

Amerikaanse

Bart Nyssen, Jan den Ouden en Kris Verheyen

vogelkers

Van bospest tot bosboom



Integrating black cherry

in forest management
in the Netherlands
and Belgium

Bart Nyssen
Jan den Ouden
Kris Verheyen
Margot Vanhellemont







Black cherry, more abundant then ever

In Northeast America

- Originally < 1%
- Pioneer on abandoned farmlands
- Promoted by clearcutting for rejuvenating Black cherry (valuable wood)
- 'herbicide' needed when rejuvenating Black cherry

| | TOTAL | % |
|--------------|----------------|--------|
| Black Cherry | 444.0 | 3.58% |
| Browsed BC | 0.0 | 0.00% |
| Hard Maple | 0.0 | 0.00% |
| Soft Maple | 2553.0 | 20.56% |
| Browsed SM | 1284.4 | 10.34% |
| Yellow Birch | 539.1 | 4.34% |
| Browsed YB | 840.4 | 6.77% |
| Black Birch | 380.6 | 3.07% |
| Browsed BB | 348.9 | 2.81% |
| White Oak | 31.7 | 0.26% |
| Browsed WO | 269.6 | 2.17% |
| Aspen | 15.9 | 0.13% |
| Browsed AS | 380.6 | 3.07% |
| White Pine | 47.6 | 0.38% |
| Am. Beech | 5243.7 | 42.27% |
| Sassawood | 31.7 | 0.26% |
| Browsed BA | 0.0 | 0.00% |
| Other | 0.0 | 0.00% |
| TOTAL | 12416.1 | |





More abundant than ever

In Northwest Europe

- Park tree, leaves, flowers and fruit (1623-1990)
- Valuable wood producing tree (1890-1940)
- Helpful pioneer for reforestation (1898-1980)
- 1st eradication period (1960-1980)
- 2th eradication period (1990–now)



Park tree, leaves, flowers and fruit (1623-1990)

Beloved ornamental tree.

First planted in Paris in 1623

*'C' est un **bel arbre**, qui s'élève à la hauteur de trente pieds,*

*les **feuilles sont d'un beau vert luisant**, et conservent leur verdure fort tard dans l'automne;*

*ses fruits sont gros, étant mûrs ils sont noirs, **plusieurs oiseaux s'en nourrissent** ;*

*son **bois est beau** et veiné de noir et de blanc et d'un poli fort doux.*

On peut tirer cet arbre des pépinières de Londres, où je l'ai vu.'

Baron de Poederlé, 1792



Black cherry is an introduced host for native biodiversity

- Habitat-enrichment of the pine forests
- Flowers and fruits
- Most dominant broadleaf tree species in pine forests
- Often the only species of the *Prunus* genus
- Some introduced tree species and biodiversity go hand in hand



Bird cherry-oat aphid (*Rhopalosiphum padi*)



Black cherry is no less a host for native organisms than other trees:



- No systematic research yet.
- 228 native insects found on Black cherry.
- Proven host for 178 native insects.
- Total native insects on *Prunus spinosa* 135, *Sorbus Aucuparia* 58, *Juniperus communis* 32 and *Ilex Aquifolium* 10.

Valuable wood producing tree (1890-1940)

Successful silvicultur experiments

Prussian forest research: Adam Schwappach

1890: 47 exotic tree species planted.

1918:

- 12 promising new forest trees.
- Among them Black cherry

1914-1918

- Experiments destroyed

1940-1945:

- End of research program
- Some experiments survive

Wirtschaftswunder: Priority for high productive species:

- Douglas
- Larch
- Red oak



194 LXXXV. PRUNUS.

Kultur: siehe No. 388. Sie nimmt mit leichten Boden und einer mittäglichen Lage vorlieb. Jeder Heideboden in der Mark Brandenburg, bringt sie nächst den Kiefern in kurzer Zeit zu ansehnlichen Bäumen, daher sie nicht genug empfohlen werden kann. Die Wangerheimische Beschreibung dieser Holzart ist mir äußerst interessant, da ich schon einen sehr starken Vorrath von jungen Pflanzstämmen besitze. Man muß sie höchstens 6 Fuß weit auspflanzen, sonst breiten sie sich zu sehr in die Aeste aus und verlieren an der Höhe des Stammes.



Wood production

Prussian forest research: Schwappach

1890: 47 exotic species planted.

1918:

- **12 promising new forest trees.**
- **Among them Black cherry**

1914-1918

- Experiments destroyed

1940-1945:

- End of research program
- Some experiments survive

Wirtschaftswunder: Priority for high productive species:

- Douglas
- Larch
- Red oak



EFICENT



Bosgroep Zuid Nederland

Wood production

Prussian forest research: Schwappach

1890: 47 exotic species planted.

1918: 12 promising new forest trees.
Among them Black cherry

1914-1918

- **Experiments destroyed**

1940-1945:

- End of research program
- Some experiments survive

Wirtschaftswunder: Priority for high
productive species:

- Douglas
- Larch
- Red oak



EFICENT



Prunus serotina, 42jährlig, Staatsso...

Wood production

Prussian forest research: Schwappach

1890: 47 exotic species planted.

