



CIRC • CROP IMPROVEMENT RESEARCH CLUB

CIRC: SECOND CALL FOR GRANT APPLICATIONS

INTRODUCTION

Food security for the UK, and internationally, is a major strategic priority for the BBSRC. The BBSRC contributes to the Global Food Security Programme, a partnership bringing together the food-related research interests of the relevant Research Councils, government departments, devolved governments and executive agencies. Crop improvement has been identified as an area where increased investment in research activity would underpin the needs of the crop production and processing industry to address the challenges of climate change and food security.

In order to bring together industry and the research community to support research in the area of crop improvement BBSRC, the Scottish Government and industry launched the Crop Improvement Research Club (CIRC). The Club addresses research challenges in barley, oilseed rape and wheat and their use in the production of food and drink for humans and feed for animals.

CIRC currently has 14 company members who contribute to funding research and take part in directing the Club's activities. CIRC has a total budget of approximately £7.06 M. (£560k of which comes from industrial membership subscriptions, £500k from the Scottish Government and £6.0 M from the BBSRC). There is approximately £3.5M to be awarded through this second call for proposals.

CIRC works closely with other funding initiatives such as the Technology Strategy Board's Sustainable Agriculture and Food Innovation Platform and the relevant Defra Genetic Improvement Networks to ensure that activities are complementary and capitalise on opportunities to work collaboratively.

CLUB AIMS

The aims of CIRC are:

1. To support high quality, innovative, basic research within UK universities and institutes to underpin the development of improved crop production systems that deliver increased productivity and consistent, high quality end products.

2. To strengthen the research community in the areas of crop breeding, production and processing through interdisciplinary research and the provision of training;
3. To ensure the exchange of knowledge between the science base and industry through effective networking between academic groups and companies involved in CIRC.

FIRST CALL FOR PROPOSALS

CIRC previously awarded £3M to support 6 research projects spread across its remit through the first call for proposals. In addition, 5 four-year PhD studentships aligned with the funded projects will also be supported by BBSRC.

SECOND CALL FOR PROPOSALS

Submissions are invited to the CIRC second call for proposals. There is a two stage application procedure. Initially, proposals must be submitted on the outline proposal form, which is available on the Research Councils' Joint Electronic Submission system (Je-S; <https://je-s.rcuk.ac.uk>). The closing date for outline proposals is 29 June 2011. Subsequently, full proposals will be invited from applicants successful at the outline stage. Approximately £3.5M is available for grant awards in this round. The funding is from the BBSRC, The Scottish Government and Industry. Further details on specific guidelines for the call are in **ANNEX 1**.

Proposals may address any aspect of the CIRC research challenges as described below (page 3). The Club has identified a number of research areas in which it would particularly welcome applications. These highlight areas are described on page 6. Resubmissions from the first CIRC call will only be accepted if feedback from the steering group has been fully addressed. Any resubmissions should be discussed with the CIRC Coordinators prior to submission.

The focus of CIRC research should be on understanding the underlying molecular and biochemical mechanisms behind important crop traits in barley, oilseed rape and wheat. Projects supported through CIRC address key challenges to industry through pre-competitive, innovative and excellent science.

Alongside the research challenges identified below, a number of current and emerging technologies exist such as genetic modification, next generation sequencing, imaging and remote sensing that could make important contributions to fulfilling the research aims of the Club. CIRC welcomes proposals that improve or develop the use of these technologies, whilst addressing the research challenges.

Where appropriate, projects supported by the Club should make use of systems approaches to research challenges incorporating mathematical and computational modelling to understand the behaviour of whole systems.

It is crucial that research funded through CIRC is strategically relevant to the crop breeding, production and processing industry sectors. Applicants will need to demonstrate that their proposed research has strategic relevance, identifying the likely impacts and how these will be achieved.

RESEARCH CHALLENGES

There is an urgent need to develop crop varieties with greater yield potential and the ability to deliver this sustainably with reduced inputs and without detrimental effects on the local ecosystem. Equally, new crop varieties are required that reliably and consistently produce high quality products that are safe, nutritious and meet end-user requirements.

