A Training Program on DSSAT Version 4.5

Assessing Crop Production, Nutrient Management, Climatic Risk and Environmental Sustainability with Simulation Models

May 12 - 21, 2008

The University of Georgia
College of Agricultural and Environmental Sciences
Griffin, Georgia, USA

International Consortium for Agricultural Systems Applications

The University of Florida
The University of Georgia
University of Guelph
Mississippi State University
International Center for Soil Fertility and Agricultural Development
United States Department of Agriculture-Agricultural Research Service

Introduction

Day	Hour	Activity	Responsibility
Monday			
May 12	**0830**	**Registration** **Computer Setup**	A. Cain D.M. Evans
	0900	**Welcome**	G.F. Arkin/G. Hoogenboom
	0930	**Introduction of Participants and Faculty**	G. Hoogenboom
	1000	**Break**	
	1030	**Goals, Course Outline, Schedule** **Administrative Issues**	G. Hoogenboom A. Cain
	1100	**History of ICASA**	J.W. Jones/G. Hoogenboom
Reading/Reference:		*Uehara and Tsuji Chapter in Kluwer book, pp. 1-7* *Jones et al. Chapter in Kluwer book, pp. 157-178*	
	1130	**Example Applications of DSSAT**	G. Hoogenboom/J.W. Jones
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Introduction to Systems Approach**	W.D. Batchelor/J.W. Jones
Reading/Reference		*Jones and Luijten chapter on Simulation of Biological Processes (Handout)* *Kropff et al., Agric. Systems 70(2001):369-393*	
	1330	**Simulating Basic Growth and Development Processes: Phenological Development**	K. J. Boote
Reading/Reference		*Boote et al. chapter in Kluwer book, pp. 99-128*	
	1430	**Installation of DSSAT Version 4.5 Software** **Overview of DSSAT**	P.W. Wilkens/G. Hoogenboom
Reading/Reference		*DSSAT V4 Volume 1* *Readme and Install files on CD*	
	1500	**Break**	
	1530	**Exercises: Running Crop Models**	P.W. Wilkens/C.H. Porter

1630	**Minimum Data Set Concept**	G. Hoogenboom/P.W.Wilkens
Reading/Reference	*Hunt and Boote chapter in Kluwer book, pp. 9-40*	
1645	**Learning the DSSAT File System**	G. Hoogenboom/P.W. Wilkens
Reading/Reference	*DSSAT V3.5 Volume 2, Chapter 1*	
1700	**Simulating Potential Production** **ICSim Demonstration**	G. Hoogenboom/P.W. Wilkens
Reading/Reference	*DSSAT V4.0 Volume 3, ICSim User's Guide*	
1800	**Reception, Naomi Chapman Woodroof Agricultural Pavilion**	Art Cain
2000	**Adjourn**	

Potential Production & Weather

Day	Hour	Activity	Responsibility
Tuesday			
May 13	**0830**	**Simulating Basic Growth and Development Processes: C Balance & Growth (CROPGRO)**	K. J. Boote/J.W. Jones
Reading/Reference		*Boote et al. chapter in Kluwer book, pp. 99-128* *Jones et al., Eur. J. Agron. 18(2003):235-265*	
	0930	**Simulating Basic Growth and Development Processes: CERES**	W.D. Batchelor/K.J. Boote
Reading/Reference		*Ritchie et al. chapter in Kluwer book, pp. 79-98*	
	1030	**Break**	
	1100	**Simulating Basic Growth and Development Processes: Other Modules**	K.J.Boote/J.W. Jones
Reading/Reference		*Singh et al. chapter in Kluwer book, pp. 129-156* *CANEGRO Handout*	
	1130	**Creating FileX: Potential Production**	P.W. Wilkens/G. Hoogenboom
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*	
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Exercises: Simulating Potential Production**	G. Hoogenboom/C.H. Porter
	1500	**Break**	
	1530	**Weather Data Inputs and Utilities**	P.W. Wilkens/G. Hoogenboom
Reading/Reference		*DSSAT v3.5 Volume 3-3*	
	1600	**Exercises: Weather Data Files**	G. Hoogenboom/P.W. Wilkens
	1730	**Adjourn**	

