

Bringing diversity to silvopastoral systems



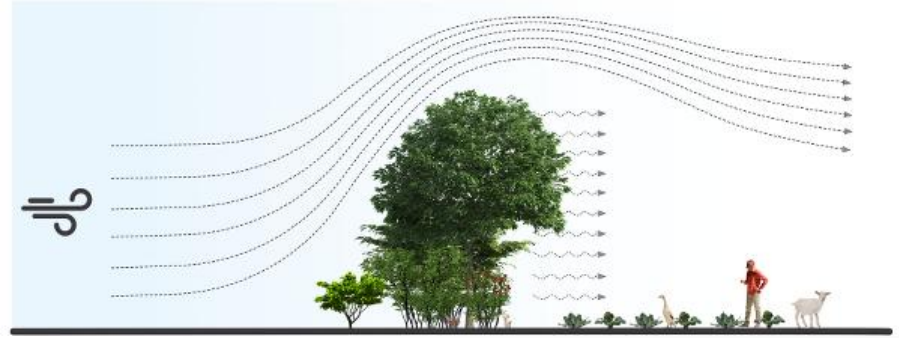
Mixing tree species: Which objectives ?

- ▶ Different growth rate
 - ▶ Spread production over time
 - ▶ Diversify incomes
- ▶ Biodiversity
- ▶ Soil fertility
- ▶ Disease resistance



Adding hedgerow: Which objectives ?

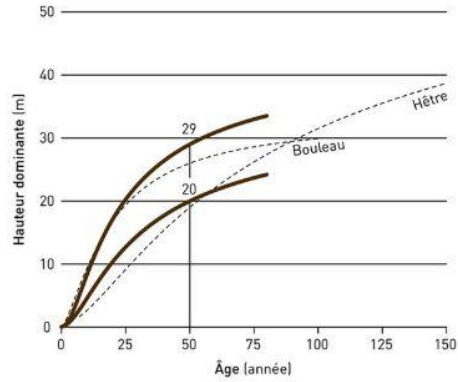
- ▶ Climate regulation
 - Windbreaks
 - Carbon storage
- ▶ Water regulation
- ▶ Biodiversity



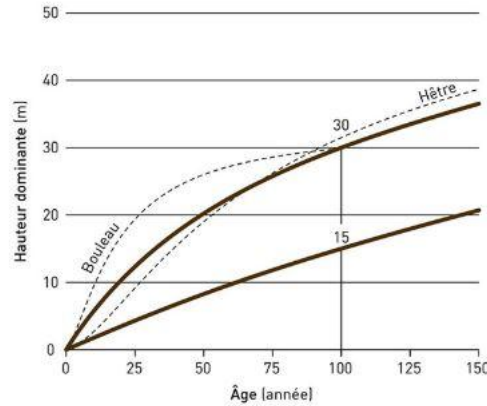
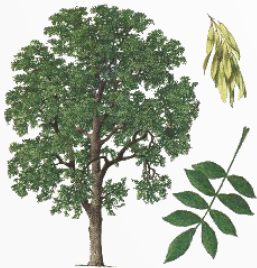
Choosing timber species

Species/Features	Valuable timber production	Productivity	Growth rate (height increase per year)	Apical dominance	Light branching habit	Bioclimatic compatibility	Market opportunities (in Ireland)	Special properties
<i>Acer platanoides</i>	**	Productive	Medium	nd	nd	***	**	Easy to transplant
<i>Acer pseudoplatanus</i>	***	Productive	Medium (12)	***	**	***	**	To plant with fast growth trees
<i>Alnus cordata</i>	**	Productive	Fast	nd	nd	***	**	N fixer, browsed leaves
<i>Alnus rubra</i>	**	Productive	Medium (14)	**	**	***	**	N fixer, browsed leaves
<i>Betula pendula</i>	**	Productive	Fast	nd	nd	***	**	Shade intolerant, poor competition, great shelter
<i>Fagus sylvatica</i>	**	Productive	Medium	**	*	***	***	Great competition, shade tolerant
<i>Fraxinus excelsior</i>	***	Productive	Medium (12)	***	***	***	**	Browsed leaves
<i>Prunus avium</i>	***	Productive	Medium	***	*	**	**	Needs lots of light
<i>Quercus petraea</i>	**	little productive	Medium	**	***	**	***	High ecological potential
<i>Quercus robur</i>	**	little productive	Low	**	***	***	***	High ecological potential
<i>Quercus rubra</i>	**	little productive	Fast (24)	**	***	**	***	Easy to transplant

