

Agro2010Montpellier **the International Scientific Week Around** **Agronomy**

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August 30, 2010 **S1: International symposium 'Agronomy for Sustainable Development'**
from 9am to 6pm at The Corum, Montpellier, France

Chairs: **Bernard Hubert** (Agropolis International, France) and **Jacques Wery** (Montpellier SupAgro, France).

Symposia topic: With high level contributions opening the dialogue between scientists, policy makers and stakeholders on the major challenges for Agronomic Research in Europe and in the developing countries.

Provisional program:

S1.1: Will we have enough to feed the world?

Chairs: **Jacques Wery** (Montpellier SupAgro, France).

Keynote speaker: **Martin K. van Ittersum** (Wageningen University, The Netherlands)

S1.2: An historical and epistemological perspective on agronomy for sustainable development in Europe with special emphasis on indicators

Chairs: **Thierry Doré** (AgroParisTech, France)

Keynote speakers: **Paul Robin** (LER UL2-INRA, France)

S1.3: Ecological intensification: theoretical concept or operational solution? - The farmer point of view -

Chairs: **Michel Griffon** (ANR, France)
- to be confirmed-

S1.4: Conservation agriculture: Did we fail in Africa and which research priorities for the future ?

Chairs: **Ken Giller** (Wageningen University, The Netherlands)

Keynote speaker: **Marc Corbeels et al.** (CIRAD, France)

S1.5: Farming system design: which role for research extension and agro-industry

Chairs: **Jacques Wery**

Keynote speaker: **Bernard Raynaud** (IN VIVO, France)

Keynote title : **Agronomy and environment : research tools in the IN VIVO network**

S1.6: Is Agronomy back in professionals and academic curricula?

Chairs: **Bernard Hubert**

Keynote speaker: **John Porter** (ESA, Denmark)

Keynote title: **Agronomy as the science of sustainable Food production**

August 31, 2010 **S2: Parallel symposia on scientific advances and challenges of interdisciplinary research around Agronomy**
from 9am to 6:30pm at The Corum, Montpellier, France

S2.1: Combining genetics and management to design crops for new challenges: climate change, low input, green chemistry, improved quality

Chairs: François Tardieu (INRA Montpellier & IFR Daphne, France) and Graeme Hammer (APSRU, Australia)

Symposia topic: At the crossroads of plant physiology, genetics and agronomy this symposium will address the design of crops for new challenges, in particular adaptation to climate change, low inputs, biofuels, green chemistry.

We propose to organise the session around 3 questions :

- Which genotypes for the period 2020-2040 : which major changes can be expected? how they are currently selected by seed companies ? how climate change and new cropping systems are taken into account in the selection process?
- Which tools are available for evaluating the relevance of a given trait / allele in a real-world situation characterised by the probability of climatic scenarios and of cropping systems?
- Can one design genotypes for specific applications driven by a cropping system or a societal question?

Authors are welcome to submit abstracts around these questions, preferably with an explicit view (even controversial) based on results, positive or negative.

Program provisional:

S2.1.1: Which genotypes for 2020-2040 ?

The session deals with the major changes in genotypes which can be forecasted, and the outcome of different strategies which can reasonably be expected (e.g. GM vs natural genetic variation, breeding in large networks of experiments vs targeted breeding, involvement of omics and precise phenotyping...). This is in a changing context in term of climate, demand and input availability. The keynote speaker will present how new traits are currently selected by seed companies.

Chair: François Tardieu

Keynote speaker: Charlie Messina (Pioneer, United States)

Keynote title : Predicting and creating trajectories in genotype-phenotype space: Approaches to product development

S2.1.2: New methodological tools for the design of genotypes

Evaluating the relevance of given traits / alleles in a real-world context is a major challenge, which can be dealt with via different methods, including networks of experiments phenotyping platforms or modelling. The keynote speaker will present the modelling strategy, able to cope with a multiplicity of combinations of environmental conditions and management practices.

Chair: Dr Zoltan Bedo (AriHas, Hungary)

Keynote speaker: Graeme Hammer (U. Queensland, Australia)

Keynote title: Predicting trait value to crop improvement in a genotype x environment x management context

S2.1.3: Design of genotypes for cropping system / societal demand

Designing genotypes for specific applications, e.g. cropping system or societal question, is a new avenue which requires understanding of the pedoclimatic scenarios, of the specific phenotypic targets and of the harvest stability which is aimed at. Some cropping systems may require the development of new genotypes. The keynote speaker will present the case of the tailoring of genotypes for quality of grain cereals.

