Challenges in *Ramularia collo-cygni* Control

Subjects: Mycology

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Ramularia leaf spot (RLS), caused by the fungus *Ramularia collo-cygni*, has recently become widespread in Europe. Succinate dehydrogenase inhibitor (SDHI) and demethylation inhibitor (DMI) fungicides are mainly applied for disease control on barley fields, but pathogen isolates with a reduced sensitivity can cause difficulties. There is an urgent need for new spring barley cultivars that are more resistant to RLS development and can inhibit *R. collo-cygni* epidemics.

Keywords: Ramularia leaf spot ; fungicide target proteins ; CYP51 ; azoles ; SDHI ; mlo gene

Barley (*Hordeum vulgare* L.) is one of the most important cereal crops grown in temperate regions worldwide [1]. Among the various pests and diseases that threaten sustainable barley cultivation [2], Ramularia leaf spot (RLS)—caused by an ascomycete, *Ramularia collo-cygni*—has become a new threat to barley cultivation. The first reported case of the disease dates back to 1893 in northern Italy and was identified by a notable botanist, Fridiano Cavara. For a century, RLS was a minor disease and did not cause any serious problems in barley cultivation, but the majority of *R. collo-cygni* outbreaks have been reported in the last few decades. The first official records in Germany, the UK, Ireland, and New Zealand are from the 1990s. In Finland, Sweden, Denmark, and France, the first records are from the 2000s, and in Estonia, Spain, and Australia, the first records are after 2010 [3]. Since the beginning of 2000, RLS has been considered to be an emerging disease of barley in Europe, South America, and New Zealand [2][4][5]. It is possible that RLS can lead to moderate barley yield losses of 5–20% or greater. Although the trigger of these increasing RLS epidemics is still under debate, *R. collo-cygni* adaptation to widely distributed RLS-susceptible barley cultivars and fungicides along with heat stress under global climate change will lead to a risk of future RLS epidemics [3][6].

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