

Patterns of *Prunus serotina* invasion in two contrasting forests

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Outline presentation

- Introduction
- Research questions
- Study sites
- Reconstruction of the *P. serotina* invasion

5. Conclusions

1. Introduction (I)

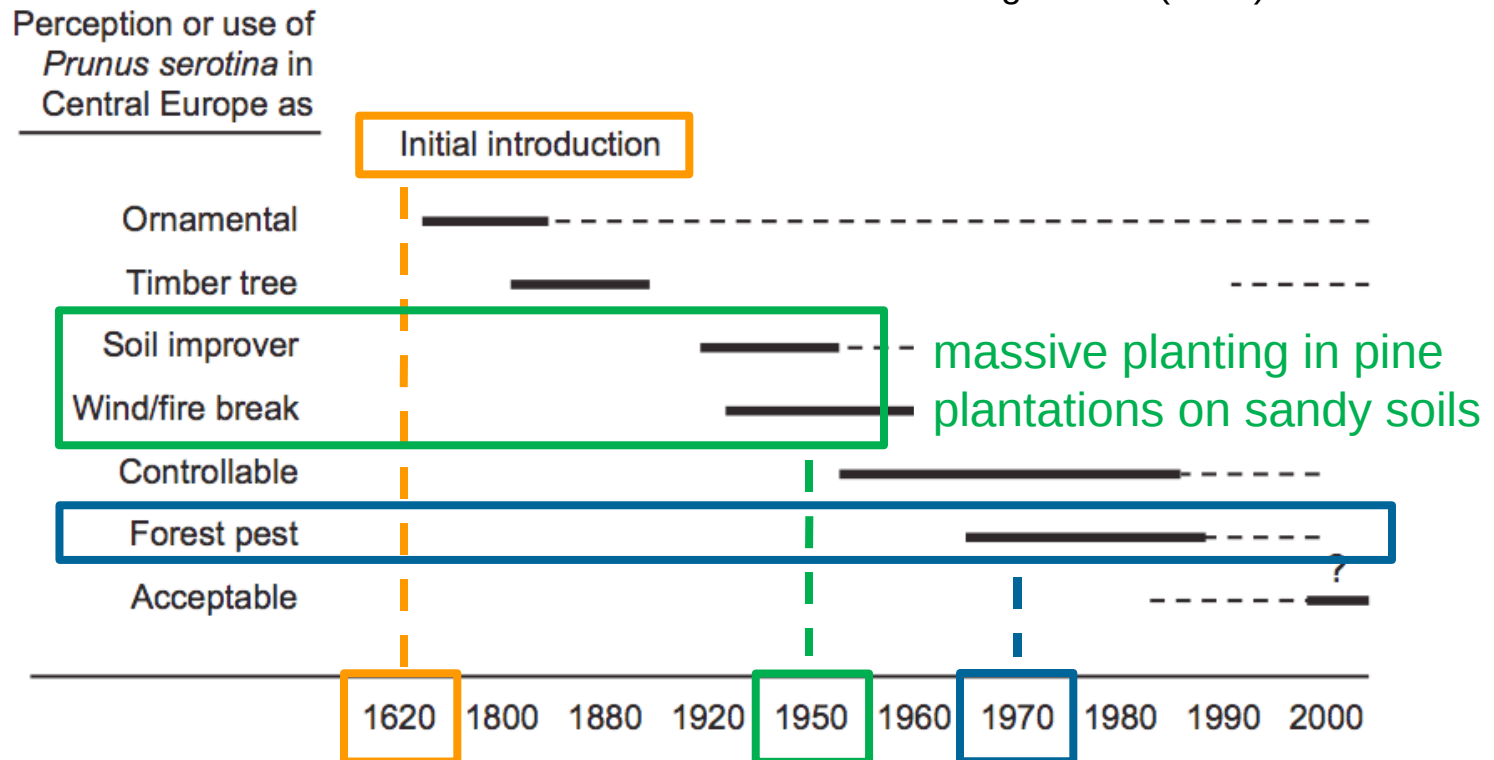
Features of black cherry (*Prunus serotina*)



