PRE-PROPOSAL APPLICATION GUIDELINES

2nd Competitive Call for Research Proposals

International Wheat Yield Partnership

BREAKTHROUGH DISCOVERIES THAT WILL LEAD TO LARGE INCREASES IN WHEAT GRAIN YIELDS

Launch: **19 December 2016**

Closing Date for Pre-proposals: **3 March 2017 24:00 GMT**

IWYP | International Wheat Yield Partnership

Research to Deliver Wheat for the Future

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SUMMARY

The International Wheat Yield Partnership (IWYP) is delighted to announce its 2nd Competitive Call for research proposals. IWYP invites creative, forward-looking proposals to discover the means to substantially increase the **genetic yield potential of wheat**, as defined by grain yield under the absence of stress. We are seeking *breakthroughs in genetic yield potential* beyond what is expected to be realized in ongoing breeding programs. IWYP has targeted specific areas of research to address this. Note that we are not seeking research that concentrates largely on defined plant stresses such as drought or agronomic systems. The overarching goal of IWYP is to increase wheat grain yields by 50% in the next 20 years by targeting increases in genetic potential.

IWYP is committed to funding the best research projects regardless of location and awarding projects that fit into a cohesive Science Program to address IWYP's principal scientific goals. This will require IWYP's funded researchers to work collaboratively and to be active participants within the partnership. Sharing of data, information and germplasm among partners will be expected as well as sending traits, germplasm and associated tools to the IWYP Hub at CIMMYT.

The selection process will be two-stage whereby applicants must first submit a Pre-Proposal due by 3 March 2017 at 24:00 GMT. The Pre-Proposals must be academic led and can be from single institutions, although national or international consortia are strongly encouraged. Applications involving private industry collaborators are also encouraged. Funding requests can range from 1 to 3 years but should not exceed a maximum cash request of US$2 Million over 3 years. A Pro Forma for the Pre-Proposals is provided in a separate document and the instructions herein must be followed for applications to qualify for consideration. Full-Proposals will be invited from selected Pre-Proposals. All proposals will be judged on their scientific excellence, novelty, breakthrough potential and relevance to markedly improving the genetic yield potential of wheat.

Background to IWYP

IWYP represents an international effort to deliver world class research to significantly increase the genetic yield potential of wheat. Increasing yield potential has been an objective of wheat breeding for decades. However, there are now clear signs globally that annual gains in breeding programs and especially in farmers' fields have slowed. This has signalled the need to explore how the rate of gain of yield potential can be substantially elevated. Whilst a number of successful international research programs have been created to protect wheat yields from both biotic and abiotic stresses, research to address yield potential *per se* has received less focus at the international level.

A specific research program focused on wheat genetic yield potential is timely in that it comes in the middle of an unprecedented period of growth of understanding in plant biology and of technical innovations of direct relevance to plant breeding. For example, the innovation of marker assisted breeding has led to Genomic Selection strategies that are radically improving breeding efficiencies for complex traits. The specific innovations in plant breeding technologies are being accompanied and driven by step changes in other technologies including genomics, gene editing, transcriptomics, proteomics and phenomics.

IWYP's funders are seeking to support research projects that will lead to breakthroughs in genetic yield potential, as opposed to progress via incremental steps typical of conventional breeding programs. Therefore, new approaches based on state of the art technologies or novel techniques are required. IWYP's progress and outputs will be metrically driven and defined in terms of specifically timed milestones and quantifiable deliverables.

IWYP has been developed as a cohesive and integrated Science Program focused on coordinating efforts, pushing delivery and creating impact. IWYP uses a robust international expert peer review process to select the best individual projects to form a wider consortium. As such, researchers who apply to IWYP must be willing to collaborate across the IWYP Science Program as a whole where scientific outputs would benefit. This will require sharing of milestones, resources, data, progress and outputs to IWYP Partners (see Terms and Conditions). The IWYP Science Program is managed by the IWYP Program Director in liaison with a Scientific Advisory Committee to include members of funded projects within the Science Program. Resources will be made available to support collaborative activities.

IWYP funded researchers will also benefit by downstream access to the IWYP Hub, based at CIMMYT. The IWYP Hub has been designed as a common central resource for supporting and validating IWYP research in the field and for translating validated traits into parents (prebreeding) that can then be used by both public and private breeders to generate cultivars that farmers will adopt. In doing so, the IWYP Hub will provide a number of services to support IWYP research and breeding projects including dedicated field plots, access to research specialists and associated facilities and support staff, precision phenotyping, data collection, and importantly pre-breeding. Additional services that can be made available include access to high throughput molecular marker facilities, vast wheat genetic resources, and a network of multi-national breeding and testing programs. Initial Pre-Proposal applications can be linked with CIMMYT if that is helpful to the research proposed (include CIMMYT costs as a collaborator on the project) or can be linked later if the proposal is selected as part of the IWYP Science Program.

