

Ash dieback control based on tree risk management

Integrated Pest Management T
IPM-T

Terra Nostra

Henry Kuppen

Knowledge Centre for trees and soil

www.terranostra.nu



History of Ash in the Netherlands

- Most *Fraxinus* was planted in '60/'80's after Dutch elm disease killed dominant genus *Ulmus*
- Currently ash is the dominant genus in west part of the Netherlands, in east part second most common tree after oak
- *F. excelsior* is the dominant species of genus *Fraxinus*
- 2010- first infestation ash dieback determined in Groningen



Effects



Facts ash dieback

- The fungus forms bark necrosis at 0.5-1°C.
(Halmschlager and Kirisits, 2008)
- Spores airborne >30 kilometer and will remain viable.
(Timmerman et al, 2011)



Ash bacterial cancer, *Pseudomonas syringae*



Utrecht

- 4th biggest city in the Netherlands
- 340.000 inhabitants
- 160.000 trees
- 21.228 *Fraxinus*, 13% of tree population
- Woodland/estate, Amelisweerd.





Utrechtse Golfclub
Amelisweerd

MAARSCHALKERWEERD
EN MEREVELD

GALGENWAA
KROMHOUTKA

Maarschalkerweerd

N411

A27

Knooppunt
Rijnsweerd

A27

16 t/m 18
Knooppunt
Lunetten

A12

Kromme Rijn

N411

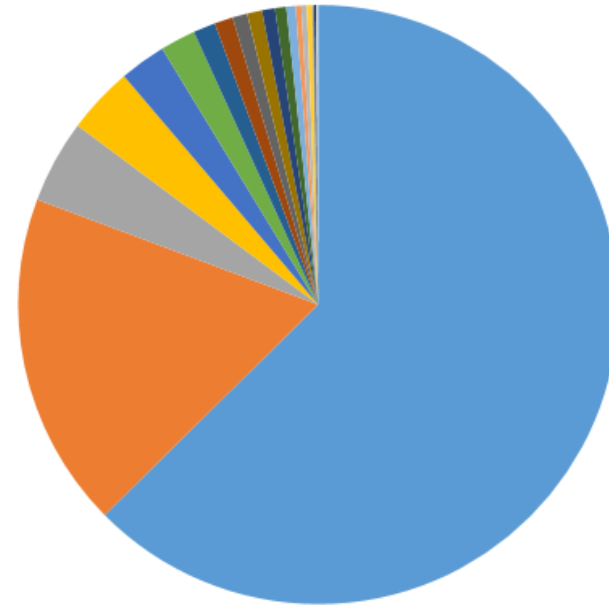
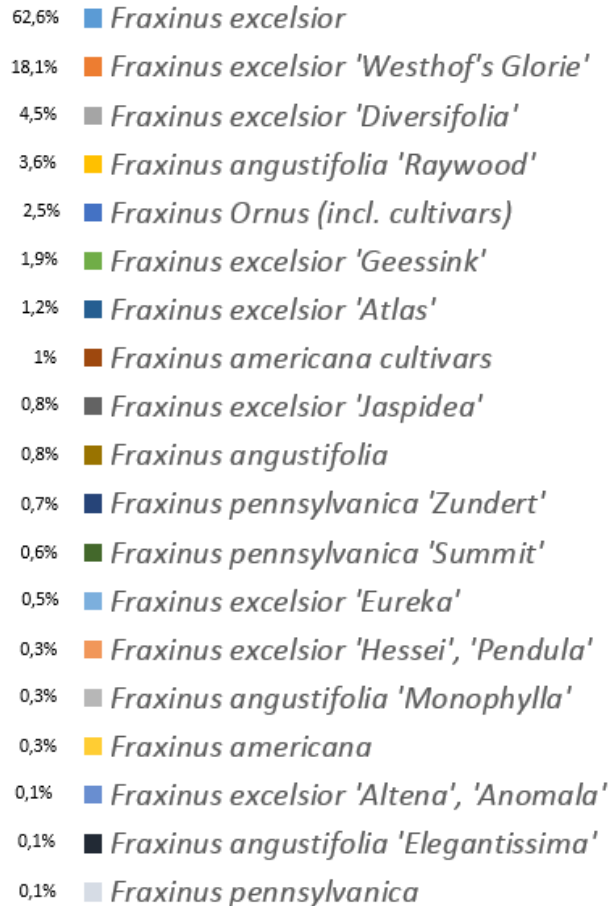
E35