1. Introduction (II)

Introduction history of black cherry

from: Starfinger et al. (2003) Biol. Invasions



2. Research questions

large-scale, massive plantings

→ large propagule pressure

large-scale, intensive control programs

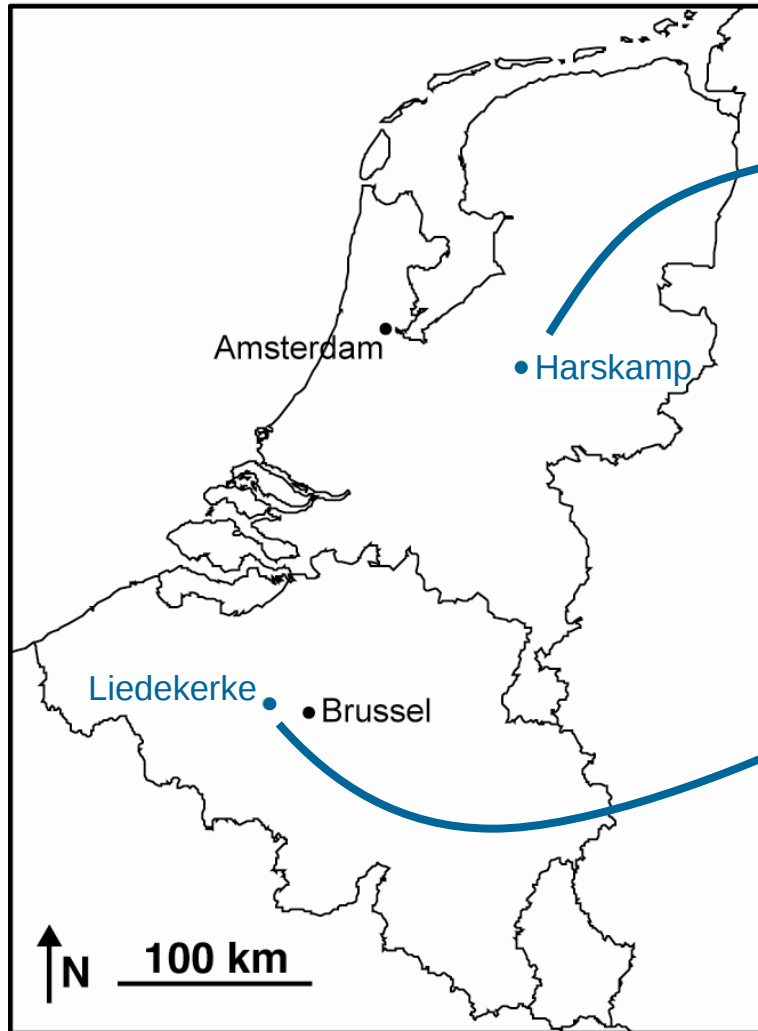
→ no undisturbed development

areas with a low (initial) propagule pressure and no management of black cherry

→ what affects its colonization?

→ black cherry = invasive species?

3. Study sites (I)



Ossenbos (OSS)

- sand
- 85 % pine (*Pinus sylvestris*)
- high herbivore pressure: 1 ha⁻¹

Liedekerke (LDK)

- sandy loam
- 43 % birch (*Betula pendula/pubescens*)
- 45 % oak (*Quercus petraea/robur/rubra*)
- no large herbivores

3. Study sites (II)

Liedekerke (LDK)



