



Small Grain Cereals

The Newsletter of UK Small Grain Cereals Research

Summer 2006 edition



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UPDATE on SGC:

Website:

Information of interest to the UK Small grain Cereal community can be accessed on the website www.smallgraincereals.org. You can find resources, news and information on upcoming events.

Mailing list:

In order to facilitate communication a mailing list has been set up recently. You can join this mailing list and post messages via the website <https://www.lists.bbsrc.ac.uk/mailman/listinfo/sgc-network>.

3rd UK Cereals Genetics and Genomics workshop:

We would like to thank everyone for their feedback on this year's event. The workshop was

very well received yet again. The general response to the questionnaire was that the majority of researchers would like to keep the workshop a smaller UK event, possibly with slightly less participants than this year. It was suggested that all the participants should contribute to the workshop. There was also a strong demand for more discussion time and there were particular requests for more directed discussions on specific topics. A considerable number of participants thought that the range of topics covered was too narrow. It also turned out that many participants are not very well informed on the scope and activities of the small grain cereals network. A detailed table on all the feedback received can be

downloaded on www.smallgraincereals.org. The next workshop will take place in April 2007.

Exchange visits:

Enhancing the skills base of researchers is an important issue for the UK cereals community. To support this SGC finances two types of activities:

- i) Exchanges between scientists in public sector laboratories to facilitate the exchange/learning of new technologies.
- ii) Secondment of public sector scientists to plant breeders or other private sector laboratories for technology transfer activities.

Up to six exchanges of 1 week duration will be funded each year. For further details and an application form please visit

www.smallgraincereals.org.

The MONOGRAM Cross Institute Programme: Research into the Genetic Improvement of Cereal and Grass Crops

At inception the Monogram CIP comprises elements of BBSRC supported research at IGER, JIC and RRES along with SEERAD-supported work at SCRI. The Monogram activities in the Institutes will form the core of a larger programme with a focus on grain and grass research, and from the outset will engage university researchers and other funders.

The programme concerns wheat, barley, oats and forage grasses; with links to work on C4 biomass species, and maize. The integration of research will enable the exploitation of comparative genomics.

The main objective of Monogram is broadly to provide infrastructure and resources that will enable basic research to make a significant contribution to crop genetic improvement, underpinning crop research in UK institutes, Universities and the private sector. It will establish a strategy that underpins a shift towards more targeted and predictive plant breeding and also facilitate the generation, identification, exploitation and preservation of germplasm relevant to crop improvement. Importantly, it will contribute to training the next generation of crop

scientists and plant breeders.

With the appointment of Tina Barsby as Programme Manager from June 1st, Monogram is up and running. A steering committee building



Dr. Tina Barsby, Monogram Programme Manager

on the membership of the SGC management group will develop the vision, guide the activities, and review and report on progress. Operationally, the already established groups focussing on informatics and genomics will gather momentum, and will be complemented by a group looking at exemplar traits; essential to guide the core activities.

An early target will be to develop a searchable inventory summarising data and biological resources that are available to the community. A web presence will be vital as a focus for community activities.

Putting MONOGRAM into the international context is vital for success particularly in achieving funding at the levels required for some large scale genomic activities. It will also have the added benefit of drawing

the participants together. ITMI is promoting a vision for small grain cereals and grasses which parallels the international Arabidopsis effort. Although this requires further exploration, MONOGRAM could be the UK component of that international vision.

BBSRC update on EU research networks relevant to the SGC community

The BBSRC is involved in two European Research Area Networks (ERA Nets) of relevance to the SGC network, ERA-PG (Plant Genomics www.erapg.org) and ERASYSBIO (Systems Biology, website under construction). Each ERA Net has fourteen participants from around Europe, including larger partners such as France and Germany and smaller partners from new and affiliated countries such as Slovenia and Israel. ERA Nets are an instrument of the EC which aim to coordinate activities of national funders in specific research areas. Many plan to hold joint European calls and both of these ERA Nets have now held their first call and are processing applications. The plant genomics ERA Net call was broad in its remit, with two sub-calls open to BBSRC applicants, Sub call B specifically designed to encourage public private partnerships. There have been 107 pre-proposals submitted to the first

stage, with a projected available budget of €30 M, and after a sift meeting in April it is likely that around 60% of these will be invited to submit full proposals. Eleven funding partners from around Europe are participating in this call and the BBSRC has committed funds in the order of £5 M to support the UK plant genomics community in collaborative research. Planning for a second call in 2007 is underway. The first call of ERASYSBIO (ERASYSMO) occurred before the ERA Net itself was in place and was a smaller call focusing on microorganisms. It is anticipated that the second call will be broader and could include plant related applications, but the network itself only started in March 2006 and the next call will not be likely to be until late 2007 or 2008.