The challenge for industry will be to achieve high yielding, high quality varieties that perform well in a commercial context against a background of greater environmental instability; particularly as a result of climate change. Within this context, the focus of CIRC is to develop a greater understanding of quality and yield traits and of the complex genetic and environmental factors affecting them.

The following research challenges were identified by industry and are the basis of CIRC's remit. This list is not exhaustive and other traits may be identified, especially in liaison with industry. A more comprehensive description of these challenges was included in the briefing document for the first call, which can be downloaded here:

<http://www.bbsrc.ac.uk/web/FILES/PrioritiesThemes/circ-research-challenges.pdf>.

Increasing Nutrient Use Efficiency

- Reducing artificial fertiliser inputs whilst improving productivity and end use quality.
- Reducing green-house gas emissions.
- Reducing the pollution of water courses and the wider environment.
- Improving root function to maximise the efficiency of nutrient uptake.
- Improving understanding of nutrient metabolism and of the remobilisation of nutrients to the seed tissues.

Combating Pests and Diseases

- Identifying genetic resistance to pest and disease organisms through specific or general defence mechanisms including tolerance.
- Incorporating resistance traits in ways that optimise their efficacy, e.g. through pyramiding, without adversely affecting crop performance.
- Improving understanding of plant defence strategies including the stimulation of natural defence responses.
- Improving understanding of the different resistance mechanisms that are needed to protect against different pests and diseases.

Increasing Yield Potential

- Identifying and understanding traits that influence the potential and actual yield of crop varieties.
- Improving understanding of the genetic components of crop architecture, photosynthetic efficiency, crop phenology, resource partitioning and their interactions with hybrid vigour.
- Improving seedling establishment (this is particularly important for oilseed rape).

Seed Structure, Composition and Functionality

- Improving understanding of protein quality and functionality in wheat.
- Improving understanding of the factors influencing the chemical and physical properties of barley grain leading to successful malting and consistent processing quality.
- Improving understanding of starch and non-starch polysaccharide functionality in wheat and barley.
- Underpinning research on the development of white wheat varieties that are suitable for cultivation in the UK.

Germination Properties

- Improving the germination properties of seeds from the perspective of quality (particularly wheat and barley) and crop establishment.

Spoilage Factors

- Reducing the occurrence of mycotoxins in the grains of wheat and barley.
- Improving the understanding of fungal pathogens and their relationships with host plants.
- Reducing the spoilage effects of adverse weather conditions on crop quality with consideration of the changing pressures arising from climate change.

HIGHLIGHT AREAS FOR SECOND CALL

The research challenges identified above define the broad scope of the second call and proposals are invited across all of these areas. Through calls one and two, the Steering Group aims to support a portfolio of projects across CIRC's remit. In order to help achieve this the following areas are highlighted where proposals would be particularly welcome in the second call.

1. Wheat quality

Wheat grain quality is critically important to its processing characteristics and its supply chain value. Delivering wheat grain processing performance must accompany any improvements in yield, resource use efficiency or overall genetic improvement. Example areas include protein content and quality, the functionality of non-starch polysaccharides, starch and lipids and grain hardness.

2. Towards a step change redesign of crops

A number of fundamental changes to crop physiology could make step changes in their yield potential and resource use efficiency. These changes will require many years to

reach commercialisation but underpinning research in this area now may have a great impact on helping us to better meet future challenges to food security. Examples might include nitrogen fixation, nitrogen utilisation, perennial ideotypes, and exploitation of allelopathy or hybrid vigour. Proposals that fall in this area, although more likely to be basic science, will still need to demonstrate clear strategic value to the industry.

3. Crop-soil interactions

Improved understanding of interactions at the rhizosphere will help to underpin improvements in nutrient use efficiency, water use efficiency, water stress tolerance and disease resistance. This under-exploited area of crop physiology could help to deliver substantial gains in crop yield and reductions in resource requirements. An example would be increasing phosphorus and potassium use efficiency.