Fort Vechten

Google



Ash population Utrecht



Highly susceptible species



Fraxinus excelsior 'Jaspidea', 90,9% infected

Highly susceptible species



Fraxinus excelsior 'Jaspidea'

Highly susceptible species



Fraxinus excelsior 'Pendula', 100% infected

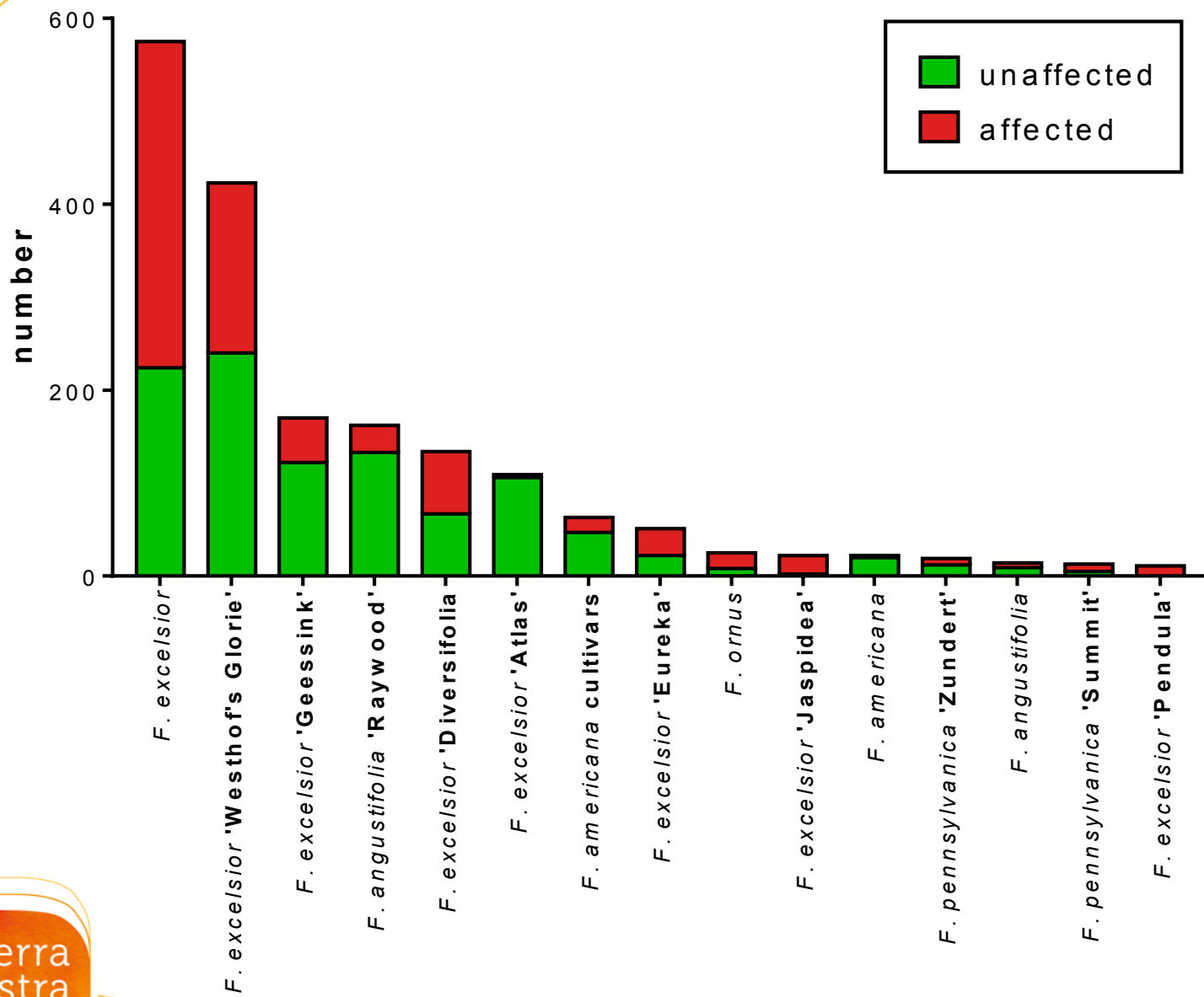
Low susceptible species



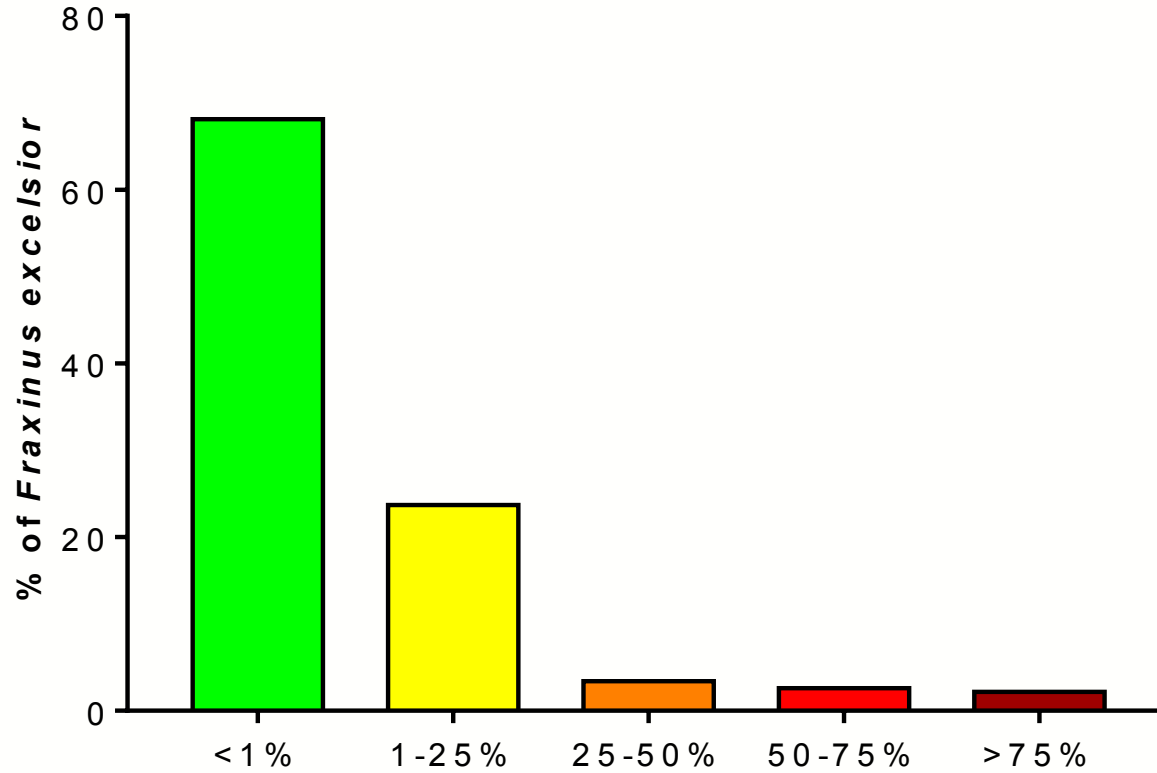
Fraxinus excelsior 'Atlas' 2,8% infected



