

# 2<sup>nd</sup> International Workshop on Advanced R & R-QTL

3<sup>rd</sup>-7<sup>th</sup> December 2018, ICRISAT, Patancheru, India

**Limited Scholarships** available from CRP-GLDC, EIB  
Module 5 & CGIAR Big Data Platform! **Apply NOW!**

**Last Date of Registration: 15<sup>th</sup> November 2018**  
**Registration Fee : USD 300 / INR 18,000**



RESEARCH  
PROGRAM ON  
Grain Legumes and  
Dryland Cereals



Excellence in  
Breeding  
Platform



Platform for  
Big Data  
in Agriculture

## Announcement

Statistics, Bioinformatics and Data Management (SBDM) Theme, ICRISAT (<http://www.icrisat.org>) in collaboration with **Professor Karl Broman** from the Department of Biostatistics and Medical Informatics, University of Wisconsin School of Medicine and Public Health (<http://www.biostat.wisc.edu/~kbroman>) and **Dr. Aniruddha Ghosh** from University of California, Davis (<https://www.ucdavis.edu/>) is organizing a training course on R, Mixed Models and R/QTL.

- Last date of registration is **15<sup>th</sup> November 2018**
- To register please send mail to [a.rathore@cgiar.org](mailto:a.rathore@cgiar.org)
- Course fee includes lunch & coffee breaks for 5 days
- Accommodation available in ICRISAT on request

Scholarships

- Few fully funded *scholarships* are available to CRP-GLDC, EIB and CGIAR Bigdata Platform NARS and CGIAR Institutions
- To apply for scholarship send mail to [a.rathore@cgiar.org](mailto:a.rathore@cgiar.org) with brief biodata and covering letter by 20<sup>th</sup> October

## About Course

The course will be mainly divided into four modules.

**First module** will focus on basics of R. This module will introduce R to participants and will include installation, introduction to RStudio, basic data management with R, package installation, basic programming and use of R Graphics. After covering basic graphics we will also cover advanced graphics by introducing ggplot2 package.

**Second module** will be focused on agricultural field experiments and phenotypic data analysis. This module will cover understanding of field/lab experimental designs and various other requirements of generating proper statistical design and analysis.

Participants will also learn defining linear models for different types of experimental designs. We shall also introduce concept of mixed models and their analysis by using R software.

**Third module** will be focused on QTL analysis. The key idea in QTL mapping is to obtain phenotypic data from a mapping population and then identify molecular markers in the genome associated with the phenotype by use of a genetic linkage map. Module will cover basic cleaning of genotypic data, development of genetic linkage map, simple & composite interval mapping & multiple QTL mapping will be covered using R/QTL software (<http://www.rqtl.org/>).

**Fourth module** will be on reproducible research. This module will introduce writing functions, generate reports by using R Markdown and best practices for writing clear R code.

## Course Content

### Module 1: Introduction to R

- ♦ Introduction to R & RStudio
- ♦ R Packages
- ♦ R for Data Manipulations
- ♦ R Graphics & ggplot2

### Module 2: Phenotypic Analysis

- ♦ Design of Experiments
- ♦ Field Trial Analysis
- ♦ Fixed, Random & Mixed Effect Models
- ♦ BLUEs/BLUPs

### Module 3: R/QTL

- ♦ Installation of R/QTL
- ♦ Genetic linkage map construction
- ♦ Basics of QTL Mapping
- ♦ Data Cleaning for QTL Analysis
- ♦ Multiple-QTL model selection
- ♦ Multi-parent population

### Module 4: Reproducible Research

- ♦ Organizing Data & Projects
- ♦ Writing R Functions
- ♦ Writing Reproducible Reports with R Markdown
- ♦ Writing Clear Code

# Main Course Instructors



Dr. Karl Broman, Professor, Department of Biostatistics & Medical Informatics, University of Wisconsin, Madison is the developer of R/QTL, an extensible, interactive environment for mapping quantitative trait loci (QTL) in experimental crosses. He is expert in statistical genetics. During the training he will teach genetic linkage map construction QTL mapping.



Dr. Aniruddha Ghosh is a Project Scientist in the Department of Environmental Science and Policy at the University of California, Davis. He is interested in developing geospatial tools using R for environmental and agricultural applications. During the workshop, he will cover topics on R, Graphics and statistical methods.