4. Crop protection

Pests, diseases and weeds result in major losses to crop yields and can have very serious detrimental effects on quality. Novel approaches are needed to reduce the waste that this loss of productivity and quality represents to the food system. Examples include exploiting pathogen genomes for durable resistance, understanding and exploiting non-host resistance, limiting losses from slug and insect pests and improving crop potential for competing with weeds.

For further information on the research challenges and advice on the industry relevance of proposed projects please contact the CIRC coordinators (contact details on page 10).

GUIDELINES FOR CALL

- The objectives of the research proposed must fit within the CIRC research challenges and must fall within the remit of BBSRC.
- Particular research areas have been highlighted as important for this call.
- Research proposals are sought for funding for up to five years.
- Outline proposals must be submitted in the first instance.
- It is likely that the aims of CIRC can best be achieved by an interdisciplinary approach. Collaborative applications which bring together groups with relevant expertise are therefore particularly encouraged.
- Total funding of around £3.5 M is available for this second call to support a portfolio of projects at fEC.

CRITERIA FOR ASSESSMENT

The primary criteria for assessment are the quality of science proposed and the strategic relevance to CIRC. It is expected that any proposal that goes on to be funded through CIRC will be competitive against comparable international work and will demonstrate alignment with the Club's aims. Proposals will be assessed against the following criteria:

- **Scientific Excellence**
The extent to which the proposal meets the highest international standards of current research in its field. High performance against this factor will indicate a project of the highest standard, competitive with the best activity anywhere in the world, demonstrating originality and innovative potential.
- **Strategic Relevance to CIRC**
Demonstrated alignment with CIRC research challenges, relevance to the crop breeding, production and processing industry sectors and balance of overall CIRC research portfolio.
- **Timeliness and Promise**
The extent to which the proposal is particularly appropriate at the present time, or offers longer-term benefits over and above the direct value of the research.
- **Economic and Social Impact**
The extent to which the output of the research will contribute knowledge that shows direct potential for economic return or societal benefits to the UK.
- **Value for Money**
The extent to which the resources requested, relative to the anticipated scientific gains, represent an attractive investment of BBSRC funds.
- **Staff Training Potential of the Project**
Where resources are requested for postdoctoral or other research staff please comment on the extent to which the proposed project will provide research training and development opportunities of benefit both to the individual(s) employed, and to the wider science base beyond the completion of the specific project.

SPECIAL CONDITIONS

Recognising the financial support for the programme from industrial members of the Club, it should be noted that special conditions will be attached to any research grants from CIRC. A letter from the institution's technology transfer office or equivalent, acknowledging that the institution is able to accept those conditions relating to IP, will be requested at the full proposal stage. The conditions are as follows:

- Grant holders will be expected to liaise with the external coordinator of the club, making available progress reports as requested and participating in meetings with both industrial members and other participants
- To respond to requests from BBSRC regarding project outcomes as required, following the end of the award
- **Early Access**

Commercial parties are entitled to early access to results from research funded by the Club. To ensure this grant holders must:

- Give a minimum of 28 days notice of an intention to publish, outside of the Club, results from research funded by a Club grant. The material for proposed publication should be submitted to the Club coordinator along with the notice of intent to publish. The coordinator will distribute a copy of the same to each of the industrial members within seven days of receipt; who shall then have 21 days to inform the coordinator if in their view the proposed publication may:
 - (i) dilute or prejudice the value of proprietary information of an industrial member or
 - (ii) jeopardise the application for resulting IPR protection or
 - (iii) otherwise inhibit future exploitation of the results where an industrial member has an interest in exploiting those results.

The coordinator will feedback comments to the grant holders who will be expected to consider the advice with their technology transfer officer. If an industry member wishes to enter into negotiations with a grant holder regarding exploitation of IP, these negotiations may be pursued as outlined "Access to Resulting IPR".