Fraxinus americana 9,1% infected



defoliation *Fraxinus excelsior*



Utrecht ash dieback

- 2014, quickscan:
 - 329 ash, 85% affected
- 2015, follow-up study:
 - 1.813 ash surveyed, 50% affected, 3% heavy infestation
 - Amelisweerd 80% affected, especially young seedlings and mature trees combined with honey fungus, *Armillaria*;
 - Large differences in species susceptibility
 - Trees younger than 40 years seems to be more sensitive
 - Trees under natural circumstances are most sensitive
 - 80-90% *F. excelsior* won't survive in parks and woodlands



Influencing factors



age



condition



growth site



species/cultivars

Process integrated management

Riskprofile: safety risk/survival tree

Ash dieback



Analysis

- Management
 - determine survey frequency
 - pruning
 - felling
- Policy
 - replanting



Selection

- Species
- Age
- Growth site
- Risk zone
- Degree of infestation



Survey

- Visual inspection
June/September



Selection



Species susceptibility

- *Fraxinus excelsior* 'Pendula'
- *Fraxinus excelsior* 'Jaspidea'
- *Fraxinus excelsior* 'Eureka'
- *Fraxinus excelsior* seedlings
- *Fraxinus excelsior* 'Diversifolia'
- *Fraxinus excelsior* 'Geessink'
- *Fraxinus ornus*
- *Fraxinus excelsior* 'Westhof's Glorie'
- *Fraxinus angustifolia* 'Raywood'
- *Fraxinus angustifolia*
- *Fraxinus americana*
- *Fraxinus pennsylvanica*
- *Fraxinus excelsior* 'Atlas'
- *Fraxinus excelsior* 'Altena'



