

### **Background**

The Plant Genome (C): Genome Structure and Organization program element will focus on research to advance knowledge of the genome of wheat (*Triticum aestivum*) as an international effort (<http://www.wheatgenomic.org/>) and in coordination with other U.S. Federal Agencies and currently funded projects.

### **FY 2008 Priority for Research Projects – Applicants must address the following priority.**

1. Develop or improve the physical map of the genome of hexaploid wheat (*Triticum aestivum*) as a prerequisite for genome sequencing or other basic and applied research.

### **Other Key Information**

- Applicants must justify the potential impact of the proposed research. If tools and resources are developed (e.g. biological materials, germplasm, software, etc.), an applicant must budget for and demonstrate an adequate and efficient storage and distribution of the tools and resources once they are available. A description of quality control measures must be included in the application.
- Applicants must include a budgeted plan for the release of the results of their research to the public in a timely manner. All sequence and expression data must be released to public repositories (e.g. Genbank under the Bermuda standards; GEO under MIAME compliance; etc.). All phenotype and map data must be deposited into an appropriate public database (e.g. major community databases, etc.) in a rapid timeframe after quality control tests. Arrangements must be documented in the application.
- Applicants are encouraged to develop National and international collaborations with research groups already working on the species of interest to minimize duplication of effort and maximize cost effectiveness. U.S. collaboration with international partners is appropriate; however, applications must be submitted by eligible U.S. institutions.
- Applications that do not address at least one of the stated research program priorities will be returned without review.
- If a project is funded, beginning in the first year of funding, the project director will be required to attend annual investigator meetings. Reasonable travel expenses should be included as part of the project budget.

### 52.1 Plant Genome (D): Applied Plant Genomics Coordinated Agricultural Project (CAP)

National Program Leader – Dr. Ed Kaleikau (202-401-1931 or [ekaleikau@csrees.usda.gov](mailto:ekaleikau@csrees.usda.gov))

Total Program Funds – approximately \$5.0 million

#### Proposed Budget Requests –

- Proposed integrated project budget requests must not exceed a cumulative \$5 million for a four year period (including indirect costs).
- Requests exceeding the budgetary guidelines above will be returned without review.

Letter of Intent – Due November 26, 2007 (5:00 P.M., ET); see the **Other Key Information** section for format and submission instructions.

Application Deadline – February 14, 2008 (5:00 P.M., ET)

### **Background**

The applied plant genomics Coordinated Agricultural Project (CAP) element is seeking applications for a community of researchers, educators, and extension specialists to focus on large-scale application and translation of genome discoveries and technology for U.S. crop or forestry improvement. The goal of the CAP is to move science from the lab to the field to the marketplace and, in the process, to solve real world problems. To accomplish this goal, the program is seeking applications that respond to existing or emerging problems, opportunities, and issues through the development and application of science-based knowledge.

CAP applications are expected to demonstrate coherent and complementary integrated activities with the ultimate goal of being a National strategy or solution that could be implemented for U.S. agricultural crops or forestry improvement. Applications are expected to take advantage of recent advances in genomics and to translate basic

discoveries and knowledge to practical applications. Comprehensive approaches are expected to include coordinated work on several of the following areas but not limited to: development and implementation of easy-to-use molecular markers for breeding; establishment of mapping populations; utilization of functional genomic tools, resources, and knowledge; identification of genomic intervals carrying genetic traits of interest (e.g. yield, quality, and disease) and pest resistance, stress tolerance, bioenergy, etc.; implementation of informatics-based tools for breeding; development and use of extension tools to provide appropriate audiences with information on agricultural advances and challenges; and educate future generations of agricultural scientists in technology use and transfer.

A CAP should seek to bring together a multi-state, multi-institutional, and multi-disciplinary team to integrate genomic discoveries and technology with breeding practice; accelerate identification of traits of interest directly useful to breeders to develop improved varieties; develop related education and degree program training for students and emerging scientists in the practical application of genomics-based tools; and provide complementary extension efforts to bring science-based information to relevant audiences that will allow them to make informed decisions. The intent of the CAP is to promote collaboration, open communication, the exchange of information and the development of resources that accelerate application of genome discovery and technology to plant improvement. The CAP aims to reduce duplication of efforts and integrate activities among individuals, institutions, states, and regions. Therefore, applications should clearly articulate how a CAP award will complement and/or link with existing programs or projects.

