

SUPPORTING FOOD SECURITY

It's estimated that the world's population will reach some 9.6 billion by the middle of this century. Close to 5 billion will rely on rice to provide both food and a livelihood.

Food security is clearly one of the world's most pressing concerns, and significant efforts are being made to address this challenging issue.

One of the effort is the 3,000 Rice Genomes Project (3KRG) – a collaborative effort of the International Rice Research Institute (IRRI), the Chinese Academy of Agricultural Sciences and the Beijing Genomics Institute Shenzhen.

The objective of the project is to sequence 3,024 rice varieties from a range of countries. The dataset emerging from this work will be an important resource for scientists working on food security for the world's growing population. Analyzing the dataset will lead directly to improved rice varieties, vital to most Asian countries, where rice is a staple.

To facilitate this work, IRRI and its collaborators are making the 3KRG dataset publicly available to scientists and researchers at no cost. It can already be accessed on Amazon Web Services, as well as on ASTI's Computing and Archiving Research Environment facility (CoARE).

TEIN's dedicated high-capacity internet connectivity is essential to the data-heavy work of 3KRG. It enables scientists and researchers from across the world to collaborate effectively on this, as well as on many other vital projects – as varied as climate change studies and realtime arts collaboration.

TEIN Asia-Pacific's dedicated high-capacity IP network for research and education

TEIN – the Trans-Eurasia Information Network – connects scientists and researchers across the Asia-Pacific Region and, through direct connectivity with GÉANT, the pan-European network, to the entire global research and academic community.

Since the first TEIN initiative launched in 2000, TEIN project is now in its fourth phase – TEIN4 and is co-funded by the European Commission (EC) and Asian partners. Currently, TEIN4 project is managed by TEIN*CC (TEIN*Cooperation Center).

It provides

- dedicated high capacity for the research, scientific, education, arts and government communities across Asia-Pacific
- a gateway for global collaboration for more than 55 million users in the region.



The Challenge :

To set up a second, publicly accessible, non-commercial site to host the rice genomes database for 3KRG, so it can be easily used by IRRI researchers and collaborators, as well as by the global rice community. IRRI asked ASTI – which maintains PREGINET (the Philippines' NREN) – to host the second site.

The Solution :

IRRI is connected to PREGINET via a 1 Gbps link and, through that link, to TEIN. ASTI maintains PREGINET and provides the network link and storage resources to host the 3KRG rice genome variants dataset, the only public hosting of the 3KRG variants dataset accessible via RENS from around the world.

Through TEIN, IRRI and its 3KRG partners can work collaboratively on large datasets. IRRI also uses TEIN to hold video conference sessions between its partners and the 15 CGIAR centers

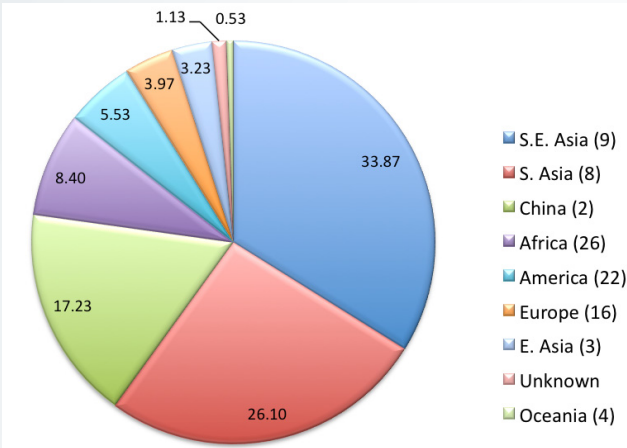
Key Benefits :

Through PREGINET and its links to international RENS, such as TEIN, APAN, Internet 2 and GÉANT, IRRI scientists and the global rice community can access the 3KRG dataset remotely – from ASTI's facility (High Performance Computer, Storage and Science Cloud).

IRRI researchers can access 3KRG data much more quickly and more efficiently through RENS than through a commercial network. It all adds up to highly effective collaboration on food research and the improvement of rice varieties.

3K RGP is a collaborative, international research programme

It has sequenced 3,024 rice varieties from 89 countries, creating a massive dataset, a powerful resource for understanding natural genetic variation in rice as well as for large-scale discovery of new genes associated with economically important traits. It will help accelerate the pace of developing improved rice varieties around the globe to feed a growing population, estimated to reach more than 9.6 billion by 2050, with half of humanity relying on rice for sustenance and livelihood."