RESEARCH SCOPE

The Research Areas chosen (read carefully below) are designed to be transformational and high risk, commensurate with the very challenging IWYP goal and the fact that current breeding programs, neither public nor private, have a sufficiently high rate of yield gain to satisfy projected future global food needs. Past major increases in the genetic yield potential of wheat have largely resulted from improvements in harvest index rather than increased biomass. Further large increases in harvest index are unlikely, but an opportunity exists for increasing both productive biomass and harvestable grain. It is widely accepted that a major limitation to increasing the genetic yield potential of wheat relates to the amount of carbon fixed via the canopy before flowering. Thus a central theme to IWYP research is discovering ways to generate more biomass resulting from more efficient carbon capture and conversion, followed by optimization of plant development, to ensure as much as possible of the additional captured carbon is translated to harvested grain.

It is expected that many proposals will focus on photosynthesis, carbon deposition and growth rate within an ideotype suitable for commercial agriculture. Based on the assumption that enhanced biomass before flowering will be achieved, proposals seeking to enhance the gains into seed yield or to translate the additional carbon into grain yield via optimizing harvest index will also be welcome.

Illustrative List of Research Areas Targeted

- Increasing carbon capture before flowering
- Increasing biomass
- Optimizing harvest index
- Enhancing photosynthetic pathways
- Specific changes in plant architecture
- Modifying phenology, e.g., flowering time
- Increasing carbon flow into grains
- Hybrid wheat development (system, traits, genetics, breeding methods, heterotic groups, etc.)
- Root structure and growth
- Faster / alternative breeding methods
- Modeling to define the optimal traits / combinations per environment

Description of IWYP Research Scope Areas

1) Research Areas A and B: Discovery or creation of genetic variation in wheat that boosts the fixation of carbon into biomass for subsequent transfer to grains

Research Area A/B involves research projects that target increasing biomass production per unit of land and time through seeking or creating genetic variation for these traits in wheat and related germplasm not already fully exploited in breeding. This germplasm includes, but is not limited to, old landraces, synthetic wheats created using novel genetic variation in diploid and tetraploid wheats and also modern wheats with ancestral chromosomal introductions. The focus must be on finding or creating major improvements in biomass production in elite modern wheats.

Because of the complexity of carbon fixation and conversion into biomass, new optimized smart screens are desired to identify component traits of efficient biomass accumulation and to recognize novel phenotypic variation. Such assays will be considered as positive attributes of proposals. They should be high throughput and designed to detect variants in photosynthesis, carbon assimilation into sugars, cell walls and biomass growth rates under varying environmental conditions to be within the scope of the Call.

Existing genetic variants within wheat may fail to unlock the significantly higher rates of carbon fixation into biomass required for a step-change in the genetic yield potential. Therefore, biotech traits based on introducing or creating genes that encode divergent proteins or having distinct expression patterns will be considered. For example, genes that optimize canopy and spike photosynthesis, increase RuBP regeneration or thermostability of associated enzymes; genes that influence source:sink relationships, partitioning, plant architecture, or grain size and number; and introducing novel RuBisCo's or chloroplast CO_2 pumps will be considered within the scope of this Call.

2) Research Area C: Maximizing grain yields from enhanced carbon capture and biomass through optimizing plant phenology

This Research Area is focused on the optimization of wheat plant phenology with advantageous genetic variation to find the best ideotypes to maximize grain yields from enhanced carbon capture and biomass. This will require the use of carefully selected parents to test for and select the best outcomes for yield. It may also require additional genetic variants such as those discovered or created in Research Area A/B. Further, the genetic basis of the optimum ideotypes should be defined by combinations of molecular markers for future breeding advances.

The environments in terms of temperature, other stresses, photoperiods and length of growing season vary around the world and influence carbon capture and the timing and efficiency of carbon transfer to the grain during development. This means that genetic variation for carbon capture will also need to be optimized with the appropriate phenology for the major environments in which the crops are to be grown. CIMMYT will be a key partner component for validation, breeding, and testing in diverse relevant environments but other organizations with these competences are also welcome as members of consortia.