CAP participants would serve as a team comprised of members working in discovery, learning, and engagement to conduct research, education, and extension utilizing an integrative approach on an emerging or priority area to improve plants important to U.S. agriculture. This integrated team would contain expertise in genomics, genetics, breeding, genetic resources, bioinformatics, plant biology, extension education, program evaluation, agricultural education, curriculum development, economics, sociology, and human sciences, as appropriate, as well as expertise from principal stakeholders and partners. Partnerships with end user groups (e.g. industry, processors, growers, etc.) are strongly encouraged. The application should outline the potential of the CAP team, its structure, coordination and plan of implementation, as well as propose an integrated research, education, and extension project that will be evaluated during the project period.

**FY 2008 Priority for Integrated Projects – Applicants must address the following priority.**

1. Improvements in U.S. crop and forestry production through the application and translation of knowledge generated via genome-wide discoveries and high-throughput technologies for traditional breeding practice. This priority is open to all applicants and is NOT plant species specific. Submitted proposals should include the following activities:
  - a. Extension programs to deliver timely, sound and objective translation of genomic, genetic and breeding information directly useful to U.S. growers and producers to make informed decisions and adopt new technologies that result in measurable changes in practice.
  - b. Education programs to develop graduate curriculums in modern molecular breeding technologies, including the use of genomic tools to train the next generation of plant breeders and strengthen U.S. plant breeding capacity.
  - c. Research programs to fill knowledge gaps and adopt new genomic technologies that significantly reduce the breeding cycle time and cost of phenotypic evaluations for improvements in U.S. crop or forestry production.

**Other Key Information**

- A letter of intent is required for this program. The letter of intent deadline is **November 26, 2007, by 5:00 P.M., Eastern Time**. Format the letter of intent using the criteria below.
  - Format the letter with one inch margins and six lines per inch and font no smaller than 12 point. The letter of intent must be submitted in portable document format (PDF).
  - The letter of intent is limited to three pages.
    - On Page 1 include a cover letter with the following information:
      - the name of the lead project director;
      - the names of collaborating investigators; and
      - the program priority addressed by the project.

- On Page 2 and 3 include
    - a descriptive title; and
    - a brief statement of **integrated** approaches and objectives
  - Attach the PDF letter of intent to an email addressed to Dr. Ed Kaleikau (202-401-1931 or [ekaleikau@csrees.usda.gov](mailto:ekaleikau@csrees.usda.gov)) with the subject heading '*Letter of Intent Program 52.1D\_PD's Last Name*'.
  - An acknowledgement receipt will be sent indicating the letter was received.
  - Letters of intent will be reviewed relative to suitability, scope, and needs of the program as delineated in the program description and priorities.
  - Submission of more than one letter of intent is not permitted.
  - Project Directors will receive a response from the National Program Leader inviting or rejecting a full application by **December 10, 2007**. The National Program Leader will not provide feedback regarding content in the letter.
  - Only invited full applications will be reviewed by the panel.
- Support will be provided as a Coordinated Agricultural Project (CAP) award that will not exceed a total budget (including indirect costs) of \$5 million (\$1.25 million per year) for a period of time not to exceed 4 years. The program anticipates making awards as a continuation grant, which is a grant instrument by which the Department agrees to support a specified level of effort for a predetermined project period (e.g. annually) with a statement of intention to provide additional support at a future date, provided that performance has been satisfactory, appropriations are available for this purpose, and continued support would be in the best interest of the Federal government and the public.
- Integrated project proposals must include at least two of the three components of the agricultural knowledge system (i.e., research, education, and/or extension) with each component represented by one or more objectives within the proposal. Projects must budget sufficient resources to carry out the proposed set of extension, education, and/or research activities, with **no more than two-thirds** of a project's budget being allocated to a single component area. Please see Part II.C.3 for a full listing of integrated project requirements, which should be followed closely to ensure success in the peer review process.
- Please see Part V, B for the criteria that will be used to evaluate integrated proposals. Applicants are also encouraged to see <http://www.csrees.usda.gov/funding/integrated/integrated/> for an example of an integrated proposal and other grant-writing resources.
- Applications for integrated projects must include the elements of a logic model detailing the activities, outputs, and outcomes of the proposed project. This information may be provided as a narrative or formatted into a logic model chart. The logic model planning process is a tool that should be used to develop your project **before** writing your proposal. Two additional pages are allowed for this information. See Part IV.B.1c(10) for details on where to attach this information to your application. More information and resources related to the logic model planning process are provided at [http://www.csrees.usda.gov/funding/integrated/integrated\\_logic\\_model.html](http://www.csrees.usda.gov/funding/integrated/integrated_logic_model.html).
- The NRI encourages integrated projects that develop content suitable for delivery through eXtension. This content is for "end users" as opposed to staff development and must align with the eXtension Guiding Principles, Implementation Plan and other requirements as presented at <http://about.extension.org/university-researcher/>. Funds may be used to contribute to an existing Community of Practice or to form a new Community of Practice as appropriate.
- Applicants are encouraged to see the previously funded CAP awards for guidance (e.g. <http://www.aicap.umd.edu/>; <http://www.prrs.org/>; <http://maswheat.ucdavis.edu/>; <http://www.uark.edu/ua/ricecap/>). Projects may not reflect this current FY CAP program description that has evolved from earlier descriptions.
- Applicants are encouraged to develop National and international collaborations with research groups already working on the species of interest to minimize duplication of effort and maximize cost

