An Integrated Physical, Genetic and Cytogenetic Map of Brachypodium distachyon, a Model System for Grass Research

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Abstract
The pooid subfamily of grasses includes some of the most important crop, forage and turf species, such as wheat, barley and Lolium. Developing genomic resources, such as whole-genome physical maps, for analysing the large and complex genomes of these crops and for facilitating biological research in grasses is an important goal in plant biology. We describe a bacterial artificial chromosome (BAC)-based physical map of the wild pooid grass Brachypodium distachyon and integrate this with whole genome shotgun sequence (WGS) assemblies using BAC end sequences (BES). The resulting physical map contains 26 contigs spanning the 272 Mb genome. BES from the physical map were also used to integrate a genetic map. This provides an independent validation and confirmation of the published WGS assembly. Mapped BACs were used in Fluorescence In Situ Hybridisation (FISH) experiments to align the integrated physical map and sequence assemblies to chromosomes with high resolution. The physical, genetic and cytogenetic maps, integrated with whole genome shotgun sequence assemblies, enhance the accuracy and durability of this important genome sequence and will directly facilitate gene isolation.