3) Research Area D: Building elite lines for dispersal to other breeding programs

The stacking of outstanding traits into elite germplasm and taking care of the relevant trade-offs to create wheat lines with much higher yield potential is a natural extension of Research Area C. The discoveries in Research Areas A/B and C will culminate here in Research Area D. However, as it is likely that useful and validated genetic variation for carbon capture, increased biomass, and optimized ideotypes exists in ongoing research programs, desirable research activity in such programs is invited.

4) Research Area E: Taking advantage of discoveries coming from other species

There is universal recognition that wheat improvement is held back by the lack of certain technologies and genetic knowledge behind traits relative to some other more intensely developed crops such as corn, rice and barley. It is recognized that discovery of specific genes and pathways for photosynthesis, flowering time, biomass accumulation, carbon fixation, carbohydrate partitioning and mobilization, grain size and number; methods for genomic selection; breeding methods, hybrid systems, etc. in other crops can all be used to find genes with similar function in wheat. Therefore, where there is sound knowledge of important genes and systems in other species that have a high probability of translating to wheat to increase genetic yield potential, proposals to exploit these species for the purposes of wheat will be considered within the scope of this Call.

APPLICATION GUIDELINES

Applications **must be academic led** and can be from single institutions, although national or international consortia are strongly encouraged. Whilst private sector participation in projects is also strongly encouraged, IWYP is unable to support costs incurred by the private-sector. Examples of private sector engagement within a project include, but are not limited to: cash contributions; materials; access to technology, equipment or facilities; and staff participation in the research or an advisory capacity.

Projects of between **1 to 3 years in duration** are invited. The **maximum cost request per project in this Call is capped at US$2,000,000**. Institutional cost share, or other in-kind contributions (those in the form of cash from other sources or goods, commodities, services) should be plainly noted in the proposal budget table from any and all members of a project consortium.

Application – Important Considerations

- It is essential that **all applications must be submitted in English.**
- A **Pro Forma** is provided in a separate document file (MS Word format) to be used for composing the Pre-Proposal. **Please use only this Pro Forma format and adhere to the space constraints and information it requests.**
- Save the Pre-Proposal (Pro Forma) and any supporting information in the same **Word format** (Microsoft) in a single file for submission.
- A **Project Leader** should be clearly identified for each Pre-Proposal and the designated Project Leader will be the single point of contact for both administrative and scientific queries.
- All other lead researchers (**Principal Investigators**) and associated institutions involved should also be clearly identified. In constructing the applications, the role, budget and contribution of any and all project collaborators must be clearly defined in the appropriate sections.
- Note: before submission, **applicants should ensure that they will be willing and able to abide by the specific IWYP conditions for award** (see Post Award Management below).
- For additional information please see Frequently Asked Questions (FAQ's) provided in a separate document.

PROPOSAL GUIDELINES

There is a two-stage process for applications and accordingly a two-stage peer review process. All applicants must first submit a pre-proposal. **Pre-Proposals that do not adhere to the instructions, formats and timelines will not be considered.** The best Pre-Proposals will be selected and invited to submit Full Proposals at a later date.

Resubmission from previous IWYP Calls: When submitting an application for a research project that was previously submitted to an IWYP Call for Proposals (1st IWYP Competitive Call in 2015, NIFA-IWYP RFA in 2016) but not selected for either an invitation to submit a Full Proposal or ultimately funded, you must provide a separate letter detailing how the project has changed due to new discoveries; response to reviewer comments; new ideas, approaches or techniques, etc.

1) Pre-Proposals

IMPORTANT: Pre-Proposals must be submitted in a Microsoft Word format by e-mail to IWYP at iwypsubmissions@iwyp.org **before 24:00 GMT 3 March 2017**. The specified **Pre-Proposal Pro Forma application format must be used** and can be found in a separate document file.

A Pre-Proposal must contain (as specified as fields in the Pro Forma) and submitted as a single MS Word document:

1. **Project Title** –make this clear, concise and stand alone as you would for a scientific journal article.

2. **Names, titles and email addresses of Project Leader and all Principal Investigators** and associated institutions for each in the consortium, if applicable. The estimated distribution of work in % between the investigators within the project should be clearly noted.

3. Name, principal contact with email address and location of **private industry partners,** if applicable. Note that IWYP currently has 9 Private Member partners (see http://iwyp.org). You may include these or any other private industry partners on your project. Note that private industry partners are not required but could enhance your application.