ERA-PG and the Technology Platform 'Plants for the Future' have been in consultation over input to FP7 and are coordinating their lobbying to the European Commission. The EC have been keen to use information gathered by these two instruments to assist in policy and decision making on specific topics for the FP7 calls. The success of ERA-PG has shown the importance of plant genomic research to the scientific community and the national funders involved. The scientific community is still able to make input to this process via the Technology Platform

(<http://www.epsoweb.org/Catalog/TP/>).

Another European lobbying initiative of particular relevance to the SGC is the European Triticeae Genomics Initiative (ETGI) which is a 'platform for the coordination and representation of Triticeae Genomics Research at the European level' (website: <http://pgrc.ipk-gatersleben.de/etgi>).

ETGI has been taking input from stakeholders around Europe on a coordinated approach to Triticeae sequencing initiatives. This has been discussed in the SGC steering group meeting.

EU FP6 Integrated projects – focus on BIOEXPLOIT and TRITIMED

TRITIMED - Exploiting the wheat genome to optimise water use in Mediterranean ecosystems

often characterized by relatively low and uncertain rainfall. The projected change in global climate towards even drier conditions in the Mediterranean basin will further compound this problem. Therefore, there is an urgent economic need to improve the water use and water use efficiency in wheat production. This project aims to identify crop traits and genetic ideotypes in wheat that impart higher and more stable yield under Mediterranean drought conditions. This shall be realised by using an integrated approach combining genomics, quantitative genetics and crop physiology. We will evaluate a range of different genotypes of durum and bread wheat for WUE, integrative morpho-physiological traits, yield and quality under Mediterranean field conditions ranging in water availability. We will select best durum and



Water is a major determinant of yield for farming wheat in the Mediterranean basin. Durum wheat is one of the most widely cultivated crops mainly grown under rainfed conditions

bread wheat lines evaluated under field conditions for integration into breeding programmes. We shall establish QTLs and molecular markers for yield stability and traits

relating to water use in a durum mapping population grown under Mediterranean field conditions. Gene expression studies of candidate genes will focus on select genotypes evaluated under field conditions in the Mediterranean for yield stability and tolerance to drought.

Partners: Dimah Habash, Roberto Tuberosa, Jordi Bort, Kawther Latiri, Abdelali Laamari, Jamal Majd, Matthew Reynolds, Miloudi Nachit, Keith Edwards, Enzo Deambrogio.

Project progress and web page
(<http://www.rothamsted.bbsrc.ac.uk/cpi/tritimed/indexcontent1.html>)

BIOEXPLOIT

The aim of BIOEXPLOIT is to facilitate the establishment of efficient and rational breeding strategies using genomics and post-genomics tools to exploit natural host plant resistance in wheat and potatoes. Disease resistance is an important trait in plant breeding but many diseases remain hard to control without the use of pesticides. Considering the potential risks for human health and the environment, many pesticides that should have been banned, are tolerated because no suitable alternatives are available. Globally, huge investments have been made to develop

transgenic plants with various types of resistance. However, the European plant breeding industry has been confronted with continuous doubts about the commercial future of genetically modified (GM) crops and most European companies have been reluctant to invest in plant biotechnology. This has led to a situation where few alternatives for harmful pesticides are developed, and promising new DNA technologies remain unexplored.

In BIOEXPLOIT, two strategies are being followed to design new resistant varieties: marker-assisted breeding and genetic engineering. In the shadow of the GMO debate, marker-assisted breeding has undergone a silent revolution and is currently a realistic option for developing new varieties. New high through-put technologies for selecting plants at the seedling stage will shorten the time between first crosses involving wild species and their eventual progenies being introduced onto the market. Genetic variation in wild accessions of crop species is still largely unexplored. It has been estimated that less than 0.1 % of the biodiversity in disease resistance is currently being used in commercial varieties. Marker-assisted breeding thus has a high priority in BIOEXPLOIT where a major goal is to exploit genetic resources to design new resistant varieties.

The relative importance of GM in the development of varieties for human consumption remains difficult to predict and will depend on the attitude of the consumer. In BIOEXPLOIT the planned GM approaches will use natural plant genes that have been used, sometimes extensively, in traditional plant breeding programmes. It is hoped that by adopting this approach BIOEXPLOIT will have a positive effect on the attitude of the European consumer.

BIOEXPLOIT will focus on wheat, and potatoes, crops for which pesticide use (mainly fungicides) is currently indispensable. Despite their importance as food crops, investment in genomics and post-genomics research lags behind that made in crops like rice or even tomato. In the coming years BIOEXPLOIT will provide an integrated critical mass of genomics research on wheat and potatoes that aims to strengthen the competitiveness of European SMEs. Despite the expansion activities of multinational companies in Europe, SMEs play still an important role in plant breeding. Opening of the European market for GM food and the increasing possibilities to grow GM varieties in Europe is likely to generate a new situation where innovative activities are of utmost importance for survival in a highly competitive market. Considering the commercial activities of the European plant

breeding industry, it is hoped that the outputs of BIOEXPLOIT will also have a major impact on various other crop species.

