

Development and implementation of Novel Algorithms and Software Modules for PGR Informatics

- **Development of Novel Algorithm to connect germplasm and genomic data**

(Project objective: Developing novel algorithms for PGR informatics)

In the past year, Digital Sequence Information (DSI) has assumed great significance in the field of genetic resources. International negotiations are on at Convention on Biological Diversity and International Treaty on Plant Genetic Resources.

At present, no information module exists in the world that can assess the contribution of genebanks around the world to genomic resource generation and use. On one hand, more than 150 genebanks located in 52 countries around the world conserve PGR belonging to 263 countries. On the other, open access genomic information repositories like GenBank (NCBI) stores more than 35m nucleotide, 8 m protein, 23m EST and 3m gene sequences.

Algorithms were created to connect GenBank sequence depositions to genebanks from to estimate the contribution of genebanks around the world to genomic resource generation and use.

- **Development of Germplasm Registration Information System**

(Project objective: Developing software and schema for a distributed network of data providers)

First system globally to facilitate germplasm registration through online procedure was developed and implemented. A mechanism for "Registration of Plant Germplasm" was instituted in 1996 by ICAR to serve as a recognized tool for registration of PGRFA at national level.

The Germplasm Registration Information System was launched by DG, ICAR on 02-08-2017.

- **Post-graduate teaching**

I have a dual faculty position in Faculty of Plant Genetic Resources and Faculty of Bioinformatics, IARI, New Delhi. During 2017-18 taught three courses:

BI 504	Evolutionary Biology (2+1)	[Course Leader]
BI 624	Genome Wide Association Study (2+1)	[Course Leader]
PGR 507	Information Management in Plant Genetic Resources (2+1)	[Course Leader]
PGR 500	Biodiversity and Plant Genetic Resources (2+0)	[Course associate]

Currently guiding five Ph.D. students of PG School, IARI.

Targets for 2018-19:

1. Development of PGR Portal version 2.0
2. Algorithm development for PGR characterization and evaluation data portal
3. Development of G2G portal

ICAR National Fellow Project on Development and implementation of Novel Algorithms and Software Modules for PGR Informatics

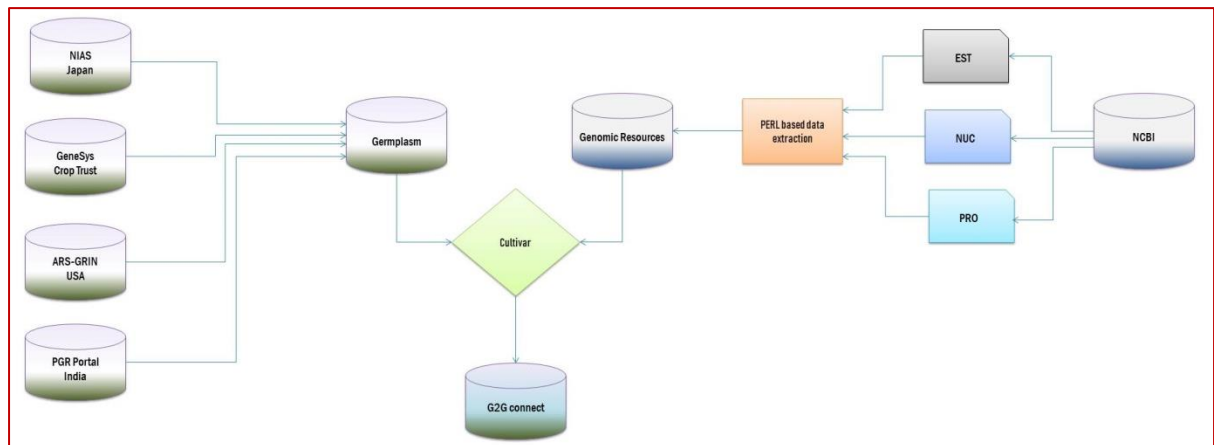
1. Development of Novel Algorithm to connect germplasm and genomic data

(Project objective: Developing novel algorithms for PGR informatics)

In the past year, Digital Sequence Information (DSI) has assumed great significance in the field of genetic resources. International negotiations are on at Convention on Biological Diversity and International Treaty on Plant Genetic Resources. Deliberations are going on to deem DSI as genetic resources. Such proposals and decisions will affect access to genetic resources and benefit sharing.

At present, no information module exists in the world that can assess the contribution of genebanks around the world to genomic resource generation and use. On one hand, more than 150 genebanks located in 52 countries around the world conserve PGR belonging to 263 countries. On the other, open access genomic information repositories like GenBank (NCBI) stores more than 35m nucleotide, 8 m protein, 23m EST and 3m gene sequences.

Algorithms were created to connect GenBank sequence depositions to genebanks from to estimate the contribution of genebanks around the world to genomic resource generation and use.



2. Development of Germplasm Registration Information System

(Project objective: Developing software and schema for a distributed network of data providers)

A mechanism for “Registration of Plant Germplasm” was instituted in 1996 by ICAR to serve as a recognized tool for registration of PGRFA at national level. This would also provide facilitated access to the developed or identified potentially valuable germplasm for utilization in crop improvement programs. Since the institution of this mechanism, a total of 1,313 germplasm belonging to 209 crop species have been registered.



The Germplasm Registration Information System was launched by DG, ICAR on 02-08-2017.

Why GRIS: The Germplasm Registration Information System has been developed to make the entire process of germplasm registration—submission of application, evaluation by experts and decision by Plant

Germplasm Registration Committee—a web-based system. The system is expected to provide genebank managers, breeders and plant researchers with a hands-on tool for management of germplasm registration process, and to policy makers with a reliable source of information. With the advent of this system, it is expected that the entire process of germplasm registration is made simple and fast, facilitating transparency and expeditious decision making. GRIS also has advantages like real-time tracking of application, speedy disposal, searchability and retrieval of old records.

How to use GRIS: Log on to www.nbpgr.ernet.in/registration to register yourself. Fill the application online and attach documentary evidence. Upload your application and track its progress using your personal dashboard. Obtain registration certificate online too! The review process is also online making the whole cycle of application-to-registration quick.

3. Post-graduate teaching

I have a dual faculty position in Faculty of Plant Genetic Resources and Faculty of Bioinformatics, IARI, New Delhi. During 2016-17 taught three courses:

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|---------|---|--------------------|
| BI 504 | Evolutionary Biology (2+1) | [Course Leader] |
| BI 624 | Genome Wide Association Study (2+1) | [Course Leader] |
| PGR 507 | Information Management in Plant Genetic Resources (2+1) | [Course Leader] |
| PGR 500 | Biodiversity and Plant Genetic Resources (2+0) | [Course associate] |

Currently guiding five Ph.D. students of PG School, IARI.

4. Publications

1. Jamla M, Gaikwad AB, Jacob SR, Archak S. (2017). Text-mining for Identifying Abiotic Stress Candidate Genes to Screen Bread Wheat (*Triticum aestivum*) Germplasm. *Indian Journal of Plant Genetic Resources* 30(2): 162-164.
2. Chourey SK, Solanki S, Gaikwad AB, Pandey CD, Archak S. (2017). SSR marker analysis points to population admixture and continuum of genetic variation among Indian landraces of brinjal (*Solanum melongena* L.). *Scientia Horticulturae* 224: 68-73.

5. Participation in conference/ workshop/ trainings/ meetings etc.

Resource person: Lecture "Protection of plant germplasm using genomic tools" in the training program on "Genomics assisted breeding for crop improvement" IARI, New Delhi 06-03-2018.

6. Targets for 2018-19

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3. Development of G2G portal