Supplementary material:

Table s1: selection of 32 parameter sets used to access the sensitivity of four main equations driving the ips typographus outbreak model. Black values are reference values whereas red values correspond to the sensitivity analysis described in section 3.3. The parameter set in green corresponds to the chosen parameter values for which the credibility score =4 and the parameter set in green bold is the one chosen for this study.

$i_{beetles\ generation}$

	$S_{generation}$	G_{limit}	$S_{activity}$	act_{limit}	$S_{susceptibility}$	$i_{rd\ susceptibility}$	$S_{mass\ attack}$	BP_{limit}	Score
Set 1.1	1.0	0.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	4
Set 1.2	5.0	0.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	2
Set 1.3	500.0	0.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	2
Set 1.4	**1.0**	**1.0**	-20.0	0.06	-5.0	0.55	-30.0	0.12	4
Set 1.5	5.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.12	4
Set 1.6	500.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.12	2
Set 1.7	1.0	1.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	3
Set 1.8	5.0	1.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	0
Set 1.9	500.0	1.5	-20.0	0.06	-5.0	0.55	-30.0	0.12	0

$i_{beetles\ activity}$

	$S_{generation}$	G_{limit}	$S_{activity}$	act_{limit}	$S_{susceptibility}$	$i_{rd\ susceptibility}$	$S_{mass\ attack}$	BP_{limit}	Score
Set 2.1	1.0	1.0	-1.0	0.03	-5.0	0.55	-30.0	0.12	0
Set 2.2	1.0	1.0	-20.0	0.03	-5.0	0.55	-30.0	0.12	0
Set 2.3	1.0	1.0	-500.0	0.03	-5.0	0.55	-30.0	0.12	3
Set 2.4	1.0	1.0	-1.0	0.06	-5.0	0.55	-30.0	0.12	0
Set 2.5	1.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.12	2
Set 2.6	1.0	1.0	**-500.0**	**0.06**	-5.0	0.55	-30.0	0.12	4
Set 2.7	1.0	1.0	-1.0	0.09	-5.0	0.55	-30.0	0.12	0
Set 2.8	1.0	1.0	-20	0.09	-5.0	0.55	-30.0	0.12	0
Set 2.9	1.0	1.0	-500	0.09	-5.0	0.55	-30.0	0.12	2

$i_{hosts\ susceptibility}$

	$S_{generation}$	G_{limit}	$S_{activity}$	act_{limit}	$S_{susceptibility}$	$i_{rd\ susceptibility}$	$S_{mass\ attack}$	BP_{limit}	Score
Set 3.1	1.0	1.0	-20.0	0.06	-1.0	0.275	-30.0	0.12	0
Set 3.2	1.0	1.0	-20.0	0.06	-5.0	0.275	-30.0	0.12	1
Set 3.3	1.0	1.0	-20.0	0.06	-500.0	0.275	-30.0	0.12	1
Set 3.4	1.0	1.0	-20.0	0.06	-1.0	0.55	-30.0	0.12	0
Set 3.5	1.0	1.0	-20.0	0.06	**-5.0**	**0.55**	-30.0	0.12	4
Set 3.6	1.0	1.0	-20.0	0.06	-500.0	0.55	-30.0	0.12	2
Set 3.7	1.0	1.0	-20.0	0.06	-1.0	0.825	-30.0	0.12	0
Set 3.8	1.0	1.0	-20.0	0.06	-5.0	0.825	-30.0	0.12	2
Set 3.9	1.0	1.0	-20.0	0.06	-500.0	0.825	-30.0	0.12	2

$i_{beetles\ mass\ attack}$

	$S_{generation}$	G_{limit}	$S_{activity}$	act_{limit}	$S_{susceptibility}$	$i_{rd\ susceptibility}$	$S_{mass\ attack}$	BP_{limit}	Score
Set 4.1	1.0	1.0	-20.0	0.06	-5.0	0.55	-1.0	0.06	0
Set 4.2	1.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.06	0
Set 4.3	1.0	1.0	-20.0	0.06	-5.0	0.55	-500.0	0.06	3
Set 4.4	1.0	1.0	-20.0	0.06	-5.0	0.55	-1.0	0.12	0
Set 4.5	1.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.12	4
Set 4.6	1.0	1.0	-20.0	0.06	-5.0	0.55	**-500.0**	**0.12**	4

