



Seventh framework programme  
Food, Agriculture and Fisheries, and Biotechnology

Specific International Co-operation Actions  
Small or medium scale focused research project



# Sweet Sorghum an alternative energy Crop

Grant Agreement n° 227422

## Deliverable 5.6:

*Identification of TPE for sweet sorghum cultivation in temperate regions as well as in semi arid tropics /*

*Transfer of SAMARA-sorghum model to partners.*

Composition of the consortium

**CIRAD**  
ICRISAT  
EMBRAPA  
KWS  
IFEU  
UniBO  
UCSC  
ARC-GCI  
UANL  
WIP



In the frame of Sweetfuel, a crop model, SAMARA-sorghum) was developed for sorghum (see deliverable D 5.5). Using this model, the objective was secondly to identify the potential area suitable for energy sorghum (sweet or biomass sorghum).

For such analysis, long series (over 30 years) of meteorological data are necessary for each target area. We faced a serious problem as such databases are considered by most of national meteo departments as very precious and thus are not easily accessible or only through buying data points at very expensive rates.

This reason pushed us to propose the modification of this Deliverable during the annual meeting in 2013 at Monterrey (Mexico). As it was not possible to have access to meteorological databases, it was proposed to transfer the model directly to partners wishing to acquire such decision support tool for agronomist, crop physiologists and breeders. This will help them to test in silico the adjustment processes of the crop, the effect of cultural practices (date of sowing, plant density etc...), identify the target population of environments or explore new ideotypes better adapted to climat change.

The title of this Deliverable D5.6 should be: **Transfer of SAMARA-sorghum model to partners**

The model is free, but a minimum training is necessary to understand concepts of the model and be able to start playing with it. Such training was organized at CIRAD-Montpellier on March 2014, from 17th to 21st, and it was also planned to organize it once a year. Programme of the training course is given in Annex 1. It alternates courses related to the different concepts used in the model with hands-on exercises.

This training course concerned 15 peoples including four partners of the project, coming from 7 countries (list of attendees is given in Annex 2). Each trainee received a flash disk including the software, a description of the model, commented code of the model, a guideline for calibration as well as all the different presentations given during the week.

Regarding the opportunity for energy sorghum development in the target regions, we must admit that we have not the same view as 5 years ago when the project started. In some partner countries, situation changed a lot, in others even if some goals of blending gasoline with ethanol were fixed, the way to reach them were not clear while in some country, it was decided to develop ethanol from starch. This explains why some partners did not attend the SAMARA training.

For example Brazil, where the potential for sweet sorghum development is the highest, identification of the suitable area is definitively not a priority (if not needed), because the development will take place first in the sugar cane area as sweet sorghum will be used to complement sugar cane production. In that case, production area is already identified and EMBRAPA did not attend the training.

In South Africa, the government decided to develop ethanol production from grain sorghum rather than sweet sorghum which motivated ARC-GCI to not come to Montpellier.



Photo of the group



Working session

## Annex 1: Programme of SAMARA training course

# SAMARA for Sorghum

Modeling training course and workshop in the context of SweetFuel project

### Site and date

CIRAD-Lavalette, Montpellier, 17-21 March 2014

### Contacts

#### Organization :

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#### Science behind model:

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#### Technical and scientific resource persons:

Richard Pasco (IRRI, programmer), [r.pasco@irri.org](mailto:r.pasco@irri.org)

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### Course objectives

- Understand potential and limitations of eco-physiological modeling in applied crop research
- Enable participants of the EU-project SweetFuel to apply SAMARA as an analytical and predictive tool, notable...
  - Explain observed variation in grain, biomass and sugar yield
  - Characterize genotypic differences by fitting SAMARA to observed phenotypes
  - Predict potential and attainable (water-limited) grain, biomass and sugar yield
- Do hands-on exercises using data produced by SweetFuel and other projects

### Course program

#### Monday 17/03/2014

a.m.