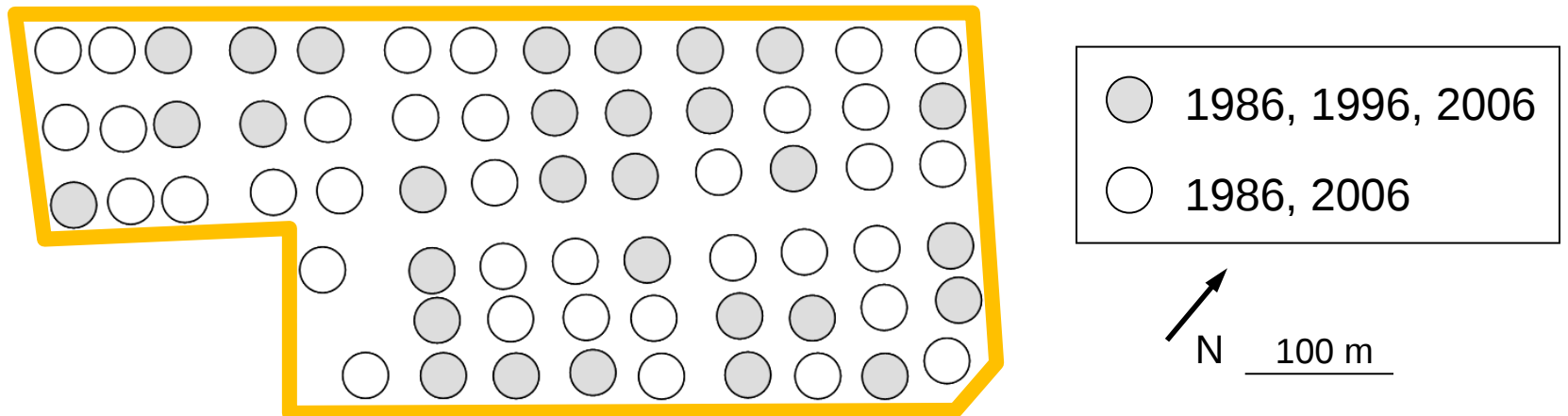
Ossenbos (OSS)



- similarities** NO management for > 60 yr
- NO deliberate introduction of black cherry

4. Reconstruction – LDK (I)

Data collection

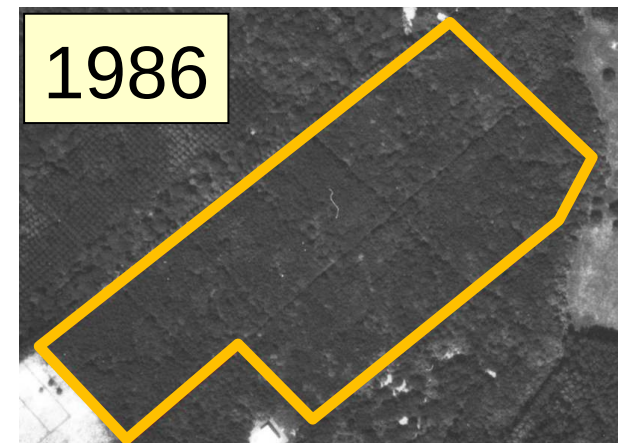
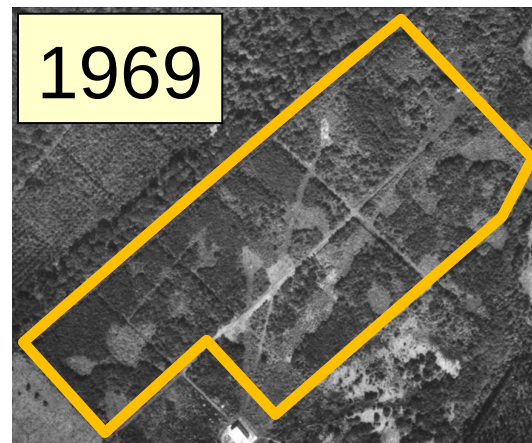
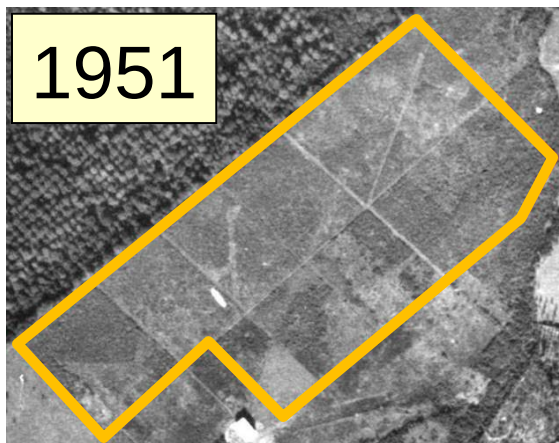