1918: 12 promising new forest trees.
Among them Black cherry

1914-1918

- Experiments destroyed

1940-1945:

- **End of research program**
- **Some experiments survive**

Wirtschaftswunder: Priority for high
productive species:

- Douglas
- Larch
- Red oak



Wood production

Prussian forest research: Schwappach

1890: 47 exotic species planted.

1918: 12 promising new forest trees.
Among them Black cherry

1914-1918

- Experiments destroyed

1940-1945:

- End of research program
- Some experiments survive

**Wirtschaftswunder: Priority for high
productive species:**

- Douglas
- Larch
- Red oak



EFICIENT



Bosgroep Zuid Nederland

Helpful pioneer for reforestation (1898-1980)

Reforesting waste land and drift sands with pine plantations,
mostly Scotch pine (*Pinus sylvestris*)

Netherlands:
1898 – 1940

Belgium
1945 - 1980

Germany
1945-1980



Helpful pioneer for reforestation

Black Cherry massively planted:

Against fires

Against plagues

For soil amelioration

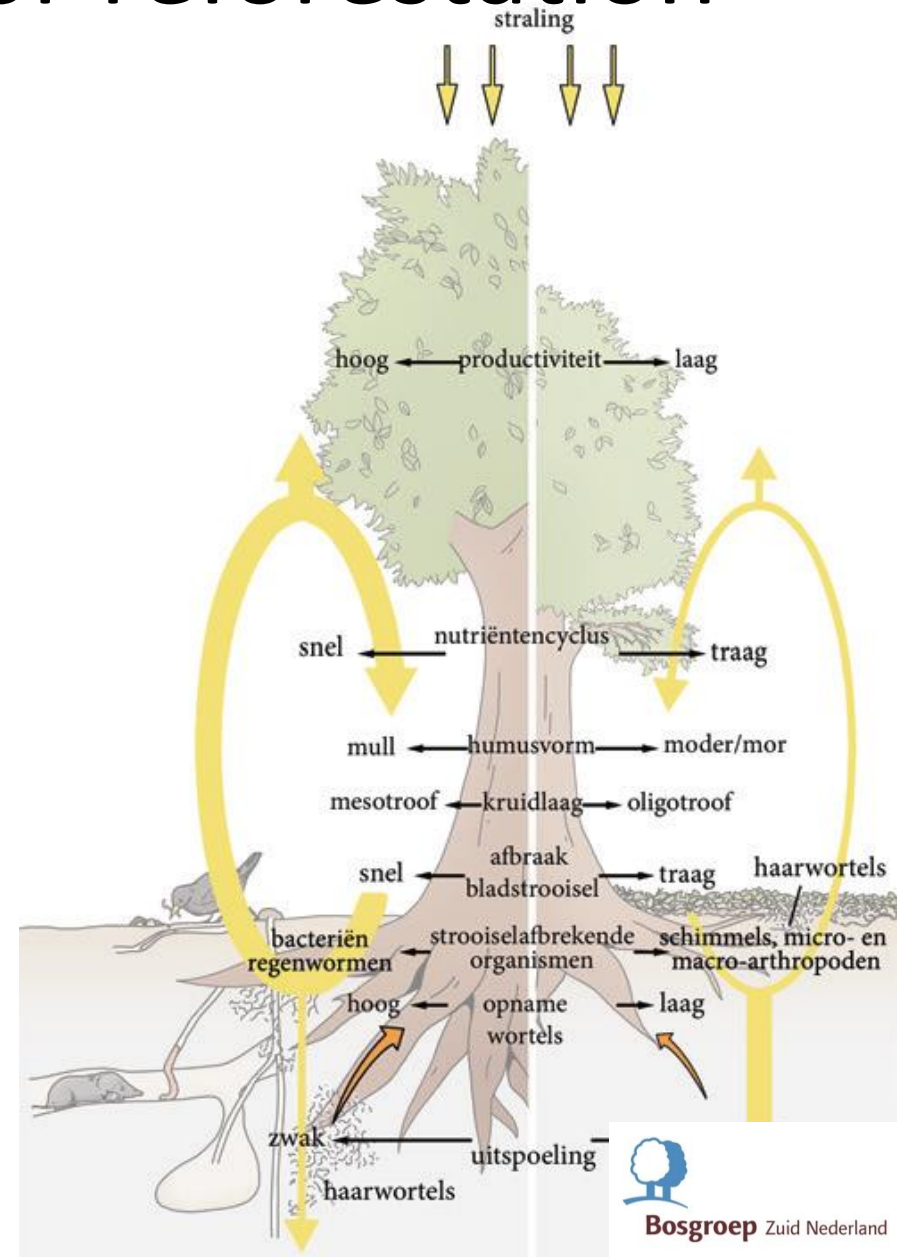






Abb. 5: Vitaler Pflanzplot der Winterlinde unter Spätblühender Traubenkirsche in der zweiten Vegetationsperiode (Versuchsfläche R1).

Sudden need for eradication

Vigorous competition to the rejuvenation of scotch pine caused black cherry's bad reputation.

1st eradication period:

Mainly in the Netherlands: 1960 – 1980



EFICENT



Bosgroep Zuid Nederland

Hopeful rethinking in the Netherlands

Around 1980: eradication is impossible and unnecessary.

