DRIVERS OF DISEASE EMERGENCE IN BOREAL CONIFER FORESTS, IMPORTANCE OF PHENOTYPIC BALANCE

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We consider host–tree imbalances from a phenotypic perspective, the lack of co-evolutionary and evolutionary history with the pathogen and the environment, respectively. Phenotypic plastic responses to environmental shifts may become maladaptive when hosts are faced with novel pathogens. Complex interactions involving the interaction with the environment (host or pathogen phenotype) are in theory possible, but are still understudied. Following an increase of records in Northern Europe, the first large scale outbreak of *Diplodia pinea* was discovered in Southern Sweden in 2016. By microsatellite markers, we saw that Diplodia strains from the outbreak area did not differ from strains belonging to the pre-existing innocuous Diplodia population, rejecting the hypothesis of disease driven by a new strain of the pathogen. Disease increased steadily over time, but new infections were more frequent in anomalously dry years. Tree-ring and isotope (δ C) analyses showed that highly infected trees produced more latewood and had lower water-use efficiency than their non-infected counterparts prior to the outbreak, pointing to a phenotypic predisposition and increased susceptibility. However, following disease outbreak, the highly infected trees produced practically no latewood while more healthy trees maintained latewood formation. We speculate that infected trees, by forming more wood in the late growing-season show a less conservative water use and may have experienced stronger summer drought stress, making them more susceptible to the pathogen. Host phenotype plays a relevant role driving disease emergence in boreal forests. Since current climatic conditions in Sweden are suitable for Diplodia survival, management efforts should aim to minimize the spread of the pathogen. Trees with a conservative use of water may be more suitable for areas in which Diplodia is present and where climate models forecast warmer and possibly drier conditions.

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