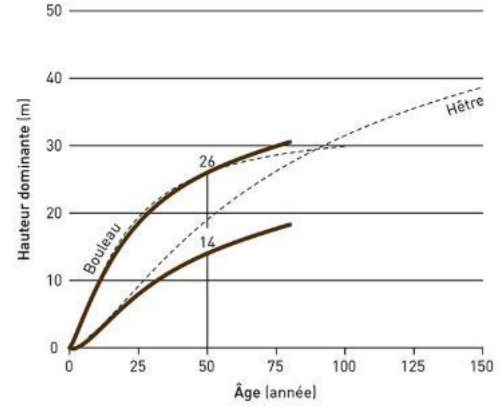
Choosing timber species



Ash (*Fraxinus excelsior*)



Oak (*Quercus petraea*)



Alder (*Alnus rubra*)



Choosing timber species

- ▶ Already tested in agroforestry trials in UK
- ▶ Native species
- ▶ Browsed leaves
- ▶ Late leaf break



Choosing hedgerow species

Species / Features	Mature age (year)	Evergreen	Max Height (Windbreaks)	Attractive for wildlife	Notes
<i>Corylus avellana</i>	15	No	6 m	***	Host an aphid which feed an antagonist orchard pest
<i>Crataegus monogyna</i>	35	No	6 m	***	Most common hedgerow plant specie
<i>Euonymus europaeus</i>	15	No	3,25 m	**	Each part are toxic for humans and animals
<i>Ilex aquifolium</i>	15	Yes	6 m	***	Grow well with blackthorn
<i>Rosa canina</i>	7,5	No	3,25 m	***	Produce fruits until December
<i>Prunus spinosa</i>	35	No	3,25 m	**	Can be used as rootstock for plum tree
<i>Ulex europaeus</i>	15	Yes	2,5 m	**	Animal fodder
<i>Viburnum Opulus</i>	15	No	6 m	***	Acid soils unsuitable, competitive

Choosing hedgerow species



Prunus spinosa
(Blackthorn)



Ulex europaeus (Gorse)



Rosa canina (Dog-rose)



Crataegus monogyna
(Hawthorn)



Viburnum opulus
(Guelder rose)