4. **A project description** in summary form - **maximum 3 sides of letter or A4 size paper**. In constructing this information, the following aspects should be covered:
   - Project objectives
   - Scientific background and strategy
   - Summary of how the proposed work matches IWYP's overarching objectives in terms of impact and the fit to the scope of this Call
   - Brief description of how the research could benefit both developed and developing countries, as well as contribute to sustainability
   - Main research methods
   - Key milestones and deliverables with associated timing by months or year quarters
   - Project and data management plans
   - Plans for data and output sharing and management of Intellectual Property Rights

5. **Amount of funding requested** indicating any in-kind contributions, institutional cost share or additional cash.

6. **Estimate of costs –** up to ½ side of letter or A4 size paper. Please give all indicative costs in $ US. The Pro Forma contains a tabular example and the major categories of costs requested at this time. You may add line items and expand the table as necessary.
   Note: purchases of large capital equipment or facility modifications cannot come from IWYP funds. Essential lower cost small equipment purchases using IWYP funds will be considered.
   Note: Private industry partners who participate in research projects are expected to participate in the project with cash or in-kind contributions and may not receive cash from IWYP Funding Partners.
   Note: IWYP Hub activities are different from the upstream research and discovery activities of submitted research projects, are considered downstream technical development and are funded via a separate mechanism. Therefore, if CIMMYT scientists are involved in the research and discovery phase of a project then their associated researchers and costs must be included in your application.

7. **Curriculum Vitae** – an abbreviated summary version, ½ to 1 side of a letter or A4 size page, should be supplied for each Project Lead and Principal Investigator. CV's are not required for associated research staff including post-doctoral researchers, technical support staff and students. Please attach to the end of the Pro Forma.

8. **Letters of Support** - Where the project relies on additional in-kind or cash contributions, a brief letter of support from appropriate institutions or private industry partners should be supplied. Please attach to the end of the Pro Forma.

2) Full Proposals

The decision on Pre-Proposal selection for invitation to submit a Full Proposal will be communicated approximately 5 June 2017.

IMPORTANT: Invited Full Proposals are to be submitted to IWYP by 24:00 GMT on 14 August 2017. The application forms and relevant guidelines will be made available to invited applicants only by 5 June 2017.

Therefore, interested parties who have not submitted a Pre-Proposal will not be eligible to submit a Full Proposal. Final decisions and outcomes for funding of selected projects will be communicated in December 2017.

The Full Proposal stage will require applicants to prepare a detailed scientific case and scientific workplan including scientific approaches and methodologies. The workplan description should be supported by a diagrammatic / project plan which has clear and timed milestones and deliverables. The use of a Gantt chart will be strongly encouraged.

A detailed breakdown of project costs will be required at the Full Proposal stage alongside a justification of the requested resources.

ASSESSMENT PROCESS

IWYP reserves the right to reject without formal peer review any Pre-Proposal that is deemed to fall outside the remit and scope of this Call (including the financial scope) or has failed to adhere to the guidelines for submitting applications.

Both Pre-Proposals and Full Proposals will be assessed through an expert *ad hoc* international Review Panel commissioned by IWYP that has the requisite balance of expertise to conduct a robust and rigorous scientific assessment of the proposed research. The Panel will assess the Proposals against the criteria for assessment and given instructions on scope (see below) to generate a rank-ordered list with projects designated as fundable and un-fundable. There will be no formal return to authors for comment or rebuttal of reviewers' conclusions. However, scientific queries or clarifications may be requested via the IWYP Program Director.

Importantly, to deliver its goals, IWYP will construct a cohesive and balanced overall research Program and therefore a strong element of portfolio management for selecting fundable projects will be employed. Final decisions for selection and recommendation for funding will be made by the IWYP Science and Impact Executive Board. The IWYP portfolio of projects will be managed by the Program Director in liaison with a Scientific Advisory Committee which will include selected Project Leaders from funded projects and other public and private scientific experts as appropriate.

Assessment Criteria

All Pre-Proposals and Full Proposals submitted to this Call will be assessed against weighted standard criteria which include:

- **Match to IWYP Goals**: Contribution towards the goal of the IWYP Call and IWYP's overall aims and objectives.

- **Relevance to the scientific themes**: Although many different approaches for research of different plant processes and genetic mechanisms are possible for each scientific theme, projects should closely align with the major categories of research specified.

- **Scientific / Technical Quality**: Novelty; Quality of the proposed R&D; Quality of the approach methodology.

- **Applicants' track records and quality of the consortium team:** Demonstrable competence and expertise to undertake the project; complementarity of partners in terms of balance of expertise and collaborative efforts; overall balance of the team in terms of technical and human resources.

- **Research Environment**: Access to necessary infrastructure and equipment to conduct the project with no to minimal need for new equipment to be purchased with IWYP funds.