Stage of life ash



young



immature



mature

Turning point: 40 years

Growth site



pavement



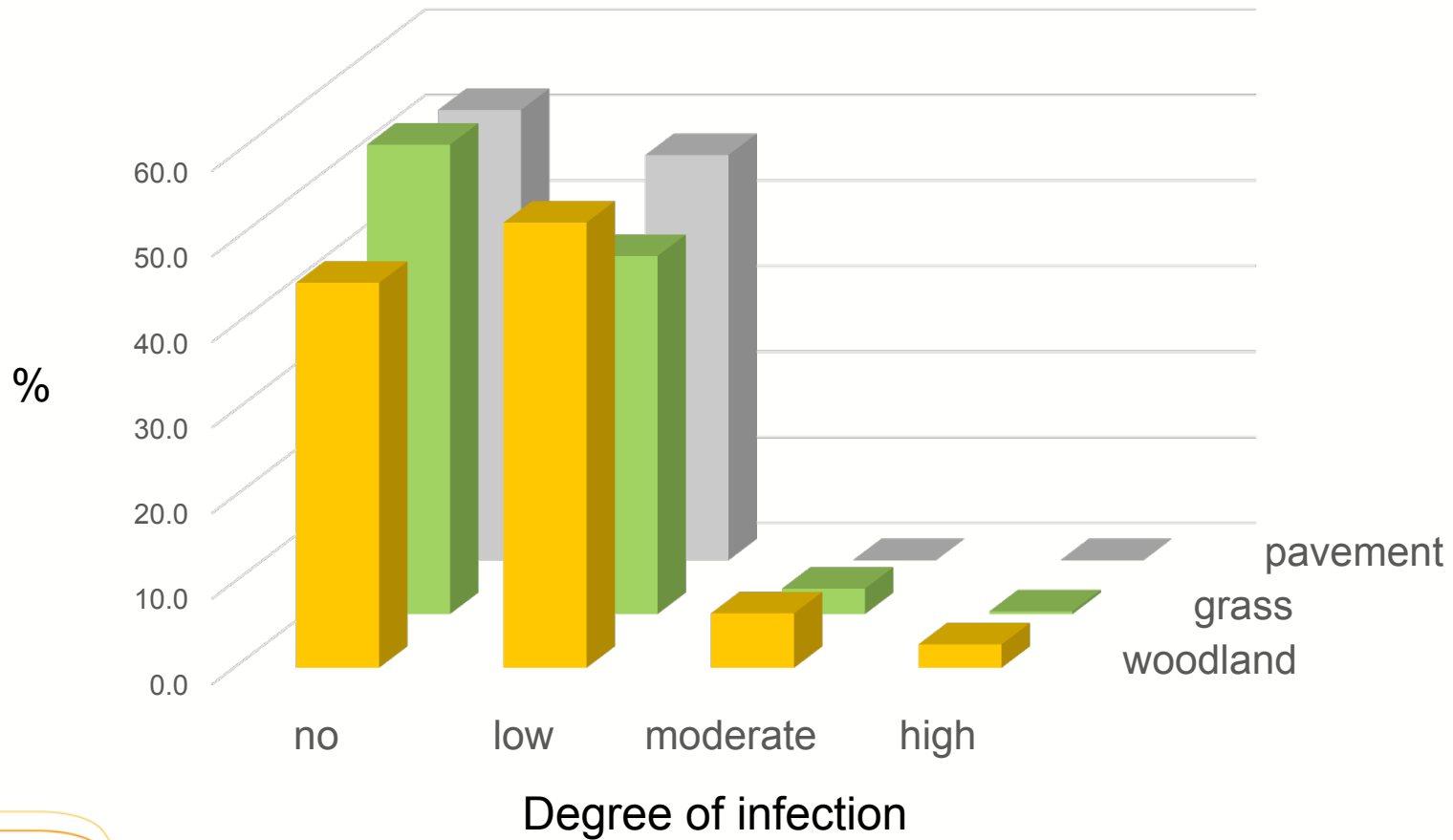
grass



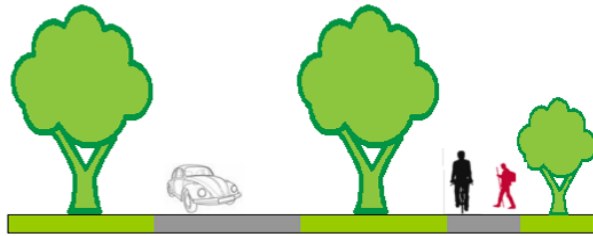
woodland

Infectiongrade is lower when leaves and branches are removed

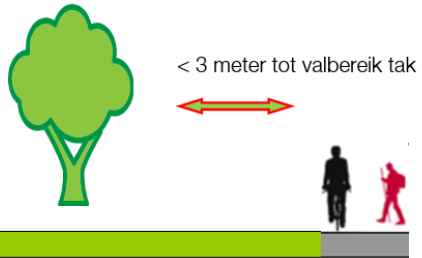
Growth site



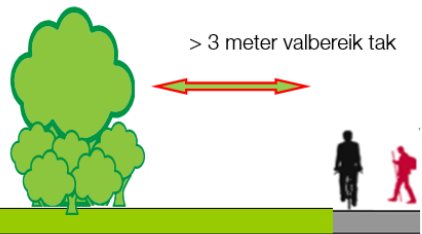
Riskzone



Riskzone high



Riskzone moderate



Riskzone low

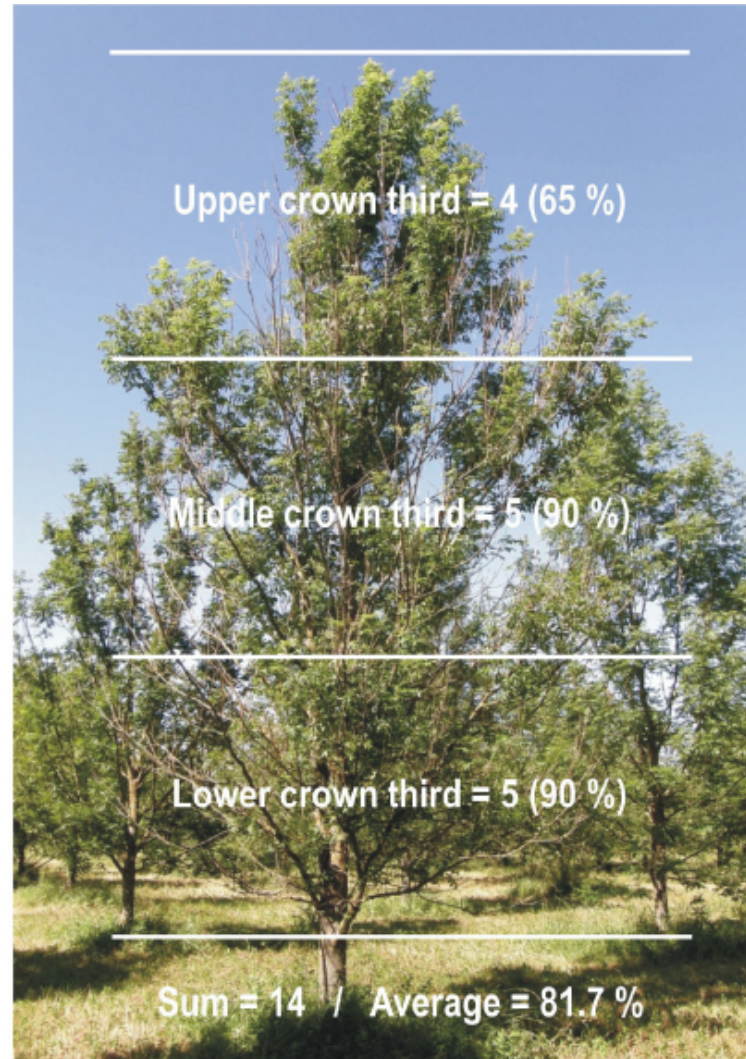


Survey



Ash dieback rating system

0	No dieback	Class mean 0%
1	< 5%	Class mean 2.5%
2	> 5% to 20%	Class mean 12.5%
3	> 20% to 50%	Class mean 35%
4	> 50% to 80%	Class mean 65%
5	> 80 to 100%	Class mean 90%
6	100%	Class mean 100%



Degree of defoliation



<1%



1-25%



25-50%



50-75%



>75%

Turning point >50% defoliation

Degree of regrowth



not applicable



minimal



moderate



good

Degree of regrowth determines survival rate

Diameter dead branch



<1 cm Ø



1-4 cm Ø



4-10 cm Ø



> 10 cm Ø

Tree with risk

Diameter branch defines risk and is a factor in analysis



Secondary infestation



Honey fungus increases risk

Trunk damage



Affected trunk can cause high risk
if >50% of total circumference is affected

Degree of infestation

- ▲ • No infestation
- ▲ • Light infestation
- ▲ • Moderate infestation, >4 cm Ø
- ▲ • Heavy infestation, > 50% netto defoliation/trunk damage.



