P. uniformis-like Phytophthora found on Finnish Alnus glutinosa

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Natural interspecific hybridization can create novel hybrid plant pathogens capable of colonizing new hosts or causing more severe disease in old hosts. The phenomenon is also well known and relatively common among Phytophthora species, where the alder phytophthora is a stellar example of a hybrid pathogen adapted to a new niche and a new host. Alder dieback was first reported in 1999, but the disease has spread thereafter and is now devastating riparian alder ecosystems in most of Europe. The causal agent has three forms, classified as Phytophthora uniformis, P. xmultiformis and P. xalni (Husson et al. 2015). The latter is the most common in Europe as well as the most aggressive pathogen on Alnus.

In June 2015, a Phytophthora was isolated from a stem lesion on an Alnus glutinosa seedling purchased for outplanting in Finland. The identity of the isolate was investigated by measuring morphological characteristics as well as sequencing four nuclear genes (betatubulin, TRP1, GPA1, RAS-Ypt, ASF-like), the mitochondrial cox-spacer and the ITS-region. Pathogenicity of the isolate was tested by stem-wound inoculation on Alnus glutinosa and Betula pendula seedlings.

The isolate was homothallic, and morphological characteristics corresponded to P. uniformis, except for the antheridia, which in contrast to P. uniformis, were almost solely single-celled. The ITS region had four separate alleles, which had the closest GenBank matches with P. uniformis sequences, but with 3-4 bases differences. All other sequenced regions had single alleles. The cox-spacer and betatubulin sequences matched 99% and 100%, respectively, with GenBank sequences classified as P. alni. The other nuclear gene sequences had exact matches with P. uniformis (GPA1, RAS-Ypt, ASF-like), or differed by one base (TRP1). The pathogenicity test showed that the isolate is virulent to both alder and silver birch.

The finding is the first observation of the alder phytophthora in Finland. Our isolate belongs to P. alni complex, where it is most closely related to P. uniformis. There are however genetic and phenotypical differences that make the taxonomic status of the isolate uncertain. In any case, the result adds to our knowledge on the variation among this group of microbes with hybrid origin. There are no previous reports on the virulence of P. alni complex on silver birch. In addition to potentially causing problems in both alder and birch nurseries, this pathogen can be transferred between nurseries or to nature also in birch seedlings, which are far more commonly planted throughout Finland than alders.