Genetic Coefficients for Growth and Development

Day	Hour	Activity	Responsibility
Wednesday			
May 14	**0830**	**Access to library facilities and other resources**	R.W. Cannon
	0845	**Feedback on exercises and software**	G. Hoogenboom/J.W. Jones
	0900	**Concept of Genetic Coefficients**	K. J. Boote/J.W. Jones
		Species vs. Ecotype vs. Cultivar Coefficients	
		Genetic Coefficients - CROPGRO	K. J. Boote
Reading/Reference		*Boote, handout of definitions*	
Reading/Reference		*Boote et al. chapter in Kluwer book, pp. 99-128*	
	1000	**Break**	
	1030	**Genetic Coefficients – CERES**	W.D. Batchelor/L.A. Hunt
Reading/Reference		*Ritchie et al. chapter in Kluwer book, pp. 79-98*	
	1130	**Genetic Coefficients – Other Models**	K.J. Boote
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Estimating Genetic Coefficients, Concepts**	J.W. Jones/K.J. Boote
Reading/Reference		*Mavromatis et al., Crop Science 42(2002):76-89* *Pathak et al., Trans ASABE 50(2007):2295-2302*	
	1330	**Exercises: Cultivar Sensitivity Analyses**	K. J. Boote/G. Hoogenboom
Reading/Reference		*DSSAT V3.5 Volume 3-4, pp. 201-233*	
	1500	**Break**	
	1530	**Exercises: Cultivar Coefficient Calibration**	G. Hoogenboom/J.W. Jones
	1730	**Adjourn**	

Water Limited Production & Soils
Tour of Envirotron

Day	Hour	Activity	Responsibility
Thursday			
May 15	**0830**	**Feedback on Exercises and Software**	G. Hoogenboom/J.W. Jones
	0900	**Simulating Water Limited Production**	W.D. Batchelor/J.W. Jones
Reading/Reference		*Ritchie chapter in Kluwer book, pp. 41-54*	
	0945	**Soil and Flood Water Balance in Rice**	P.W. Wilkens/J.W. Jones
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*	
	1000	**Break**	
	1030	**Soil Data Inputs and Utilities**	G. Hoogenboom/P.W.Wilkens
Reading/Reference		*DSSAT V3.5 Volume 1-3, pp. 49-90* *DSSAT V4.0 Volume 2* *Gijsman et al., Eur. J. Agron. (2002):75-105*	
	1100	**Exercises: Soil Data Files**	G. Hoogenboom/C.H. Porter
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Creating FileX: Water Balance On**	P.W. Wilkens/G. Hoogenboom
	1330	**Exercises: Water Limited Production**	G. Hoogenboom/C.H. Porter
	1500	**Break**	
	1530	**Tour of Envirotron**	I. Flitcroft/A. Garcia/S. Thain
	1630	**Growth Analysis and Other Measurements**	K.J. Boote/A. Garcia
	1730	**Adjourn**	

Nitrogen & Phosphorus Limited Production

Day	Hour	Activity	Responsibility
Friday			
May 16	**0830**	**Feedback on Exercises and Software**	G. Hoogenboom/J.W. Jones
	0900	**Simulating Nitrogen Limited Production Processes in the Soil**	J.W. Jones/G. Hoogenboom
Reading/Reference		*Godwin and Singh chapter in Kluwer book, pp. 55-78* *Gijsman et al., Agron. J. 94(2002):462-474*	
	1000	**Group Picture**	S. Omahen
	1010	**Break**	
	1030	**Simulating Nitrogen Limited Production Processes in the Plant**	K. J. Boote/J.W. Jones
Reading/Reference		*Bowen et al. chapter in Kluwer book, pp. 189-204*	
	1130	**Simulating Phosphorus Limited Production Processes in the Soil and Plant**	J.W. Jones/C.H. Porter
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Creating FileX: Water and N Balance On**	P.W. Wilkens/G. Hoogenboom
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*	
	1430	**Exercises: Nitrogen Limited Production**	G. Hoogenboom/C.H. Porter
	1500	**Break**	
	1530	**Importance of Soil Inputs in Computer Simulation**	J.W. Jones/S. Adiku
Reading/Reference		*Gijsman et al., Computers and Electronics in Agric. 56(2007):85-100* *Dardanelli et al., Trans. ASABE 46(2003):1265-1275*	
	1630	**Exercises: Nitrogen Limited Production - Continued**	G. Hoogenboom/C.H. Porter
	1730	**Adjourn**	

