

The Poster Award!

The Organizing Committee



Institut
Méditerranéen
de Biodiversité
et d'Ecologie
marine et continentale

The Poster Award

About 60 posters were contributed

Thank you, all of you, for them!

Really all of them would deserve a poster award

*Perhaps spending a few days in Aix,
with all these great people,
is a little award in itself?*

The Organizing Committee nevertheless tried to select some “particular good posters”

Some criteria

A clear scientific objective of relevance to biodiversity and food security

A focus on interdisciplinarity

Attractive, and legible, design (but no “over-design”)

The human being behind the poster is identifiable – the reader should want to get in touch with you

3 awards

Again: all posters were excellent
We selected two runners-up

Third Prize

Quantifying trade-offs between food security and biodiversity

Ruth Delzeit, Gernot Klepper, Florian Zabel, Wolfram Mauser

Quantifying Trade-offs Between Food Security and Biodiversity

Ruth Delzeit, Gernot Klepper Kiel Institute for the World Economy, Kiel, Germany
Florian Zabel, Wolfram Mauser Department of Geography, Ludwig-Maximilians-Universität München, München, Germany

Introduction

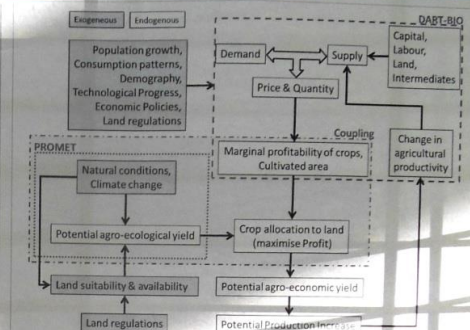
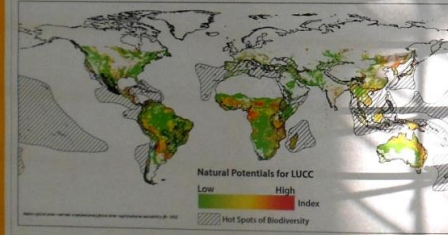
- Food demand is expected to increase by 70 to 110 percent by 2050 (Bruinsma 2011; Tilman 2011).
- Current yield projections see at best an increase by 60 percent -> demand will not be met without expansion of agricultural areas (IIASA, FAO 2012; Fisher et al. 2011; Mueller et al. 2012).
- Climate change will affect agricultural productivity with regionally different effects.
- Current literature on agricultural potential does not consider feedback effects of agricultural markets on land use.

Research Objectives

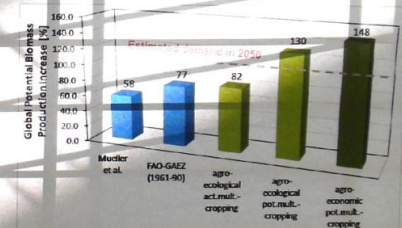
- Locate hot spots of natural potential for expansion of cropland.
- Identify biomass production potentials for intensification.
- Quantify price effects as indicator of food security.

Natural Potentials for Land Use/Cover Change (LUCC)

- Simulated for SRES A1B near future climate conditions (2011-2040)

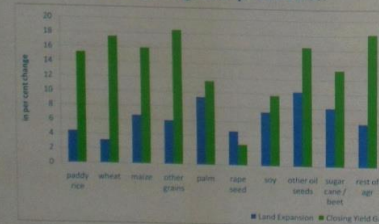


Intensification Potential



Expansion vs. Intensification:

Change in global production



Change in global prices



Conclusion

- We have developed a unique modelling framework that allows to simulate scenarios on future pathways of land use change.
- Future demand could be met by closing yield gaps without expanding agricultural land into unused / native areas.
- Scenario on closing yield gaps by 5% leads to large reductions in agricultural prices -> improving food security.

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FOR THE WORLD ECONOMY

LMU LUDWIG-MAXIMILIANS-UNIVERSITÄT MÜNCHEN

Second Prize

WHEATAMIX Project – Increasing within-field wheat diversity to foster ecosystem services in the Parisian basin The Wheatamix Consortium

WHEATAMIX Project
Increasing within-field wheat diversity to foster ecosystem services in the Parisian basin