- 65 circular plots (1986, 1996, 2006)
- aerial photographs
- tree ring analysis

4. Reconstruction – LDK (II)

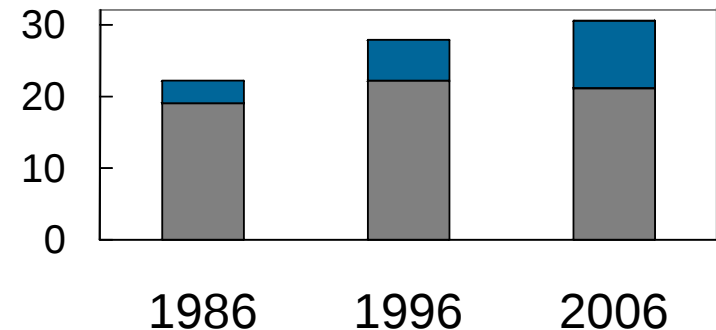
Forest development

1926 clearcut – *heath & coppice* – 1945 stop management



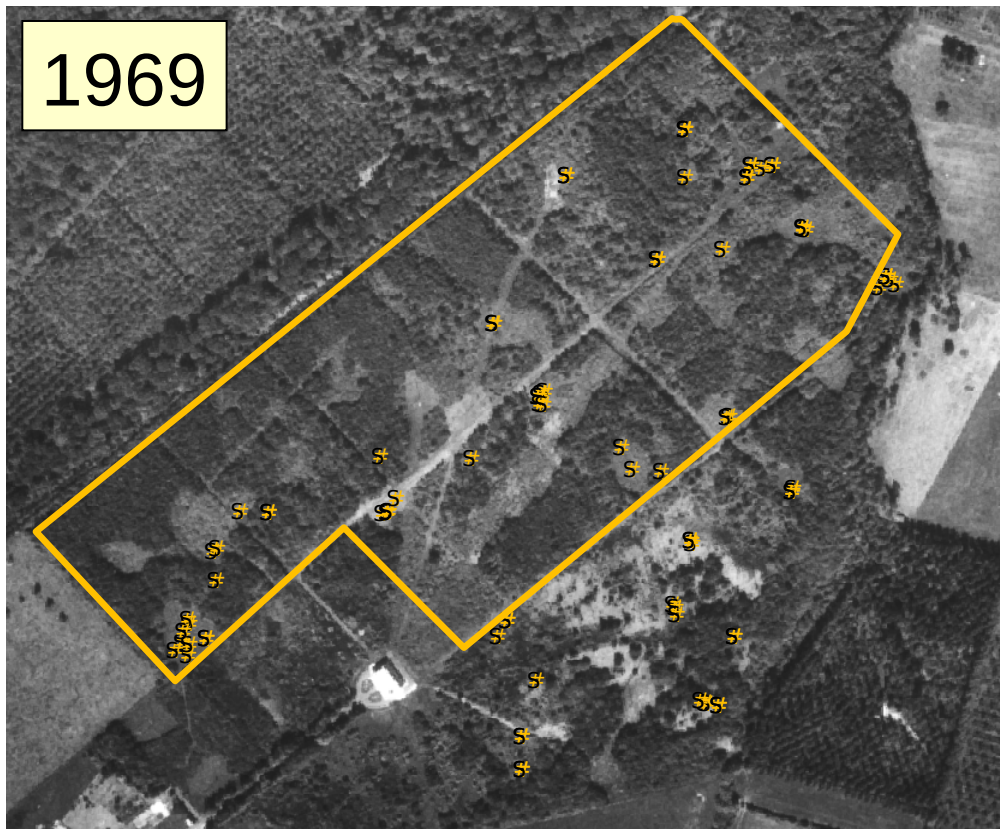
Basal area ($\text{m}^2 \text{ha}^{-1}$)