1976 *'Black cherry, acceptance or eradication?'*

1984 rapport SBB (Dutch State Forestry Agency):

'Een poging tot uitroeien is niet meer aan de orde. Kennis van groeiplaats, begroeiingstype en voorkomen van prunus moet ertoe leiden dat uiteindelijk bestrijding alleen daar plaatsvindt, waar dit noodzakelijk is.'



.... and second eradication-period

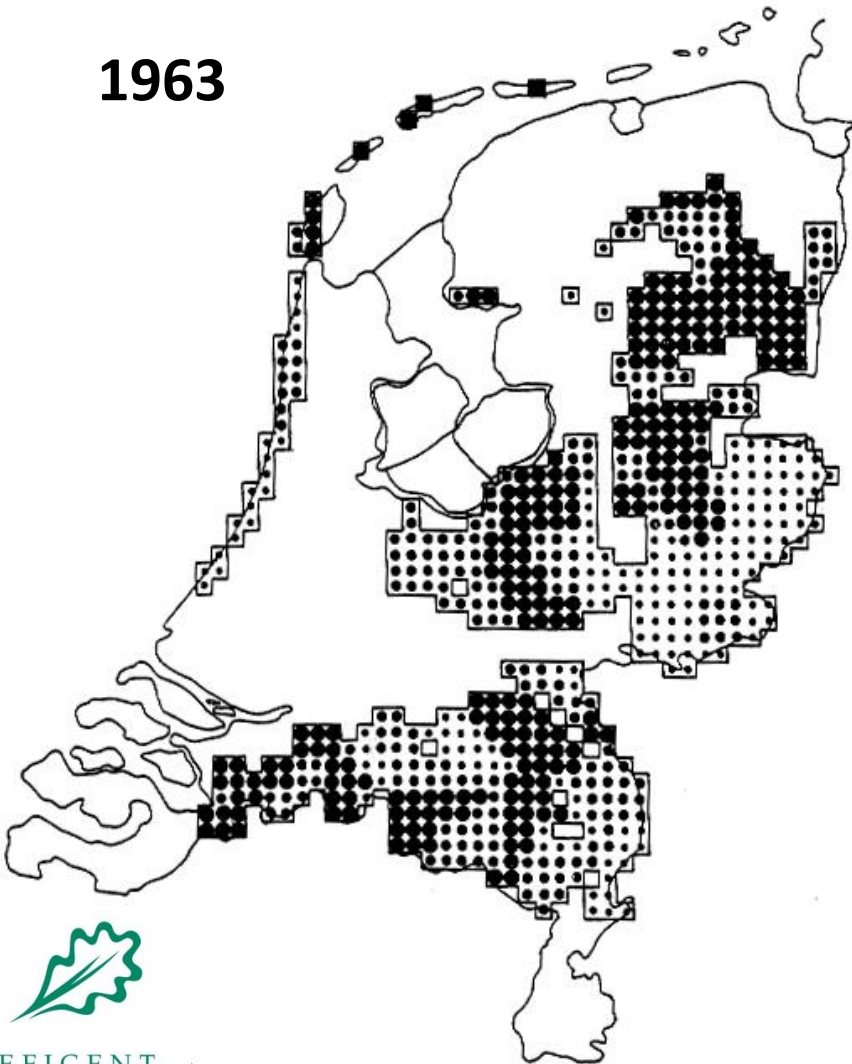
Netherlands: End of the 1980's (eradication
100% employment-subvention)
Belgium and Germany: 1990
Rest of Europe: 2000