Chair: Graeme Hammer

Keynote speaker: Pierre Martre (INRA Clermont Ferrand, France)

Keynote title: Tailoring grain protein composition for wheat using an ecophysiological modelling approach

S2.2 : Ecological intensification of cropping systems

Chairs: Jean-Dominique Lebreton (CNRS & UMR Cefe, France) , **Marie-Laure Navas** (SupAgro & UMR Cefe, France) and **Jean-Luc Chotte** (IRD & UMR Eco&Sols, France)

Symposia topic: The impact of current intensive agricultural practices on biodiversity and ecosystems induces a need of exploring an "ecological intensification" of cropping systems, whether in European, Mediterranean or tropical environments.

The purpose of this session is to present and discuss the variety of questions linked with ecological intensification, in particular:

- Can we meet the production needs with less land and fewer undesirable inputs?
- How can we benefit from ecological processes, including soil processes, by adequate management procedures, from the plot to the landscape scale?
- Which trade-offs can be expected between agricultural production and ecosystem services?

Program provisional:

S2.2.1: Landscape and resilience

Chairs: Marie-Laure Navas

Keynote speaker: Françoise Burel (CNRS-Université de Rennes, France)

S2.2.2: Pests: Interaction and chemical ecology

Chairs: Jean-Luc Chotte

Keynote speaker: John Pickett (Rothamsted Research, United Kingdom)
-to be confirmed-

S2.2.3: Diversity mechanism and agro-ecology

Chairs: Eric Malézieux (CIRAD Montpellier, France)

Keynote speaker: Louise Jackson (University of California, United states)

S2.3 : Assessment and design of agro-ecological technologies and policies for sustainable development in agricultural regions

Chairs: **Robert Lifran** (INRA Montpellier, France), **Martin van Ittersum** (Wageningen University, The Netherlands) and **Jacques-Eric Bergez** (INRA Toulouse, France).

Symposia topic: Agronomists are not very active in development of national and international policies on environmental protection, climate change, and food security. Such a state of affairs is unacceptable given the central role agricultural systems play with regard to each of these issues. This symposium seeks to lay a foundation for greater agronomic relevance to policy development by addressing three questions: (1) How to meet global demand for food while also protecting environmental quality and natural resources for future generations? (**S 2.3.1** see below)? (2) How to design and assess policies that are effective and efficient in realizing societal objectives? (**S 2.3.2**)? (3) How to design cropping systems to cope with policy objectives, farmer's constraints and economic conditions? (**S 2.3.3**)?

With regard to S 2.3.1, a key step is to quantify potential yield of a given crop and cropping system based on climate, soil, sequence, and in irrigated systems, water supply. Once potential yield has been established, the exploitable gap between current average farm yield and potential yield can be estimated and research priorities identified to close this gap in an environmentally sound manner (ecological intensification). Quantifying current yield gaps and the rate at which they can be closed at regional and global scales is crucial for estimating the impact of policies, e.g. those that promote biofuels, on land use change and associated greenhouse gas emissions. Session S.2.3.1 is described below.

With regard to S 2.3.3, Identifying concurrence and complementarities between the multiple functions of agro-ecosystems is certainly the key in order to understand how to organize the cost-benefits analysis of new cropping systems facing a bunch of objectives, either private or social. As complementarities of actions and practices arise between different objectives, it's easier to design sustainable cropping systems. But as soon as concurrence among objectives or social targets are identified, the coordination of public policies faces difficult trade-off, and the issue calls for different levels of reasoning, either at the farm level or at the regional level.

Program provisional:

S2.3.1: Yield gap analysis: Implications for research and policy on food security and land use change

Global food production must nearly double to meet demand as population hopefully stabilizes at +9 billion by 2050. This can in principle be realized through: (1) increasing the extent of agricultural land, (2) closing the yield gap between potential and current yield levels on existing arable land, (3) increasing the potential yield ceiling. This session evaluates research approaches and results of yield gap analyses and their implications for global food availability and land use. Approaches to assess yield gaps may be model-based, experimental, empirical, or a combination of these. Moreover, methods may differ depending on scale of yield gap analysis—from the farm, to regional and national, levels.