- light-demanding woody species
- shade-tolerant woody species



4. Reconstruction – LDK (III)

Oldest black cherry: establishment ~ 1970

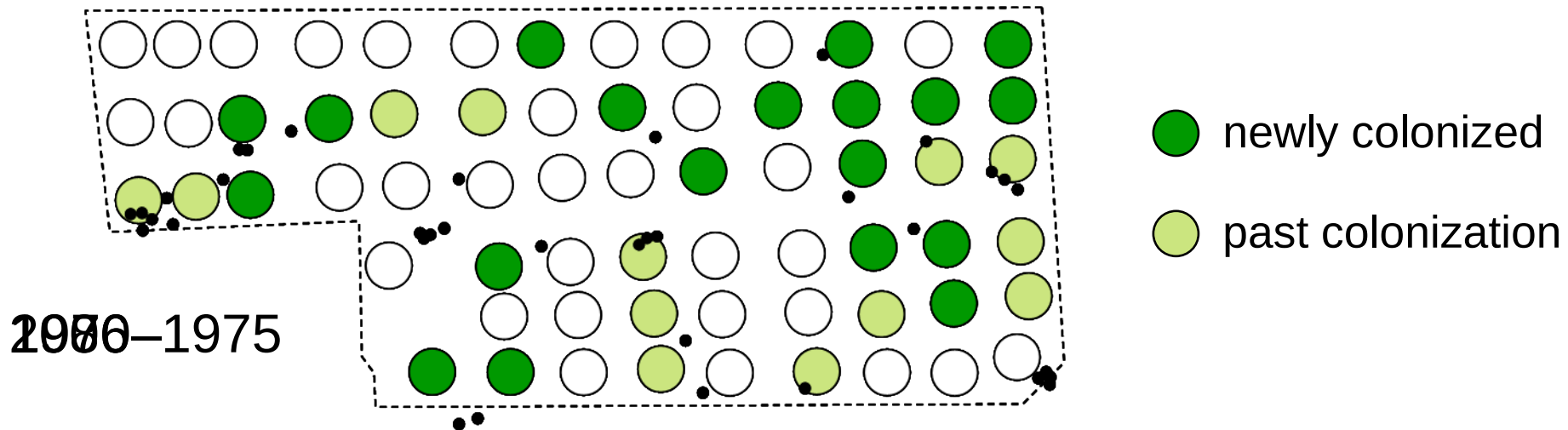


In 2006:
seedlings found in
< 10 % of the plots

Black cherry needs light
to establish.

4. Reconstruction – LDK (IV)

Spread of black cherry



Plots with black cherry

- high connectivity to seed trees
- high basal area (of shade-casting species)
- low *Rubus* cover

4. Reconstruction – LDK (V)

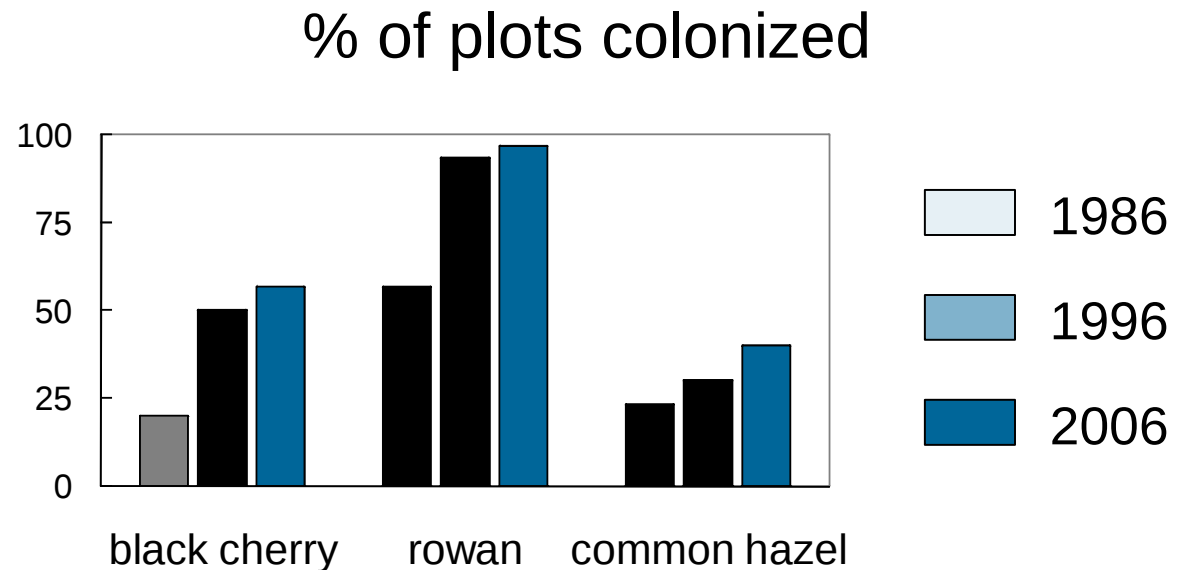
Black cherry ↔ native species



rowan



common hazel



Black cherry did not hinder the spread of native species.
Largest spread between 1986–1996

