

9-5 Frequency of the birch leaf-roll disease caused by *Cherry leaf roll virus* in Fennoscandia

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INTRODUCTION

Virus-related symptoms were increasingly found on birch leaves throughout northern Fennoscandia during the last ten years. Disease symptoms occurring abundant on downy (*Betula pubescens*) and silver birch (*B. pendula*) and many other native birch species and subspecies in Finland could be associated with an infection of *Cherry leaf roll virus* (CLRV) (Jalkanen *et al.* 2007; von Bargaen *et al.* 2009). Symptomatic birch trees could be seen abundant in parks, street sides, roadsides and forests throughout the northern areas.

Although two silver birch saplings had been recorded to carry CLRV in Finland as early as in the 1980s (Bremer *et al.* 1991), the disease, hereafter birch leaf-roll disease, was described no earlier than in 2006 (Jalkanen *et al.* 2007). At the same time when the disease became common throughout the country in 2003–2006 (von Bargaen *et al.* 2009), the disease spread dramatically also vertically so that some trees have strongly declined and even died due to the birch leaf-roll disease. As no data existed about the frequencies of symptomatic birches, we started to monitor first urban and later also forest areas countrywide.

MATERIAL AND METHODS

We monitored disease frequencies mainly in birch alleys of town centres in 2006–2012. For objectivity and if available, our main target in each town or village to be examined was to choose the street leading to the main church and named with Kirkkokatu or Kyrksgatan (= Church street) or similar, having a birch alley. Depending on the length of the alley and the number of birch trees along the alley, the street was entirely or from its most representative

part assessed for symptoms of the birch leaf-roll disease. In Rovaniemi and Kajaani, Finland, several locations were surveyed. It was repeated annually once to four times in some of the alleys in Rovaniemi, Kajaani and Nurmes. Two of the Rovaniemi sites represent forest environment. Disease frequency for the forest land was obtained by assessing one fifth of the permanent sample plots of the Finnish National Forest Inventory (NFI) for Finland in 2010. Total number of the surveyed birches was 4286 (1644 in towns and two forest road side locations) in Finland and 310 (six urban locations) in northern Sweden. The tree material consists of a mixture of downy (majority) and silver birch. Trees were monitored mainly between mid-July and mid-August to attain the best symptoms appearance in field assessment. A birch was assessed positive, i.e. symptomatic if it displayed some of the symptoms associated with a CLRV infection such as leaf roll, veinbanding, chlorotic ringspots, proliferation, reduced leaf size, necrotic lesions, and tip dieback.

RESULTS AND DISCUSSION

Average frequency of diseased trees associated with CLRV infection in town alleys was clearly lower in Sweden (15.5%) than Finland (28.3%). Street-based-values varied from zero to 71.4%. The frequency of symptomatic trees normally increased annually, with the feature that once symptomatic always symptomatic. However, it was recorded for the first time that several birches, which appeared very slightly symptomatic earlier, had no symptoms in the cool summer of 2012. More data about the disease in forests are needed because the frequencies of the two forest road side locations were very high, 40.8 and 45.7%, as compared to the NFI value of 0.23% only. In repeated surveys it became evident that personnel responsible for urban trees replace severely declined birches with a young specimen.

ACKNOWLEDGEMENTS

Research was partly funded by the DFG-grant BU890/15-1.

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