



Small Grain Cereals

The Newsletter of UK Small Grain Cereals Research

Welcome to the first "Small Grain Cereals" newsletter!

This should arrive in your inbox every six months and form part of a series of activities which are funded by BBSRC to improve communication between public and private sector scientists working on small grain cereals (wheat, barley, oats) and related forage grasses in the UK.

The Website

The small grain cereals website is now on-line and provides information and links on research organisations, funding bodies, resources and meetings. We want to make this the logical entry point for those seeking information on small grain cereal research but this will only happen with your help. We would be happy to include profiles on your groups and links to your websites so please send information on these to Sam Irving. Similarly, please send us details of other activities and links which should be included.

Small Grain Cereals Workshops

BBSRC have provided support for three annual workshops, the first of which was hosted by SCRI in Dundee on 9-11th March 2005.

The second workshop is scheduled for the JIC on 5-7 April 2006 while the third may be hosted by NIAB in Cambridge in Spring 2007.

Further details are available on the website at <http://www.smallgraincereals.org> or contact John Snape at JIC for details of the 2nd Workshop

Exchanges and Visits

We are able to provide support for short visits of public or private sector scientists between laboratories to use specialised facilities, learn new methods and transfer technologies. Two exchanges have so far been supported in 2005 and support for four more is available.

Further details of the awards and application procedures are available on the website.

BRACT: the UK wheat transformation facility

BRACT (Biotechnology Resources for Arable Crop Transformation) is a Defra-funded grant led jointly by Rothamsted Research and the John Innes Centre.



Wheat plant regenerating via callus derived from mature seed
M Wilkinson

The aim of this project is to draw together existing expertise to facilitate the use of crop transformation technology within the UK and to develop and distribute best practice among the scientific community.

The main objectives are to:

- Develop robust transformation protocols for the three major crops wheat, barley and oil seed rape.
- Develop and apply clean gene technology.

•Generate a suite of Gateway-compatible, over-expression and RNAi-based binary vectors with a range of promoters and selectable markers.

•Provide a publicly-available resource providing expertise, vectors, a crop transformation service on a collaborative or cost recover basis.

The principal route for the dissemination of information and on the transformation resources, including vectors, protocols and contact details, will be via the BRACT web-site (www.bract.org). Through the involvement of a user group, resources will be tailored to meet demand as far as is practicable. It is envisaged that after three years it will be possible to maintain a transformation resource centre for the benefit of the research community by users building full costs for their transformation needs into grant proposals.

Establishment of a TILLING platform for wheat

TILLING (Targeting Induced Local Lesions In Genomes) is a PCR-based method for detecting genomic DNA sequence variation between individuals and was developed in the Seattle laboratories of Luca Comai and Steven Henikoff (McCallum et al. (2000) *Plant Physiol* 123:439-42; Colbert et al. (2001) *Plant Physiol* 126:480-4; Comai et al. (2004) *Plant J* 37:778-86). Various detection methods are available but the most common relies on the single-stranded cleavage activity of

the endonuclease Cell to identify mismatched heteroduplexes of annealed PCR products, followed by denaturing gel separation of the products. As DNA from a number of individual can be pooled, the technique can be scaled for high throughput, screening for point mutations in several thousand individuals per day.

Under the Defra Wheat Genetic Improvement Network (<http://www.wgin.org.uk/>), Kim Hammond-Kosack and Andy Phillips at RRes are also establishing TILLING in hexaploid and diploid wheat species, as a tool for both wheat improvement through allele mining and as a platform for functional genomics. With Robert Koebner at JIC, EMS-mutagenised populations of the bread wheat cultivars Paragon and Cadenza (~6000 lines of each) have been prepared. The hexaploid nature of bread wheat results in tolerance of high mutation rates, and although it is likely that each individual in the populations carries up to 106 mutations, few plants (<2%) have a readily observable phenotype. Thus relatively few plants need to be screened to identify a selection of alleles in each gene, but it is likely that alleles in each homoeologue will need to be brought together before a phenotype is observed. Initial targets of the WGIN programme include genes involved in GA biosynthesis and signalling to manipulate plant architecture and grain amylase content as well as defence signalling genes that orchestrate the activation of plant defence responses to numerous phytopathogenic microbes.

GARNet hosts Arabidopsis, Brassica and Cereal Forum

The GARNet 2005 meeting will be held at the John Innes

Centre, Norwich, from the 5th to the 6th September. The overall meeting theme, '2010 and beyond', aims to look to the future of plant research be it greater interactions between plant communities or systems biology. With a programme that includes internationally renowned speakers such as David Baulcombe (Sainsbury Laboratory), Nam-Hai Chua (Rockefeller University), Ottoline Leyser (University of York), Wayne Powell (NIAB) and Bob Pruitt (University of Purdue) we believe that this years' meeting will be as successful as the previous five and hope you will be able to join us. To register go to http://garnet.arabidopsis.info/garnet_meeting.htm.

