



Sustainable Maize and Wheat Systems for the Poor

Proposal to the System-wide Genetic Resources Program

1. **TITLE: PHASE II OF THE INTERNATIONAL CROP INFORMATION SYSTEM (ICIS)**
2. **LEAD CENTRE: CIMMYT (contact: Dr. Paul Fox, Wheat Program)**
3. **OTHER COLLABORATORS (CGIAR AND OTHERS):**

a - Continuing from phase 1

IARCs: CIAT, CIP, CIMMYT, ICARDA, ICRAF, ICRISAT, IITA, IRRI, IPGRI (SINGER)

NARSs: Chinese National Rice Research Institute (CNRRI)

Indian National Sorghum Programs

Indian, Chinese and South African Wheat Programs

ARIs: Wheat programs in Australia, Canada and USA. GrainGenes, Integrated Information Management Laboratory of Texas Agricultural Experiment Station and Universities (Idaho, Queensland, Cornell and others)

b - To be encouraged to participate in phase 2

IARCs: WARDA, INIBAP, ICLARM

NARSs: NARS partners for each ICIS implementation

4. **TOTAL COST AND DURATION:**

This proposal seeks US\$ 25,000 to be spent in 1998 as part of an initiative estimated to cost \$400,000 in total and last four years: (January 1997 - December 2000)

5. **PROJECT TYPE: SEED MONEY**

to stimulate further collaborative development through an inter-centre ICIS workshop in 1998

6. **BACKGROUND:**

ICIS phase I accelerated the development of an information system that removes barriers to the association of information through the unambiguous identification of germplasm. The common genealogical schema or data model of ICIS can now accommodate all crop collection and breeding methods and will link to applications, such as fieldbooks, required by individual users.

ICIS phase II will significantly extend the software and also the range of crops and institutions supported. The project will increase the efficiency of germplasm conservation and crop improvement in the NARSs and CG institutions and strengthen links between conservation and utilization of germplasm. Information is explicitly linked to stocks of seed or planting material, so the North-South transfer of information and germplasm is facilitated.

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Phase II ICIS

Representatives from CIMMYT, IRRI, ICRISAT, ICARDA, ICLARM and ICRAF met for the First ICIS Inter-Centre Workshop at IRRI. Then CIMMYT, IRRI, ICRISAT and ICRAF met for the Second Workshop at CIMMYT. These workshops produced designs for the central modules and key applications of ICIS and these are being programmed and implemented. The Third Workshop will be held at CIMMYT in March 1997.

7. OBJECTIVES:

To continue development of international crop information systems that seamlessly support and integrate activities covering conservation, characterization, evaluation and use of germplasm for a wide range of CG mandated crops and to extend these systems to a global user base including IARCs, NARS and ARIs

8. WORK PLAN

EACH CROP COMMODITY CENTER will:

- ✓ Designate for each crop implementation one ICIS administrator who will liaise closely with staff at the center and in participating NARSs on progress and issues related to the project,
- ✓ Identify key NARSs in LDCs with which to collaborate both as users of the implementation and as partners in development of the ICIS system,
- ✓ Be responsible for maintaining, updating and extending the resulting commodity database(s),
- ✓ According to requirements, capacities and interests; contribute to ICIS development through the design and programming of components or applications, following ICIS standards,
- ✓ Be involved in training and extension for new ICIS users.

SINGER and **CIMMYT** will liaise on interfacing ICIS structures with **SINGER** so that germplasm characterization and utilization data become accessible through **SINGER** across all crops for which an ICIS implementation is developed. **CIMMYT** and **IRRI** will organize meetings of partners on the structure and function of the ICIS database schema, produce a detailed work plan, and coordinate development of software and NARS training. Comprehensive development documentation will be distributed by **CIMMYT** and **IRRI**.

9. OUTPUTS:

Deliverables by December, 1998:

- A seamless management system for all data associated with germplasm conservation, breeding and genetics for a wide range of CG mandated crops.
- Implementation of ICIS for several crops in addition to wheat, rice and sorghum. Potential additional crops include maize, barley, beans, potatoes, groundnuts, chickpeas, millets and cowpeas.
- NARS partners added for each crop implementation.
- Software capabilities for genealogies of cross-pollinating species.
- Genealogical diagnostics such as coefficients of parentage.
- Data updates via CD-ROM, the IVDN, the Internet, and other electronic media.
- A flexible output tool for genealogy and data management specifically developed for germplasm collection management.

Deliverables by December, 2000:

- Data management systems for molecular and genetic sequence data integrated with existing databases.
- A Geographic Information System to manipulate and query passport, performance and ecological data.
- New crop implementations.
- Increased participation of NARS partners in all crop implementations.
- Direct integration with SINGER for access to multi-crop characterization and utilization data.

10. MEASURABLE INDICATORS:

- Number of species implemented.
- Number of ICIS implementations in CG centres.
- Number of users in NARSs, by crop.
- Number of users in ARIs, by crop.
- Number of genotypes recorded, by crop.
- Number of variables managed, by crop.
- Countries contributing passport and performance data, by crop.

11. BUDGET:

- a. Total budget needed:** \$400 000. Covers coordination, software development, support to new crop implementations, harmonizing SINGER and ICIS, consultancies (on genetic data, GIS, WWW interfaces), NARS training, CD production & documents. The budget submitted here is designed to further stimulate collaborative development through an ICIS workshop and signals that other special funding and strong core commitments are required. (IRRI is committed to ICIS technology for managing all its genetic resources and breeding operations and CIMMYT is similarly committed for small grain cereals.)

b. Budget requested for SGRP funding:

1998 Inter-centre ICIS workshop	\$ 25,000
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12. JUSTIFICATION:

- (a) How will the project advance the SGRP strategy? ICIS adds value to genetic resources and promotes and streamlines their use. The SGRP strategy to link data globally will be underpinned by a strong foundation in crop information laid by separate ICIS implementations for many crops.
- (b) What leverage potential does the project have? CIMMYT has attracted special funds for wheat applications. ARIs are involved at their own expense in ICIS phase I, providing technology transfer to the CG system and subsequently to NARSs. A software company oriented to trial management is interested in accommodating ICIS germplasm identifiers, thus financing linkage between ICIS and complementary software for NARSs and the CG.
- (c) How relevant is the project to the SGRP core activities? It is directed to the management and use of genetic resources.
- (d) How broad is the applicability of the project? Potentially ICIS applications could extend beyond all crops and the scientists working on them, e.g. ICLARM has expressed interest in applying genealogical tools from ICIS to fish species.

- (e) What are the inter-Centre interactions/contributions? To date there has been major synergy from broad inter-centre participation, for example from the interaction of CIMMYT and IIRRI on germplasm issues, coupled with initiatives by ICRAF and ICRISAT to manage complex field data.
- (f) What disciplines are involved? Genetics, statistics and modeling, breeding, pathology, entomology, economics, agronomy, seed technology, physiology, food technology and seed technology.
- (g) What impacts (social, environmental, economic) will the project have? When? ICIS is currently increasing the efficiency of resources devoted to wheat and rice and contributing to food security. Similar advances will be seen for more crops within two years. By 2000, ICIS will be used regularly to quantify diversity in farmers' fields and will also be employed in crop disaster mitigation.
- (h) What are risks/assumptions? It is assumed that, at the very minimum, ICIS will be fully implemented for wheat and rice. There is, however, a risk that without sufficient on-going funding, the technology transfer to NARSs and other crops will languish.
- (i) Other considerations. Major savings will accrue to the CG by collaborative software development. ICIS is a bottom-up initiative with a major impact in linking conservation and utilization.