The Wheatamix Consortium: V Allard¹, B Andrieu², S Barot³, J Borg⁴, A Cantarel⁵, C Cervek⁶, F Coleno⁷, C de Vallavieille-Pope⁸, D Descoureaux⁹, F Dubs¹⁰, J Enjalbert¹¹, M Feret¹², N Galic¹³, A Gauffretreau¹⁴, JD Gilet¹⁵, J Goldringer¹⁶, M Hannachi¹⁷, G Houivet¹⁸, S Jouanne¹⁹, MH Jeuffroy²⁰, C Kerbiriou²¹, P Labarthe²², JC Lata²³, S Lecarpentier²⁴, L Lejars²⁵, B Lemaire²⁶, S Lemarié²⁷, F Leny²⁸, X Le Roux²⁹, J Le Viol³⁰, C Montagnier³¹, A Niboyet³², B Omon³³, S Plaud³⁴, F Poly³⁵, T Pommier³⁶, E Porcher³⁷, S Saint-Jean³⁸, S Salmon³⁹, D Trépée⁴⁰, T Vidal⁴¹

¹UMR Génomique Diversité et Ecophysiologie des Céréales, ²UMR Environnement et Grandes Cultures, ³UMR Institut d'Ecologie et des Sciences de l'Environnement de Paris, ⁴UMR de Génétique Végétale, ⁵Chambre Régionale d'Agriculture de Centre, ⁶UMR Sciences Action Développement Activités Produits Territoires, ⁷UMR Biologie et Gestion des Ravageurs en Agriculture, ⁸Chambre d'Agriculture du Lot-et-Cher, ⁹Chambre d'Agriculture de l'Indre, ¹⁰UMR Agronomie, ¹¹IGDDA du Cher, ¹²UMR Centre d'Ecologie et des Sciences de la Conservation, ¹³Chambre d'Agriculture du Loiret, ¹⁴UMR Laboratoire d'Economie Appliquée de Grenoble, ¹⁵Chambre d'Agriculture de l'Eure, ¹⁶Chambre d'Agriculture de Seine et Marne

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Toward an increase in crop genetic diversity

During the 20th century, agriculture in developed countries experienced major gains in productivity via homogenization and intensive use of inputs. This model is jeopardized by the awareness of rapid **global change** and the need for greater **agricultural sustainability**.

A new paradigm is emerging : (i) crop production should rely more on **ecological functions**, (ii) intra-field genetic diversity likely foster the **diversity of functional traits** and the **resilience of agro-ecosystems**, thus (iii) genetic diversity should increase **agricultural multi-functionality**. One option for increasing biodiversity in agro-ecosystems is **variety mixtures**, which have been seldom used in agriculture despite their potential interest, demonstrated in various studies (fig 1).

Global change
More extreme climatic events
Decreasing inputs and pesticide use
Less environmental control

Increasing environmental stochasticity

Increasing genetic diversity to foster ecosystem services

Soil fertility, Biodiversity conservation, Pest & disease regulation, Yield potential & stabilization

Fig 1: Overyielding of mixtures compared to their midcomponents

(C) Lecarpentier. Synthesis of 83 observations collected from Baker 1977, Smithson and Lenné 1988, Gaudet et al. 2001, Cassin and Desjardins 2003, Morrell 2003

Variety mixtures for a sustainable and multifunctional wheat production

WHEATAMIX focuses on wheat, the major cereal of the production basin of Paris, and aims to better evaluate the possible roles of within-crop genetic diversity to reinforce the multi-functionality and resilience of cropping systems under global change. The **multidisciplinary research** involves scientists (in genetics, agronomy, ecophysiology, economy, management...) and stakeholders ("Chambres d'Agriculture" and farmers). It is structured in four work-packages with **complementary approaches**:

- WP1: Traits and genetics of wheat genotypes**
Varietal traits and genetic variability, trait response of genotypes in blends
- WP2: Linking variety traits to agroecosystem functioning and services**
Ecosystem services provided, trade-offs/synergies among services, links between groups of services and variety traits
- WP3: Blend impacts on the wheat supply chain**
Techno-economic and environmental performances of blends, bases of blend choice and their impacts on the wheat supply chain
- WP4: design rules and breeding schemes for blend development**
Scenarios of blends development in the Paris Basin, rule design and breeding schemes for blend production, result and guideline dissemination

Diverse experiments allow to evaluate blends in the field:

On test plots... Main diversity experiment (16 genotypes, 3 (16 plots), 2 (24 plots), 4 (28 plots), 8 (20 plots))

Multisite experiment (High nutrient inputs, Low nutrient inputs)

... and in farms!

On the way to defining association rules to design optimized wheat blends

In its first year, Wheatamix has developed an in-depth **phenotypic characterisation** of a panel of 60 lines and selected the 16 more representative genotypes to study them in association. The selection was based on the clustering of functional traits that affect aspects of agroecosystem functioning, 4 groups of traits (each including 4 varieties) allowed to deduce the components of wheat variety diversity.

The parallel **ideotyping exercise**, performed by scientists and advisers from Chambre d'Agriculture, pointed out some **key rules for blend design**, and highlighted the importance of the production context for targeting baskets of services. Through its holistic approach from wheat traits to blend performances, Wheatamix aims at documenting the potential impact of cultivar mixtures on the wheat supply chain, and at building scenarios for their development in the Paris Basin.