4. Reconstruction – LDK (VI)

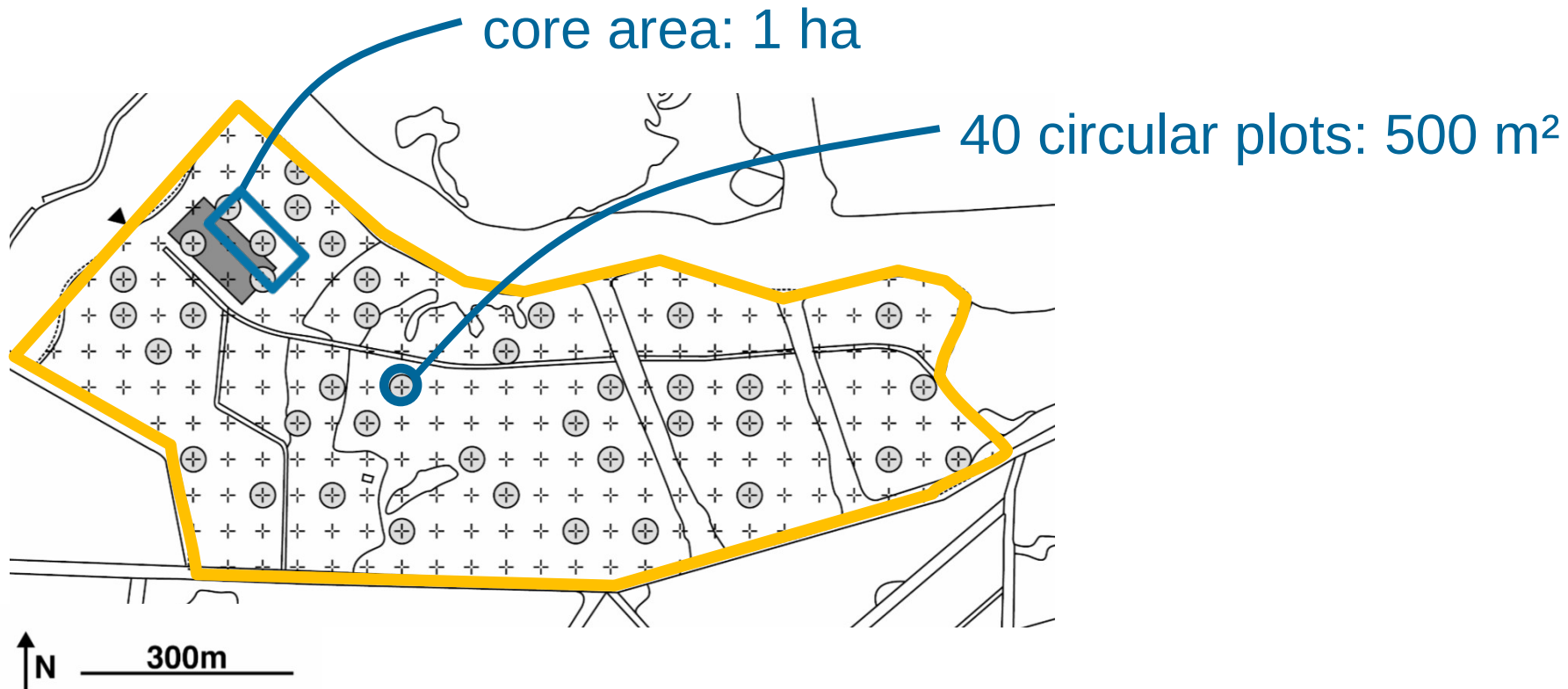
Overview Liedekerke

- first establishment ~ ‘windows of opportunity’
- further colonization ~ light availability & seed input
- largest spread 1986–1996, slow-down 1996–2006
- native species able to spread

→ black cherry = just ‘one of the species’