Experimentation
Calibration of Parameters & Model Evaluation

Day	Hour	Activity	Responsibility
Saturday			
May 17	**0830**	**Feedback on Exercises and Software**	G. Hoogenboom/J.W. Jones
	0900	**Experimental Data Collection --Model Evaluation**	K. J. Boote/J.W. Jones
Reading/Reference		*DSSAT V3.5 Volume 4-7 & 4-8, pp. 203-233*	
	1000	**Break**	
	1030	**Experimental Data Files and Utilities** **ICASA Data Exchange**	P.W. Wilkens/G. Hoogenboom G. Hoogenboom/J.W. White
Reading/Reference		*Bostick et al., Agron. J. 96(2004):853-856* *Hunt et al., Agric. Systems 70(2001):477-492*	
	1045	**Exercises: Experimental Data Files**	G.Hoogenboom/C.H. Porter
	1145	**Introduction to Envirotron Experimental Data**	A.Garcia/G. Hoogenboom
	1200	**Lunch, The Research and Education Garden**	
	1330	**Systematic Procedure for Model Calibration**	K. J. Boote/J.W. Jones
Reading/Reference		*DSSAT V3.5 Volume 4-6, pp. 181-197* *White et al., Agron. J. 99(2007):419-427*	
	1400	**Exercises: Model Calibration**	K. J. Boote/G. Hoogenboom
	1500	**Break**	
	1530	**Gencalc: Automated Model Calibration**	L.A. Hunt/J.W. White
Reading/Reference		*Hunt et al. Agron. J. 85(1993):1090-1094* *Hoogenboom et al., Field Crops Research 90(2004):145-163*	
	1600	**Exercises: Model Calibration with Gencalc**	J.W. White/L.A. Hunt
	1730	**Adjourn**	

One-Day Weekend

Day	Hour	Activity	Responsibility
Sunday May 18		**Free**	**-**

Options within driving distance:

- **CNN/Georgia Aquarium/Olympic Park, Atlanta**
- **Stone Mountain Park, Atlanta**
- **Great Smoky Mountain National Park**
- **Callaway Gardens, Pine Mountain**
- **Savannah & Atlantic Coast**

Evaluating Risk and Sustainability

Day	Hour	Activity	Responsibility
Monday			
May 19	**0830**	**Feedback on Week 1**	G. Hoogenboom/J.W. Jones
	0900	**Uncertainty, Risk, BMPs, and Sustainability**	J.W. Jones/G. Hoogenboom
Reading/Reference		*DSSATV3.5 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., Europ. J. Agronomy 27(2007:165-177*	
	1000	**Break**	
	1030	**Creating FileX: Seasonal Analysis**	P.W. Wilkens/G. Hoogenboom
Reading/Reference		*DSSAT V3.5 Volume 2-1, pp. 1-93* *DSSAT V3.5 Volume 1-4, pp. 111-143*	
	1100	**Exercises: Seasonal Analysis**	G. Hoogenboom/C.H. Porter
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Seasonal Analysis Exercises: Continued**	
	1400	**Creating FileX: Rotation/Sequence Analysis**	P.W. Wilkens/G. Hoogenboom
Reading/Reference		*DSSAT V3.5 Volume 2-1, pp. 1-93* *DSSAT V3.5 Volume 1-4, pp. 111-143*	
	1430	**Exercises: Rotation/Sequence Analysis**	G. Hoogenboom/C.H. Porter
Reading/Reference		*DSSAT V3.5 Volume 3-2, pp. 67-127*	
	1530	**Break**	
	1600	**Continue Seasonal and Crop Rotation Exercises** **Work with your Personal Experimental Data** **Case Study (Optional)**	
	1730	**Adjourn**	