[Geographical distribution of the 3,000 sampled rice accessions from 89 countries]

ASTI and IRRI working together

ASTI and IRRI collaborate on access to ASTI's CoARE, an archiving and high-performance computing facility, holding the 3KRGP dataset. ASTI provides network and storage service infrastructure to IRRI to establish a public rice genomic database for the combined 3KRGP variant dataset, and to enable large data exchanges among IRRI and its collaborators. This dataset can be remotely accessed by researchers and scientists via the TEIN link – as downloadable files using iRODS, an open-source data management platform designed to handle massive amounts of data.

To enable easy access to the dataset, researchers are prompted to connect to iRODS using one of the three different methods available:

- iRODS iCommands, the recommended method for large file (2GB and above in size) and bulk data (many small files) transfers
- WEBDAV, for small file transfer operations
- WEBDAV client, for drag-and-drop transfers.

• NREN

National Research and Education Network

• PREGINET

Philippine Research, Education and Government Information Network

• ASTI

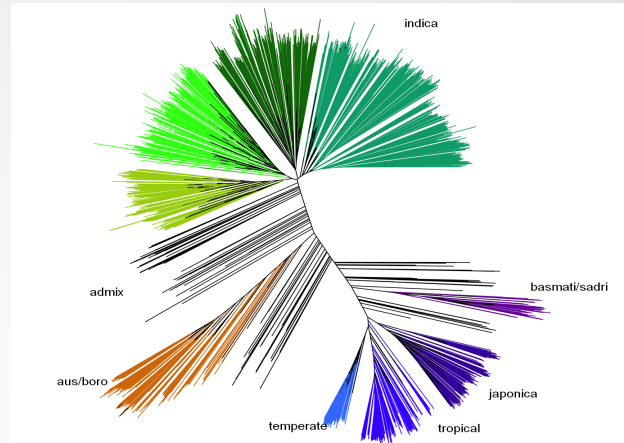
Philippine Advanced Science and Technology Institute

• CGIAR

Consultative Group for International Agricultural Research

For more information

- TEIN: www.tein.asia / www.teincc.org
- ASTI: www.asti.dost.gov.ph
- IRRI: www.irri.org



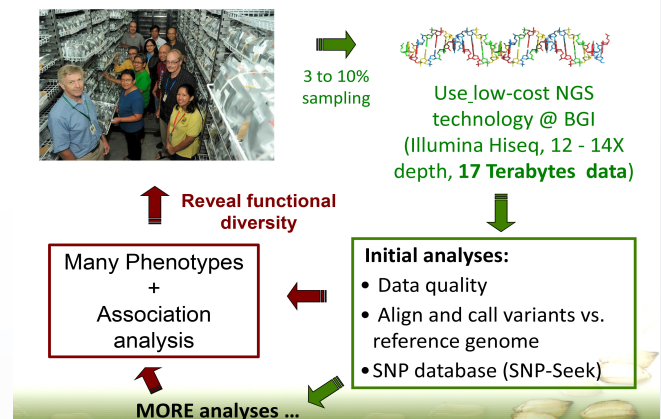
[Classification of 3,000 rice accessions into five distinct varietal groups based on 5 sets of 200,000 random sets]

TEIN's high capacity network: vital to high value research

ASTI will continue to support IRRI in its goal of improving rice varieties to help improve global food security. The 3KRGP dataset will be available to other countries through the link provided by TEIN.

The connectivity provided by TEIN is critical to this work – it's a dedicated high-capacity network for research and education communities in the Asia Pacific region and it supports high-impact research applications, such as the rice genome project, which give fundamental value to the work of NRENs.

GRiSP Product 1.2.3. Sequencing the Genebank – 3000 Genome project



[3KRG Project Summary]

Articles about 3KRGP

Main article:

<https://sites.google.com/a/irri.org/iric/resources/3000-genomes-project>

Other articles:

<http://iric.irri.org/resources/3krp-aws>

<http://irri.org/rice-today/dawn-of-a-new-era-in-rice-improvement>

<http://irri.org/news/media-releases/3-000-rice-genome-sequences-made-publicly-available-on-world-hunger-day>

<http://www.gigasciencejournal.com/content/3/1/7>

<http://irri.org/news/media-releases/big-data-on-3-000-rice-genomes-available-on-the-aws-cloud>

<http://iric.irri.org/resources/3000-genomes-project>

<http://gigadb.org/dataset/200001>

<http://www.gigasciencejournal.com/content/3/1/8>