60 Year and € 200.000.000 later

1963



2008

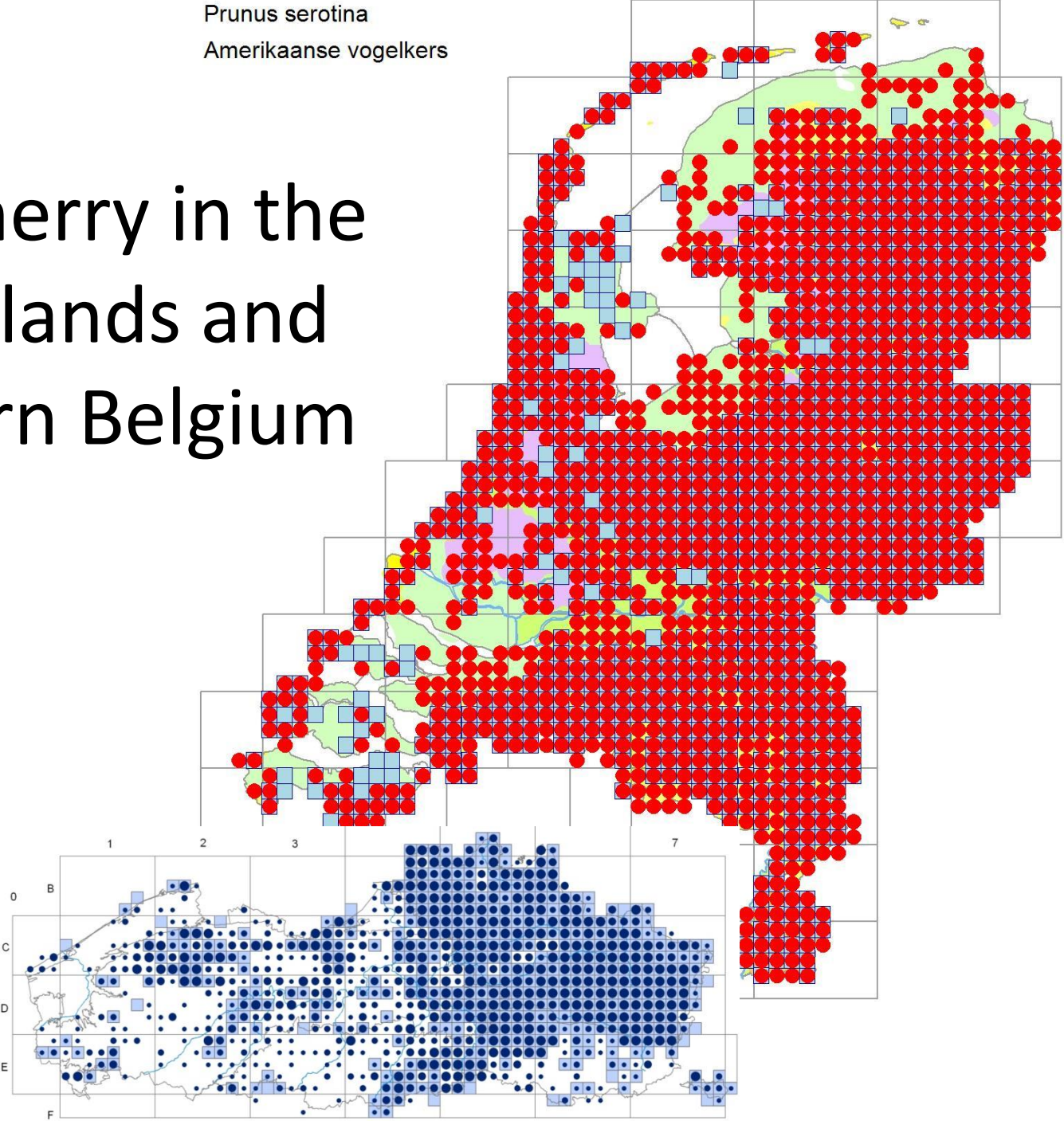


Amerikaanse vogelkers

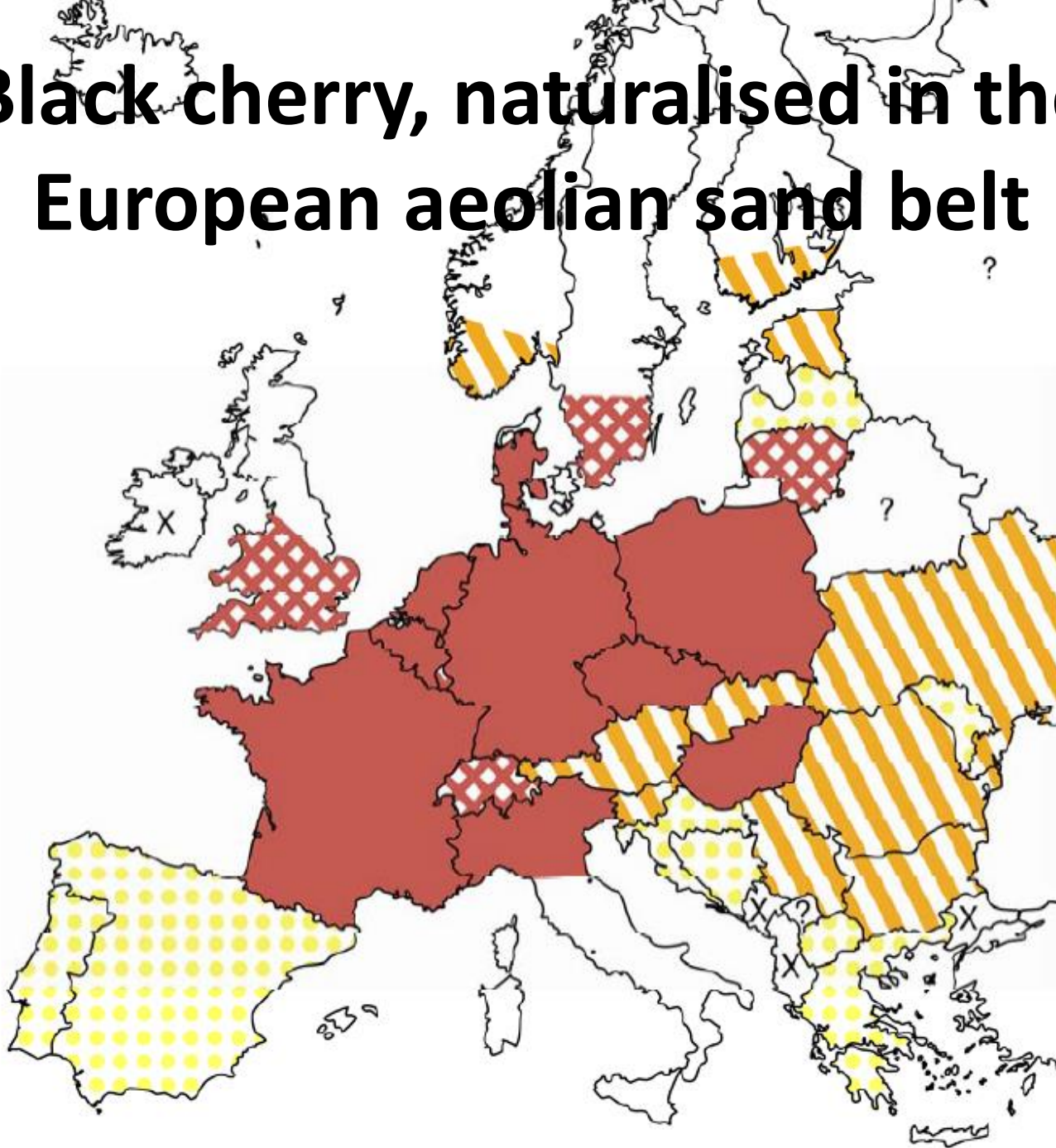


Prunus serotina
Amerikaanse vogelkers

Black cherry in the netherlands and Northern Belgium



Black cherry, naturalised in the European aeolian sand belt



Pioneer in invincible man-made forests

- Netherlands: 1,5% forest (1850); 11% now
- Black Cherry massively planted: in NL from 1920 to 1940 most planted broadleaf.
- Black cherry is a pioneer that loves clearcutting, just like birch and pine.
- Black cherry is a late pioneer, supporting just that much more shade than birch and pine.



Black cherry more shade tolerant ...

STS (Schade Tolerance Scale)
(Niinemets & Valladares 2006).

| | |
|-------------------------------|-------------|
| >50% light | |
| 50 tot 25 % light | |
| <i>Larix Kaempferi</i> | 1,38 |
| <i>Pinus sylvestris</i> | 1,67 |
| 25 tot 10 % light | |
| <i>Betula pendula</i> | 2,03 |
| <i>Pinus nigra</i> | 2,10 |
| <i>Salix caprea</i> | 2,16 |
| <i>Sambucus nigra</i> | 2,29 |
| <i>Quercus robur</i> | 2,45 |
| <i>Prunus serotina</i> | 2,46 |



After Clearcut









Black cherry less shade tolerant ...

| | |
|-------------------------------|-------------|
| <i>Prunus serotina</i> | 2,46 |
| <i>Rhamnus frangula</i> | 2,66 |
| <i>Fraxinus excelsior</i> | 2,66 |
| <i>Sambucus racemosa</i> | 2,66 |