Input to this session will include research on: (a) estimating yield gaps at farm, regional and national levels, (b) strategic efforts to narrow yield gaps in different agro-environmental zones of the world while also reducing the environmental footprint of high-yield systems, (c) implications of yield gap analysis for land use change and food security. Contributions may also refer to policies that facilitate narrowing yield gaps either through generating or applying new knowledge or stimulating efficient use of resources. In all cases, the link to yield gaps should be explicit and well elaborated and preferably trade-offs between production and environmental aims should be addressed.

Chairs: Martin K. van Ittersum and Kenneth G. Cassman

Keynote speaker: Kenneth G. Cassman (University of Nebraska, United State)

S2.3.2: Interdisciplinary approaches to assess and design farming systems at regional scales

Different innovations may be produced at field level to tackle sustainability challenges. These innovations may be of different types: genetics, equipment, new cropping design... Development and testing may be from experiments or simulation. However one has to notice that the transfer and the acceptance of the innovation to the farm and to a larger agricultural territory and surrounding is less important that researchers may expect at first view. The topic of this session is to analyse such problem: what is missing between on lab innovation and farmer's adoption. What is needed to improve such diffusion: is it "just" a problem of scale or do we need to favour multidisciplinary approaches, participatory co design? Can we develop generic innovation without accounted for regional specificities? How take into account the local knowledge and the stakeholders strategies in these innovation processes? This session will address these issues. Methodological proposals and experiments (failure or success) are expected for oral presentation.

Chairs: Jacques-Eric Bergez (INRA Toulouse, France)

Keynote speaker: André Torre (AgroParisTech, France)

Keynote title: Technical and organisational devices: the governance of creation and diffusion of innovations at the level of rural and agricultural territories.

S2.3.3: Assessment, design, coordination and implementation of public policies for productive and multifunctional cropping systems

As cropping systems will face increasingly sustainability constraints, it could become more and more difficult to satisfy simultaneous private and social objectives. As a matter of fact, trade-off inherent to multiple objectives depend on the extent of functional complementarities and substitutability's inside the agro-ecosystems. In some cases, convergence between farmer's interest and social interest could happen and help to meet policy objectives. For instance, reducing pollutants emissions to rivers and aquifers by the mean of buffer strips, tree plantation and changing fertilizing practices could accommodate both objectives of reducing eutrophication and halting the soil erosion. In the same way, carbon sequestration objective could be compatible with sustainable soil organic matter management and mineral fertilizers sparing. But more often, objectives of separate public policies are substitutes.

This session will explore methodological issues arising from that set of observations.

Identifying functional relationships inside cropping systems and among agricultural practices like no-till, organic or conventional agriculture, and relate them to actual main challenges could help in establishing cost-benefits analysis of actual and prospective cropping systems.

Identifying functional relationships inside catchments and/or agricultural landscape will help to analyse external effects among agricultural practices from the plot, to the landscape level. Better non-market coordination among farmers would certainly be required. For instance, how to control soil erosion arising from upstream-downstream plots supporting different agricultural practices?

Eventually, implications of several public policies, each pursuing politically and economically sounded objectives, could be reciprocally detrimental and are calling for difficult trade-off. Markets and markets instruments could fail to accommodate such an issue. The session will take onto account institutional arrangements needed to overcome that issue.

Chairs: Robert Lifran

Keynote speaker: Hervé Guyomard (INRA Paris, France)

September 1, 2010 **S3** : 'The Heart and the Art of Agronomy' :
scientific advances and challenges of Agronomy as a Science
sessions organised by the new ESA divisions from 9am to 6:30pm at The Corum,
Montpellier, France

S3.1 : Crop System Biology: The functioning of the plant in a field

Chairs: Dimah Habash (Rothamsted Research, United Kingdom) and Jacques Wery (Montpellier SupAgro, France)

Symposia topic: This symposium covers research on plant function and development in the context of a cultivated field. Emphasis is on the function of individual plants in plant populations utilising both laboratory, field and model based science including phenology, architecture, photosynthesis, transpiration, mineral nutrition, stress, plant competition and source-sink interactions. Focus is sought on research linking genomic, genetic and crop physiology approaches.