- Produce annual progress reports. A form will be available on the website for grant holder to complete and grant holder will be notified in advance when the final report will be due.
- Attend and present the results and progress of Club funded research at 6-monthly Club dissemination events. Grant holder will be notified of the dates and format of their presentation.
- Give advance notification of any opportunities to exploit intellectual property arising from their grant to the industrial members.

Access to Resulting IPR

Industrial members are entitled, if they wish, to engage in good faith negotiations with the grant holders for terms of access to the resulting IPR to allow further development or commercial exploitation of results, such access rights preferably to include the right to sublicense. This must be offered before access to resulting IPR can be offered to third parties outside the Club. An interested Industrial member can exercise its option right by giving notice to the grant holder within two months of the date of receipt of notice of results or resulting IPR.

Good Faith Negotiations

Good faith negotiations imply a willingness to reach agreement with industry members on the terms and conditions of a commercial licence, to desist from publishing results or making offers to third parties while negotiation with industrial members are ongoing and, if such agreement is not reached within a reasonable period (for example four months from the exercise of the option) the grant holder will not seek to enter into negotiations with third parties on terms substantially more favourable to such third parties.

APPLICATIONS PROCEDURE

There is a 2-stage application process:

- Outline proposals must be submitted in an electronic form using the Je-S system. CVs of all applicants (maximum 2 pages per applicant) and a completed Case for Support document (please see the Downloads section of the website at www.bbsrc.ac.uk/circ) should be uploaded to Je-S. Please read the CIRC outline proposal Je-S guidance notes (also in the Downloads section of the website).
- The closing date for outline proposals is **29 June 2011, 4pm**. A workshop will be held on **23 May** at the Royal Society to facilitate the development of research proposals by enabling applicants to discuss their ideas with CIRC industry members.
- Successful applicants will be invited to write a full proposal in September for submission by **9 November 2011** (dates are for guidance only and may be subject to change).
- Pathways to impact will be required at the full proposal stage and these should be formulated to meet the needs of the crop breeding, production and processing industry sector.

ASSESSMENT

Outline proposals will be assessed by the CIRC Steering Group and will not be externally reviewed. Full proposals will be externally peer reviewed prior to final assessment by the CIRC Steering Group. The decision to fund proposals will be announced in March (dates are for guidance only and may be subject to change). Further details on assessment are as follows:

- In order to be considered fundable proposals must demonstrate both scientific excellence and strategic relevance to CIRC.

- The Steering Group consists of a chair, 7 academic members (nominated by BBSRC) and 7 industrial representatives (chosen by the CIRC Industry Members). Steering Group membership is shown on the website (www.bbsrc.ac.uk/circ)
- For assessments conducted by the Steering Group, each full proposal has two Introducing Members (IMs). One IM is from academia and the other is from industry.
- Where there is a conflict of interest (e.g. where a Steering Group member has pre-existing links to an applicant) individuals will leave the room while the proposal is being discussed.
- Outline and full proposals may be circulated to company members of CIRC that are not represented on the Steering Group to seek their views. Any comments provided by company members will be taken into account by the Steering Group when the proposal is assessed.

STUDENTSHIPS

Due to the need to foster development of research skills in this sector, BBSRC will support 5 four-year Targeted Priority Studentships in the area of crop improvement as part of this call.

These studentships will be awarded formally as part of CIRC. Funding for awarded studentships will start in **2012/13**.

The competition for these studentships will be held later in the application process when further details will be provided on how to apply. No information on potential studentship projects is required at the outline stage.

Studentships will only be awarded to applicants receiving a research grant under this call.

ELIGIBILITY

UK Higher Education Institutions, Independent Research Organisations and BBSRC-sponsored institutes are eligible to apply. In addition, the contribution from the Scottish Government means that all Main Research Providers (MRPs) to the Scottish Government are also eligible. This includes the Moredun Research Institute, The James Hutton Institute and Biomathematics and Statistics Scotland (BioSS).

CONTACTS

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