- **Project Management**: The Project plan; willingness to share in IWYP's data management and data sharing plans and to enter a collaboration agreement and/or IPR agreements with project partners.

- **Tracking**: The projects will submit and follow a timeline indicating milestones and deliverables that will be essential to follow for reports on progress and outputs. This should ideally be done with a simple but descriptive Gantt chart.

- **Project outputs and exploitation:** How the project will deliver against IWYP's overall aims and objectives in a tangible, fit-for-purpose way; quantification of potential impact on increasing the genetic yield potential of wheat.

POST AWARD MANAGEMENT

IWYP will build a portfolio of research that has complementary milestones and deliverables to address IWYP's overarching aims and objectives. This will require IWYP funded researchers to work in partnership, share result and outputs, and interact as part of a wider overall Science Program.

Projects will be reviewed on an annual basis and may terminate early if progress is deemed insufficient. Conversely, projects showing exceptional progress and potential for impact may be invited to submit an extension request with new milestones.

Terms and Conditions

Researchers and institutions that are awarded funding under the IWYP system must be willing to:

- **Contribute** to IWYP's overarching aims and objectives. This will include the timely sharing of research objectives, research outcomes and data with the IWYP Program Director, Scientific Advisory Committee (SAC) and /or other researchers in the IWYP wider Science Program.

- **Participate** in the overall IWYP management arrangements including the SAC if selected.

- **Collaborate** effectively with other IWYP projects which could include hosting and exchange of research staff from other IWYP projects when appropriate, e.g. following recommendations from the SAC or requests from other projects.

- **Perform and Communicate**: Employ specific data standards for collection, management, sharing and reporting. This will include providing progress reports on an annual basis, or more frequently if deemed necessary.
- **Share** outputs and deliverables in terms of information, data, techniques or germplasm among other IWYP Partners while ensuring appropriate confidentiality and legal vehicles such as Material Transfer Agreements and licenses are in place prior.

- **Move discoveries to the IWYP Hub**: The IWYP Hub at CIMMYT is our central technical development platform and will carry the major responsibility for advanced field validation and building the innovations into elite adapted germplasm for distribution, with the required supporting prebreeding tools, to public and private programs through existing worldwide networks and collaborations. This is considered a distinctive and important downstream function of IWYP for the further development of successful project discoveries for delivery.

- **Adhere** to IWYP policy regarding Intellectual Property Rights (IPR). IWYP's plan is that both background and foreground IP generated within the projects will be owned and managed by the inventor(s). Cross agreements among all parties within a consortium relative to IPR will need to be finalized shortly after the time of any funding award and before Offer of Grant is finalized. It is important to note that the outputs of the IWYP supported programs will be International Public Goods to be made available nonexclusively through appropriate material transfer and licensing agreements to the public and private sectors for deployment.

- **Participate** in relevant Knowledge Exchange and Dissemination activities when requested by the Program Director, SAC or the IWYP Executive Board. Sufficient funding should be built in to grant applications to enable travel for grant holders to contribute to IWYP activities such as the annual IWYP Program Conference held usually with CIMMYT in Mexico.

- **Acknowledge** IWYP when presenting the outputs from IWYP funded research using the IWYP logo when appropriate. Liaise with the Program Director or other members of the IWYP Secretariat in advance of issuing IWYP related press releases, presentations at meetings/conferences, or publications in journals.

Other non IWYP specific employment terms and conditions will operate according to in-country rules.

ESTIMATED TIMETABLE

Launch of Call for Pre-Proposals	19 December 2016
Closing date for Pre-Proposals	3 March 2017
Pre-Proposals reviewed, decisions made	March – May 2017
Outcome of Pre-Proposal stage communicated to Project Leads	2-5 June 2017
Full Proposals invited from selected Pre-Proposals	2-5 June 2017
Guidelines for Full Proposals available	5 June 2017
Closing date for Full Proposals	14 August 2017
Full Proposals reviewed, decisions made	August – November 2017
Outcome from Full Proposals communicated to Project Leads	Early December 2017
Offers of Grant delivered	To be determined by funding agency
Offers of Grant accepted, finalized, and projects start*	January 2018 - April 2018

Projects start date: *Grants funded by this Call are expected to commence by 1 January through 1 April 2018, or as soon as a formal Offer of Grant is fully executed or as otherwise agreed.

IWYP CONTACTS AND HELP

IWYP website – http//iwyp.org

IWYP proposal submissions – iwypsubmissions@iwyp.org

IWYP Secretariat – iwypsecretariat@iwyp.org