Provisional program:

S3.1.1: A general theoretical session on the need for crop systems biology.

What it means; why is it important, how can it work in terms of theory and combined approaches,...what are the current status , knowledge, models and examples. How can it be applied to crop function in the field.

Chairs: Dimah Habash and Xinyou Yin

Keynote speaker: Xinyou Yin (Wageningen University, the Netherlands)

Keynote title: Rooting systems biology in crop modelling: crop systems biology creates interfaces between omics and practice

S3.1.2: Interactions plant / pathogens

Illustrating the relevance of FSPM (combining microclimate /architecture /pathogens biology) for conceiving new innovative crop management practices (interaction crop management x genotype)

Chairs: Bertrand Ney (AgroParisTech & Académie de l'Agriculture, France)

Keynote speaker: Corinne Robert (INRA Grignon, France)

Keynote title: Coupling epidemic model with FSPM model to promote disease escape in fields

S3.1.3: Overview on phenotyping tools

The phenotype is the outward physical manifestation of a plant. It includes the sum of its component parts, their observed regulation, function and integration. Phenotyping aims to screen for variation in phenotype across any level of organisation, across multiple environments and hopes to deliver datasets to enable the linking with the respective genotype. Recently, advances in various technologies and approaches have developed tools to enable phenotyping of various genetic resources in plants and crops. We seek examples of such approaches and new technologies which seek to deliver knowledge on the functioning of plants in the field.

Chairs: Dimah Habash

Keynote speaker: Miloudi Nachit (ICARDA, Syria)

Keynote title: Breeders perspective on approach and application under climate change

S3.2 : Field Scale Agro-ecology: The cultivated field as an ecosystem

Chairs: Muriel Valantin-Morison (INRA Grignon, France) and Christian Gary (INRA Montpellier, France)

Symposia topic: Focus is on the systemic approach to design and assess cropping systems at field level, responding to various objectives: pest protection, water, nutrients and energy efficiency, food and feed supply, reduction of greenhouse gases. It will identify scientific outcomes and challenges for ecological intensification of multifunctional cropping systems. This division is dealing with the analysis and management of a cultivated field, considered as a complex -and generally heterogeneous- ecosystem made of a monospecific or a plurispecific plant population, a soil and the associated flora and fauna among which weeds, diseases and pests in a context of global change or not. The heterogeneity in a field has sometimes to be considered to manage pests, energy and water and it results in studies dealing with precision agriculture, which is also in the scope of this division.

Provisional program:

S3.2.1: Cropping systems which aim at reducing the dependency to pesticides

It focuses on a systemic approach to design and assess novel cropping systems, responding to a main objective of crop protection, with considering the other effects on water and/or energy efficiency, production. Studies that take into account interactions between crops, soil, pathogens, pests and their natural enemies to achieve these objectives are clearly in the scope of this division. Studies that increase biodiversity in a field (mixing crop, intercropping in perennial and cultivar mixtures, agroforestry) or in the succession to reduce pest pressure are encouraged.

Chairs: Eric Malézieux (CIRAD Montpellier) and Muriel Valantin-Morison

Keynote speaker: Paul Wojtkowski (Independent Consultant, United State)

Keynote title: How to improve biological control of pests and diseases at field scale?

S3.2.2: Cropping systems which aim at improving resource efficiency and at reducing the emission of greenhouse gases

It focuses on a systemic approach to design and assess novel cropping systems, which permit to improve water and nutrient efficiency and to reduce the fossil energy utilisation. Studies that increase biodiversity in a field or in the succession to improve long term soil fertility, and water and nutrient utilisation are concerned by this division. Studies which deal with the impact of global change on cropping systems are encouraged to assess also the impacts of cropping systems on diverse criteria of sustainability.

Chairs: Christian Gary and Nadine Brisson (INRA Avignon, France)

Keynote speaker: Marco Bindi (Università degli Studi di Firenze, Italy)

Keynote title: Which consequences of global change on the way to manage cultivated field: fate of actual cropping systems in a changing environment and new ones to reduce the global change ?