| <i>Sorbus aucuparia</i> | 2,73 |
| <i>Quercus petrea</i> | 2,73 |
| <i>Quercus rubra</i> | 2,75 |
| <i>Pseudotsuga menziesii</i> | 2,78 |
| 10 - 5 % light | |
| <i>Castanea sativa</i> | 3,15 |
| <i>Acer campestre</i> | 3,18 |
| <i>Prunus padus</i> | 3,26 |
| <i>Prunus avium</i> | 3,33 |
| <i>Corylus avellana</i> | 3,53 |
| <i>Ulmus laevis</i> | 3,67 |
| <i>Acer pseudoplatanus</i> | 3,73 |
| <i>Ilex aquifolium</i> | 3,86 |
| <i>Carpinus betulus</i> | 3,97 |
| 5 - 2 % light | |
| <i>Tilia platyphyllos</i> | 4,00 |
| <i>Tilia cordata</i> | 4,18 |
| <i>Acer platanoïdes</i> | 4,20 |
| <i>Fagus sylvatica</i> | 4,56 |
| < 2 % light | |



Black cherry integrating a new pioneer species

Making forests more resilient



EFICENT

Resilient forest

Planting

late successional species

- *Tilia cordata*
- *Acer pseudoplatanus*
- *Corylus Avellana*
- *Carpinus betulis*
- *Prunus padus*
- *Castanea sativa*
- *Fagus sylvatica*
- ...







Resilient forests





Using Black cherry for wood production





Silvicultural management on acidic sandy soils

Closed fase:

- Canopy gap minimal 10 m diameter
- Top shoot of the options free of concurrence

Pole fase:

- Selection of futur-trees at 5 - 6 m branch free (12 à 15 years)
- Remove dead branches
- Crown permanently 100% free
- 2,5 are growing space

Tree fase:

- Maximum crown expansion at 45 à 50 yr.
- Acidic sandy soil: 50 à 60 cm dbh at 50-80 yr.