effectiveness. U.S. collaboration with international partners is appropriate; however, applications must be submitted by eligible U.S. institutions.

- An aim of a CAP award is to encourage maximum flexibility in applied plant genomics research, education and extension. Applications will be evaluated based on how well their goals and objectives respond to current needs utilizing genomic tools and resources. It is recognized however, that as an award's comprehensive approach unfolds, unexpected advances and promising leads, or unforeseen new National needs related to project goals and objectives, may be identified. The CAP team members are expected to be capable of responding to these opportunities. As a result, there is an expectation that objectives may be redirected and/or new objectives may be developed with associated budget adjustments. To encourage flexibility, the program does not expect that all investigators associated with the proposed project will be supported throughout its duration. It is suggested that investigators involved in shorter-term, specific tasks be supported through a series of renewable subcontracts. In their original budgets, applicants may request that no more than 25 percent of the requested funds be available to accomplish time-critical objectives of National interest that they will determine at a later date. The requested funds should be indicated on Field H, Other Direct Costs, of the budget form and identified as "Future National Interests" in the budget narrative.
- In a Single Integrated Research, Education, and Extension Application, applied plant genomic projects are requested that incorporate the following:
  - (a) A budgeted plan and timeline for extension initiatives leading to measurable behavior change or adoption of technology in an identified audience or stakeholder group. Collaboration with Extension personnel is encouraged to transform developed plant genomics information into eXtension Communities of Practice <http://about.extension.org/university-researcher/> where appropriate;
  - (b) A budgeted plan and timeline for education (teaching) initiatives must include approaches to evaluate educational deliverables (e.g. curricula design and exceptional core competencies in plant genomics) for expertise development through undergraduate and graduate training. As an integral part of the project approach, a broadening educational experience for students (e.g. provide innovative frameworks for curriculum development); undergraduate and graduate training; and/or exceptional learning opportunities in emerging knowledge areas, postdoctoral research associates and others, to participate in the CAP. The plan must include education (e.g. development of integrative university-level teaching modules/curricula utilizing the knowledge for the problem area) opportunities with measurable outcomes for groups under-represented in science to participate. We also strongly encourage coordination with the CSREES educational programs as an opportunity, for example, to partner with minority serving institutions. The following link has been included to access CSREES educational funding opportunities, [http://www.csreecs.usda.gov/about/offices/serd\\_funding.html](http://www.csreecs.usda.gov/about/offices/serd_funding.html);
  - (c) A budgeted project management plan and timeline to ensure efficient functioning of the CAP team that includes an organizational chart, administrative timeline, a description of how the project will be governed, and identification of short-, medium- and long-term metrics to be evaluated, what expectations are required from each team member, a mechanism whereby progress metrics can be evaluated for future budgetary allocations, and how the project will complement and/or link to existing programs or projects to include multi-disciplinary, multi-institutional, multi-state and international collaborations. The plan must include an exit strategy beyond the requested award period, without assuming long-term NRI support. The management of the research, education, and extension integrative activities must be clearly incorporated in the overall management plan;
  - (d) A budgeted data management plan and timeline that includes a description of how project information, data, and results will be made publicly available (e.g. capacity to freely interface with major community databases and with all project locations), a description of the database development, deployment, nomenclature standardization, data mining and analysis, interoperability, web presentation, etc. Applicants must aim to release the results of their research to the public in a timely manner and in an accessible and usable form. If a professional managed community database exists, the plan must demonstrate coordination