S3.2.3: Methodological approaches to design and assess new cropping systems in changing environment

The methods to design and assess these cropping systems can be based on station and/or farm experimentations or on crop modelling, possibly in combination with expert knowledge. They aim at developing indicators models and methods of aggregation for the combined assessment of various criteria in relation with crop production, provision of ecological services, costs, or robustness of the cropping system. The challenge of this session is in the methodological approaches that allow to reinforce the ecological intensification in cropping systems and to evaluate them with multiple criteria methods.

Chairs: Muriel Valantin-Morison and Christian Gary

Keynote speaker: Thierry Doré (AgroParisTech, France)

Keynote title: Which agronomy to reinforce the ecological intensification: concept, methods and knowledge?

S3.3 : Cropping Systems at Farm, Regional and Global Scales: the Cropping System in its embedding systems

Chairs: Olaf Christen (Martin Luther University, Germany) and Marc Benoit (INRA Mirecourt, France)

Symposia topic: This symposium will cover research relevant to agricultural production and its environmental effects on the farm, the regional and the global level. It will link research on different time scales with various regional scales and will identify major methodological advances in complex assessment systems using indicators systems and modelling approaches.

The question of indicators will be addressed in each session considering potential and limits at each level.

Programme:

S3.3.1: Farm scale design of cropping systems

Farm is, worldwide, the first integration level of cropping system choice and management by farmers and their families. System modelling methods increase the agronomist capacity to take into account this first level of complexity. But how do we progress in the design modelling processes? What are our relationships with modellers and with farmers? How to deal with new assessment method of cropping systems at farm level? This first session will deal with these challenges.

Chairs: Marc Benoit

Keynote speaker: Henning Kage (Kiel University, Germany)

Keynote title: Multi-criteria assessment and optimization of cropping systems: What do we have and what do we need

S3.3.2: Cropping system design and assessment at landscape level

Unlike other areas in the evolution of agricultural systems, the development of cropping systems has been mainly empirical and driven by a number of external factors. Quite recently a number of methodological advances and appropriate tools have been developed to deal with the enormous complexity at the cropping system and the agro landscape level. This section will show state of the art approaches to deal with cropping systems embedded in agro-landscapes.

Chairs: Olaf Christen

Keynote speaker: Walter Rossing (Wageningen University, The Netherlands)

Keynote title: Designing multifunctional agro-landscapes

Spatial planning aimed at multifunctional agriculture can be seen as a negotiation process on environmental, social and economic aspects of land use. Complexity arises due to the high number of stakeholders and due to the limited knowledge, which is often organized along disciplinary divides. The role of agronomy in such land use planning processes can be strengthened by approaches that allow multi-objective and multi-scale evaluation of spatially explicit land use alternatives. This contribution will review the issues arising from multi-objective, multi-scale, multi-stakeholder problems, present a conceptual model and an operational framework for goal-oriented design and show applications aimed at re-designing field-farm-landscape interactions.

S3.3.2: Cropping system design and assessment at larger scales

Agronomists have to deal with new scales for their work: our planet for greenhouse effects of cropping systems, the landscapes of hot spots for biodiversity preservation, regional watersheds (Nil, Amazonia, Rhin, Seine, Pô, ...). These new scales in our works are linked with heavy regulations (Kyoto, Copenhagen, ...), and we have to take into account the multiple drivers of change of cropping systems.

Chairs: Olaf Christen

Keynote speaker: Holger Meinke (Wageningen University, The Netherlands)

Keynote title: Multiple drivers of change – a challenge for systems designers and systems managers

September 2, 2010 **S4: Innovation and Decision Support in
Agriculture Which Roles and Partnership for Research?**
from 8:30am to 6:30pm at Amphithéâtre Lamour, Campus La Gaillarde,
Montpellier, France

The symposium will be held in both English and French language.

Chairs: Jean Boiffin (Research Director INRA & AFA president, France) and Florent Maraux (Annual Crop Systems Research Unit CIRAD, France)

Symposia topic: Regarding the trends in demography and climate and their consequences for food production and environment the situation in Africa and Europe is very contrasting. Nevertheless, Agronomy is on both continents confronted with the same crucial challenge: showing that it is able to generate and support a new development for agricultural progress, "sustainable development" oriented, a progress called in other contexts "doubly green revolution" or "ecologically intensive agriculture". Regarding agriculture, the challenges are:

- To answer the increasing food requirements, and their evolution in quantity and quality;
- To ensure a durable management of the physical and biological resources, what imposes, inter alia, a better reasoned use of the inputs, and a control of the extension of cropped land;
- To adapt it to climatic change and to its multiple consequences;
- To better take into account and stimulate the ecological processes, in particular to control crop health while reducing the dependence to pesticides.