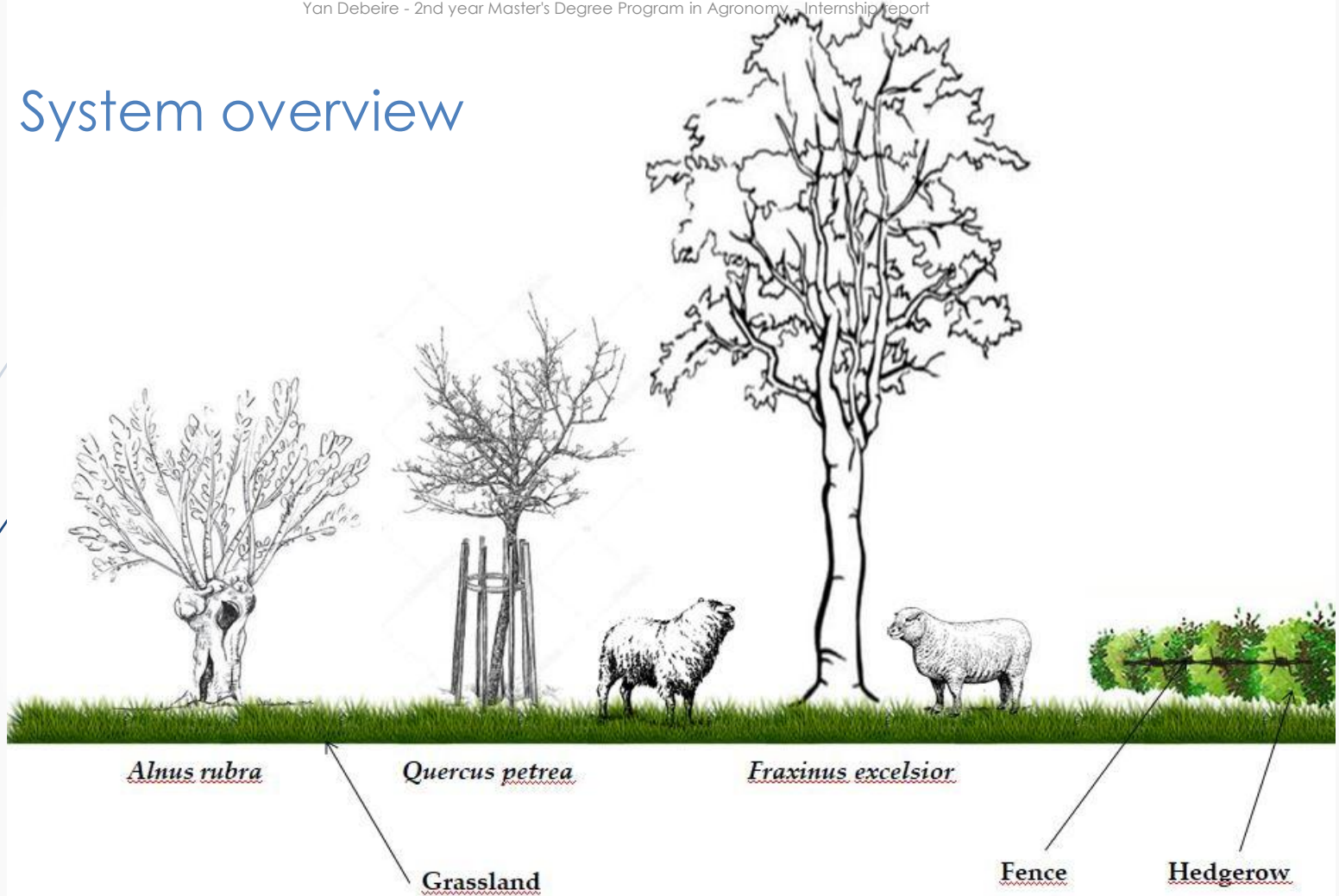


Corylus avellana
(Hazel)



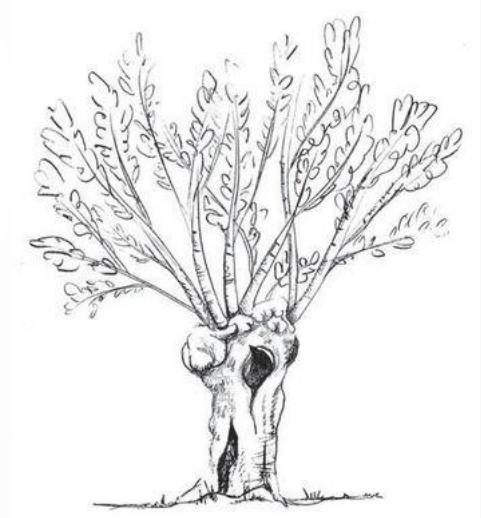
Ilex aquifolium
(Holly)

System overview



System maintenance : Why pollard trees ?

- ▶ Modulate rate of nitrogen fixation
- ▶ Provide quicker income return
- ▶ Diversify wood market opportunities
- ▶ Improve biodiversity

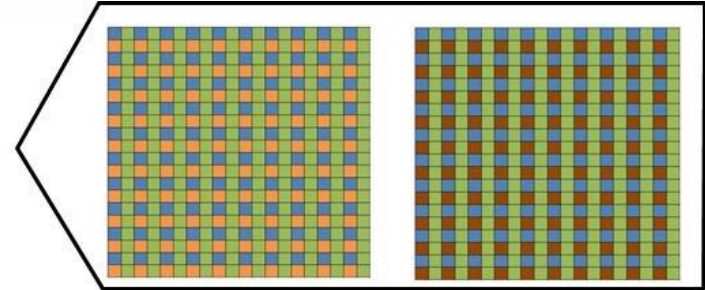


System design

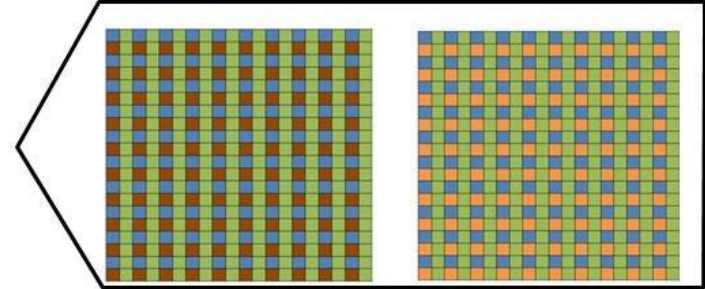
-  *Quercus petraea* (100 stems/ha)
-  *Fraxinus excelsior* (200 stems/ha)
-  *Alnus rubra* (100 stems/ha)
-  *Alnus rubra* (pollard) (100 stems/ha)

