Traits for perennial wheat adaptation in Australia

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Abstract

Interest is increasing worldwide in developing perennial crops to improve sustainability of mixed-farming systems. Perennial wheat has prospects in Australia to contribute to both grazing and grain production, especially by providing timely autumn grazing to relieve pressure on other forages. Amphiploids from crosses between various wheats and perennial grasses have been imported into Australia for initial evaluation, and crosses between adapted Australian wheats and Australian native perennial grasses are proposed. Initial efforts have demonstrated that some imported amphiploids have a capacity to perenniate in the field with adequate water, but questions remain concerning appropriate phenology for a perennial wheat ideotype, and its capacity to tolerate the extremes of the Australian environment, especially the hot dry summer conditions encountered in southern Australia. This paper reviews trait requirements for successful perenniation, growth and performance of perennial wheat in contrasting environments, from north America to Australia, but especially from northern Australia (summer-dominant rainfall, heavy-textured soils) and south-western Australia (winter-dominant rainfall, light-textured soils), to south-eastern Australia (with a little summer rain and deep soils, but the likelihood of very hot-dry summers overall). The review concludes that appropriate phenology and summer dormancy will be desirable to escape exposure to summer drought, with avoidance and tolerance traits assisting plant performance and perenniation in different zones.