In both continents, this new context has as common consequences:

- An increased need for innovation, more complex in its targets, in its scales of application, and in the means to be implemented;
- An increased responsibility for the agronomic research concerning the innovation processes, and this at its initiation as well as its implementation;
- And ultimately, an increased difficulty to ensure in an efficient way the link between researchers and extension services: When they exist, the extension services may be more or less destabilized, and their agents feel uncomfortable, when confronted to the novelty of the stakes and the initiatives to be implemented, notably to take into account the environmental targets and the environmental laws and rules.

Of course, this general framework addresses in Europe and Africa a very different range of technical and socio-economic problems. Indeed, these two continents present strong contrasts in cropped species, in agricultural production systems and in agro-food commodity chains. And these contrasts correspond to large differences in the investment capacities of the producers, their vulnerability to climatic or economics hazards and the capacity of the public authorities to orient or support their agriculture. But the main difference is, perhaps, that of the financial and human resources available for the Research – Development systems, inducing very different capacities to promote the processes of innovation, to build and conduct on an appropriate way research operations, and to develop the assets of them.

Taken into account these considerations, the conference aims to illustrate and analyze, for a varied range of socio-economic and agricultural situations, the place and the role of agronomic research in the processes of innovation in the framework of Sustainable Development. Above all, the conference will identify and discuss:

- The nature and the form of the deliverables through which research in agronomy contributes to innovation: new techniques, new cultural practices or cropping

systems, but also new decision support systems applicable at various space scales and organization levels;

- The conditions and steps through which these various types of deliverables are elaborated (modelling, experimentations of various types, inquiries, co construction of questions, etc.), and the types of subjacent knowledge;
- The modes of interaction efficient between research and the actors (sometimes new) of innovation: farmers and their organizations, extension services, companies and organizations concerned by the inputs (agro supplies) and outputs (collecting and transformation of the production) of the farms ;
- The ways in which public policies and agronomic research may interact for stimulating sustainable innovation processes, in agriculture.

The proposed contributions will have to be centred on one or more of these four items. They may be related to a wide range of agronomic topics and production systems in varied environments: tropical, Mediterranean or tempered. The contributions will have to take into account simultaneously the questions of production and sustainable management of the resources and the environment. They may also concern very varied contexts regarding the structure and the effectiveness of research for development systems.

The symposium will comprise an introductory plenary session, then two parallel sessions devoted respectively to Africa and Europe, supplemented each one by a "poster session", and finally a plenary closing session during which the points of view of different actors of innovation will be expressed in the form of round table.

Programme:

S4.1: Plenary introductory session

Chairs: Jean Boiffin and Florent Maraux

***Keynote speaker:** Jean-Marc Meynard (Head of the Research Division 'Science for Action and Sustainable Development' INRA, France)

Keynote title: Designing innovative agricultural systems

***Keynote speaker:** Harold Roy-Macauley (Director of Programs, West and Central African Council for Agricultural Research and Development ,WECARD/CORAF, Africa)

Keynote title: Place of regional, national and international agronomic research in the process of innovation in Africa

S4.2.1: Parallel session "Europe"

Chairs: Jean Boiffin

S4.2.2: Parallel session "Africa"

Chairs: Florent Maraux

S4.3: Plenary closing session

Chairs: Jacques Wery (Montpellier Supagro, France)

Round table: "Innovation and decision support in Agriculture: expectations and prospects"

September 2 to 4, 2010: **Working with dynamic models for agriculture**
at **Campus La Gaillarde, Montpellier, France**

Organized by: INRA(France), **University of Florida** (United States), **Montpellier Supagro** (France)



Chairs: Daniel Wallach (INRA), David Makowski (INRA), James W. Jones (U. of Florida)

Contact for information and registration: bastie@supagro.inra.fr

GENERAL INFORMATION:

Dynamic system models are now widely used in agronomic research and extension. These models consist of differential or difference equations that represent the dynamics of the different components of the system (soil, plant, pathogens, etc). One then solves the equations on a computer to simulate the dynamics of the real system. Such models can thus be used to explore the effects that changes in the environment or in management would have on the system that is modelled. They are used in impact assessment, in evaluating innovative management practices, as decision aids, as diagnostic tools or to aid in planning experiments.