4. Reconstruction – OSS (I)

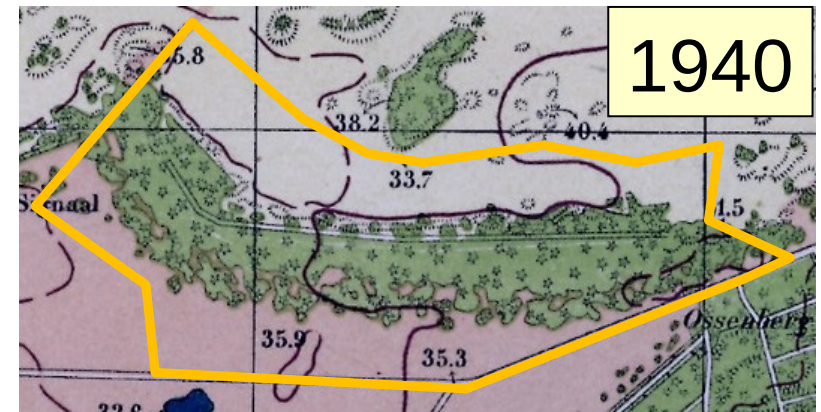
Data collection



historical maps & tree ring analysis

4. Reconstruction – OSS (II)

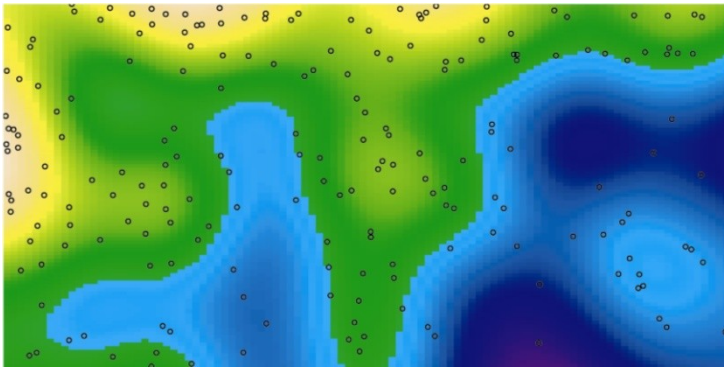
Forest development



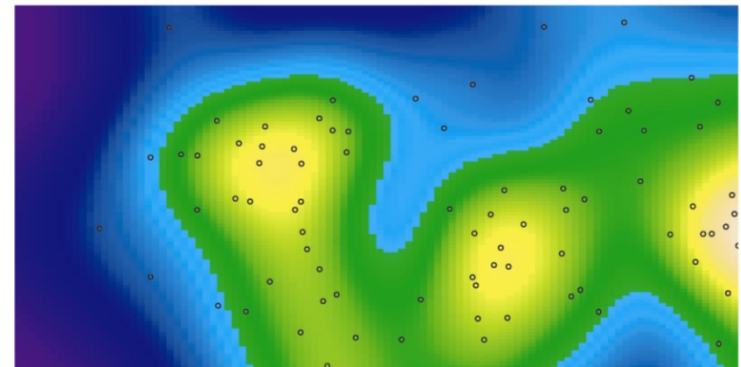
4. Reconstruction – OSS (III)

