FGRT-- Breeding for restoring ash

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Ash dieback disease:

The bad news

- Kills trees – slowly
- Caused by fungus *Hymenoscyphus fraxineus*
- Ascomycete
- Billions of spores per leaf

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Breeding for restoring ash

We must follow the science:

- **Breeding a whole new population**
- **Genetic diversity**
- **Climate change**
- **Several systems possible**

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Breeding for restoring ash

Ash dieback disease:

The really good news

We can breed trees for resistance because

- **Resistance it determined genetically**

- **Resistance is stable** in trees propagated vegetatively

- **Phenotypic selection is relatively easy**

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Assembling a breeding stock

1. ***Identify*** healthy trees in ash plantations--- they will be the basic breeding stock for future generations of ash in Ireland

1-2% of ash trees in any population are tolerant of dieback

A register is required of all healthy trees selected

Durable health needs to be confirmed by test screening on multiple sites

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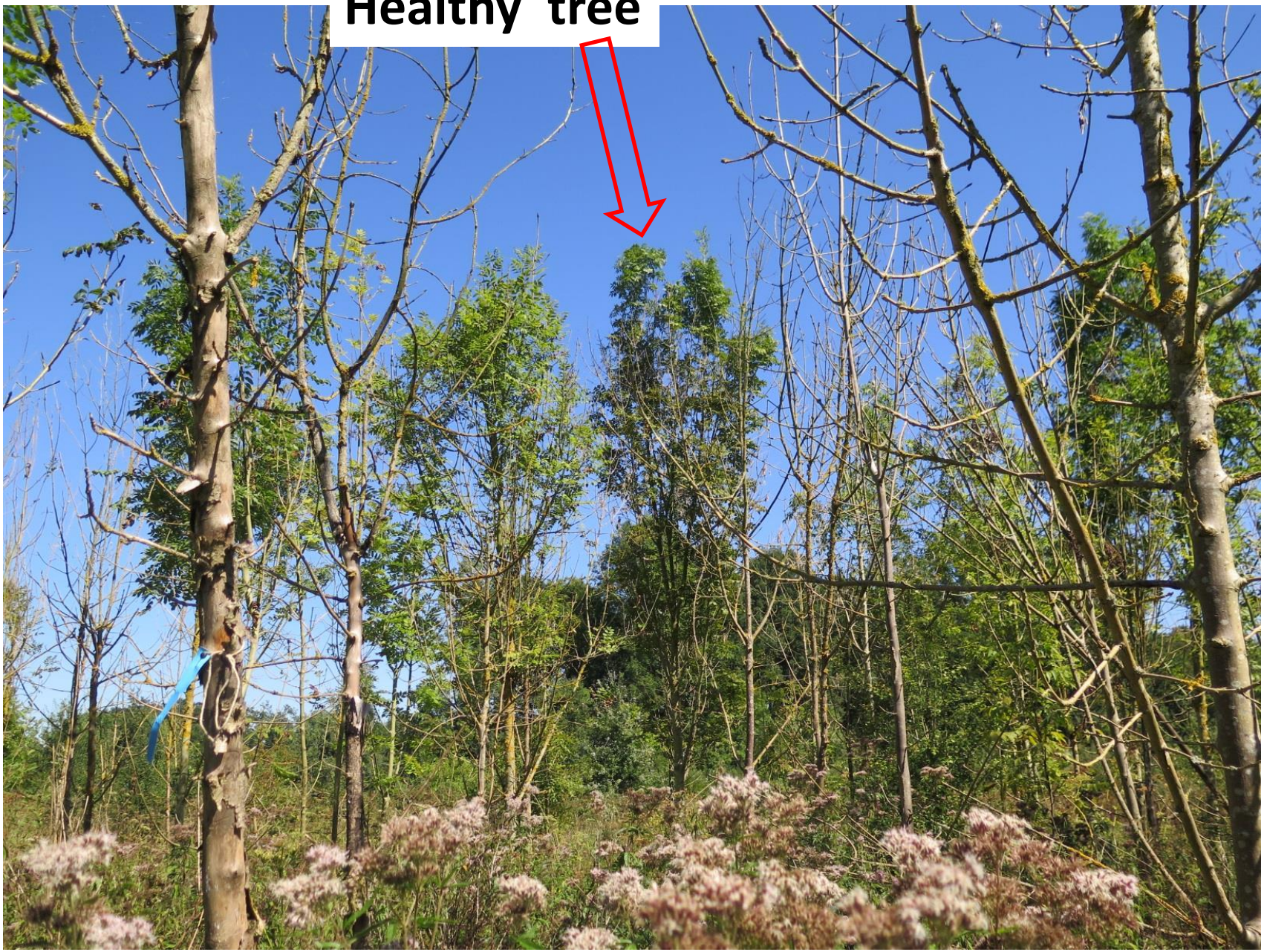
Healthy tree

