

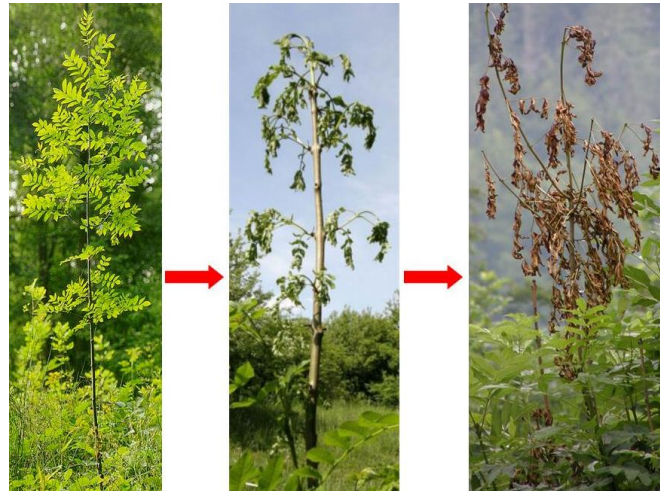
Project number: 6859

Funding source: Department of Agriculture,
Food and The Marine

Date: November, 2020

Project dates: Sep 2016 – Nov 2020

FORM: Identification and propagation of ash genotypes tolerant to ash dieback



Key external stakeholders:

Forestry companies, forest nurseries, hurley makers, policy makers

Practical implications for stakeholders:

The outcome/technology or information/recommendation is to identify and propagate ash genotypes with tolerance to ash dieback.

- Identify genotypes abroad which are suitable for Ireland
- Screen 1000 Irish genotypes abroad
- Develop tools for propagation of the tolerant genotypes
- Develop tools for the identification of tolerant ash genotypes
- Establish a collection of tolerant genotypes

Main results:

There is an ash gene bank with tolerant ash genotypes established in Ireland
36 biochemical markers for tolerance for ash dieback identified, of which 2 have been validated
45 putatively tolerant genotypes have been repatriated from Lithuania after three years of screening.

Opportunity / Benefit:

There is now all the necessary tools required to start an ash breeding program for tolerance to ash dieback.

Collaborating Institutions:

LAMMC
Max Planck Institute
Forest Research
INBO
Skogforsl
WSL
BOKU

Teagasc project team: Dr. Miguel Nemesio-Gorriz (PI), Teagasc

External collaborators: Prof. Alfás Pliura, LAMMC
Dr. Marijke Steenackers, INBO

1. Project background:

Ash dieback has extended its range in Ireland since 2012 and occupies now every county in the island. As a result, large areas of forestry, parks and the hedgerow network are affected by the disease and a portion of the ash trees have died. The majority of the ash trees in the country are expected to die in the next two decades. A long-term solution to this problem is the creation of a core collection of ash genotypes with natural tolerance to ash dieback. Tolerance to ash dieback is relatively common (1-3%), durable through time and it can be passed down to the next generation of ash trees.

2. Questions addressed by the project:

- Can ash genotypes with tolerance be identified?
- Are there effective ways to propagate tolerant ash genotypes?
- What tools can be used to identify tolerant ash genotypes?

3. The experimental studies:

- Natural screening of 1000 Irish ash genotypes for tolerance to ash dieback in Lithuania
- Importation of ash genotypes with tolerance to ash dieback from other European countries
- Grafting propagation of ash genotypes and establishment of a seed orchard/gene bank
- Metabolomics study with the aim to find biochemical markers for tolerance to ash dieback

4. Main results:

- Identification of 45 putatively tolerant ash genotypes from the 1000 genotypes that were sent to Lithuania
- Importation of 208 ash genotypes putatively tolerant to ash dieback
- Establishment of a seed orchard in Castlemorris with 208 tolerant ash genotypes (Co. Kilkenny)
- Identification of 36 biochemical markers for tolerance to ash dieback and validation of two of them, fraxetin and esculetin

5. Opportunity/Benefit:

A breeding program for the obtention of tolerant ash material to be deployed in forestry can now be started. All the necessary tools to start this work are provided by the end of the project.

6. Dissemination:

- Presentation at the Annual Forestry Conference 2020 "New findings in ash research"

Main publications:

Miguel Nemesio-Gorriz, Riya C Menezes, Christian Paetz, Almuth Hammerbacher, Marijke Steenackers, Kurt Schamp, Monica Höfte, Aleš Svatoš, Jonathan Gershenzon, Gerry C Douglas, Candidate metabolites for ash dieback tolerance in *Fraxinus excelsior*, *Journal of Experimental Botany*, Volume 71, Issue 19, 7 October 2020, Pages 6074–6083, <https://doi.org/10.1093/jxb/eraa306>

Popular publications:

T-Daily presentation

<https://www.teagasc.ie/news--events/daily/forestry/new-findings-in-ash-dieback-research-by-teagasc.php>

7. Compiled by: Miguel Nemesio-Gorriz