

# Ash Dieback in Slovenia

TINE HAUPTMAN, NIKICA OGRIS AND DUŠAN JURČ

## Abstract

The first symptoms of the disease were observed in 2006, and since then the disease has rapidly spread throughout Slovenia. Dieback thus far has affected common ash and narrow-leaved ash. In 2008, involvement of the fungus *Chalara fraxinea* T. Kowalski in ash dieback in Slovenia as a causal agent was confirmed. Further research revealed differences in strain pathogenicity and the possible resistance of individual trees. The first sanitary fellings of ash trees due to the fungus *C. fraxinea* were done; the situation is also very serious in forest nurseries.

**Keywords** | ash dieback, *Chalara fraxinea*, Slovenia

## Kurzfassung

### Eschentriebsterben in Slowenien

Die ersten Symptome der Krankheit wurden im Jahr 2006 beobachtet, und seitdem hat sich Krankheit rasch in ganz Slowenien verbreitet. Vom Zurücksterben betroffen sind die Gemeine Esche und die Schmalblättrige Esche. Im Jahr 2008 konnte die Beteiligung des Pilzes *Chalara fraxinea* T. Kowalski am Zurücksterben in Slowenien als ein Hauptgrund bestätigt werden. Weitere Untersuchungen lieferten Hinweise auf Unterschiede in der Pathogenität einzelner Stämme und in der möglichen Widerstandsfähigkeit von einzelnen Bäumen. Die ersten Kalamitätsnutzungen von Eschen wegen des Pilzes *C. fraxinea* wurden durchgeführt; die Situation ist auch in Forstgärten kritisch.

**Schlüsselwörter** | Eschentriebsterben, *Chalara fraxinea*, Slowenien

## Native ash species in Slovenia

There are three native ash species in Slovenia. Common ash (*Fraxinus excelsior*) is widespread across the country, especially on rich, moist, loamy soils along rivers and streams. With 2,877,000 m<sup>3</sup>, common ash represents 0.9 % of total growing stock in Slovenia. Flowering ash (*Fraxinus ornus*) is especially frequent and important in the Karst, where it is known as a pioneer species in newly forming forests on abandoned grasslands and in Austrian pine (*Pinus nigra*) plantations. Its growing stock is 924,000 m<sup>3</sup>. Narrow-leaved ash (*Fraxinus angustifolia*) represents only 0.07 % (214,000 m<sup>3</sup>) of total growing stock in Slovenia. It is an important tree species in northeastern part of the country, where it is a good replacement for black alder (*Alnus glutinosa*) trees affected by hydro-melioration. This species also

occurs in other parts of Slovenia, but rarely (Kotar and Brus 1999, Gozdni fondi 2009).

## Research of ash dieback in Slovenia

Ash dieback was first observed in northeastern Slovenia in 2006. The symptoms were shoot, twig and branch dieback, wilting, lesions in the leaves and bark, and grey to brown discoloration of wood (Ogris et al. 2009b). In 2007 and 2008, the symptoms of ash dieback extended throughout Slovenia. Dieback thus far has affected common ash and narrow-leaved ash, while no symptoms have yet been observed on flowering ash.

In spring 2007, we started collecting samples from ash trees showing symptoms of the disease from different parts of the country. To date, we have collected 93 different *C. fraxinea* isolates from 28 different locations (Figure 1). The first isolation of the fungus *Chalara fraxinea* T. Kowalski in Slovenia was also made in 2007; its pathogenicity was confirmed the following year (Ogris et al. 2009b). The teleomorph of this fungus, apothecia on fallen leaf petioles of *F. excelsior* from previous year, was first noticed in the end of May 2009 in Ljubljana (Ogris 2009). They were formed abundantly up to the beginning of July.

Pathogenicity tests, made in 2008 on *F. excelsior* and *F. angustifolia* shoots inoculated with two isolates, showed greater susceptibility of narrow-leaved ash and great differences in necrosis size caused by different isolates. This indicates that isolates may differ in pathogenicity (Ogris 2009). Differences in necrosis length also existed between specimens of the same ash species, so we decided to further investigate differences in the resistance of individual trees. In 2009, we made observation of 467 trees in a 20-year old clonal seed orchard of *F. angustifolia* in Hraščica (Prekmurje). Assessments of crown damage caused by *C. fraxinea* and statistical analyses of collected data showed large differences among trees of the same clone, but also statistically significant differences among some distinct clones. On the basis of this research, we assume that differences in the resistance of individual trees really exist. To prove or reject this assumption we performed pathogenicity tests. The experiment is still in progress and the results are not yet known.

