

# Training Workshop for Scientific Staff under ICAR-HRM Programme 2019-2020

On

## Advances in Simulation Modelling and Climate Change Research towards Knowledge Based Agriculture

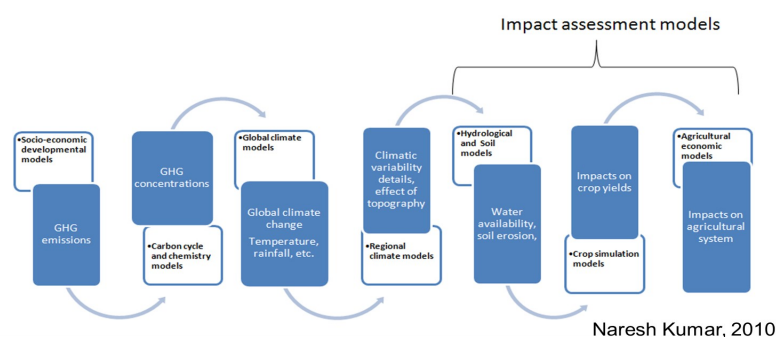
(13<sup>th</sup> November– 3<sup>rd</sup> December, 2019)

### Background

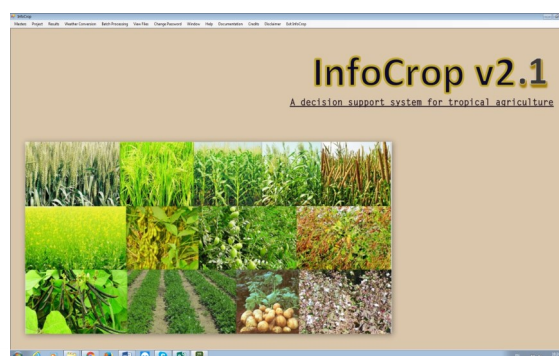
Climate change science is rapidly expanding with the advent of new and improved understanding on causes, manifestations and impacts of climate change on wide-spectrum of troposphere and agriculture in particular. Agriculture across the globe is challenged by multiple factors including soil health, climatic stresses, resource constraints, market and socio-economic dynamics. Traditional agricultural management is falling short to meet these challenges, particularly in the changing climates. This necessitates a comprehensive agricultural management which is possible only with the aid of scientifically integrated decision support systems. Simulation modelling is one such scientific approach to not only study the integrated effects but also to de-segregate the effects of individual factors related to soil, climate, variety and management. The crop models are increasingly used for several applications including yield gap analysis, yield forecast, climate change studies on impacts, adaptation gains and vulnerability assessment, greenhouse gas emission studies, optimization of management practices, crop zonation studies, genotype designing and so on. In view of the indispensable role of simulation modelling in climate change research and the potential use of crop simulation models as decision support systems for developing 'Knowledge Based Agriculture', it is important to develop trained manpower for scientific use of simulation models for above mentioned applications to improve the resilience of agriculture in current and future climates. Under the ICAR-HRM Programme, this workshop was first held in 2017, second one was in 2018 and this is the third in the series. We thank ICAR for bestowing continued confidence in us.

*“Agriculture is challenged to provide food security and environmental security...”*

*Cynthia E. Rosenzweig , 2015  
NASA-GISS*



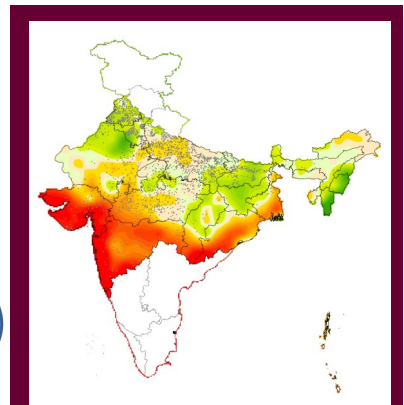
Naresh Kumar, 2010



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Assessments on regional impacts and adaptation gains



Experiments in research fields and Demonstrations in farmers' fields



Monitoring crop growth and GHG emissions



Quantification of crop response

Sought after information by farmers

## Objectives

To impart knowledge on

- 1) Advances in climate change research and climate change impacts on agriculture
- 2) Basics of processes involved in crop simulation modelling
- 3) Hands-on training on major simulation models
- 4) Application of simulation models in climate change research for impact assessment, adaptation and mitigation

