



Evaluation of resistance against ash dieback in *Fraxinus* spp.

Jelle A. Hiemstra, Bart, J. van der Sluis & Silvia Coolen
Wageningen University & Research, Field Crops section, The Netherlands

Introduction

Ash (*Fraxinus excelsior* L.) is an important native species in forestry and landscaping in Europe. However, in large parts of Europe ash dieback disease caused by the newly introduced fungal pathogen, *Hymenoscyphus fraxineus* (Hf) is causing serious problems in ash trees (figure 1). Currently, no effective measures to fight the disease are available. However, preliminary results have shown that certain individuals of *F. excelsior* may have increased resistance to *H. fraxineus*, and that susceptibility varies between *Fraxinus* species. Therefore, we aimed at unraveling differences in susceptibility in a large array of *Fraxinus* species and cultivars used in urban forestry.

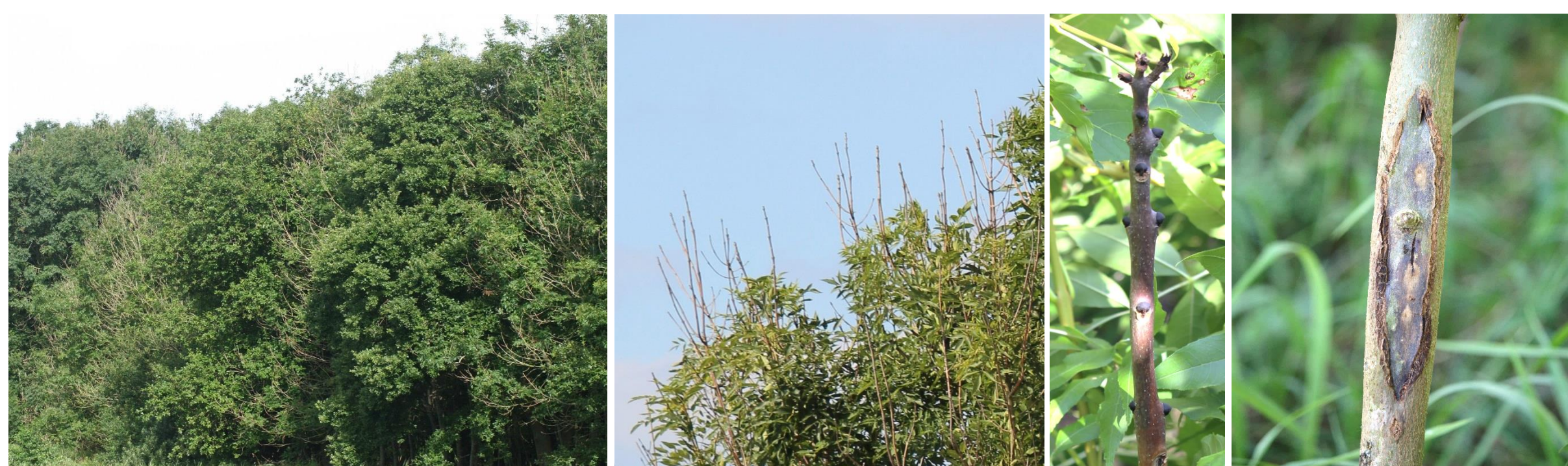


Figure 1. Ash dieback symptoms in the field.

Objective

The aim of the work was to develop tools that can help urban green managers in the management of the ash dieback problem; i.e.:

- providing information on disease risk in existing ash plantations
- identifying less susceptible alternatives to replace seriously affected ash varieties

Results

Inoculation with two *H. fraxineus* isolates resulted in large phenotypic variation in susceptibility between ash species and cultivars (Figure 3 and 4). Of the common ash species *F. americana*, *F. ornus* and *F. pennsylvanica* tested less susceptible whereas *F. excelsior* and *F. angustifolia* were very susceptible. Among the less common species *F. manchuensis* and *F. spaethiana* tested very resistant.



Figure 3. Disease symptoms of ash trees inoculated with *H. fraxineus*; on the left a resistant species without symptoms (inoculation wound closed and overgrown by healthy tissue).

Conclusions

- The inoculation procedure works well and allows comparison of the level of susceptibility in different ash species and cultivars.
- The ash species used in urban forestry vary in susceptibility to Hf.
- Less susceptible cultivars within the very susceptible European ash (*F. excelsior*) have been identified.

Methods

Susceptibility to *H. fraxineus* was examined in a large screening with over 750 trees of 15 species and 25 cultivars on an experimental field in the North of The Netherlands. Young grafted plants were planted in 2016, and artificially infected with *H. fraxineus* (Figure 2) at the end of the second growing season (August 2017). In August 2018 external symptom development was recorded and all plants were sampled for examination of internal discoloration (Figure 3). In the laboratory the extent of the discoloration from the inoculation point (ip) was assessed by measuring upward and downward spread and the percentage of the area discolored at the ip.



