

Resistance to dollar spot disease in fine fescues is linked to the presence of the endophyte *Epichloë festucae*

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Dollar spot is a major disease in many turfgrass species. Resistance to dollar spot is critical for fine fescues to be used on golf courses or as low input turfgrass lawns. Many fine fescue species, including *Festuca rubra* and its subspecies, have coevolved with *Epichloë festucae*, a filamentous fungal endophyte with which they form long-term, symbiotic associations. These endophytes confer several benefits to their host, including pest and disease resistance. In fine fescues, different sources of resistance to dollar spot linked to genotypes of *E. festucae* could exist. Dollar spot resistance in strong creeping red fescue (*F. rubra* subsp. *rubra*) has been attributed to an antifungal protein gene, *Efe-afpA*. In hard fescue (*F. brevipila*), a diallel cross between three resistant endophyte-containing and three susceptible endophyte-free parents was performed to determine the inheritance of dollar spot disease resistance. The highly significant maternal effect demonstrated that

dollar spot disease resistance is maternally inherited in hard fescue and linked with the maternal inheritance of *E. festucae*. However, *Efe-afpA* is absent in endophyte strains that associate with hard fescue. The mechanism of endophyte-mediated disease resistance in hard fescue is therefore unknown. It is possible that small effector proteins from *E. festucae* strains associated with hard fescue could function similarly to *Efe-AfpA* and/or trigger plant defence responses against fungal pathogens. Regardless of the source of resistance, *E. festucae* strains that confirmed dollar spot resistance can be transferred within or between turfgrass species. Our research suggested that artificially inoculating turfgrass species with *Epichloë* endophytes can generate novel dollar spot resistant germplasm, creating more opportunities for turfgrass breeding and cultivar development.