Tree owner identifying & monitoring healthy trees

Score	Symptoms	Action
0	None-- **Healthy** tree	Retain & Monitor 3-4 years
1	A **few** dead shoot tips- healthy	Retain & Monitor 3-4 years
2	**Clearly damaged** crown	Fell
3	**Seriously** damaged crown, + trunk lesions	Fell
4	Dead tree	Fell

*** **All <u>healthy</u> trees in badly affected woods should be retained**


May 27 2021
Score 1
June 1 2022
Score 2

Assembling breeding stocks

1. ***Identify***……3-500 trees
2. ***Monitoring*** health status in situ - min 3 yrs.
3. ***Conserve*** in gene banks all potentially healthy (propagated by grafting)
4. ***Screen*** all to establish their for durable health (4 diverse sites)
5. ***Establish seed orchards***–Indoor & outdoor --- pilot scale testing

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Where can healthy trees be found ?

Heavily diseased forest plantations

19,000ha X 1000 = **19 million ash trees**

Hedgerows

- 350-400,000 km long – ash trees a major component
- 400, 000 woodland patches and scrub

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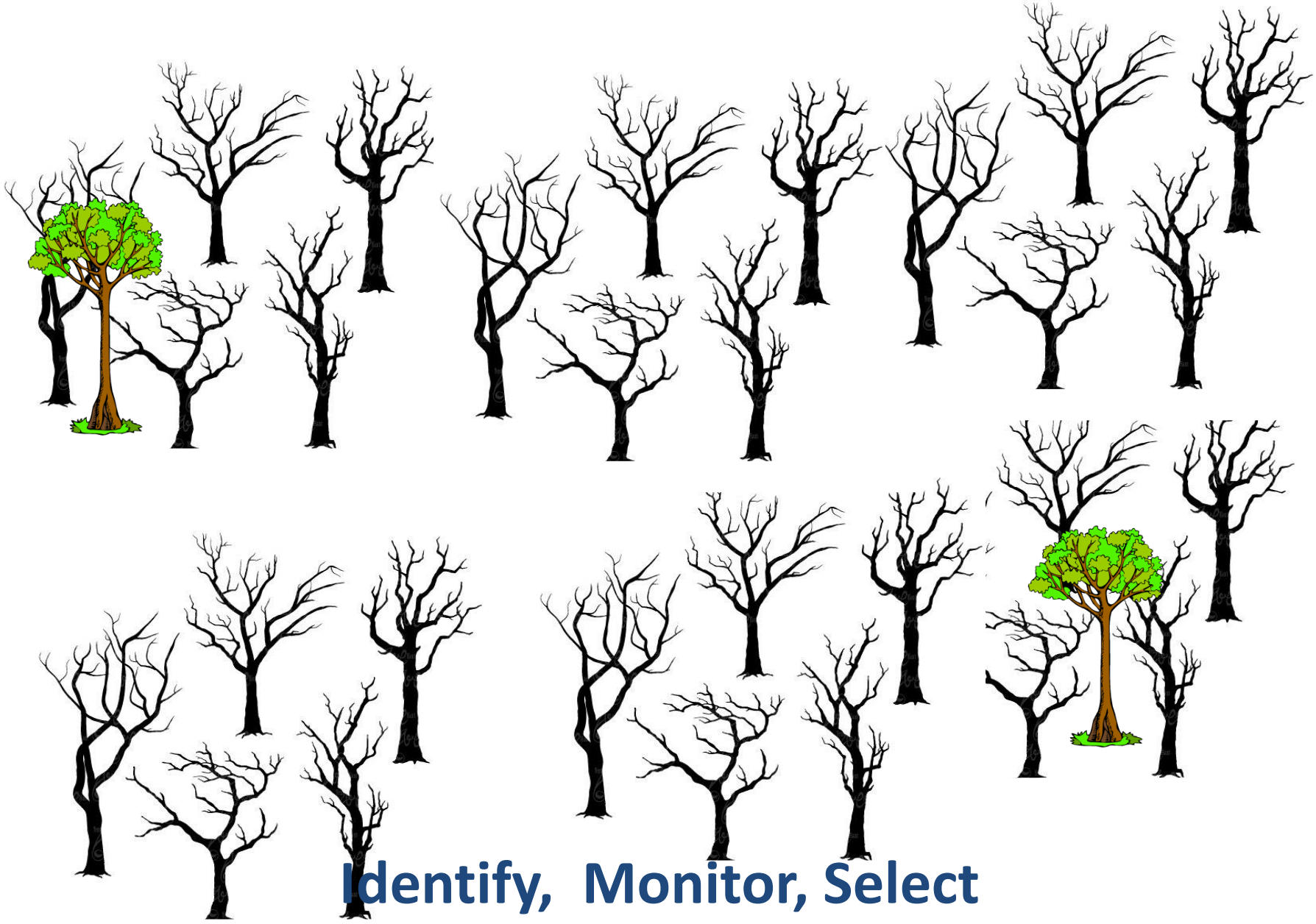
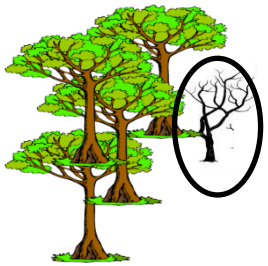
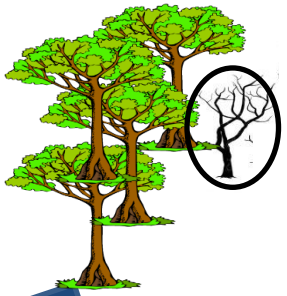


