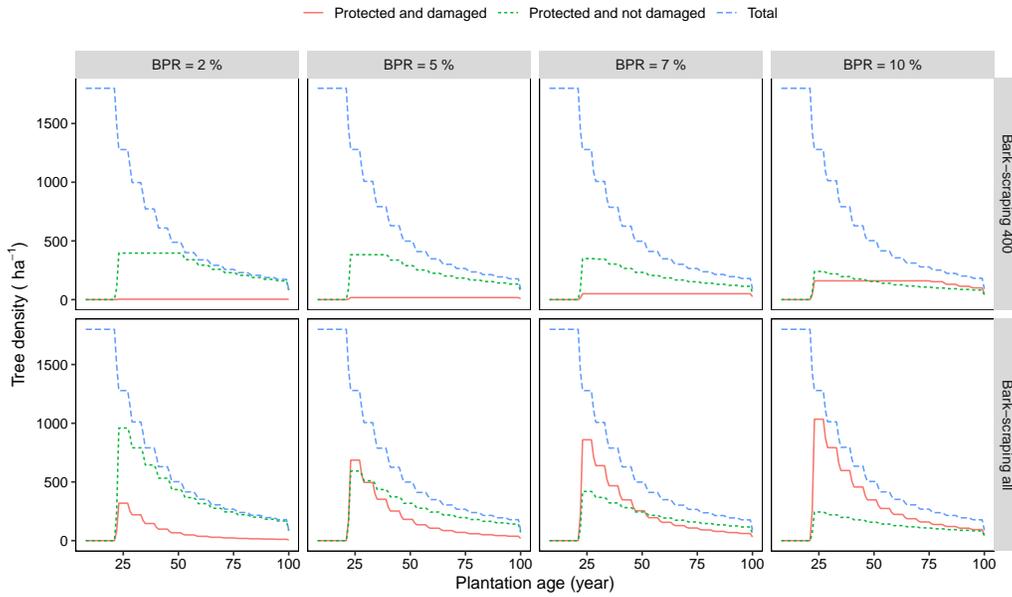


Figure S4: In the simulations, some trees were damaged before being protected. These plots show the changes in density of all trees, density of the protected trees that were damaged before the protection, and density of the healthy protected trees. The plots are shown only for the simulations with $SI = 27$ m.

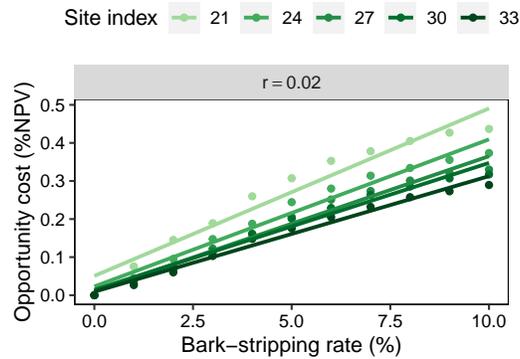


Figure S5: Relationships between the bark-stripping rate BSR , site index (SI) and opportunity cost of bark-stripping damage expressed as the percentage of the net present value (NPV_{∞}) of the corresponding scenario without damage. The plots were built with a discount rate of 2%.