Insects and fungi in short rotation coppice - critical factors for success or failure?

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Introduction
The cultivation of fast growing tree species to satisfy the growing demand for woody biomass is not a new idea in Germany. Time and time again the shortage of timber has led to similar considerations. However, the cultivation of fast growing tree species (mainly poplar, willow and black locust) in short rotation coppices (SRC) on agricultural land is a new type of land use. Due to using a low number of clones in large homogeneous areas, SRC are susceptible to insect pests and fungal diseases. But the question is whether these are irrelevant or critical factors for success or failure of SRC. To assess the importance of insect and fungal pests we are going to look at them from four different perspectives.

Scientific perspective
The susceptibility of monocultures to insect pests and fungal diseases is common knowledge. The simplification of these habitats results in optimal conditions for some insects and fungi, as well as a decreasing number of natural enemies [3]. The larger and the more interlinked these areas are, the more relevant insect pests and fungal diseases become [16]. In addition it has to be noted that poplars and willows belong to those tree species that are inherently associated with a large number of insects [18].

Historical perspective
In the past, fungal diseases and pest insects often played an important role in Germany. In the mid of the 1950s, a period of extensive poplar planting, the trees were substantially damaged by dothiciza canker (Cryptodiaporthe populea) [20] as well as other fungal species [5, 6]. In addition various insect pests in poplar and willow plantations were reported [23, 13].

Current perspective
In the beginning of growing short rotation coppices in Germany, starting from the 1990s, insect pests and fungal diseases were not considered influential despite the knowledge emanating from science and history. Only with certain varieties suddenly showing heavy infestations with leaf rust (Melampsora spec.) and dying within a short period of time [19], biotic risk factors got increasing attention. Over the last few years insect problems have become apparent also [10, 15, 11; 14]. Furthermore, several other fungal diseases have caused heavy damage on poplars and black locust.

International perspective
In an international context about 50 major insect pests on poplar are known [24]. For poplar in Europe 50 potential pest species are listed [8]. Reports of harmful insects and fungi can be found from many European countries where poplars and willows are cultivated in large scale, such as Austria [22], France [2], Greece [17], Italy [7], Turkey [1] and the UK [21]. Furthermore, the importance of insect pests and fungal diseases in SRC is reported from North America [8] and Asia [12].