Identify, Monitor, Select
Healthy trees (Propagate 1 to 2 %)

Propagate, Conserve
Screen for
Durable health on 4 sites

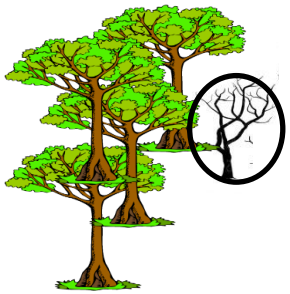


Site 1

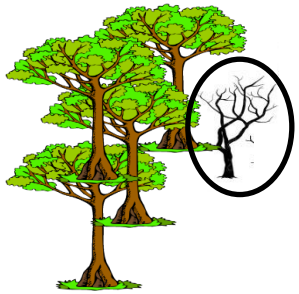


Site 2

Seed orchards



Site 3



Site 4

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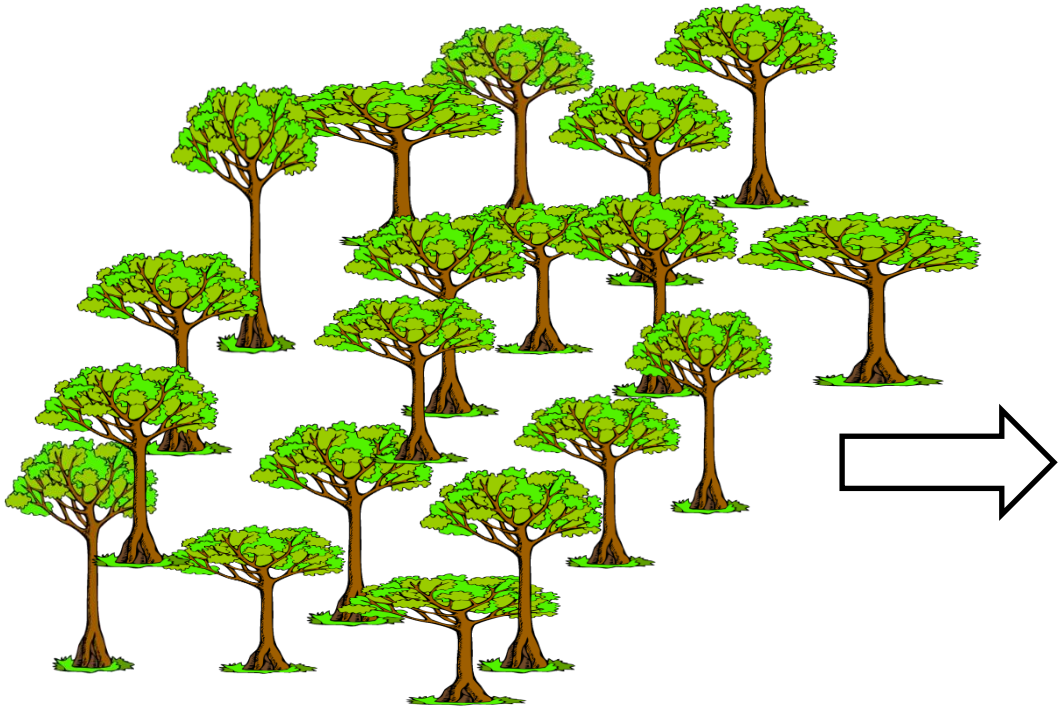
Use Durably healthy trees to generate Ash Seed Orchards



