2019 International Training Program on DSSAT v4.7 and MWCropDSS

Efficient and Precision Agricultural Resource Utilization Under a Changing Climate With Simulation Models And GIS

August 19 – 24, 2019
Chiang Mai, Thailand

Topic:	Decision Support Systems for Precision Agriculture in Southeast Asia
Country:	Thailand
Venue, City:	Lotus Pang Suan Kaew Hotel, Chiang Mai
Date:	August 19 – 24, 2019
Trainers	1. Prof. Dr. Attachai Jintrawet, Chiang Mai University (CMU) 2. Prof. Dr. Gerrit Hoogenboom, University of Florida (UF) 3. Dr. Jakarat Anothai, Prince of Songkhla University (PSU) 4. Mr. Thewin Kaeomuangmoon, Chiang Mai University (CMU) 5. Mr. Tupthai Norsuwan, Chiang Mai University (CMU) 6. Dr. Mohan Geetha, United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS)

Aims and Objectives: The overall goal of this Workshop is to familiarize participants with comprehensive agroinformatic tools for the simulation of crop growth and yield, soil and plant water, nutrient and carbon dynamics and their applications to real world problems. Simulation results may be used to improve management decisions to precisely allocate agricultural resources.

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 and precise 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.

Day 1: Introduction & Potential Crop Production

Mon, Aug 19, 2019	Activity	Responsibility
08:30	Registration	Karnpitcha & Somjit
09:00	Welcome remarks G. Hoogenboom G. Mohan C. Buddhaboom A. Jintrawet	
	Introduction to trainers and participants	A. Jintrawet
	Group photo	
10:00	Break	
10:45	Workshop Goals, Course Outline, Schedule	G. Hoogenboom
11:00	History and Overview of DSSAT & Example applications	G. Hoogenboom
Reading/Reference:	The IBSNAT Decade Uehara and Tsuji Chapter in Kluwer book, pp. 1-7 Jones et al. Chapter in Kluwer book, pp. 157-178 Boote et al., Int J. Agr & Env Inf Sys 1(2010):41-54 Holzworth et al., Env Modeling & Software 72(2015):276-286 Uehara and	
12:00	Lunch	
13:00	Installation of DSSAT Version 4.7 Software,	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
13:30	Exercises: Running Crop Models	All
14:00	Simulating Phenological Development	G. Hoogenboom
Reading/Reference	Boote et al. chapter in Kluwer book, pp. 99-128	
15:00	Introduction to Sensitivity Analysis Tool	G. Hoogenboom

Day 1: (Con't)

Mon, Aug 19, 2019	Activity	Responsibility
15:15	Exercises: Sensitivity Analysis Tools	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
15:30	Break	
16:00	Creating FileX: Potential Crop Production	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan

Reading/Reference DSSAT V3.5 Volume 2-1, pp. 1-93
DSSAT V3.5 Volume 1-4, pp. 111-143
DSSAT V4.0 Volume 2, XBuild User's Guide

16:30 Exercises: Potential Crop Production G. Hoogenboom

17:30 Adjourn

Day 2: Weather & Genetic Coefficients

Tue, Aug 20, 2019	Activity	Responsibility
08:30	Feedback on exercises and software	A. Jintrawet
09:00	Simulating Basic Growth Processes	G. Hoogenboom
10:00	Weather Data Inputs and Utilities	G. Hoogenboom
Reading/Reference	DSSAT v3.5 Volume 3-3	
10:15	Break	
10:45	Exercises: Weather Data Files	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
12:00	Lunch	
13:00	Minimum Data Set Concept	G. Hoogenboom
Reading/Reference	Hunt and Boote chapter in Kluwer book, pp. 9-40 Hoogenboom et al., 2012, Chapter in Springer Book: 9-18	
13:15	Learning the DSSAT File System	G. Hoogenboom
Reading/Reference	DSSAT V3.5 Volume 2, Chapter 1	
13:30	Concept of Genetic Coefficients Species vs. Ecotype vs. Cultivar Coefficients	G. Hoogenboom
Reading/Reference	CERES-Maize Species & CERES-Rice Species Definitions CROPGRO Species &; CROPGRO Cultivar Definition files Boote et al. chapter in Kluwer book, pp. 99-128 Ritchie et al. chapter in Kluwer book, pp. 79-98	
14:00	Genetic Coefficients – CROPGRO & CERES	G. Hoogenboom
15:00	Break	

Day 2: (Con't)

Tue, Aug 20, 2019	Activity	Responsibility
15:30	Exercises: Cultivar Sensitivity Analyses	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
16:30	Estimating Genetic Coefficients, Concepts	G. Hoogenboom
Reading/Reference	Mavromatis et al., Crop Science 42(2002):76-89 Pathak et al., Trans ASABE 50(2007):2295-2302 DSSAT V3.5 Volume 3-4, pp. 201-233 Boote et al., Agric. Systems 70(2001):395-420.	
17:30	Adjourn	

Day 3: Water Limited Production, Soils

Wed, Aug 21, 2019	Activity	Responsibility
08:30	Feedback on exercises and software	A. Jintrawet
09:00	Estimating Genetic Coefficients, Concepts Tools for Estimating Cultivar Coefficients	G. Hoogenboom

