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CIHEAM

A protocol for designing a database based on production activity concept: a case study using a bio-economic model

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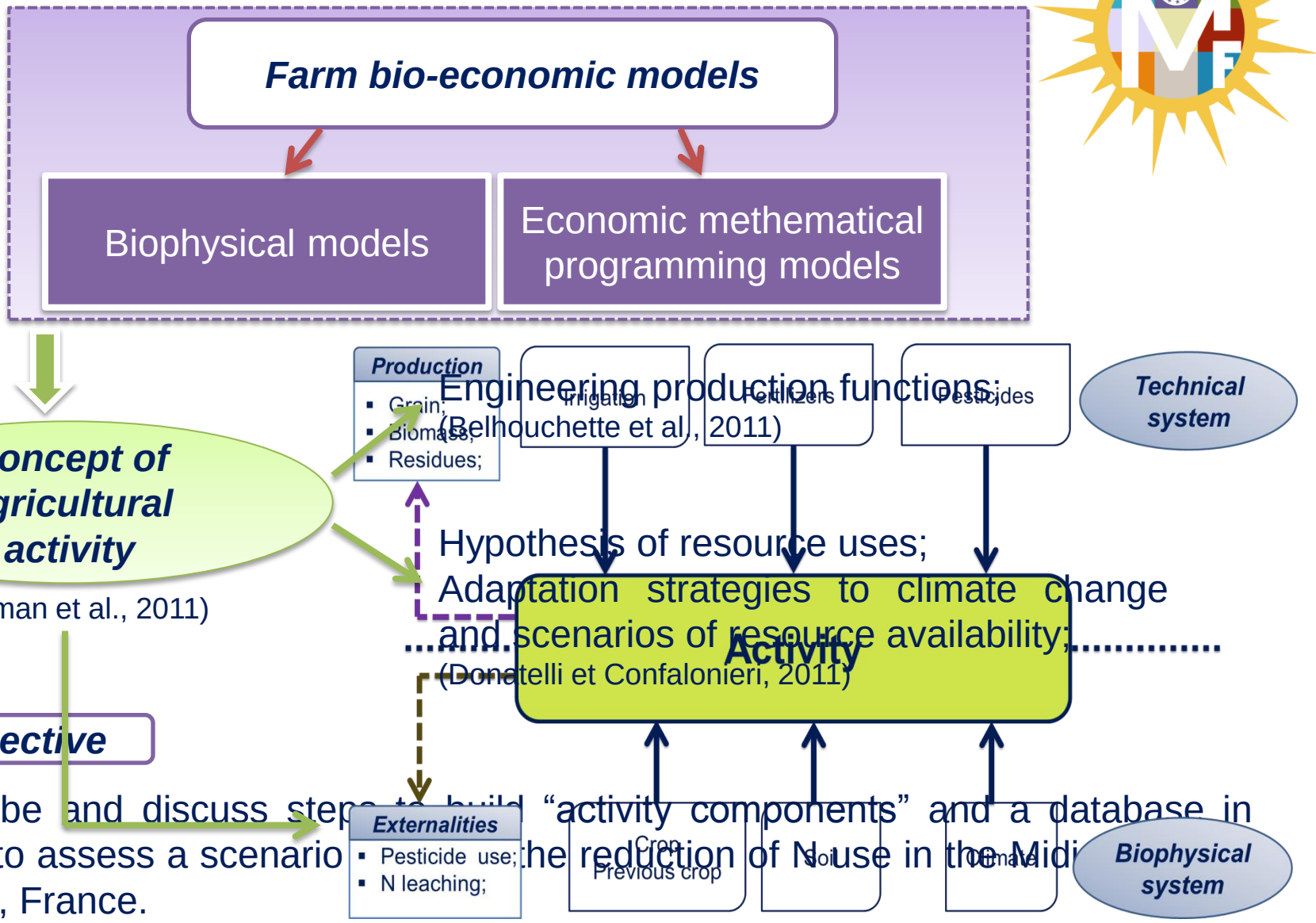

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Methodological approach
Conceptual framework for « Activity » definition and performance evaluation

1. Definition of agricultural activities

- Specify the purpose of the study;
- Determine the activity« dimension »;

2. Activities' input-output coefficients

Data collection VS data availability/data quality to quantify technical coefficients from:

