International Training Course 2012

On

Crop Simulation Modeling and Impacts of Climate Change
on Agricultural Production Systems: A Training Program on DSSAT

November 26 – December 7, 2012

Organized by

Thailand International Development Cooperation Agency (TICA)

The Ministry of Foreign Affairs of Thailand

In Collaboration with

Chiang Mai University

1. Course Title

   Crop Simulation Modeling and Impacts of Climate Change on Agricultural Production Systems: A Training Program on DSSAT

2. Duration

   Two weeks (November 26 to December 7, 2012)

3. Background and Rationale

   Today more than ever, increased food production and security depend on judicious use of resources. In addition, issues such as climate change, climate variability, soil carbon sequestration and the long-term impact on food production and food security and environmental sustainability, have become important. Many weather, soil, genetic and management factors affect the way a crop will respond to irrigation, fertilizer and other management practices. Determining appropriate crop management strategies under these uncertainties has major economic and environmental implications. Computer simulation models of the soil/plant/atmosphere system with user-friendly GIS interfaces can make a valuable contribution to both furthering our understanding of the processes that determine crop responses and predicting crop performance, resource use and environmental impacts for different environments and management scenarios. User-oriented simulation models greatly facilitate the task of optimizing crop growth and deriving recommendations concerning crop management. They can also be used to determine the potential impact of climate change on crop production and long-term soil carbon sequestration, carbon stock of a landscape, or provide management scenarios for adapting to climate variability.

4. Objectives

   The overall goal of this training and seminary program is to familiarize participants with a comprehensive computer model for the simulation of process-based crop growth and yield, soil and plant water, nutrient and carbon dynamics and their application to real world problems.

5. Course Contents

   The course will be facilitated through a number of teaching methods, including lectures, group discussion and presentation, and case studies.

5.1 Course outline

1. Introduction
- History and Overview of DSSAT, IBSNAT

2. Potential Production
- Simulating Basic Growth & Development
- Minimum Data Set Concept

3. Genetic Coefficients for Growth and Development
- Concept of Species vs. Genetic Coefficients
- Cultivar Coefficients – CSM–CERES Models
- Cultivar Coefficients – CSM–CROPGRO and Other Models
- Species Coefficients, CSM–CROPGRO and CERES Models
- Estimating Genetic Coefficients, Concepts

4. Water Limited Production, Soils and Weather
- Simulating Water Limited Production
- Soil Data Inputs and Utilities
- Weather Data Inputs and Utilities
- Creating File X: Water Balance On

5. Nitrogen Limited Production
- Simulating Nitrogen Limited Production Processes in the Soil
- Simulating Nitrogen Limited Production Processes in the Plant
- Creating FileX: Water and N Balance On

6. Model Testing and Calibration of Parameters
- Simulating N in soil and Plant N

7. Model Validation and Calibration
- Systematic Procedure for Model Calibration
- Uncertainty, Risk, BMPs, and Sustainability

8. Model Applications
- Research on Climate Change
- Climate Change and Climate Variability
- Soil Organic Carbon
- Demo Create File X: Sequence Analysis

9. Model Applications

- CropDSS Shell
- CropDSS Shell spatial data requirement

5.2 Practices

- Software Installation
- Running Crop Models
- Simulating Potential Production
- Genotypic Sensitivity Analyses
- Genetic Coefficient Calibration
- Soil Data Files
- Weather Data Files
- Water Limited Production
- Nitrogen Limited Production
- Model Calibration
- Model validation
- Seasonal Analysis
- Sequence Analysis
- Running rice model
- Impact of climate change on rice production

5.3 Advance Assignment

1. Country report (For TICA's grantees only)

Individual will be asked to briefly introduce research experiences and future planned activity with respect to the use of DSSAT tools. A 10-minute presentation will be organized for each participant to

2. Reading Assignment

Jones, J. W.,G. Hoogenboom, C.H. Porter, K.J. Boote, W.D. Batchelor, L.A. Hunt, P.W. Wilkens, U. Singh, A.J. Gijsman, J.T. Ritchie. 2003. The DSSAT cropping system model. Europ. J. Agronomy, 18: 235-265.