Spatial Applications
Pests

Day	Hour	Activity	Responsibility
Tuesday			
May 20	**0830**	**Feedback on Exercises and Software**	G. Hoogenboom/J.W. Jones
	0900	**Simulating Spatial Variability and Precision Management**	J. Paz/G. Hoogenboom
Reading/Reference		*DSSAT V3.5 Volume 4-2* *DSSAT Volume 4-3, pp. 37-158* *Beinroth et al. chapter in Kluwer book, pp. 293-311* *Booltink et al., Agric. Systems 70(2001):445-476* *Stoorvogel and Antle paper, Agric. Systems 70(2002):623-640* *Nijbroek et al., Agric. Systems 76(2003):359-377*	
	1000	**Break**	
	1030	**Simulating Spatial Variability and Precision Management - Demonstrations:**	
		AEGIS: Agricultural and Environmental GIS	G. Hoogenboom
		CIATool: Climate Information Analysis Tool	P.W. Wilkens
	1100	**Exercises: Spatial Analysis**	G. Hoogenboom/C.H. Porter
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Exercises: Spatial Analysis - Continued**	G. Hoogenboom/C.H. Porter
	1500	**Break**	
	1530	**Simulating Pest Damage**	K. J. Boote/J.W. Jones
Reading/Reference		*DSSAT V3.5 Volume 2-2, pp. 225-232* *Teng et al. chapter in Kluwer book, pp. 221-266* *Timsina et al., Agron. J. 99(2007):148-157*	
	1630	**Pest Damage Discussion and Demo Files**	K. J. Boote/C.H. Porter
	1730	**Adjourn**	
	2000	**Dinner @ Local Restaurant**	A. Cain

Model Applications

Day	Hour	Activity	Responsibility
Wednesday			
May 21	**0830**	**Feedback on Exercises and Software**	G. Hoogenboom/J.W. Jones
	0900	**Yield Improvement and Yield Gap Analysis**	K.J. Boote/J.W. White
Reading/Reference		*White chapter in Kluwer book, pp. 179-188* *Boote et al., Agric. Systems 70(2001):395-420*	
	1000	**Break**	
	1030	**Climate Change and Climate Variability**	J.W. Jones/J.W. White
Reading/Reference		*Rosenzweig and Iglesias chapter in Kluwer book, pp. 267-292* *Hammer et al., Agric. Systems 70(2001):515-553* *Hoogenboom, Agric. For. Met. 103(2000):137-157*	
	1130	**Weather and Climate Application Tools** **Demonstration:** **SimCLIM and Weather File Perturbation** **MarkSim Weather Generator**	 G. Hoogenboom P.W. Wilkens
	1200	**Lunch, Naomi Chapman Woodroof Agricultural Pavilion**	
	1300	**Exercise: Simulating Climate Change Impact**	J. W. Jones/G. Hoogenboom
	1330	**Decision Support Systems for Farmer Applications** **Demonstration:** **AEMN: Automated Environmental Monitoring Network** **SECC: Yield and Climate Tools**	 G. Hoogenboom/J. Paz
	1430	**Group Discussion of Applications and Needs**	J.W. Jones/K.J. Boote J.W. White/P.W. Wilkens J. Paz/C.H. Porter G. Hoogenboom
	1530	**Break**	
	1600	**Certificates**	A. Cain/G. Hoogenboom K.J. Boote/P.W. Wilkens J.W. White/J.W. Jones C.H. Porter/J. Paz
	1700	**Adjourn**	