New dieback on ash (*Fraxinus spp.*) of Central and Northern Europe – involved factors and their significance in Germany

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Introduction
Noteworthy damages on ashes have been increasingly recorded in forests, landscapes and nurseries in Central and Northern Europe since a few years. Symptomatic trees show wilting, shoot dieback with bark necroses and premature leaf fall (fig. 1 and 2). The pathogenesis is often chronic and can be lethal. Both young plants and older trees with different site conditions are involved. Especially plants for planting and young plantations are creating problems of economical relevance. Ash decline is so far known in Poland, Sweden, Norway, Denmark, Finland, Germany, Austria, Switzerland and the Baltic states (Juodvalkis and Vasiliauskas 2002; Przybyl 2002; Thomsen 2005; Barklund 2005; Cech 2005; Schumacher et al. 2007; Kowalski and Holdenrieder 2008).

Materials and methods
Samples of diseased trees were taken in forests and nurseries in different parts of Germany. Preparation of samples was conducted according to Kowalski (2006). Fresh fragments of both symptomatic and asymptomatic tissue (wood, bark, roots) were superficially cleaned with 70% ethanol and then cut in pieces of 5 mm² sizes. Cuttings were placed in Petri dishes onto 2% malt extract agar and incubated at 25 °C in the dark. Growing colonies were transferred to new MEA plates and incubated for 6 weeks before identification.

Symptomatic plant material was studied also by histological investigations. Infected twigs were longitudinally cut and observed under the microscope. In addition, slices of 20 µm thickness in the radial-, tangential- and cross-section-area were cut by a microtome. Cuttings were mounted in Safranine and aniline blue solution in order to accentuate the woody cell walls and hyphae.

Results and discussion
In spring 2007 the hyphomycete *Chalara fraxinea* was isolated from discoloured wood of diseased twigs and branches for the first time in Germany. The disease has been found on *Fraxinus excelsior* and on *F. angustifolia* as well as on their cultivars, i.e. „Westhof’s Glorie“ or „Raywood“.

In our studies *C. fraxinea* could steadily be isolated from brownish wood but not from healthy xylem, bark or roots. The fungus is therefore considered a vascular pathogen without general endophytic character. Leaf stalks and buds seem to be important entrances for the fungus to infect the vessels of woody tissue (fig. 3).

Since the first detection, the fungus (fig. 4) was confirmed in nearly all successively studied samples and is now seen a conspicuous cause of the decline. *C. fraxinea* was recently described as a new species by Kowalski (2006). However, the causes of the decline are complex and controversial discussed. In some places *C. fraxinea* has not recorded and abiotic factors (drought, frost and changing winter conditions) are seen as primary. Moreover a lot of other fungi were isolated from diseased ash trees in different European countries.
**Fig. 1:** Dieback caused by *Chalara fraxinea* on *Fraxinus excelsior* in young plantations (left) and older stands (right).

**Fig. 2:** Variably discoloured necrotic bark tissue of diseased ash twigs without exudates
Fig. 3: Three-year-old longitudinally cut sapling with dead terminal bud and discoloured xylem (circle, arrow and triangle)

Fig. 4: Three weeks old colony of *C. fraxinea* on MEA (left) and vegetative hyphae with phialides and conidia (right)

References
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Thomsen, I. M., 2005: Frostskader i ask. Skovbrug Videnblade 8, 2-1.