Epichloë endophytes from *Elymus dahuricus* enhance the growth and nutritional quality of *Poa pratensis*

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In natural ecosystems, symbiotic *Epichloë* endophytes can contribute significantly to the growth and development of cool season grasses in the Pooideae subfamily with which they form host specific, long-term associations. Selected *Epichloë* strains can also be transferred to alternate grass hosts, such as elite grass germplasm used as forage, where they can also confer advantageous traits. Most of these 'novel' endophyte-grass associations have been developed in fescue and ryegrasses that are agriculturally important to farm systems in many countries including New Zealand and the USA. Limited reports exist regarding the symbiotic relationship between *Epichloë* and *Poa pratensis* within natural ecosystems, and no studies have documented the application of this *Epichloë* species in managed pastoral systems. In this study, three *Epichloë* strains (LE1, LE3, and WBE1) isolated from *Elymus dahuricus*, determined as non-toxic to grazing livestock, were inoculated into modern cultivars of *P. pratensis* to investigate their colonisation ability, compatibility and potential effects on agronomic traits and nutritional quality of the novel symbioses. The colonisation rates of strains LE1, LE3, and WBE1, reached 4.1% (n=369), 4.4% (n=341), and 4.1% (n=320), respectively. All three strains significantly enhanced key agronomic traits, including plant height, leaf length, potassium (K) accumulation, and soluble sugar content. PCA revealed that LE3 exhibited the most pronounced synergistic effects on host nutritional growth, as evidenced by its superior comprehensive evaluation score. Furthermore, endophytic fungal colonisation induced significant structural alterations in the phyllosphere bacterial community, characterised by shifts in dominant taxa and functional guilds, thereby establishing a novel plant-microbe functional network. These findings underscore the potential of *Epichloë*-mediated microbiome remodelling as a driver of phenotypic optimisation in grass-endophyte symbioses. This study confirms that novel symbiotic associations between *Epichloë* endophytes and *Poa pratensis* can be achieved to confer advantageous traits to the host grass. These findings contribute valuable insights to the field of grass-endophyte symbiosis research and practical breeding applications.

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