GARNet 2005 will host the 1st UK ABC (Arabidopsis, Brassicas and Cereals) Forum to discuss how to improve current interactions and two-way (or more) information exchange between Arabidopsis and Crop science. The long term aim of the ABC forum is to further integrate plant science based on common underlying genomics and trait biology. We hope that this forum will assist in: - breaking down division between communities, identifying potential links between research in models and crops, identifying current limitations in the cross over of plant science between species, ensure that a wide range of species are used as models in the future.

GARNet: a potted history

GARNet (Genomic Arabidopsis Research Network) was formed in 2000 with the aim to provide reliable, efficient, user-driven and publicly available functional genomics resources for the Arabidopsis community. BBSRC funding via the IGF initiative enabled GARNet to

establish transcriptomic, metabolomic and proteomic service centres along with additional resources, for further information see the <http://arabidopsis.garnet.info> Today all these services have moved to full cost recovery and GARNet now exist in a co-ordination capacity only with renewed funding until 2010. The key goals of GARNet now are:-

1. To keep the community up to date with functional genomic services and methods via the website, newsletter and annual meeting.
2. To promote interactions and collaborations between Arabidopsis and other UK plant communities via the ABC forum and annual meeting.
3. To aid Arabidopsis researchers make the best advantage of global opportunities by enhancing UK participation in International Research.
4. Facilitate collaborations with other plant functional genomics programmes.

For further details contact Ruth Bastow, GARNet Assistant Co-ordinator
e-mail ruth@arabidopsis.info

New EU Programmes

Two new FP6 integrated Projects, including HEALTHGRAIN (detailed below), will include substantial amounts of work on small grain cereals.

HEALTHGRAIN is focussed on wheat and aims to develop nutritionally enhanced products through a combination of improved raw material composition and innovative processing. It is co-ordinated by Dr Kaisa Poutanen (VTT, Finland) with a "crop improvement" module led by Peter Shewry at Rothamsted Research.

BIOEXPLOIT is focussed on reducing the agrochemical inputs currently required to combat pests and pathogens in Europe by using biodiverse germplasm to develop crop varieties with improved natural resistance (principally cereals and potatoes). It is coordinated by a Dutch Consortium (Wageningen University) and Robbie Waugh (SCRI) leads a module to map, isolate, characterise and deploy genes conferring disease resistance.



The first of these was held at CIMMYT (Mexico) in December 2004 and the second with scientists from the French Institute Nationale de la Recherche Agronomique (INRA) was held at Clermont Ferrand on 21-22 April, supported by a BBSRC ISIS grant. The EU delegation comprised 14 scientists from Rothamsted Research, the John Innes Centre, NIAB and the University of Nottingham and the BBSRC Swindon office, while the INRA representatives came from Bordeaux, Nantes, Estrées-Mons, Montpellier, Moulain and Rennes as well as from the host site.

One of the recommendations of the BBSRC "Review of Research of Crop Science", which was published in April 2004, was to improve the collaborations between UK researchers and the international community,



Joint BBSRC/INRA Workshop on improvement of wheat

The Defra Wheat Genetic Improvement Network (WGIN) was established in 2003 with the aim of providing research to underpin the UK wheat breeding industry. Although this research is largely based at Rothamsted and the John Innes Centre, WGIN also plays a wider role in improving communication and fostering collaboration between wheat researchers and end-user industries in the UK. A further aim is to develop strategic alliances with the major wheat research organisations in the wider international community, via a series of joint workshops.



focussing on major crop research organisations such as CIMMYT and INRA. This has resulted in discussions between BBSRC and INRA about mechanisms to support bilateral research programmes and the second day of the workshop was therefore directed toward group discussions which identified a number of joint research programmes which can be developed if funding becomes available. UK contacts and topics under discussion are Kim Hammond-Kosack (plant/pathogen interactions), Peter Shewry (grain development), Wayne Powell (polyploidy) and John Snape (sustainability traits).

Forthcoming Events

BBSRC Crop Science Event 18th September 2005 Stoneleigh Park, near Coventry

A one-day event to present responses to the BBSRC Crop Science Review to the research community, and industrial and other stakeholders.

For further information, please see:-
http://www.bbsrc.ac.uk/news/events/28_sept_cropsci.html

This newsletter includes contributions from Peter Shewry, Andy Phillips, Huw Jones, Ruth Bastlow and Robbie Waugh and edited by Sam Irving

Further details about the Small Grain Cereals project can be found at www.smallgraincereals.org

Please let us have your contributions for the Spring 2006 Newsletter!