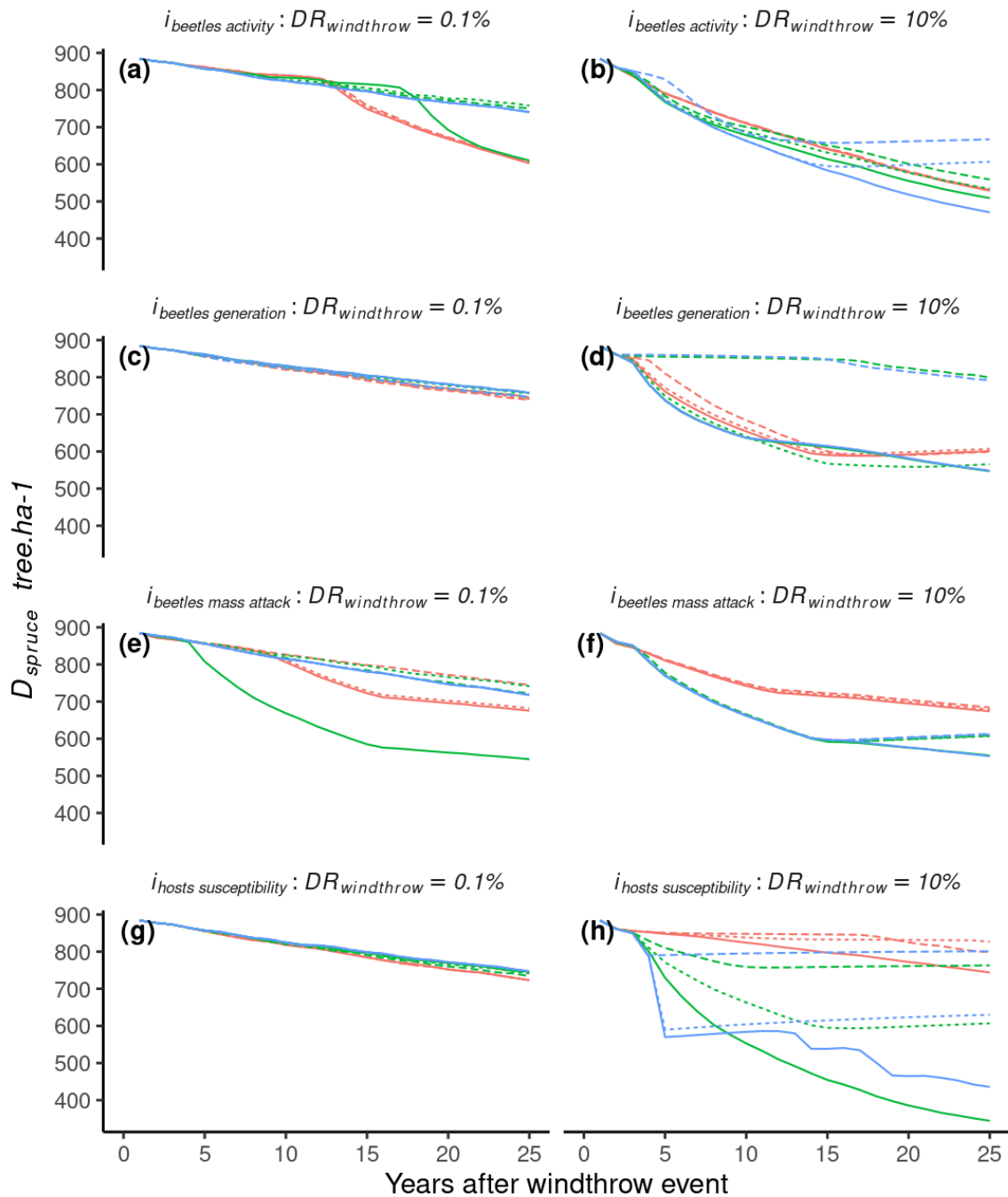|									
Set 4.7	1.0	1.0	-20.0	0.06	-5.0	0.55	-1.0	0.18	2
Set 4.8	1.0	1.0	-20.0	0.06	-5.0	0.55	-30.0	0.18	3
Set 4.9	1.0	1.0	-20.0	0.06	-5.0	0.55	-500.0	0.18	4