Registration, Welcome, Presentation of course participants and organisers

Course objective, Participants' objectives, General introduction to crop modeling

Background to SAMARA: Model genesis, targeted Applications, Scales, User groups, Original features

Modeling with SAMARA: Scientific concepts, Assumptions, Inputs and Outputs

Installation of software and first contact with user interface

p.m.

Phenology and thermal factors

Water balance and drought

Hands-on exercises

- SAMARA screens and interfaces
- Data importation

## Tuesday 18/03/2014

a.m.

Light interception, Assimilation, Respiration

A specificity of SAMARA: Assimilate supply vs. demand, demand driven partitioning and senescence

Management of non-structural carbohydrate (NSC) reserves

Adaptation strategies and Ideotypes

p.m.

Guided hands-on exercises:

- Generating a Scenario: Crop, Site, Plot, Cultural practice
- Generation of different ideotypes,
- Simulations of trade-offs grain vs. biomass vs. sugar reserves
- Evaluation of ideotypes under different crop densities

SAMARA parameterization procedures and scenario management

## Wednesday 19/03/2014

a.m.

Photoperiodism: Theory, Adaptive function, Modeling concepts

Photoperiodism: Interaction with other traits, phenotypic plasticity, Simulation examples

Target population of environments (TPE): Concept and implications for applied research

p.m.

Guided hands-on exercises:

- Sowing date experiments
- Multi-annual simulations
- Variatal comparisons

## Thursday 20/03/2014

a.m.

Identification of working groups

Task definition for working groups

Work on task

p.m.

Work on Task (cont.)

## Friday 21/03/2014

a.m.

Presentation of results by Working Group

Discussion

In-depth lectures on specific problems upon request

p.m.

Discussion on future collaboration

Wrap-up discussion

Course critique

Closure and departure of participants

## Annex 2: List of attendees

**Sorghum workshop 17 to 21 March 2014**

**Presence list**

Names			Monday		Tuesday	
			morning	afternoon	morning	afternoon
ADAM	Myriam	Cirad				
AGUILAR	Grégory	Cirad				
AMADUCCI	Stefano	UCSC				
AKINSEYE	Folorunso	ICRISAT				
ARMENDARIZ	Jaime	UANL Univ. Agronomia Nuevo Leone				
BRACONNIER	Serge	Cirad				
DE RAISSAC	Marcel	Cirad				
DINGKUHN	Michael	Cirad				
LAFARGE	Tanguy	Cirad				
LOPEZ	José	UNIVERSITY FLORIDA				
MULLER	Bertrand	Cirad				
NDIAYE	Malick	CERAAS				
NOCENTINI	Andrea	UNIBO (Univ Bologne)				
PASCO	Richard	IRRI				
RAMIREZ	Jacqueline	UNIBO (Univ Bologne)				
SOULIE	Jean-Christophe	Cirad				
GOZE'	Eric	Cirad				

**Sorghum workshop 17 to 21 March 2014**

**Presence list**

Names			Wednesday		Thursday		Friday	
			morning	afternoon	morning	afternoon	morning	afternoon
ADAM	Myriam	Cirad						
AGUILAR	Grégory	Cirad						
AMADUCCI	Stefano	UCSC						
AKINSEYE	Folorunso	ICRISAT						
ARMENDARIZ	Jaime	UANL Univ. Agronomia Nuevo Leone						
BRACONNIER	Serge	Cirad						
DE RAISSAC	Marcel	Cirad						
DINGKUHN	Michael	Cirad						
LAFARGE	Tanguy	Cirad						
LOPEZ	José	UNIVERSITY FLORIDA						
MULLER	Bertrand	Cirad						
NDIAYE	Malick	CERAAS						
NOCENTINI	Andrea	UNIBO (Univ Bologne)						
PASCO	Richard	IRRI						
RAMIREZ	Jacqueline	UNIBO (Univ Bologne)						
SOULIE	Jean-Christophe	Cirad						
GOZE'	Eric	Cirad			X			