

## BIOMASS BIOLOGY

### **Developing *Brachypodium distachyon* as an experimental system for temperate grasses**

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*Brachypodium distachyon*/ genetic map/ transformation/ genome sequencing/ model systems.

The use of *Arabidopsis* as an experimental organism has had an important impact on the way plant research is conducted and it will continue to be a powerful research system for dicot species for the foreseeable future. There is no directly comparable experimental system for the grass family, which have some distinctive developmental and structural differences from dicots that are scientifically and economically important. Although there is a high quality genome sequence for rice and extensive functional genomics resources, rice has not really taken off as a widely used experimental system in the UK. This is mainly due to the expense and complexity of growing the plant in our conditions, and to the large size and its relatively slow generation time. This is a problem because grasses are the most important crop plants in the UK, and thus researchers who wish to conduct research directly relevant to food crops such as wheat and barley, to forage crops such as *Lolium*, and bioenergy crops such as *Miscanthus*, are currently limited by the experimental suitability of these crops, which is generally recognised as being limited compared to *Arabidopsis* and rice.

Given these factors, a group of scientists from the USA and UK formed the International *Brachypodium* Initiative (IBI) in early 2006 to promote the development of *Brachypodium distachyon* as an experimental system. This temperate grass has several potential advantages as an experimental system. It has a rapid life cycle, a reasonably good seed set, it is closely related to wheat, barley and forage grasses, it can be diploid and it has a relatively small rice-sized genome.

IBI has established a cooperative research plan ( <http://www.brachypodium.org/> ) that aims to achieve the following objectives:

- Define and distribute a standard set of single-seed descent lines as community standards
- Generate a high quality genome sequence and annotation
- Establish a genomics database and portal
- Construct genetic and BAC- based physical maps of the genome
- Develop efficient *Agrobacterium tumefaciens*- based transformation systems and vectors
- Develop functional genomics resources
- Promote the potential benefits of research in this plant.

In my talk I will describe progress towards these objectives and discuss ways in which the UK research community could use *Brachypodium* as a research tool.