Ms. Roma Rani Das is a Statistician working with SBDM, ICRISAT. She has extensive experience on Designing and Analysis of Experimental Trials and Mixed Models. During the training she will be taking classes on concept of R and mixed models using R.



Dr. Abhishek Rathore, Principal Scientist and Theme Leader (SBDM) at ICRISAT. He is an expert in Designing and Analysis of Experimental Trials, QTL Mapping and Genetic Map Construction. During the training he will be taking classes on concept of experimental designs, phenotypic analysis.

## Hyderabad Tourist Information



Hyderabad is the capital of Telangana and the fifth largest city in India, with an ancient civilization and culture. Attached to the city is its twin, Secunderabad, which is part of Hyderabad. The twin cities of Hyderabad and Secunderabad are separated by the Hussain Sagar, an artificial lake constructed during the time of Ibrahim Quli Qutub Shah Wali in 1562 A.D. While Telangana is known as the most IT savvy state in India, Hyderabad is emerging as a major center for IT exports. Hyderabad was founded

on the River Musi five miles east of Golconda, in 1591-92 by Muhammad Quli Qutub Shah. In the 16th century the city grew spontaneously to accommodate the surplus population of Golconda, which was the capital of the Qutub Shahi rulers. The city is more than 400 years old and is noted for its natural beauty, mosques and minarets, bazaars and bridges, hills and lakes. It is perched on the top of the Deccan Plateau, 1776 ft., above sea level, and sprawls over an area more than 100 sq. miles.

Hyderabad is the capital



## About the International Crops Research Institute for the Semi-Arid Tropics

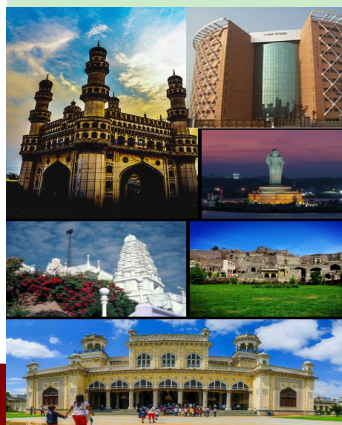


The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) is a non-profit, non-political organization that conducts agricultural research for development in Asia and sub-Saharan Africa with a wide array of partners throughout the world. Covering 6.5 million square kilometers of land in 55 countries, the semi-arid or dryland tropics has over 2 billion people, and 644 million of these are the poorest of the poor. ICRISAT and its partners help empower these poor people to overcome poverty, hunger and a degraded environment through better agriculture. ICRISAT is headquartered in Hyderabad, Andhra Pradesh, India, with two regional hubs and four country offices in sub-Saharan Africa. It belongs to the Consortium of Centers supported by CGIAR. ICRISAT conducts research on six highly nutritious, drought-tolerant crops – chickpea, finger millet, groundnut, pigeonpea, pearl millet and sorghum. It also develops sustainable management of semi-arid tropic (SAT) systems through efficient and sustainable management of natural resources, and enables policies and institutions for improving livelihoods and achieving food, nutrition and health security while protecting the environment.

groundnut, pigeonpea, pearl millet and sorghum. It also develops sustainable management of semi-arid tropic (SAT) systems through efficient and sustainable management of natural resources, and enables policies and institutions for improving livelihoods and achieving food, nutrition and health security while protecting the environment.

### Vision, mission & approach

ICRISAT envisions a prosperous, food-secure and resilient dryland tropics. To achieve this, our mission is to reduce poverty, hunger, malnutrition and environmental degradation in the dryland tropics. Our approach is through partnership-based international agricultural research-for-development that embodies Science with a Human Face.



## Contact Us

### Workshop Organizer

Dr. Abhishek Rathore  
Principal Scientist & Theme Leader  
Statistics, Bioinformatics & Data Management  
ICRISAT Patancheru, Hyderabad  
Telangana, India-502 324  
email: [a.rathore@cgiar.org](mailto:a.rathore@cgiar.org)  
Office Landline: +91 40 3071 3413

### Logistics & Accommodation

Ms. Jyotsna Gontu  
Admin Associate  
ICRISAT Patancheru, Hyderabad  
Telangana, India-502 324  
email: [g.jyotsna@cgiar.org](mailto:g.jyotsna@cgiar.org)  
Office Landline: +91 40 3071 3385  
Mobile: +91-8886930226