

## INTRODUCTION

Sorghum and millets are the important staple foods in the semi-arid tropics of Asia and Africa. Millets are highly nutritious than fine cereals, and are the principal sources of energy, protein, vitamins and minerals for millions of the poorest people in these regions. They grow well in harsh environments where other crops yield poorly. The area of millet cultivation in the country has declined very significantly over the past few decades. This could be primarily due to very low productivity, susceptibility to biotic and abiotic factors. In this scenario, breaking the yield plateau is a major challenge to the millet breeders. Application of modern breeding tools such as molecular markers and transgenics in breeding programmes would help to address this challenge more effectively. The use of molecular marker technology, in improving breeding efficiency and designing superior cultivars with greater speed, precision and value, has been well demonstrated in major crops. The advent of molecular technologies for mapping and manipulation of complex genomes now permit use of new approaches to improve millets. Combining molecular marker and transgenic approaches with conventional breeding schemes can increase the overall selection gain, and therefore, the efficiency of a breeding programme.

Molecular marker technology has undergone a major change during the last two decades. Significant advancements have been made in the sequencing technologies and bioinformatics resulting in quicker genome sequencing of a crop species at a relatively cheaper cost. This has brought in revolutions in marker discovery and development, high throughput genotyping for QTL mapping and gene discovery of economically important traits, and has made application of MAS in large-scale breeding programmes more affordable. Pyramiding of desirable genes through MAS has now become a practice in several crop breeding programmes.

Advancements in marker discovery and genotyping provide novel opportunities to execute molecular breeding programmes in orphan crops like millets. However, the millet workers in general are not greatly involved in the use of molecular markers in their breeding programmes partly due to lack of exposure on basics and technical skills required. Hence, the winter school on "Molecular Breeding Approaches for Genetic Enhancement of Millet Crops" is being organized at the Directorate of Sorghum Research (DSR), Hyderabad to train millet researchers on these aspects. DSR has a well-equipped laboratory for molecular breeding and transgenic

development.

## OBJECTIVE

The training programme aims to familiarize the millet researchers with different molecular techniques and enable them to address genetic enhancement issues in breeding of millets.

## COURSE CONTENT

The course consists of both lectures and hands-on practical classes including the demonstration of software packages. Course material will be provided to all the participants. The faculty for the training course will consist of eminent National and International researchers working in the area of molecular breeding and other biotechnology applications. Participants will be given an opportunity to share their own experiences. The topics of the course include: molecular markers and their application, concept of marker-assisted selection (MAS), development of mapping populations, phenotyping and genotyping of populations, linkage map development, QTL mapping, marker development strategies, utilization of molecular markers in transfer of abiotic and biotic stress resistance genes into elite cultivars, DNA fingerprinting, use of markers in assessment of seed purity of both hybrids and parental lines, association mapping, genetic engineering concepts, bioinformatics and its tools, functional genomics and candidate gene discovery, gene cloning and allele mining, gene regulation for cultivar development, IPR issues in molecular breeding, TILLING and eco-TILLING, development of transgenics and biosafety issues, marker-based detection of transgenic plants, basic and applied aspects of sorghum genomics, etc.

## TARGET GROUP

The training course will be suitable for breeders, scientists working in the area of molecular breeding of sorghum, millet and other crops. The candidate must possess Master's degree in any discipline of Agricultural Sciences or allied fields. He/she should be working in a position not below the rank of Assistant Professors/scientists in the concerned subject in State Agricultural Universities/CAU/ ICAR institutes, etc.

## COURSE DATE AND DURATION

The duration of the Winter School will be 21 days from 6-26

January 2014. The sessions will start daily from 9:30 AM and will continue till late evening. Outstation participants are required to arrive latest by the evening of 5<sup>th</sup> January 2014.

## VENUE AND OTHER DETAILS

The programme will be conducted mainly at DSR. The programme is residential and participants are required to stay at the DSR campus, Rajendranagar, Hyderabad. Accommodation will be provided on twin-sharing basis at the Guest House/Hostel at DSR and other sister institutes. Candidates should bring relieving letter from their respective Institute. Selected participants will be paid travel fare to and fro for the journey by AC II Class train fare as per their entitlement only or bus or other means of transport in vogue as the case may be. Actual TA will be paid on production of ticket(s) by the participants. TA will be paid from the place of duty to the Winter School location and back by the shortest route. Free boarding and lodging will be provided to the participants during the training programme as per ICAR's guidelines on winter school. No DA is admissible to the participants. The participants are advised not to bring family members with them. The climate will be pleasant and the day temperature during January ranges from 15 to 30°C.