3. Project Assignment

We invite you all to bring your laptop and your own experimental data. This will help you get the most out of the workshop by seeing the immediate application of DSSAT and CropDSS tools using your own data. Experimental data includes daily weather, soil physical and chemical data, crop management, crop characteristics, phenology and crop growth analysis.

6. **Number of Participants**: (TICA's supported 25, 23 for Foreigners and 2 for Thai)

7. **Participant Criteria**

Participants for this course should:
- be university graduates currently engaged in crop production or agroecosystems related research, teaching, outreach, or planning.
- have some understanding of crop and soil science and be relatively familiar with the terminology used in these fields. An in-depth knowledge, however, is not a prerequisite.
- be familiar with personal computers and the Windows operating environment.
- have a sufficient command of spoken and written English.

8. **Invited Countries (23 grants to be approved by TICA):**

Afghanistan, Algeria, Bangladesh, Bhutan, Botswana, Burkina Faso, Burundi, Cambodia, Cape Verde, China, Comoros, CARICOM Member Countries, Djibouti, Egypt, Ethiopia, FEALAC Member Countries, Gambia, Ghana, India, Indonesia, Iran, Jordan, Kenya, Lao PDR, Lesotho, Madagascar, Malawi, Malaysia, Mauritania, Mali, Mauritius, Mongolia, Morocco, Mozambique, Myanmar, Namibia, Nepal, OAS Member Countries, Nigeria, Pakistan, Palestine, Philippines, PIF Member Countries, Rwanda, Senegal, Sri Lanka, Sudan, Swaziland, Tajikistan, Tanzania, Timor Leste, Vietnam, Uganda, Uzbekistan and Thailand

9. **Venue**

  O   The training workshop and seminar program will start on November 26 and end December 7, 2012. It will be held on the Chiang Mai University campus (CMU), ==Center for Agricultural Resource System Research (CARSR)==, Faculty of Agriculture, Chiang Mai University, Thailand.

  O   ==Chiang Mai Orchid Hotel in Chiang Mai city (Not included in registration fee)==

10. **Institution:**

  O   The course will be conducted by:

  Department of Crop Science and Natural Resources, and ==Center for Agricultural Resource System Research (CARSR)==, Faculty of Agriculture, Chiang Mai University 50200, THAILAND.

  O   Preparation:

  –   Instructors;

  Assoc. Prof. Dr. Attachai Jintrawet, Chiang Mai University.

  Prof. Dr. Gerrit Hoogeboom, Washington State University (WSU), USA.

  –   Equipment Available (Computer and software)

  O   Department of Crop Science and Natural Resources, and Center for Agricultural Resource System Research, Faculty of Agriculture, Chiang Mai University 50200, THAILAND.

  O   E-mail: **attachai.j@cmu.ac.th/attachij@gmail.com**

11. **Registration Fee**

  Costs 1,680 USD (exclude dinner, ==lodging, travel to-and-from Chiang Mai, Thailand==)

  Remark: Hotel information

  By walk

  CMU's UNISERV http://www.uniserv.cmu.ac.th/html/room.html

  http://www.sinthanaresort.com/index.php

  http://www.kantarycollection.com/kantaryhills-chiangmai/

  http://www.atpingnakorn.com/

http://www.chiangmaiflora.com/

http://www.baiyokehotel.com/

By car (near CMU Campus)

http://www.sirinartgarden.com/index.php

http://www.chateauchiangmai.com/index.php

http://www.chiangmaigrandview.com/index_en.php

http://www.lotuspskhotel.com/psk/

http://www.furama.com/

http://www.chiangmaiorchid.com

By car (near Night Bazaar)

http://royalprincesschiangmai.dusit.com

http://www.centralhotelsresorts.com/cdc/gallery.asp

http://royallannahotel.co.th/

http://www.imperialhotels.com/imperialmaeping/

http://www.empresshotels.com/