The International Consortium for Sugarcane Modelling

https://sasri.sasa.org.za/agronomy/icsm/index.php

- Goal: To promote the development and application of sugarcane simulation models.

- Key objectives:
  - Coordinate efforts and generate resources for sugarcane modelling projects,
  - Promote and enable the sharing of knowledge, information and data in the field of sugarcane modelling.

- Established: July 2006,

- Current MoU: Nov 2012-Nov 2017

- Members: BSES Limited (Australia), CIRAD (France), Chiang Mai University (Thailand), CSIRO (Australia), KESREF (Kenya), Mitr Phol Sugar (Thailand), SASRI (South Africa), SCGC (Florida, USA), SRIF (Fiji), ZSAES (Zimbabwe)

- Projects: Incorporate Canegro into DSSAT, Worldwide modelling of GxE interaction

ICSM Sugarcane genetic trait modelling workshop

- Aims:
  - Explore different approaches to simulating genetic trait impacts
  - Develop concepts for improved modelling capabilities in this area

- Envisaged outcomes:
  - Model simulations for each of the ICSM field experiments
  - Ideas for improved simulation of genetic impacts
  - Pointers to more data sets and literature and other resources to assist with further model development
  - Workshop report

What is trait modelling?

▶ Plant genetics are represented by "trait parameters" (genetic coefficients, cultivar parameters, species parameters, etc.)

▶ These regulate process responses to environmental signals

▶ Should reflect genetic effects predominantly

▶ Trait: eye colour, trait value: blue or brown

▶ Trait modelling

  ▶ Formulating traits (definitions) and their role in plant development and growth

  ▶ Simulating trait impacts (sensitivity of given process or state e.g. yield to change in trait values)

	26 June	
9:00 – 9:10	Welcome	Riekert van Heerden, Jim Shine
9:10 – 9:20	Background and objectives	Abraham Singels
9:20-10:00	Recent advances in genetic trait modelling in DSSAT	Gerrit Hoogenboom
10:00-10:40	New features of the APSIM Sugar model for simulating traits for yield improvement of sugarcane in water limited environments	Geoff Inman-Bamber et al.
	Tea	
11:10-11:50	Combining calibration techniques improves the quality and usefulness of sugarcane model predictions	Fabio Marin
11:50-12:15	Sugarcane trait modelling at SASRI	Abraham Singels
12.15-12:40	Trait parameter estimation and ideotyping with Canegro	Natalie Hoffman
12:40-13:20	Selecting sugarcane with higher transpiration efficiency	Phil Jackson
	Lunch	
14:00-14:40	The ICSM genotype growth analysis dataset	Abraham Singels et al.
14:40-15:05	Other genotype growth analysis datasets	Sanesh Ramburan
15:05-15:30	Simulating genotype performance with Canegro	Matthew Jones
	Tea	
16:00-16:25	Simulating genotype performance with Mosicas	Mathias Christina et al.
16:25-16:50	Simulating genotype performance with APSIM-sugar	Fabio Marin
16:50-17:20	Discussion: Issues and insights	
19:00	Dinner	
	27 June	
9:00-9:10	Recap	Abraham Singels
9:10-9:40	Process level comparison of approaches to simulating environmental and genetic effects	M. Jones, M. Christina, F. Marin, et al.
9:40:-11:00	Discussion : Model strengths and weaknesses, improvements	
	Tea	
11:30-12:30	Discussion: Data requirements and sources	
12:30-13:00	Discussion: Way forward, closure	Abraham Singels
	Lunch	
14:00-14:45	ICSM business meeting (Finances, MoU renewal, proposals etc,)	Jim Shine
14:45:-	Hands-on session for modellers and data collectors	

ICSM project: Worldwide modelling of GxE interaction

Goal

▶ To gain a better understanding of the physiological mechanisms underlying the genetic variation in crop response to environmental factors

Specific objectives

▶ Monitor canopy development, radiation interception, biomass accumulation and partitioning for diverse cultivars in diverse environments

▶ Determine model trait parameter values for each cultivar, derived from these measurements

▶ Evaluate models' ability to simulate genotypic differences in crop performance

▶ Develop improved concepts for simulating genetic control of crop response to environmental factors

▶ implement these in sugarcane models and apply to demonstrate improved understanding of the physiology of GxE interaction, and potential use in crop improvement programs.

▶ Project participants: CIRAD, ZSAES, SCGC Florida, SASRI