## Duration

21 days

Dates of commencement: 13<sup>th</sup> November– 3<sup>rd</sup> December, 2019

## Venue

CESCRA, NRL Building, ICAR-IARI

## Participation eligibility

25 participants

- 1) Scientist or higher grade in any ICAR Institute, SAU, CAU, National/ State Institutes, Ministries
- 2) M.Sc or PhD in Agriculture/allied sciences with basic knowledge on crop husbandry

Desirable: Basic computer skills with working knowledge on MS Office  
 Applicant from SAU, CAU, National/State Institutes, Ministries required to pay a nominal course fee of ₹10000 (Rupees Ten thousand only) in the form of Demand Draft in favor of the Director, ICAR - Indian Agricultural Research Institute, New Delhi, payable at Syndicate Bank (IFSC code SYNB0009029), Pusa, New Delhi-110012

## Facilities

Seminar rooms

Modelling lab

FACE, FATE, OTC, TGT, Phenomics, Controlled Environment Facility, Satellite data reception facility, etc.

**you should bring.....**

**Laptop (with Windows 7 and above Professional version....**

**Please note that versions other than Professional may not fully support the simulation software)**

If you want to work with your own data then bring....

experimental data, soil data, weather data .... If available



Field facilities for climate change research at IARI

## Topics to be covered

- Introduction to system, model & simulation modelling
- Modelling plant growth, development and yield-basics
- Crop growth parameterization
- Modelling soil nitrogen & carbon balance
- Modelling methane, carbon-di-oxide & nitrous oxide emission
- Modelling crop-environment and crop-pest interactions
- Modelling soil-water balance and crop-water requirement
- Data requirement for running a simulation model, data collection and minimum datasets
- Crop model application steps—model calibration, evaluation & sensitivity analysis- concepts
- Climate change and simulation models- recent concepts and approaches
- Climate change scenarios-concepts, data utilization methods
- Impacts of climate change on agriculture at different spatial scales
- Adaptation strategies for climate change
- GHG emissions from agriculture and mitigation strategies for climate change
- Simulating climate change impacts, adaptation gains and vulnerability
- Application of simulation models for crop and agricultural management,
- Yield forecast techniques using simulation models and linking remote sensing technology
- Application of crop models for climatic risk analysis

## Hands-on sessions

- Data and input file preparation for crop models
- Assessing crop growth and yield using crop simulation models (InfoCrop, DSSAT and other models): Experiment setup and running simulations
- Work with your data (weather, soil, variety and management)
- Climate scenario data use methods/ steps
- Simulating climate change impacts
- Simulating adaptation strategies and interpretation
- Soil carbon balance model
- Hydrological model
- Pest and disease modelling
- Simulating GHG mitigation options
- Yield forecast using simulation models
- Field visits (FACE, OTC, Phenomics, SDRC, Eddy Flux tower)

## Registration and logistics

Send your application through proper channel to the Course Director on or before 30<sup>th</sup> September, 2019

A two page application should contain....

- Name, Designation, Official Address, email, Mobile no., Gender
- Educational qualifications, Specialization
- Trainings undergone
- Research areas, current projects
- Future research interests
- Specify experience in modeling, if any and why you are interested in this training, expected use of training
- Signature of applicant and forwarding authority

Also must

### Indicate accommodation preference: Hotel/ Guest house

IARI has limited Guest House facility on first-come-first service and payment basis

If you wish to stay outside, hotels are available nearby campus with ₹2500-3500 range, please let us know for blocking rooms for you on payment basis

Tea and working lunch will be provided. Guest houses provide breakfast and dinners on payment basis

TA and DA should be borne by the sponsoring Institute of the trainee Participants should make arrangement to reach to ICAR-IARI

Send scanned copy of completed application to the Course Director

## About CESCRA, IARI and New Delhi

Established in 1993, Environmental Science Division was renamed as Centre for Environment Science and Climate Resilient Agriculture in 2011. The Centre has pioneering contributions in the field of simulation modeling and climate change. Scientists of the Centre have contributed to IPCC, UNFCCC reports as well as to National and State Actions Plans on Climate Change.

ICAR-Indian Agricultural Research, established in 1906 is the 'Seat of Green Revolution' and is striving to bring the 'Evergreen Revolution' in Indian agriculture. The Institute is recognized globally and has several state of art facilities.

New Delhi, the National Capital is the one of the oldest and historical cities of India. With about 2 billion population, Delhi is one of the happening cities in the world. Weather during your stay period is generally pleasant with minimum and maximum temperatures ranging from 20-27/8-13°C. You are advised to carry winter wear.

## Seminar halls



## Contact

### Course Director

#### Dr S. Naresh Kumar

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### Course coordinator

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