Figure 2. Inoculation procedure; fungal colony on agar plate with small wood chips (left) that are inserted into the stems by making a cut (center left) placing the wood chip in the wound (center right) and closing the wound by wrapping with parafilm (right).

Results

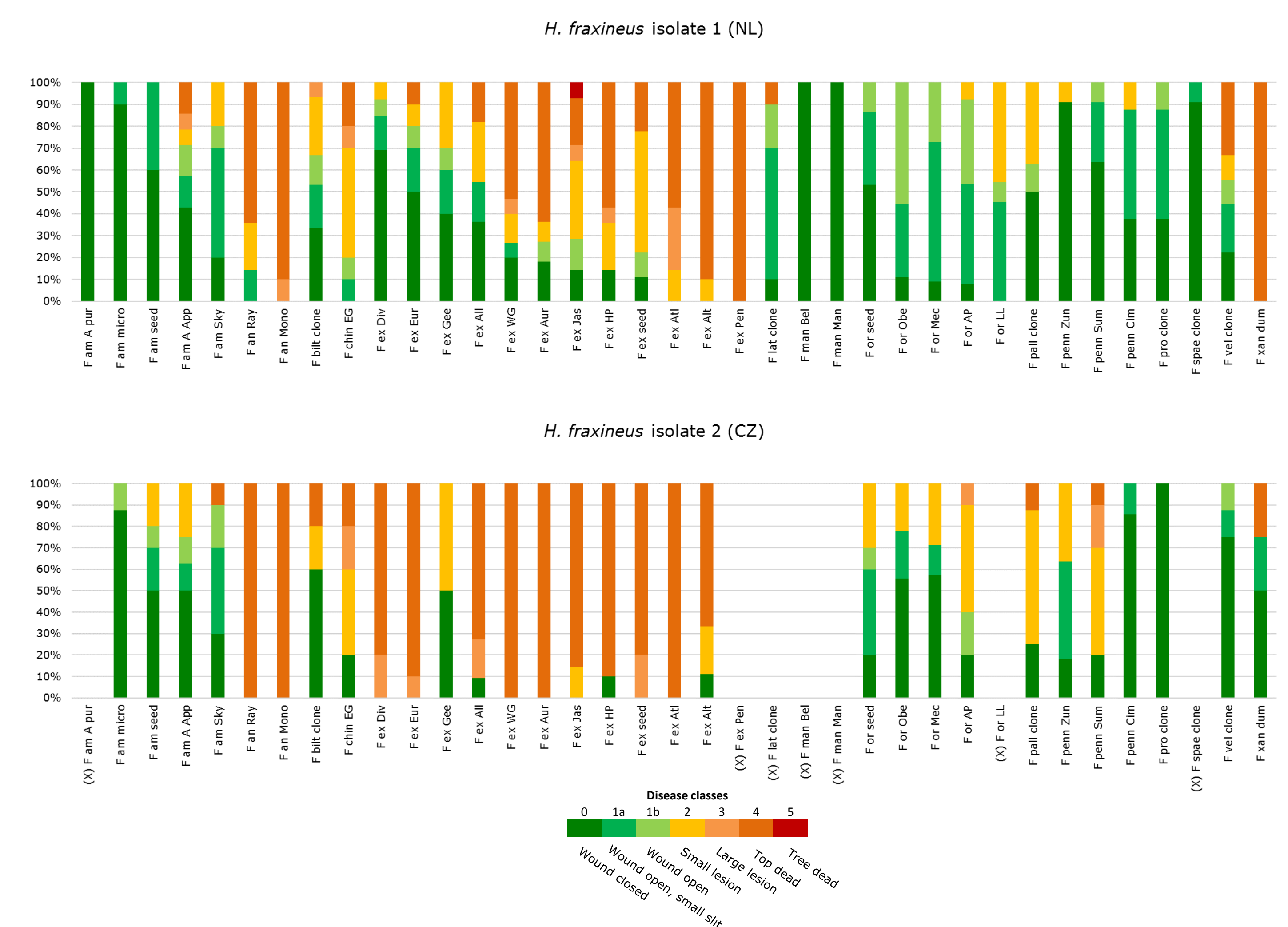


Figure 4. External disease symptoms of ash tree species and cultivars inoculated with *H. fraxineus*. Disease symptoms are categorized in 6 classes. On the x-axis the ash tree species and cultivars are shown with corresponding percentages of trees with the different disease classes on the y-axis.

Acknowledgements

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