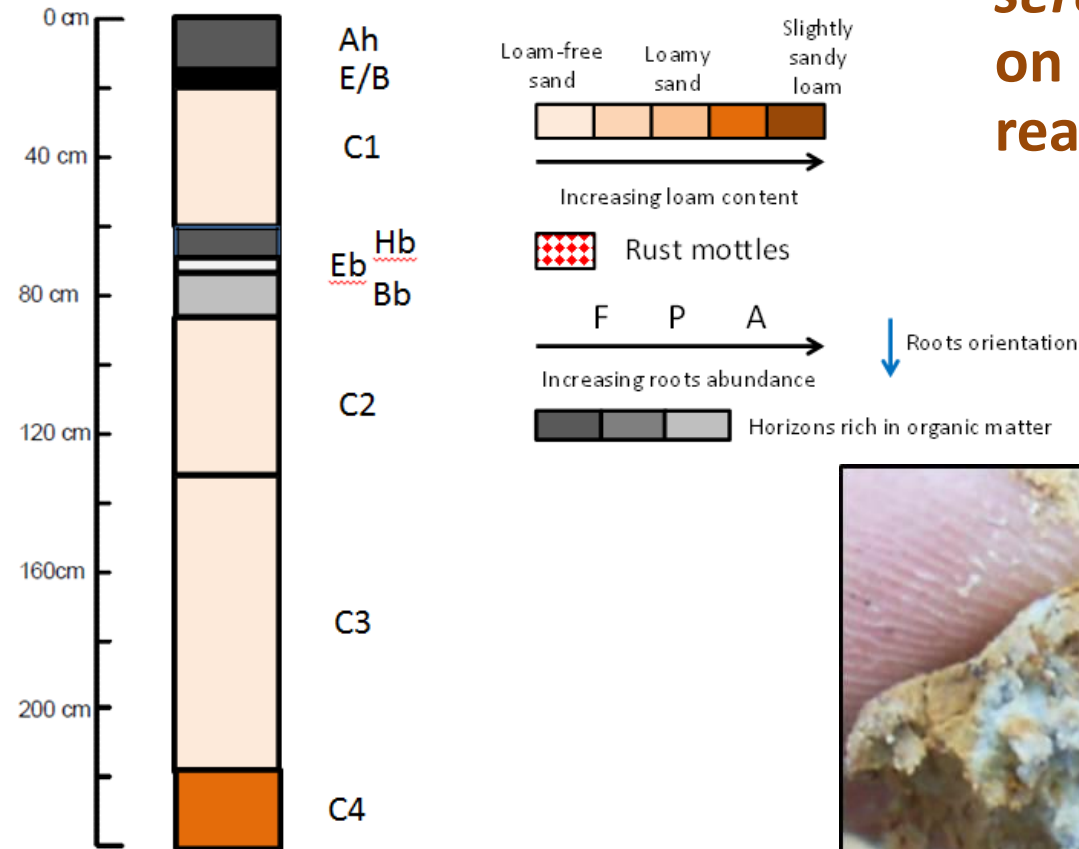
Black cherry

Acceptance

necessary for

Integration

It is safe to conclude that *Prunus serotina* has a positive influence on soils with loamy layers within reach of its roots (Crétin 2013)



Soil profile study site 'Het Zand'



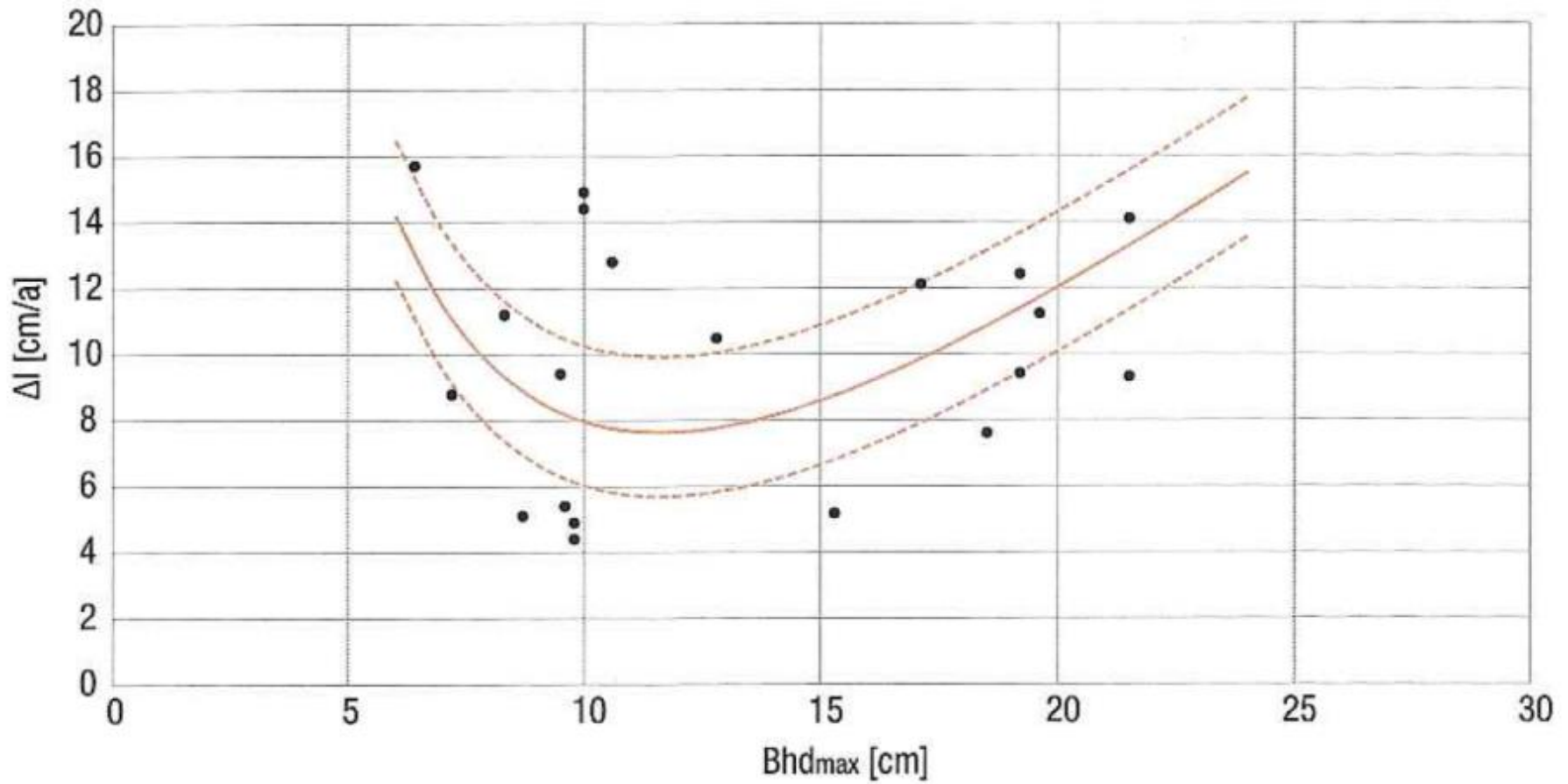
Figure 2. Living *Prunus* root found in a loamy layer at a depth of about 2,3 metre in Best, near Eindhoven

