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# Evolution of phenotypic plasticity in *Hymenoscyphus fraxineus* during its propagation across Europe

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## Résumé

Thirty years after its emergence in northern Europe, ash dieback is still spreading across the continent, threatening ecosystems dominated by ash trees. The disease is caused by *Hymenoscyphus fraxineus*, an ascomycete pathogenic fungus reproducing sexually. Despite a strong genetic bottleneck upon its introduction from Mandchourie, the fungus has successfully colonized highly diverse areas. We tested the hypothesis that the spread of the dieback is associated with evolution of adaptive plastic traits of *H. fraxineus*. We collected infected rachises from European ash trees (*Fraxinus excelsior*) across five sites located along a North-South colonisation gradient (Lithuania, Denmark, Switzerland, France, and Italy) to obtain fungal populations with different establishment histories (the oldest in Lithuania and the most recently established in Italy). These populations have experienced a variety of climatic and biotic conditions. We examined mycelium growth, viability, and aggressiveness in relation to temperature and host susceptibility. We found that the optimal temperature for mycelial growth was the highest in the Italian population, whereas the Lithuanian population had the highest mortality rates at elevated temperatures. Furthermore, the plasticity of aggressiveness in relation to temperature was significantly higher in the Lithuanian isolates than in the Italian ones. Besides, the within-population variability of reaction norms was higher for the Lithuanian population. These findings offer insights into the evolution of phenotypic plasticity in adaptive traits in a fungus which spreads in heterogeneous environments. From an applied perspective, understanding the evolution of pathogen’s plasticity is crucial for forestry management and predicting future spread.

**Mots-Clés:** phenotypic plasticity evolution, aggressiveness, thermal tolerance, range expansion, ash dieback

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