Wheatamix - 5488 Avenue de la République - 93100 La Courneuve - 2014/2017

And the Winner is....

The “best post

An evidence-based online tool for assessing farm-scale biodiversity

Caitlin McCormack,
Lynn Dicks, Henk
Kloen, Carl van
Tonder, Richard
Heathcote, Jon
Hillier

An evidence-based online tool for assessing farm-scale biodiversity

Caitlin McCormack^{*1}, Lynn Dicks¹, Henk Kloen², Carl van Tonder³, Richard Heathcote⁴ and Jon Hillier⁵

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Introduction

Farm biodiversity management decisions should be informed by evidence for what measures have previously been effective in real-farm environments. Tools allowing growers to identify such measures are limited by the challenge of creating widely applicable, evidence-supported metrics with which to make farm-scale assessments. Funded by the Natural Environment Research Council, we are combining an established user-friendly tool – the Gaia Biodiversity Yardstick – with results of a structured expert evidence-assessment to create just such a biodiversity assessment module to be incorporated within the industry-led Cool Farm Tool.



The Gaia Biodiversity Yardstick

An online farmer self-assessment tool created by CLM.

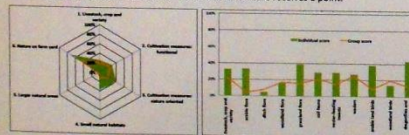
Comprises a checklist of features and management measures judged to enhance farmland biodiversity.

For each measure, users gain a point towards an overall performance score for biodiversity in 6 aspects of the farm landscape and 11 ecological groups.

The checklist, and the points awarded, were devised by a multidisciplinary group of farmers organisations, NGOs and species-specialists. They are currently not based on scientific evidence.

The Yardstick is well-established and is used and endorsed by major food companies including McCain Foods.

Gaia Biodiversity Yardstick input screen. Each ticked measure receives a point.



Output: User scores for 6 aspects of farm landscape (L) and 11 ecological groups (R).

Cambridge evidence assessment

Experts read summarised studies testing the effectiveness of measures to enhance biodiversity on farms and score each measure 0 to 100 for:

- How effective is it in enhancing biodiversity on farmland?
- How certain is the evidence for this effectiveness?

Iterative scoring rounds based on the Delphi technique (Hutchings & Raine, 2006) give a thorough assessment of each measure, grounded in scientific evidence and collective expertise. Median scores are used to put measures into categories adapted from medicine (BMJ Group, 2004).

Each category is given a value which is used to reinforce the Gaia Biodiversity Yardstick points, adding weight to measures for which there is evidence that they actually enhance biodiversity.

Measure (NB: these are illustrative only)	Median effectiveness score	Median certainty score	Category	Category value
Reduce artificial fertiliser use	>60	>60	Effective	2
Restrict mechanical weed control	>60	40 - 60	Likely to be effective	1
Grow grain other than maize	40 - 60	<40	Unknown effectiveness	0
Leave stubble overwinter	<40	>60	Unlikely to be effective	-
Leave set aside area	<40	>60	Likely to be ineffective or harmful	Excluded
Grow green manure	<40	>60		
Crop rotation	<40	>60		

Cambridge expert evidence assessment score thresholds, categories and category values.

The assessment category value will be added to the Gaia Biodiversity Yardstick score for each measure. These new combined values will be summed to give the user's biodiversity performance scores for the 6 aspects of the farm landscape and 10 of the 11 species groups.

New biodiversity assessment module in the industry-supported Cool Farm Tool

The Cool Farm Tool allows growers to calculate farm-scale greenhouse gas emissions and test potential alternative management scenarios.

It was developed by the University of Aberdeen, Unilever, and the Sustainable Food Lab and has been developed as an online application by the Anthesis Group. It is supported by several multinational businesses involved in agricultural sourcing, including Heineken, Marks & Spencer, Yara and Tesco.

Our biodiversity assessment module answers demand amongst partners and users to expand the tool to other metrics. Once added to the Cool Farm Tool, our module will provide a farm-scale biodiversity assessment resource that is:

- Comprehensive and proven user-friendly, using the Gaia Yardstick framework
- Evidence-based, from the Cambridge expert evidence assessment
- Industry supported and endorsed, through incorporation in the Cool Farm Tool
- Global in potential scope and reach

Crucially, it will also allow the collation of biodiversity data from real global supply-chains which will be used to explore win-wins and trade-offs between biodiversity and production at a farm and field level.



The Cool Farm Tool online

Towards synergies between food security and biodiversity conservation: an outlook

Talk by Jörn Fischer