Figure s2: Simulation results from the sensitivity experiment at the THA site. Eight parameters from four equations were evaluated. Each equation represents an index from the bark beetle outbreak model ($i_{hosts\ susceptibility}$ $i_{hosts\ mass\ attack}$, $i_{beetles\ activity}$, $i_{beetles\ generation}$). Each index is represented by a logistic function defined by a shape parameter (*Shape*) and a limit parameter (*Limit*). Three values were chosen for each parameter resulting in 9 pairs of parameters for each index. Colored lines represent the shape parameter varying from linear : *Shape* = -1.0 (red), logistic -5.0 < *Shape* < -30.0 (green), to step function where *Shape* = -500.0 (blue). Line type represents three different values for *Limit* parameters where references (dashed line) are values of $i_{rd\ susceptibility}$, BP_{limit}, act_{limit} and G_{limit} (given in table 4), whereas permissive (full line) and restrictive (dashed dotted) represent a 50% decrease or increase respectively.
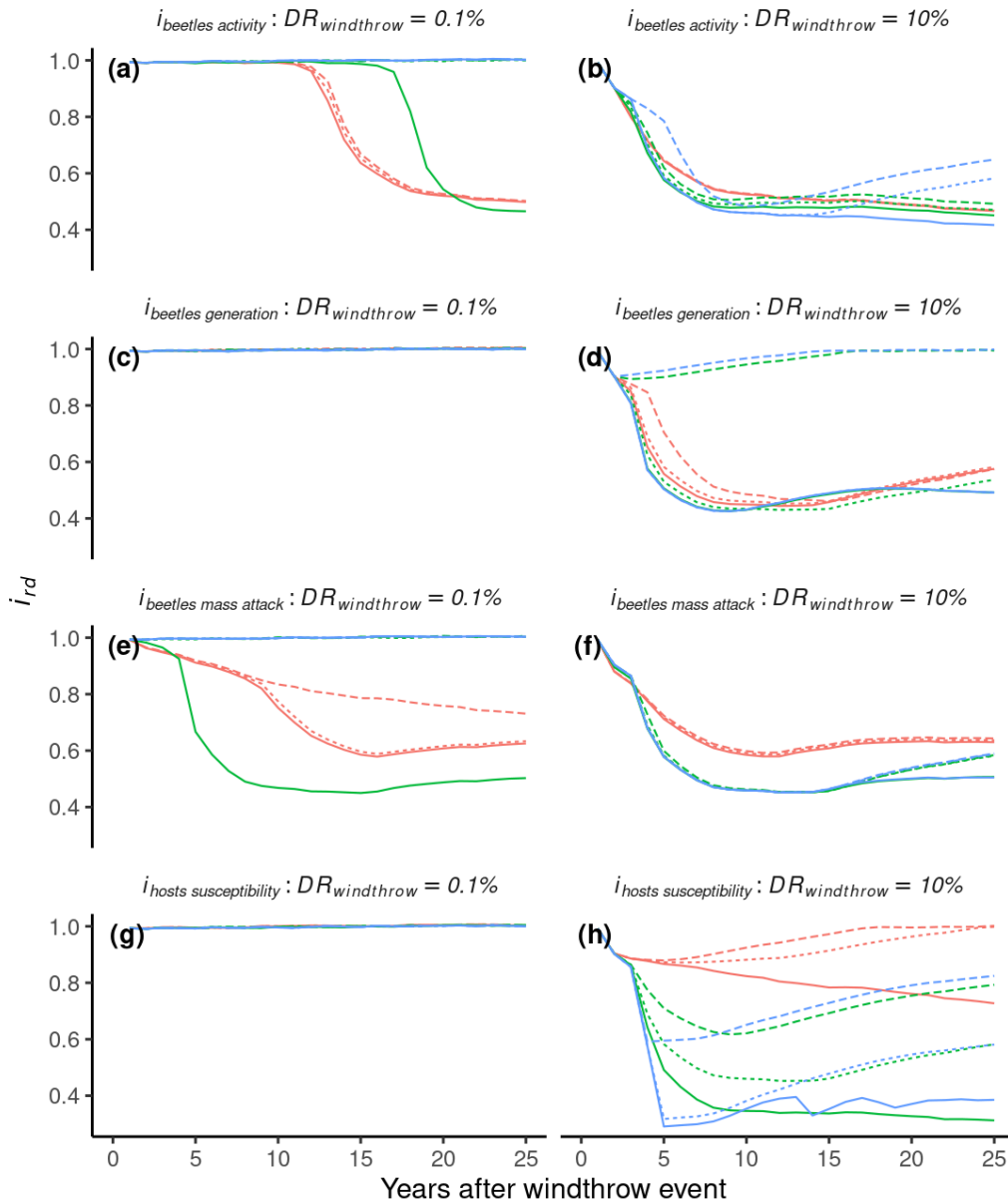
Figure s3: Simulation results from the sensitivity experiment at the THA site. Eight parameters from four equations were evaluated. Each equation represents an index from the bark beetle outbreak model ($i_{hosts\ susceptibility}$ $i_{hosts\ mass\ attack}$, $i_{beetles\ activity}$, $i_{beetles\ generation}$). Each index is represented by a logistic function defined by a shape parameter (_Shape_) and a limit parameter (_Limit_). Three values were chosen for each parameter resulting in 9 pairs of parameters