## HOW TO REACH DSR

Hyderabad is well connected to all parts of India by Air, Train and Road. DSR is located on the Himayatsagar Road near the Acharya N.G. Ranga Agricultural University (ANGRAU) at Rajendranagar, Hyderabad 500030. It is located at an approximate distance of 20 km from Rajiv Gandhi International Airport (Hyderabad), 17 km from Nampally or Kacheguda Railway Stations, 23 km from Secunderabad Railway Station and 15 km from Mahatma Gandhi Bus Station (MGBS). DSR can be reached by local bus (94H, 94R, 94L, 95R, 95L, 92 and 92R) or taxi or auto rickshaw.

## LAST DATE FOR NOMINATIONS

The duly filled in nomination form forwarded through proper channel must reach Dr. J V. Patil, Director, Directorate of Sorghum Research, Rajendranagar, Hyderabad - 500 030 on or before November 1, 2013. The nomination form can be downloaded from the website <http://www.sorghum.res.in> and sent in advance through e-

mail to: [jvp@sorghum.res.in](mailto:jvp@sorghum.res.in). There is a provision for 25 participants and the selection would be based on the suitability of the applicant as assessed by the selection committee. Announcement of the final selection will be intimated individually by November 15, 2013 through e-mail / regular mail. The list of selected participants will also be displayed in DSR website. The selected candidates should confirm their participation by 30<sup>th</sup> November 2013 without fail.

### REGISTRATION FEE

A registration fee of Rs. 50/- (Fifty only) per participant fixed as per ICAR guidelines, can be sent through Postal Order in favour of Director, DSR, payable at Hyderabad along with the application form.

### CONTACT DETAILS:

#### COURSE DIRECTOR

Dr. JV Patil, Director, DSR, Rajendranagar, Hyderabad 500030, Phone: +91-40-24018651, Fax: +91-40-24016378, E-mail: [jvp@sorghum.res.in](mailto:jvp@sorghum.res.in)

#### COURSE CO-DIRECTORS

Dr. R Madhusudhana, Principal Scientist, DSR, Rajendranagar, Hyderabad 500030

Phone: +91-40-24015349 Ext. 226, Mobile: 09618099658  
Fax: +91-40-24016378,  
E-mail: [madhu@sorghum.res.in](mailto:madhu@sorghum.res.in)

Dr. P Rajendrakumar, Senior Scientist, DSR, Rajendranagar, Hyderabad 500030

Phone: +91-40-24015349 Ext. 226, Mobile: 09848186445,  
Fax: +91-40-24016378  
E-mail: [rajendra@sorghum.res.in](mailto:rajendra@sorghum.res.in)

## REGISTRATION FORM

### NOMINATION FORM FOR PARTICIPATION IN WINTER SCHOOL (to be sent to the Course Director/Course Co-Directors)

#### "Molecular Breeding Approaches for Genetic Enhancement of Millet Crops" (January 6-26, 2014)

Full name (in block letters) :  
Designation :  
Present employer and address :  
Address for Correspondence (in block letters) :  
Telephone :  
Mobile :  
Email ID :  
Fax :  
Permanent Address :  
Date of Birth :  
Sex :  
Marital status :  
Academic qualification :

Teaching/research/professional experience (mention post held) during the last 5 years and number of publications

Please mention, if you have participated in any research seminar, summer/winter/short course. etc. during the previous 5 years under ICAR/other organizations

Please briefly mention your motivation to undergo this training course and how would you utilize the knowledge gained during the training

**Registration fee**  
payment details:

Postal order No. \_\_\_\_\_ dated \_\_\_\_\_  
\_\_\_\_\_ of 50/- (Not refundable) for registration of application.

Signature of the applicant

Date:  
Place:

Recommendation of the forwarding authority.  
Date:  
Signature with official Seal



Winter School on

## Molecular Breeding Approaches for Genetic Enhancement of Millet Crops

January 6-26, 2014

Course Director  
Dr. JV Patil

Course Co-Directors  
Dr. R Madhusudhana  
Dr. P Rajendrakumar



**DIRECTORATE OF SORGHUM RESEARCH**  
(Indian Council of Agricultural Research)  
Rajendranagar, Hyderabad – 500030  
<http://www.sorghum.res.in>