to that database and a letter of support submitted with the application. To the extent possible, the plan should adapt software and data structures already available through an open source system, adopt a LIMS convention for the project with breeder input into the ontology and design of the system, training for key project personnel who will generate or analyze data, agreement on nomenclature at every level, assurance that the data are compatible with databases or information services for long-term curation and storage, dedicated personnel to provide day-to-day management of the database and compliance monitoring, etc.;

(e) A budgeted plan and timeline to develop or improve high-throughput mapping and marker development, establish mapping populations, and identify genomic intervals carrying traits of agronomic interest directly useful to breeders and to other biologists for fundamental plant science research. The plan may include production of localized or total-genome maps that will be useful in improvement or in cloning genes of agricultural importance. The application should clearly justify the nature of the map to be constructed (e.g. genetic, physical, or comparative); high density or low density. Applications must include an assessment of the present state of the genome map, the availability of existing genetic materials and technologies, the rationale for choice of the mapping population, genotype or breeding line, and the short- and long-term applications of the map for plant breeding or other research;

(f) A budgeted plan and timeline to develop or improve web accessible informatics-based tools for plant breeders that enable efficient access to genetic, trait, physical, and expression data, etc. The plan may focus on to the extent possible: providing informatics training and education opportunities that foster a collaborative interface between CAP participants, breeders, biologists, computational scientists, and end users; the improvement of statistical and computational methods for analyzing genome/genetic data critical for plant breeding objectives that include controlled vocabularies; the improvement of resources for the acquisition, management, storage, and interoperability of genome/genetic data that can incorporate increasingly diverse information for plant improvement; the enhancement of tools for analysis of plant genome sequence data including quantitative and graphical representation of germplasm relatedness, comparison of data across species, and QTL analysis; and the improvement of resource Web pages for specific classes of traits, proteins, genes, or metabolic pathways for plant improvement, etc.;

(g) A budgeted plan and timeline to develop or improve molecular markers and apply marker-assisted breeding/selection to U.S. plant breeding objectives and to utilize new genome technologies to address problems not readily solved by conventional breeding methods. The CAP will support projects to locate, identify, and isolate genes that are important to the productivity and sustainability of U.S. agriculture. To prevent duplication of effort, applicants are strongly encouraged to use the available genetic tools and resources, such as existing genomic/genetic maps, cytogenetic stocks, alien addition lines, near isogenic lines, mutants, transposons, molecular markers, or other existing information and technologies to locate, identify, and isolate genes that are directly useful to breeders;

(h) A budgeted plan and timeline for sharing results and management of intellectual property that includes a description of what, how, and when the user community would have public access to the research, education, and extension deliverables and outcomes of the project; and

(i) A budgeted plan and timeline for an integrated advisory group of principal stakeholders and scientists relevant to the proposed research, education, and extension projects (e.g. include letters of commitment and rationale for their role) to assess and evaluate the quality, potential outcomes, and impacts, and how they could function effectively to support the goals and objectives of the CAP.

- Applications that do not address at least one of the stated integrated program priorities will be returned without review.