Reading/Reference

Mavromatis et al., Crop Science 42(2002):76-89
Pathak et al., Trans ASABE 50(2007):2295-2302
Hunt et al. Agron. J. 85(1993): 1090-1094
Hoogenboom et al., Field Crops Research 90(2004): 145-163
Anothai et al., Field Crops Research 108(2008): 169-178
He et al., Agric. Systems 103(2010): 256-264
Jones et al. Advances in Ag. Systems Modeling 2(2011): 365-393

09:30	Exercises: Cultivar Coefficient Calibration using the GLUE Tool	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
10:00	Break	
12:00	Lunch	
13:00	Simulating Water Limited Production Soil and Flood Water Balance in Rice	G. Hoogenboom

Reading/Reference Ritchie chapter in Kluwer book, pp. 41-54
DSSAT V3.5 Volume 2-1, pp. 1-93
DSSAT V3.5 Volume 1-4, pp. 111-143

14:00	Soil Data Inputs and Utilities	G. Hoogenboom

Reading/Reference DSSAT V3.5 Volume 1-3, pp. 49-90
DSSAT V4.0 Volume 2
Gijsman et al., Eur. J. Agron. 18(2002):75-105
Romero et al., Env. Mod & Software 35(2012):163-170

Day 3: (Con't)

Wed, Aug 21, 2019	Activity	Responsibility
14:15	Exercises: Soil Data Files	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
15:15	Creating FileX: Water Balance On	G. Hoogenboom
15:30	Break	
16:00	Exercises: Water Limited Production	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
17:30	Adjourn	

Day 4: Nitrogen Limited Production, Soils & Experimental Data

Thu, Aug 22, 2019	Activity	Responsibility
08:30	Feedback on exercises and software	A. Jintrawet
09:00	Experimental Data Collection - Model Evaluation	G. Hoogenboom
Reading/Reference	DSSAT V3.5 Volume 4-7 & 4-8, pp. 203-233 Hoogenboom et al., 2012, Chapter in Springer Book: 9-18	
09:45	Experimental Data Files and Utilities	G. Hoogenboom
Reading/Reference	Hunt et al., Agric. Systems 70(2001):477-492 Bostick et al., Agron. J. 96(2004):853-856	
10:00	Exercises: Experimental Data Files	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
10:30	Break	
12:00	Lunch	
13:00	Simulating Nitrogen Limited Production Processes in the Soil	G. Hoogenboom
Reading/Reference	Godwin and Singh chapter in Kluwer book, pp. 55-78 Gijsman et al., Agron. J. 94(2002):462-474	
14:00	Simulating Nitrogen Limited Production Processes in the Plant	G. Hoogenboom
Reading/Reference	Bowen et al. chapter in Kluwer book, pp. 189-204	
14:30	Creating FileX: Water and N Balance On	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
Reading/Reference	DSSAT V3.5 Volume 2-1, pp. 1-93 DSSAT V3.5 Volume 1-4, pp. 111-143 DSSAT V4.0 Volume 2, XBuild User's Guide	

Day 4: (Cont't)

Thu, Aug 22, 2019	Activity	Responsibility
15:00	Break	
15:30	Exercises: Nitrogen Limited Production	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
17:30	Adjourn	

Day 5: Evaluating Risk and Sustainability

Fri, Aug 23, 2019	Activity	Responsibility
08:30	Feedback on Exercises and Software	A. Jintrawet
09:00	Uncertainty, Risk, BMPs, and Sustainability	G. Hoogenboom

Reading/Reference DSSAT V3.5 Volume 3-1, pp. 1-66
Thornton and Wilkens chapter in Kluwer book, pp. 329-345
Bowen et al. chapter in Kluwer book, pp. 313-327
Tojo Soler et al., Eur. J. Agronomy 27(2007):165-177

10:00 Break

10:30 Creating FileX: Seasonal Analysis — A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan

Reading/Reference DSSAT V3.5 Volume 2-1, pp. 1-93
DSSAT V3.5 Volume 1-4, pp. 111-143

12:00 Lunch

13:00 Exercises: Seasonal Analysis

15:00 Break

16:30 Cropping Systems – Simulating Crop Rotations — G. Hoogenboom
Reading/Reference Tojo Soler et al., J. of Agric. Sci 149(2011):579-593

17:30 Adjourn

Day 6: Evaluating Risk and Sustainability

Sat, Aug 24, 2019	Activity	Responsibility
08:30	Feedback on Exercises and Software	J. Anothai
09:00	Creating FileX: Rotation/Sequence Analysis	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
Reading/Reference	DSSAT V3.5 Volume 2-1, pp. 1-93 DSSAT V3.5 Volume 1-4, pp. 111-143	
10:30	Break	
11:00	Spatial Modeling Applications Demonstration: MWCropDSS	A. Jintrawet/ J. Anothai/ T. Kaeomuangmoon/ T. Norsuwan/ G. Mohan
12:00	Lunch	
13:30	Group Discussion of Applications and Needs	All
14:30	Certificates	All
15:30	Break	
15:30	Closing/Adjourn	