- 2 combinations
- 3 replicate blocks
- 400 stems/ha
- Spacing 5 m x 5 m

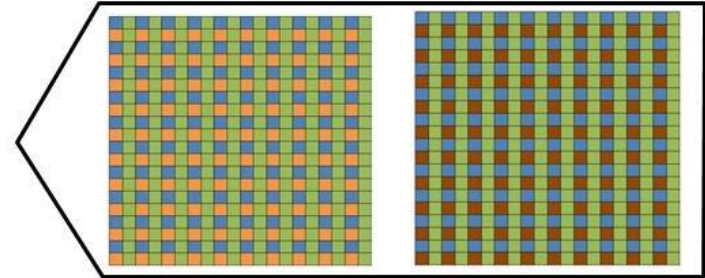
Block I



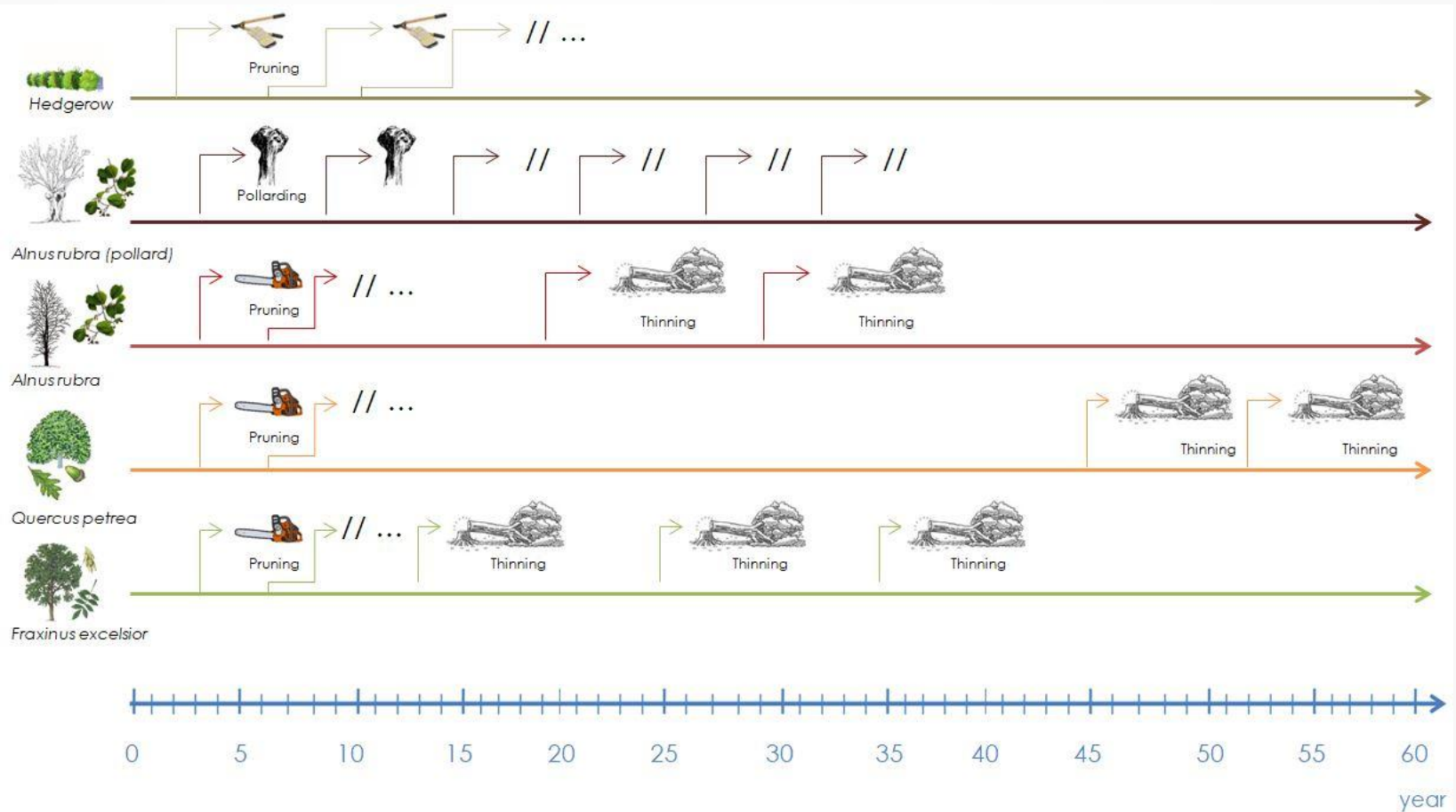
Block II



Block III



System maintenance



Measuring performances

- ▶ Grass yield
- ▶ Tree growth
- ▶ Biodiversity
- ▶ Carbon storage
- ▶ Soil fertility and tree competition
- ▶ Soil moisture



Thank you for your attention

Beaucoup
sur l'espace
réactions
compar
basen
de bon res
espèces vo

Reste plus



References

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