| Variable | no prunus | st dev | prunus | st dev |
|---------------|-----------|--------|---------|--------|
| ph-KCl | 2.59 | 0 | 3.19 | 0.18 |
| CEC | 12.72 | 3.22 | 16.45 | 0.73 |
| CP ratio | 855.6 | 23.09 | 554.56 | 40.27 |
| CN ratio | 26.74 | 0.96 | 22.89 | 0.28 |
| N, mmol/kg | 1428.43 | 51.5 | 1588.59 | 29.36 |
| P , mmol/kg | 18.11 | 0.52 | 27.49 | 1.95 |
| K, cmol/kg | 0.4 | 0.1 | 1.55 | 0.42 |
| Mg, cmol/kg | 1.3 | 0.37 | 4.12 | 1.65 |
| Ca, cmol/kg | 2.99 | 0.85 | 4.92 | 1.39 |
| Ca saturation | 1.7 | 0.02 | 2.23 | 0.11 |

Chemical variables for the study site 'Het Zand': Humus-layer.

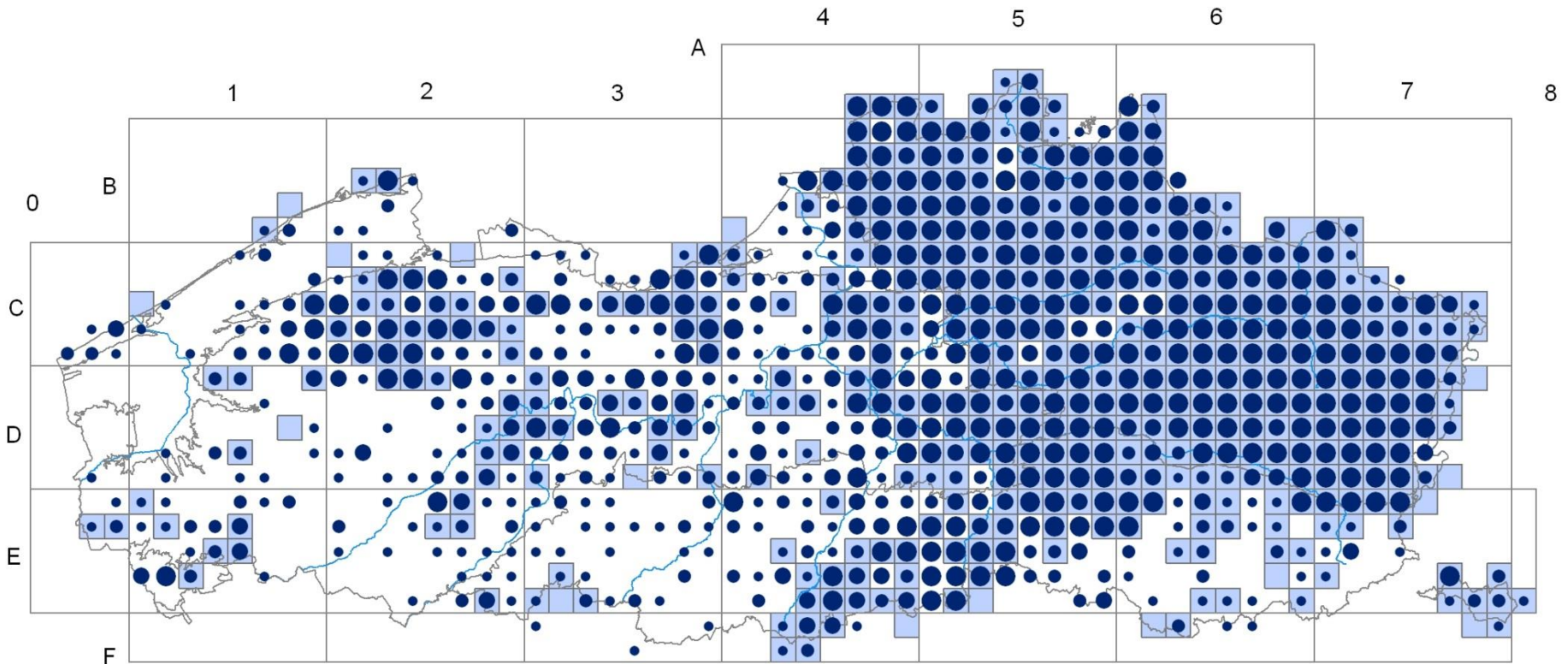
| Variable | No prunus | st dev | Prunus | st dev |
|---------------|-----------|--------|--------|--------|
| ph-KCl | 2.54 | 0.01 | 2.7 | 0.01 |
| CEC | 9.29 | 0.99 | 10.39 | 1.47 |
| CP ratio | 204.35 | 40.96 | 188.49 | 10.82 |
| CN ratio | 18.25 | 3.19 | 16.96 | 2.85 |
| N, mmol/kg | 214.8 | 1.98 | 254.5 | 49.36 |
| P , mmol/kg | 7.36 | 0.24 | 8.82 | 0.83 |
| K, cmol/kg | 0.18 | 0 | 0.29 | 0.25 |
| Mg, cmol/kg | 0.19 | 0.06 | 0.36 | 0.12 |
| Ca, cmol/kg | 0.61 | 0.23 | 0.78 | 0.13 |
| Ca saturation | 2.3 | 0.4 | 2.5 | 0.77 |