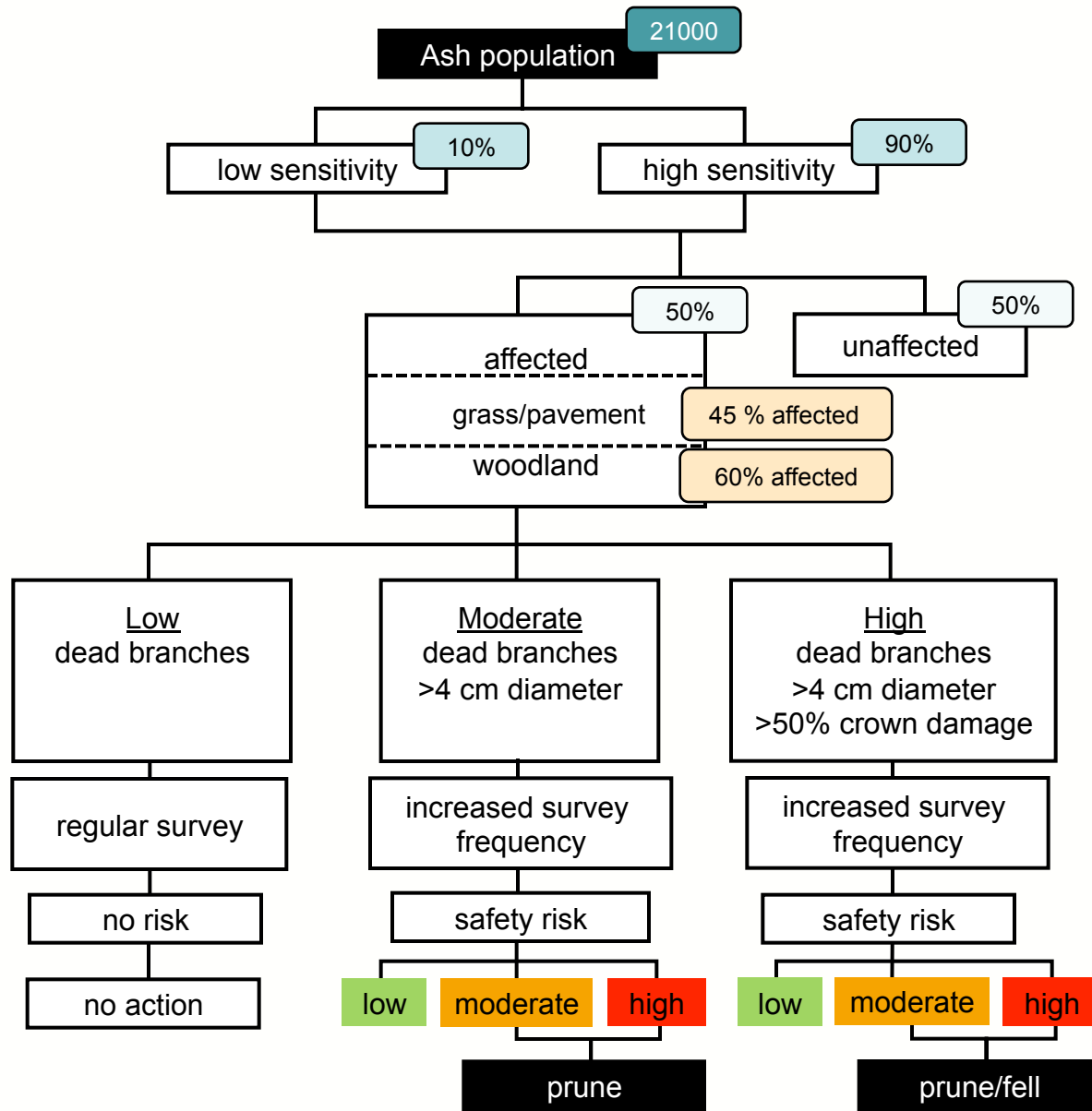
Analysis



Analysis

1. Increase survey frequency of moderate and high infested trees: based on riskzone
2. Increase management: based on survey report pruning/felling.
 - Prune moderate affected trees in moderate and high riskzone
 - Fell heavy affected trees on individual consideration, less susceptible species with good regrowth can possibly still remain
3. When ash is the dominant genus stop replanting ash till acceptable levels (maximum 10% of genus and 5% of species)





Management

1. When pruning, assess if buds and bark tissue are really dead
2. Prevent reaction of the tree: producing suckers which are more sensitive to be infected by ash dieback;
 - Prune limited in living branches.
3. Remove part or complete branch when bark necroses affect more than 50% of its circumference.



2016: year of truth



Begin of the season: progressive development ash dieback but nearly no wilting signs

Symptoms wilting



Symptoms caused by wet conditions, maximum regrowth

Susceptibility



The degree of ash dieback in seedlings can vary a great deal

Research result

- 2013 consortium of researchers NORNEX formed
- Target: “Find genetic markers that are more common in tolerant trees”
- Markers were found and can be associated with the trait
- Genetic markers in healthy trees can be used to show tolerance



Coppice ash, Amelisweerd



Source: University of York, A. Harper (2016)

Ash will survive ash dieback but be prepared for what the future will bring.

Diversity is the only solution to control pest and diseases to acceptable levels.

Thank you for
your attention!

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