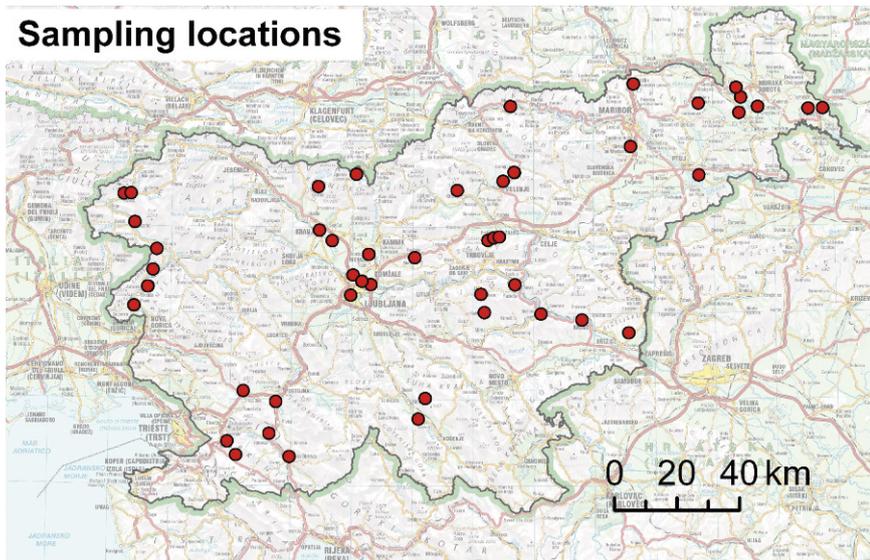


Figure 1: All sampling locations in Slovenia; the fungus *C. fraxinea* was successfully isolated from 28 of these locations.

Abbildung 1: Sämtliche Probenstandorte in Slowenien; der Pilz *C. fraxinea* wurde auf 28 von diesen Standorten erfolgreich isoliert.



Figure 2: Necrotic lesion on leaf petiole of *F. excelsior*.

Abbildung 2: Nekrotische Läsionen auf Blattstielen der Gemeinen Esche.

In addition to all the above-mentioned symptoms of the disease, premature leaf shedding of common and narrow-leaved ash was regularly observed in 2009. Numerous ash trees were already totally defoliated at the end of August and all fallen leaves showed necrotic lesions on petioles (Figure 2). Isolations proved *C. fraxinea* to be the causal agent (Ogris 2009a). This indicates a possible important role of leaf petioles necrosis in the disease cycle, already mentioned by other researchers (Kirisits et al. 2009).

## Conclusion

The severity of the disease in Slovenia seems to be higher on sites with high relative air humidity, with lower temperatures and without direct sun exposure (Ogris 2008). Ash dieback occurs on trees of all ages. Mortality on heavily affected sites is especially common on saplings and young trees, although on some areas also mature trees have already died. At the beginning

of 2009, the first sanitary fellings of ash trees due to *C. fraxinea* were performed (Ogris 2009). The situation is also very serious in forest nurseries, where cultivation of healthy ash seedlings has become almost impossible.

The fungus *Chalara fraxinea* has no special status on the list of harmful organisms in Slovenia. Nevertheless, as members of the Slovenian phytosanitary system, we proposed general directions to the Slovenian Forest Service regarding the management of common and narrow-leaved ash. We recommend stopping promoting ash species for planting. Ash should be replaced in plans for planting with *Acer pseudo-platanus* saplings or other ecologi-

cally similar tree species (e.g. on sandy soils near rivers, we recommend planting of *Populus* spp.). Sanitary felling of heavily damaged ash trees is taking place when encountered. The necessary changes should be executed through forest management and silviculture plans.

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Tine Hauptman, Nikica Ogris and Dušan Jurc, Slovenian Forestry Institute (SFI), Department for Forest Protection, Večna pot 2, 1000 Ljubljana, Slovenia, Phone: +386-1-2007853, Fax: +386-1-2573589, E-Mail: [tine.hauptman@gozdis.si](mailto:tine.hauptman@gozdis.si)