Developing such models and interpreting the results requires detailed domain knowledge concerning the behaviour of the real system. However, this domain knowledge is in general not sufficient. There are also mathematical, statistical and computer considerations which are equally important, but are seldom considered by agricultural modelers. This has led to difficulties in working with such models: modellers are usually researchers in the area being modelled, and they often lack expertise in the methods for working with models. The purpose of this course is to provide agronomic researchers the information and tools that are necessary to work effectively with dynamic models.

Current PhD students and established agronomic researchers who are interested in applications of agricultural models in their research programs should apply. The course will include lectures, demonstrations of models and software for working with the models as well as hands-on practical exercises. Participants will learn how to estimate parameters for dynamic agricultural models, how to evaluate them, and how to conduct sensitivity and uncertainty analyses using modern techniques. Substantial time will be devoted to exercises. At the end of the course, the students should be able to apply the methods on their own. The material will be based on the text book, "Working with Dynamic Crop Models: Evaluation, Analysis, Parameterization and Applications" edited by D. Wallach, D. Makowski, and J. W. Jones.

Fee: 200€, which includes the book "Working with Dynamic Crop Models: Evaluation, Analysis, Parameterization and Applications".

PROGRAMME:

Day 1: Thursday, September 2nd 2010
Morning
<ul style="list-style-type: none">- Course introduction<ul style="list-style-type: none">o Objectives, presentation of lecturers and students- Introduction to systems and modelling. Examples<ul style="list-style-type: none">o What is the systems approach, what is a systems model, how are models used, examples of system models
Afternoon
<ul style="list-style-type: none">- The R programming language and basic statistical principles<ul style="list-style-type: none">o A first course in this high level, free language. It will be used for the examples and for the exerciseso Review of basic statistical principles and applications with R- Computer simulation<ul style="list-style-type: none">o Finite difference or differential equations, numerical considerations, programming considerations
Day 2: Friday, September 3rd 2010
Morning
<ul style="list-style-type: none">- Uncertainty and sensitivity analysis<ul style="list-style-type: none">o What it is, why it is useful, sources of uncertainty, Monte Carlo simulations.o Local sensitivity analysis, global sensitivity analysis. Application to dynamic system models. Examples and exercises
Afternoon
<ul style="list-style-type: none">- Uncertainty and sensitivity analysis (continuation)- Parameter estimation (calibration)<ul style="list-style-type: none">o The principles underlying parameter estimation, least squares, maximum likelihood, Bayesian methods. The specific problems in applying these methods to dynamic system models.
Day 3: Saturday, September 4th 2010
Morning
<ul style="list-style-type: none">- Parameter estimation (calibration)<ul style="list-style-type: none">o Examples and exercises.
Afternoon
<ul style="list-style-type: none">- Model evaluation<ul style="list-style-type: none">o Criteria of model quality, with emphasis on predictive accuracy and the quality of decisions.o How to estimate the criteria. Examples and exercises.

September 5-10, 2010: **Integrated Assessment of Agricultural Systems (IAAS) for a Sustainable Development**
at **IAMM, Montpellier, France**

Organized by: **CIHEAM-IAMM** (France), **Montpellier Supagro** (France) and **SEAMLESS the Association** (The Netherlands)



Chairs: **Hatem Belhouchette** (IAMM), **Jacques Wery** (Montpellier SupAgro) and **Martin van Ittersum** (SEAMLESS Association, Wageningen University)

GENERAL INFORMATION:

This course on "Integrated Assessment of Agricultural Systems" will be organized by Montpellier SupAgro and IAM-Montpellier in collaboration with the SEAMLESS association (www.seamlessassociation.org/), from 5-10 September 2010. It will be organized in conjunction with the Agro2010 congress organized in the same place from August 29 to September 3, 2010 (www.agropolis.fr/agro2010/index.html).