In summary, BIOEXPLOIT has the following strategic objectives:

- 1) To understand the molecular components involved in durable disease resistance, principally in wheat and potatoes
- 2) To explore and exploit natural biodiversity in disease resistance
- 3) To accelerate the introduction of marker-assisted breeding and genetic engineering in the EU plant breeding industry
- 4) To coordinate and integrate resistance breeding research, to provide training in new technologies, to disseminate the results, and to transfer knowledge and technologies to industry

Recent events:



**BRACT
Workshop
report**

**Biotechnology
Resources for Arable
Crop Transformation**

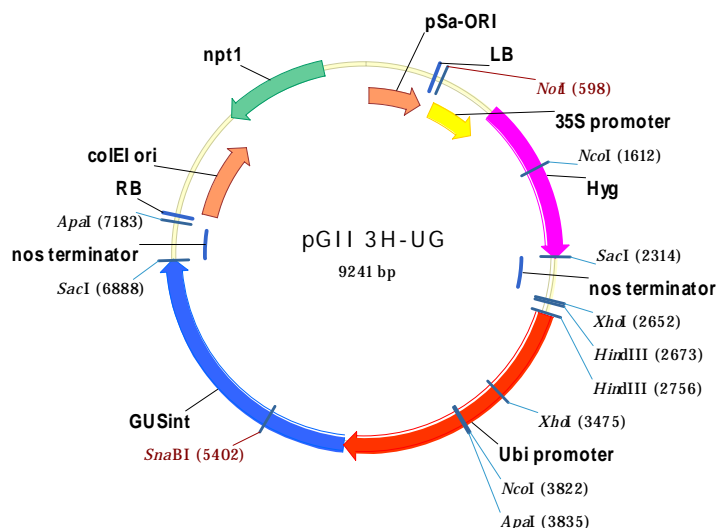
BRACT is a Defra funded research programme, delivered jointly by JIC and RRes, which is providing an efficient transformation capability for the main UK crops while also working to further improve transformation

technology. On 5th April 2006 a one day BRACT workshop was held at the John Innes Centre, Norwich. Eighty participants spent the day listening to presentations and discussing various aspects of crop transformation. The morning session highlighted the progress made during the BRACT project in the *Agrobacterium*-mediated transformation of wheat, barley and oilseed rape and described the resources available. Invited speakers Philippe Vain and Tina Barsby then looked at different approaches for producing

while Tamas Dalmay looked at regulating gene expression using short RNAs. Tony Conner described some new approaches for the development of transformation vectors that avoided the use of foreign DNA. The workshop ended with an update on Molecular Pharming as one particular example of the application of GM technology by Julian Ma.

BRACT Resources Update

BRACT-funded protocol development has enabled significant



transgenic crops that did not contain marker genes and Phil Dale rounded off the morning session by giving a perspective on transgenic crops in 2006.

In the afternoon the workshop welcomed Stan Gelvin from Purdue University who described ways of manipulating the plant genome to improve *Agrobacterium*-mediated transformation. The theme of improved *Agrobacterium* transformation was then continued by Cyril Zipfel

advances to be made in *Agrobacterium* transformation of wheat, barley, oilseed rape and some secondary crops including *Brassica oleracea* and pea. A full transformation service, at cost-recovery, as well as training and advice is now available. In addition, binary vectors for a range of specific applications including RNAi and marker gene removal have been developed and will be available to order. Members of the BRACT

project are happy to discuss any ideas for collaborative projects involving crop transformation and can provide help with the preparation of research proposals. Full details of the transformation resources are available on the BRAC T website.

Website: www.bract.org
BRAC T contacts:
Wendy Harwood (JIC)
(wendy.harwood@bbsrc.ac.uk)

Huw Jones (R Res)
(huw.jones@bbsrc.ac.uk)

Forthcoming events:

June 29 – July 2, 2006:
10th International Conference on Agricultural Biotechnology: Facts, Analysis and Policies, Ravello (Italy).
Website:

<http://www.economia.uniroma2.it/conferenze/icabr2006/>

October 31, 2006:
Making Connections,

Plant Science to Crop Products, RRes, Harpenden, Herts
Website:

<http://garnet.arabidopsis.info/Connections.htm>

October 11 -14: Plant Genomics European Meeting, Plant GEM5, Venice (Italy)

Website:
<http://www.distagenomics.unibo.it/plantgems/>

Many thank's to Robbie Waugh, Dimah Habash, Wendy Harwood, Huw Jones, Tina Barsby and Sophie Laurie for their contributions! This newsletter was edited by Elke Anzinger.

If you want to make suggestions or contribute to the next newsletter please contact elke.anzinger@bbsrc.co.uk