



Whole Plant Modelling project of the Generation Challenge Programme (SP 1)

Final Meeting, 4-7th February 2008 - Programme

Meeting hosted by Pioneer (USA), co-organized by Pioneer and Cirad (France)

Project PI: Delphine Luquet, CIRAD

Project participants: Cirad, Embrapa, INRA, University of Queensland / CSIRO

Pioneer contacts: Mark Cooper, Stephen Smith and Leslie Lorenc

Location: Pioneer, Johnston, Iowa, U.S.A.

Dates: 4-7th of February 2008

Participants (WPM Project & invited)

Embrapa (WPM participants; 5)

Camilo Andrade
Reinaldo Gomidie
Cleber Morais
Edson Bastos
Alexandre Heinemann

INRA (WPM participants; 3)

Claude Welcker
François Tardieu
Karine Chenu

UQ (WPM participants ; 4)

Scott Chapman
Graeme Hammer
Erik Van Oosterom
Greg Mc Lean

Cirad (WPM participants; 4)

Michael Dingkuhn
Delphine Luquet
Nourollah Ahmadi

Invited speakers (3)

José Arous (Cimmyt)
Yves Gibon (Max Planck Institute, Golm)
David Jordan (DPI, Australia)

Pioneer speakers (2)

Mark Cooper
Charlie Messina

Other participants

José Crossa (Cimmyt)

... and participants to be appointed by Pioneer

List of presentations (& code for related file names C# ”)

➤ Day 1

8:00am - Welcome address by Pioneer (Mark Cooper, Bill Niebur, 15min)

- Introduction and presentation of project components (D Luquet, 15min)

Component 1 (C1) - Model assisted environment characterization (TPE)

Session chaired by R. Gomide

C1_1 Keynote by David Jordan: “Progress towards the integration of model based environmental characterization in an applied sorghum crop improvement program” (30 min presentation, 15 min discussion).

C1_2 Charlie Messina (Pioneer): “Developing modelling technologies to enhance molecular breeding for drought tolerance in temperate maize” (30 min presentation, 15 min discussion).

C1_3 A. Heinemann: “Characterization of drought stress environments for upland rice and maize in central Brazil” (30 min presentation, 10 min discussion).

C1_4 M. Dingkuhn – “The West African TPE for sorghum: varietal fit to agro-ecological zones” (30 min presentation, 10 min discussion).

Debate chaired by S. Chapman; Perspectives for model assisted TPE characterization vs. breeding - where we are, where do we go? Methodology usefulness in GCP context and beyond.

Component 2 (C2): multi-site trial model assisted trait evaluation for breeding

Session chaired by C. Andrade

D. Luquet: Introduction on C2 objectives, challenges and difficulties (10min)

C2_1: Keynote by José Araus – “Maize phenotyping for drought adaptation: contribution of physiological tools”. (30 min presentation, 15 min discussion).

C2_2: Mark Cooper (Pioneer): “Applying modeling technologies within a maize drought molecular breeding program”. (30 min presentation, 15 min discussion).

Session chaired by C. Welcker

C2_3 "Challenges and difficulties of imposing and monitoring crop water stress on field trials.". by C. Andrade (20min)

C2_4&5 Rice and maize drought phenotyping for modelling application (E. Bastos & C. Guimaraes) (20min)

C2_6 A. Heinemann: “Crop model assisted characterization of appropriate traits for the rice TPE in Brazilian Cerrados” (20 min presentation, 10 min discussion).

C2 7 10:15pm: M. Dingkuhn “Phenotyping of sorghum photoperiod responses using heuristics”. (20min presentation, 10 min discussion).

Debate chaired by C. Welcker. Difficulties of complex/fine trait phenotyping in the field. Usefulness of modelling. Lessons learned and perspectives.

Component 3 (C3): Model improvement for assisting process based trait phenotyping and connection to genetic information

Session Chaired by D. Luquet

D. Luquet. Introduction – reminder of Component 3 objectives (10min)

C3 1: Keynote by Yves Gibon: “Metabolic Phenotyping and Plant Performance” (30min presentation, 15min discussion).

K. Chenu, F. Tardieu, G. Hammer, S. Chapman, C. Welcker :

C3 2 1- “Modelling the GE interaction for leaf and silk growth rates in maize: genetic analyses of time courses and responses to environmental conditions”.

C3 3 2- “Modelling the GE interaction in maize: from organ to whole plant and yield”. (About 25min each presentation and 30 min discussion)

➤ **Day 3**

Component 3 (2nd session)

Session chaired by G. Hammer

D. Luquet, M. Dingkuhn, N. Ahmadi - EcoMeristem model applied to rice phenotyping

C3 4 “Modeling drought effects on rice with EcoMeristem: Feedbacks of water and carbohydrate relations on phenotypic plasticity”.

C3 5 “Model assisted phenotyping of morphogenetic process diversity within sativa rice”

C3 6 “Model assisted phenotyping of a rice mapping population for morphogenesis regulation related QTL detection: proof of concepts”.

(20 min each presentation; 20 min discussion)

Debate chaired by G. Hammer. Discussion & perspectives. High throughput phenotyping for complex or opaque traits, association of model derived traits with genomic information: where are we, where do we go?

General discussion on project outputs, lessons learned and future project objectives
Discussions of potential future involvement of Pioneer in relevant GCP projects that follow on from the current work.