• **Course objectives and set up.**

The objectives of the course are:

1. To present **concepts for integrated assessment** of agricultural systems.
2. To gain theoretical and practical understanding of the **methods, models and tools** used in integrated assessment of agricultural systems.
3. To understand conceptually and practically how integrated assessment and modelling can support **ex-ante impact assessment and decision making processes**.

In the course, various research tools (including the ones recently developed in the SEAMLESS project) are used as an example to present how concepts, tools and models (conceptual and numerical) can be integrated to assess complex agricultural systems and sustainable development. The course is problem orientated, so all lectures are linked to practical applications, such as the Water Framework Directive, Trade Liberalization such as the liberalisation of commodity prices (for example rice) and the impact of the increase of interest rates for credit on farm sustainability. Models used for these practical applications will be presented and discussed, but gaining detailed understanding of specific components is not the objective of this course. At the end of the course participants will understand how an integrated research framework and its individual components contribute to integrated assessment of a problem and how this may contribute to decision-making.

Besides a series of plenary presentations by speakers, a number of interactive activities will allow participants to discuss general and detailed issues with the specialists and other participants. Participants are expected to actively contribute to the course by leading discussions and presenting outputs of parallel workshop sessions.

• **Group work and practical**

The aim of the group work is mainly to discuss the topics that are presented during the day in a smaller group. Smaller groups will enable more interaction. During the week the group of participants will also have a common goal, i.e., to set up and interpret a

possible application (from their own research or other more general problems), along which they discuss the various topics.

Group work always refers to work in groups of 4-6 participants, while practicals refer to common exercises, which can be done individually or in small groups.

In the one week course there is relatively little time to go into detail in the models. Information and some pre-cooked scenarios needs to be available, so participants can finalize a case study (at least conceptually) without having to do detailed simulation runs.

WHO CAN APPLY?

PhD students, post docs and young researchers are the target of this course. Individuals from Mediterranean and tropical countries are particularly encouraged to apply.

Participants should have experience in the field of agronomy, agri-environmental policy analysis, agricultural/environmental economics, integrated assessment or related academic fields. We expect all participants to give a 15 minutes presentation of their current work showing the link to integrated assessment, followed by a discussion in the group.

Fee: 350€, which includes working documents (papers and CD), Sunday's dinner and Monday, Tuesday, Wednesday, Thursday lunches.

PROGRAMME:

Day 1: Sunday, September 5th 2010
Evening (2h)
<ul style="list-style-type: none"> - Background and introduction of the course - General concepts on integrated assessment (1h)
Day 2: Monday, September 6th 2010
Morning (3h)
<ul style="list-style-type: none"> - How to assess the impact of policy and technological innovation using IA approach: 2 presentations:- Scenario-based approaches (1.5h) - Multi-agents based approaches (1.5h)
Afternoon (3h)
<ul style="list-style-type: none"> - Conceptual exercise: how to assess at farm and regional scale the impact of policy and technological innovations on cropping system sustainability?
Day 3: Tuesday, September 7th 2010
Morning (3)
<ul style="list-style-type: none"> - Practical illustration and exercise: Trade liberalization – G20 proposal
Afternoon (3)
<ul style="list-style-type: none"> - APES: presentation and exercises
Day 4: Wednesday, September 8th 2010
Morning (3h)
<ul style="list-style-type: none"> - FSSIM: presentation and exercises
Afternoon (3)
<ul style="list-style-type: none"> - SEAMLESS-IF Framework: General presentation of the three phases of Integrated Assessment with a modelling chain - Focus on scenario development (participative approach): problem, scale, context, indicators, policy options, external driving forces, etc.

Day 5: Thursday, September 9th 2010

Morning (3h)

- **SEAMLESS application:** each participant use SEAMLESS platform to assess specific scenarios

Afternoon (3h)

- Example of the nitrate directive application using APES-FSSIM-Indicators modelling chain
- Practical exercise: Multi-criteria and multi-scale assessment of the nitrate directive scenario in the Midi-Pyrenees region (data analysis and conclusions)

Day 6: Friday, September 10th 2010

Only morning (3h)

- General discussion on integrated assessment: models, data base, typology, indicators
- Discuss concepts, model linkages, interest, link with own research;
- Course evaluation