Chemical variables for the study site 'Het Zand': Topsoil.

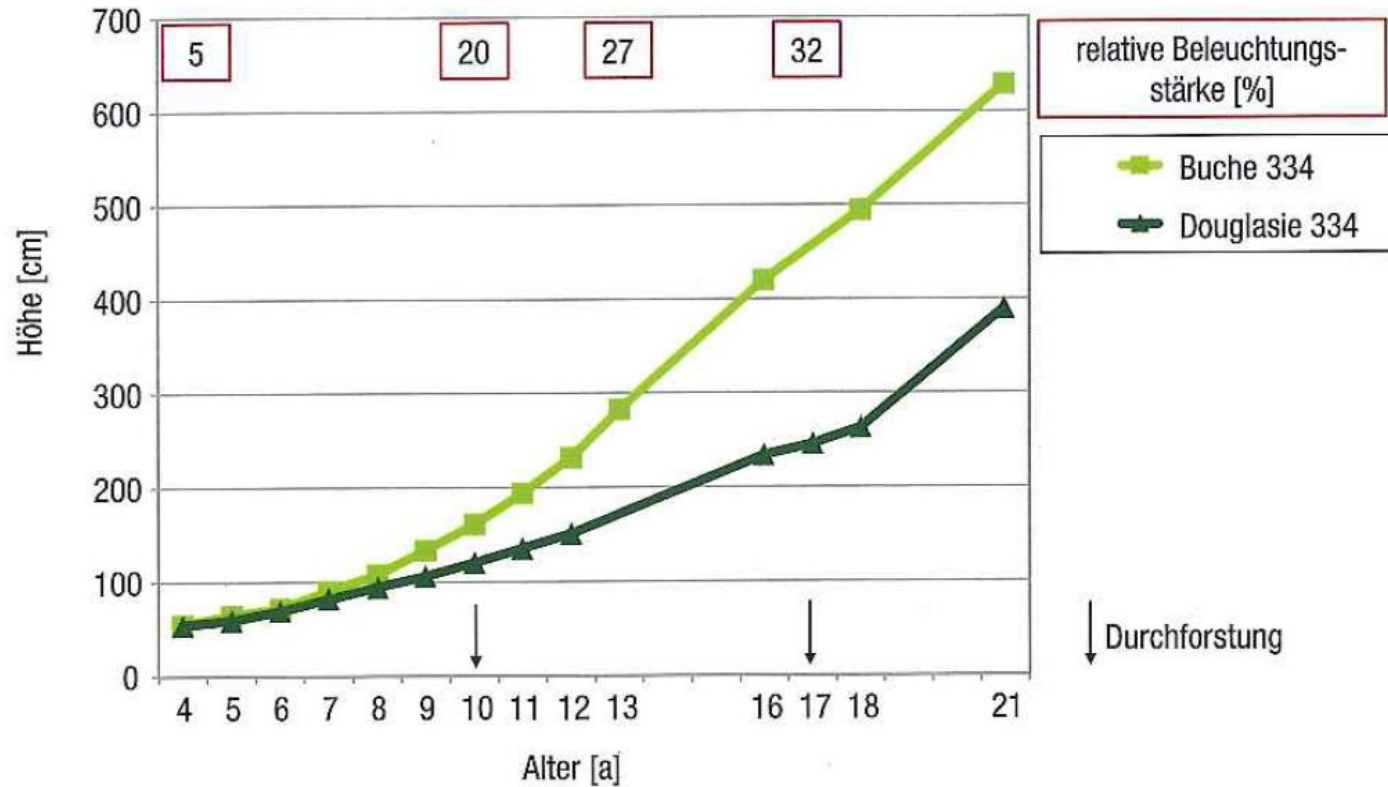


Shoot growth of *Tilia cordata* under Black cherry related to diameter of canopy trees.

Black cherry in Northern Belgium



Light blue: 1939-1971
Dark blue: 1972-2004



Beech and douglas under 2 canopy layers

- 52-year old birch
- 28-year old Black cherry

