

# Susceptibility of *Fraxinus* Species to Ash Dieback Caused by *Chalara fraxinea*<sup>©</sup>

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## INTRODUCTION

Ash dieback caused by the fungus *Chalara fraxinea* was first identified in 1990 on *Fraxinus excelsior* in southern Sweden and Poland. At that time, little information was available about this new disease. Since then a sexual form of the pathogen has been isolated and named *Hymenoscyphus pseudoalbidus*.

First symptoms in seed-raised nursery stock normally occur in the late summer of the second growing season. Leaves turn brown but an abscission layer does not form and they remain on the plant. During the autumn the 1-year branches show discoloration from yellow to dark brown. Grading-out unhealthy plants in autumn is impossible, because the symptoms continue to appear and develop through winter.

## Chemical Control

It is possible to control ash dieback during nursery production using chemical fungicides. The first treatments should be carried out at the end of June with contact fungicides such as Dithane<sup>®</sup> (mancozeb) or Bravo<sup>®</sup> (chlorthalonil). Treatments with Mirage<sup>®</sup> (prochloraz) as a semi-systemic product have also been successful. Applications should be continued till the end of the growing season at 2-3 week intervals, depending on the rainfall or amount of irrigation.

Use of fungicides to control the disease in amenity or landscape plantings or in woodland, forestry, and other areas is possible in theory but not economic or practical and the only long term answer to the disease is to identify ash species, varieties, or cultivars which are tolerant or resistant to it.

## MATERIALS AND METHODS

Since 2009 plantings of *Fraxinus* species and cultivars have been carried out on a test field north of Hamburg where they have been challenged with both natural and deliberate infection with *C. fraxinea*. The test plants include seedlings of *Fraxinus* species, grafted landscape cultivars and some species of botanical interest only.

At present 28 different taxa are being tested under natural infection. Ten trees per taxon are planted in two replicates at 2-m spacing. Plants known to be already infected are placed among the test plants.

From 2011 further plantings have been artificially infected by chip-budding in late summer with a piece of infected wood.

*Fraxinus* taxa currently under test are:

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<i>F. americana</i> seedlings; and cultivars ‘Autumn Applause’ and ‘Skyline’	<i>F. mandshurica</i>
<i>F. angustifolia</i> ‘Raywood’	<i>F. nigra</i> ‘Northern Gem’
<i>F. bungeana</i>	<i>F. ornus</i> seedlings; and cultivars ‘Louisa Lady’ (syn. ‘Louisiana Lady’) and ‘Nijmegen’
<i>F. excelsior</i> seedlings; and cultivars Birkenmarken (DK), Kronborg (DK), ‘Altena’, ‘Atlas’, ‘Diversifolia’, ‘Geessink’, ‘Jaspidea’, and ‘Westhof’s Glorie’	<i>F. pennsylvanica</i> seedlings; and cultivars ‘Cimzam’, ‘Patmore’, ‘Summit’, and ‘Zundert’
<i>F. hupehensis</i> (syn. <i>F. hubeiensis</i> )	<i>F. sieboldiana</i>
	<i>F. texensis</i>

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## RESULTS SO FAR AND DISCUSSION

The trials have already revealed big differences in tolerance to the disease between the *F. excelsior* cultivars. For example ‘Jaspidea’ is very susceptible (although not in the trial, observations in the field suggest ‘Pendula’ is, too). ‘Westhof’s Glorie’, the most important cultivar in landscape use, also shows quite a high susceptibility. Others like ‘Altena’ seem to be much more tolerant, but still do not remain free of the disease. None of the cultivars was free of symptoms after 2 years of testing. The future for this native tree in Europe does not look very optimistic and it could suffer the same fate as elms following the outbreak of the more virulent form of Dutch elm disease some 50 years ago. However there remain opportunities for selection of potentially more tolerant or resistant clones by observation and further testing.

The two Danish sources Birkenmarken and Kronborg did not prove to show any tolerance to the pathogen so further selection is required.

*Fraxinus angustifolia* ‘Raywood’ has shown only limited infections during this trial. However, observations on trees in urban plantings suggest it is much more susceptible than the plants in the trial have so far proved to be (Fig. 1).

Few symptoms have occurred on seedlings and cultivars of white ash (*F. americana*), green ash (*F. pennsylvanica*), and flowering ash (*F. ornus*) (Fig. 1).

*Fraxinus americana* and *F. pennsylvanica* do have some potential as alternatives to *F. excelsior*. Many selections for landscape use are available, especially in the United States of America. *Fraxinus ornus* is native to central Europe, but it is only a small tree compared to *F. excelsior*.

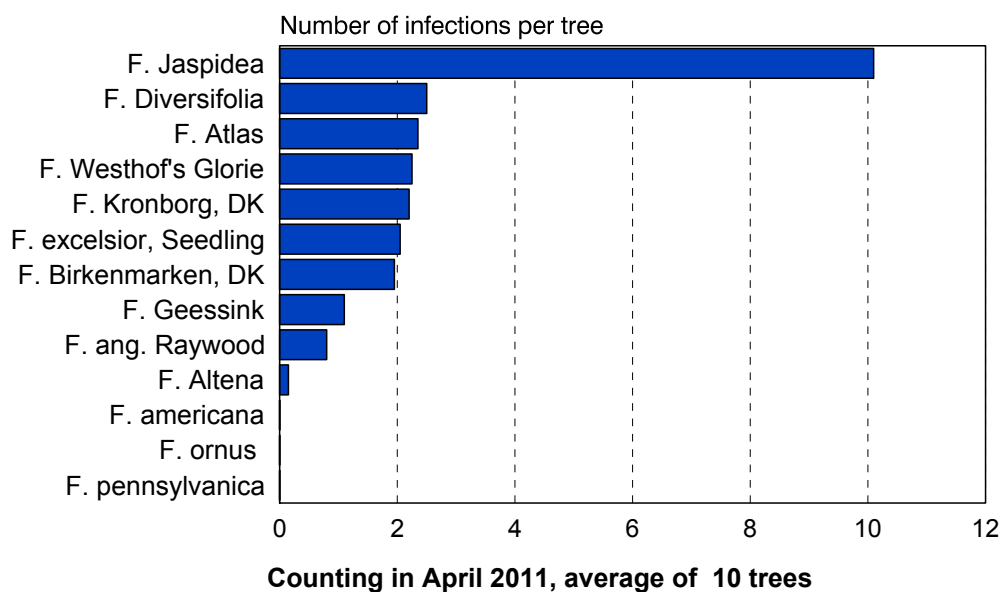


Fig. 1. *Chalara fraxinea* infections on different sources, results 2010.

The systematics of the genus *Fraxinus* (Wallander, 2008) may provide clues about where to focus attention when looking for resistance to *C. fraxinea*. Only the section *Fraxinus* (species include *F. angustifolia*, *excelsior*, *mandshurica*, *nigra*, and *platypoda*) seems to be susceptible. The section *Melioides* (e.g., *F. americana*, *pennsylvanica*, *caroliniana*, and *latifolia*) and *Ornus* (*F. ornus*, *sieboldiana*, *texensis*) seem to be tolerant or even resistant. Further detailed studies would be required to test this hypothesis.

### Literature Cited

Olrik, D.C., Kjaer, E.D. and Ditlevsen, B. 2007. Klonforskelle i angreb af asketoptorre, Skoven 11:522-525.

Wallander, E. 2008. Systematics of *Fraxinus* (*Oleaceae*) and evolution of dioecy. *Plant Syst. Evol.* 273:25-49.