for each index. Colored lines represent the shape parameter varying from linear : _Shape_ = -1.0 (red), logistic -5.0 < _Shape_ < -30.0 (green), to step function where _Shape_ = -500.0 (blue). Line type represents three different values for _Limit_ parameters where references (dashed line) are values of $i_{rd\ susceptibility}$, BP_{limit}, act_{limit} and G_{limit} (given in table 4), whereas permissive (full line) and restrictive (dashed dotted) represent a 50% decrease or increase respectively.
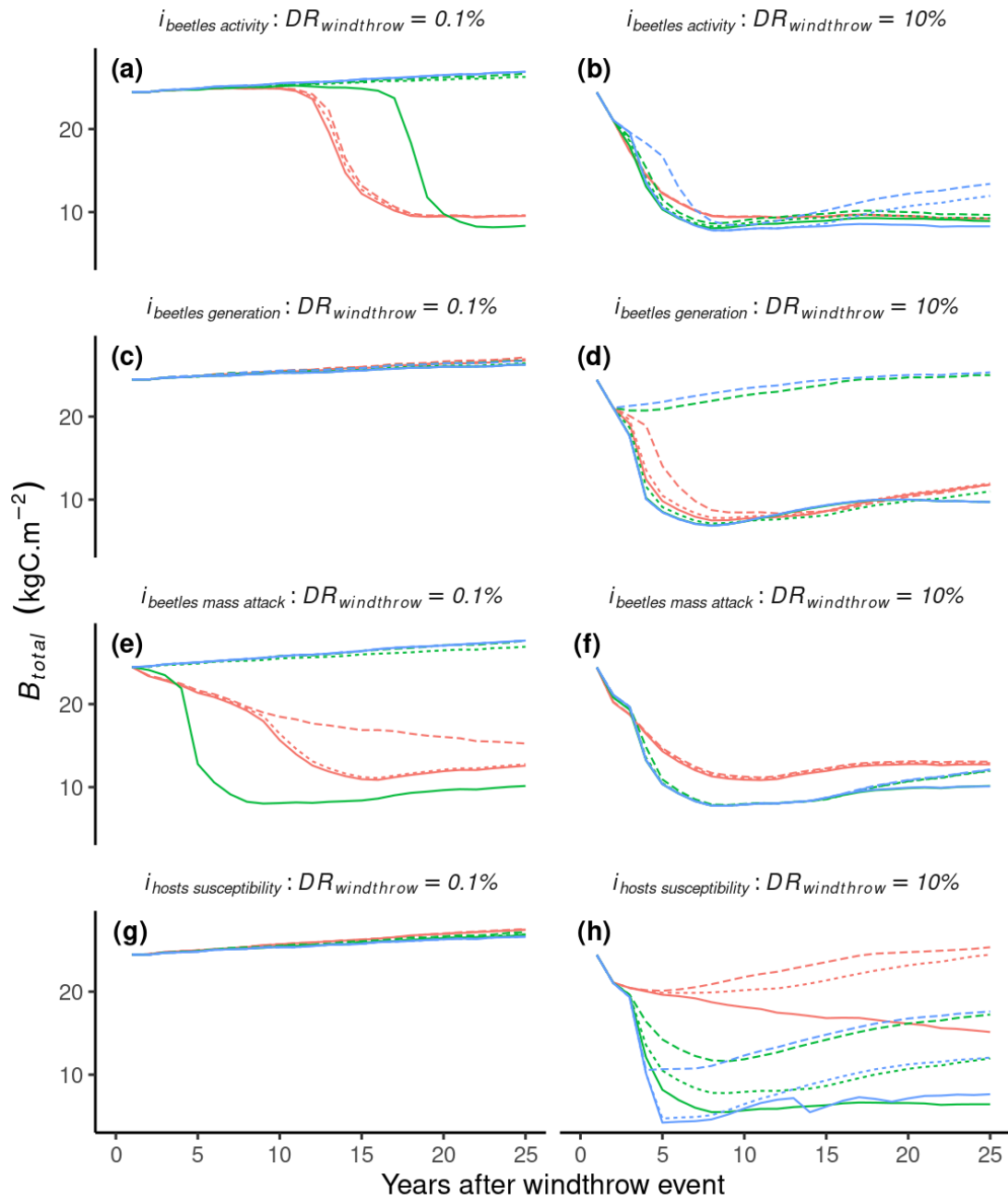
Figure s4: Simulation results from the sensitivity experiment at the THA site. Eight parameters from four equations were evaluated. Each equation represents an index from the bark beetle outbreak model ($i_{hosts\ susceptibility}$, $i_{hosts\ mass\ attack}$, $i_{beetles\ activity}$, $i_{beetles\ generation}$). Each index is represented by a logistic function defined by a shape parameter (*Shape*) and a limit parameter (*Limit*). Three values were chosen for each parameter resulting in 9 pairs of parameters for each index. Colored lines represent the shape parameter varying from linear : *Shape* = -1.0 (red), logistic -5.0 < *Shape* < -30.0 (green), to step function where *Shape* = -500.0 (blue). Line type represents three different values for *Limit* parameters where references (dashed line) are values of $i_{rd\ susceptibility}$, BP_{lim}, act_{limit} and G_{limit} (given in table 4), whereas permissive (full line) and restrictive (dashed dotted) represent a 50% decrease or increase respectively.