Healthy Seed progeny For Nurseries & Forest plantations

Two orchards per province

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Vegetatively micropropagated

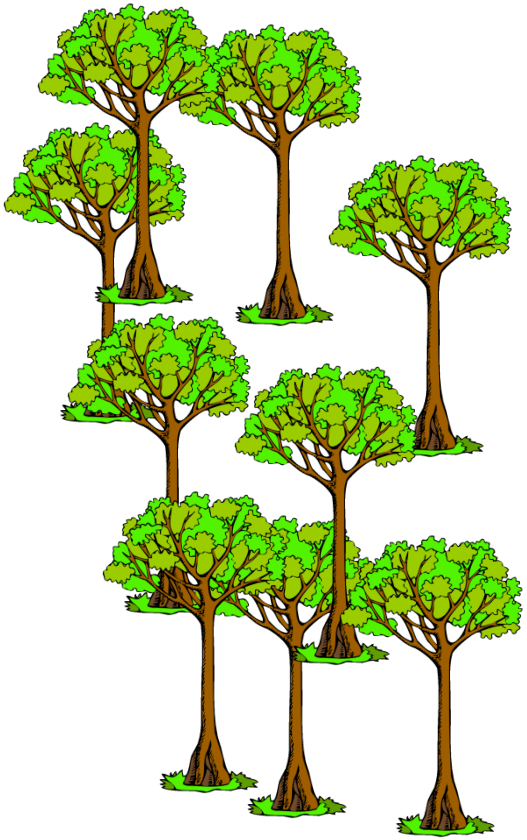
Field trials

14 years old

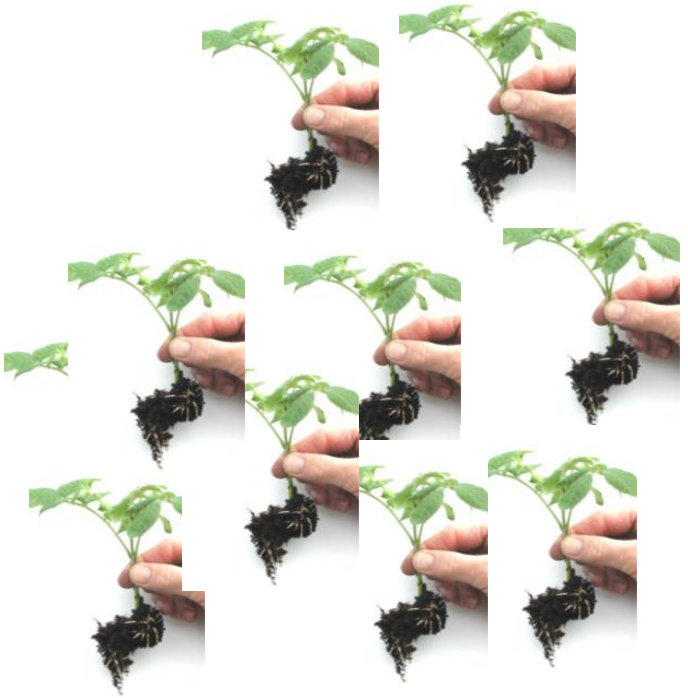
Teagasc Ballyhaise

Ash trees grow normally

Mass vegetative propagation of durably healthy trees (many genotypes)



Healthy



200 m² glasshouse 280, 000 cuttings / yr

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Ash Dieback can be defeated

Thank you

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