Trees & shrubs in the core area

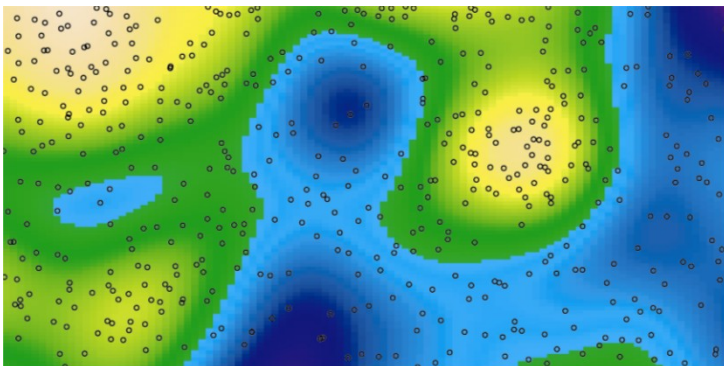
a) pine & oak overstory



b) black cherry overstory



c) black cherry shrubs



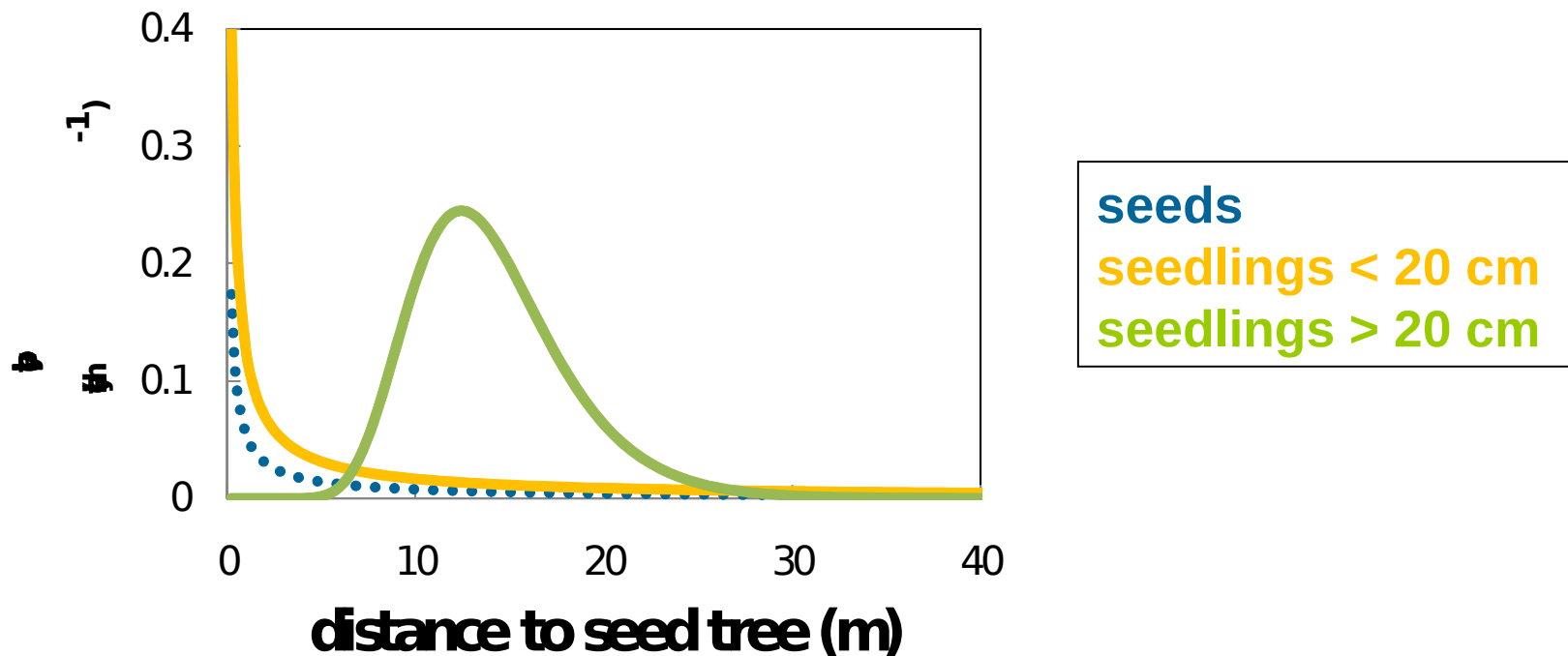
black cherry trees in gaps

shrubs below pine/oak



4. Reconstruction – OSS (IV)

Spatial patterns of seeds & seedlings



small seedlings ~ seed input
large seedlings ~ distance & density dependent survival

4. Reconstruction – OSS (V)

Black cherry ↔ native species

Stem density (ha⁻¹)

	pine	oak	black cherry	rowan
trees	177	29	82	-
shrubs	-	16	503	1
seedlings 1 year old	7 844	83	10 875	42
seedlings < 20 cm	-	385	149 656	1 396
seedlings 20–120 cm	-	73	20 771	396
seedlings > 120 cm	-	-	1 344	-

The herbivores suppressed the native species.

4. Reconstruction – OSS (VI)

Overview Ossenbos

- successful recruitment into the canopy layer in gaps
 - spatial patterns ~ seed input & light availability
 - seedling bank: seedlings < 20 cm
 - almost no native species (regeneration)
- black cherry = omnipresent = ‘invasive’
- the high herbivore pressure favours black cherry above native species

5. Conclusions

Colonization outcome different

- ‘one of the species’ in Liedekerke
- omnipresent & abundant - invasive - in the Ossenbos

→ look at an invasive species and the invaded ecosystem

Establishment & spread directed by

- ‘windows of opportunity’: light availability
- connectivity to seed sources
- native shrub/herb species ↔ herbivore pressure

→ black cherry is a species that seizes its opportunities

Thanks to

- **you** – your attention
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– the Liedekerke study
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– data collection