- Experiments;
- Bibliography;
- Statical data;
- Expert knowledge;
- Farm surveys;

Structuration of the database

3. A bio-economic model to assess farmer's production strategies

Bio-economic model

- Based on linear programming;
- Optimizes the farmer's utilities which includes the revenue and the risk aversion coefficient;

4. Scenarios definition

S0 « Reference scenario »

Current nitrogen use constraint = 180 kg N/farm;

S1 « Reduction scenario »

Limiting nitrogen use at 90 kg N/farm;

Results/scenarios VS stakeholders expectations

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Methodological approach
Case study: farm type specification

	Activity dimension					*Input coefficients*				*Output coefficients*	
List of activities	*Crops*	*Previous crops*	*Soil type*	*Soil_useful reserve (mm/m)*	*Irrigation technique*	*Area (ha)*	*Irrigation dose (mm)*	*Fertilizers (kg/ha)*	*Treatment frequency index (herbicides)*	*Yield (q/ha)*	*Crop prices (€/t)*
Activity 1	Sunflower	Winter barley	clay	162	dry	6.5	0	140	1.75	20	36
Activity 2	Soya	Meadows	clay	162	irrigated	4	100	0	2.09	33	36
Activity 3	Soya	Soft wheat	clay	162	irrigated	24	100	0	2,09	33	36
Activity 4	Winter barley	Durum wheat	clay	162	dry	17.6	0	100	1.59	65	13,5
Activity 5	Durum wheat	Soya	clay	162	dry	17	0	220	1.69	60	26
Activity 6	Soft wheat	Grain Maize	clay	162	dry	16	0	250	1.67	70	20
Activity 7	Soft wheat	Sorghum	clay	162	dry	14.67	0	200	1.67	65	20
Activity 8	Soft wheat	Meadows	clay	162	dry	6.71	0	250	1.67	70	17
Activity 9	Soft wheat	Soya	clay	162	dry	6	0	200	1.67	65	17
Activity 10	Grain Maize	Meadows	clay	162	irrigated	1.5	180	200	1.52	100	40

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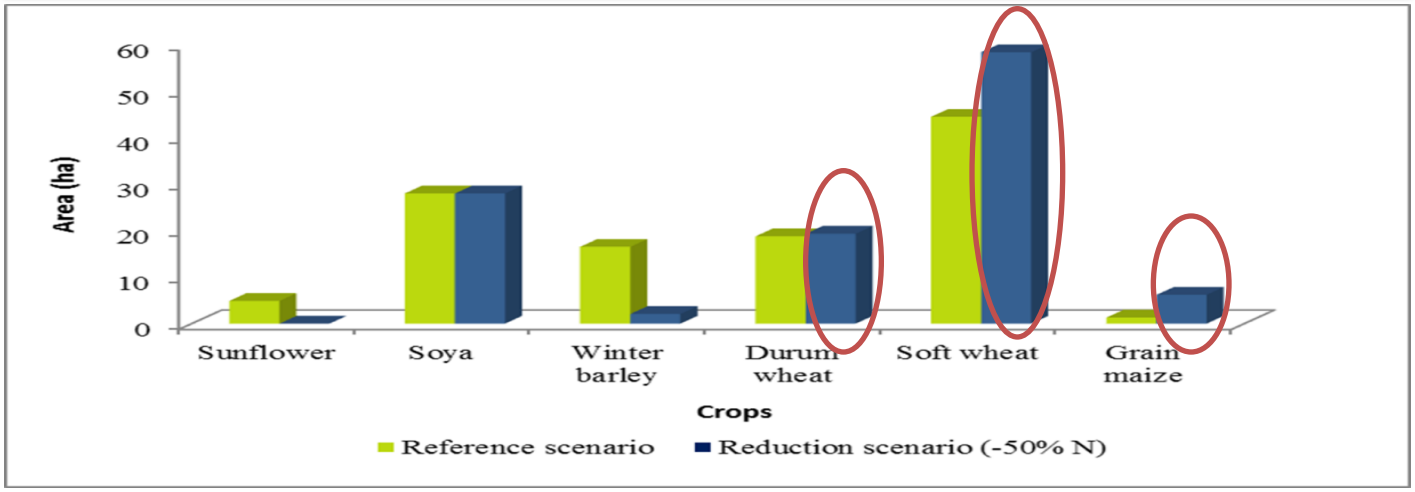
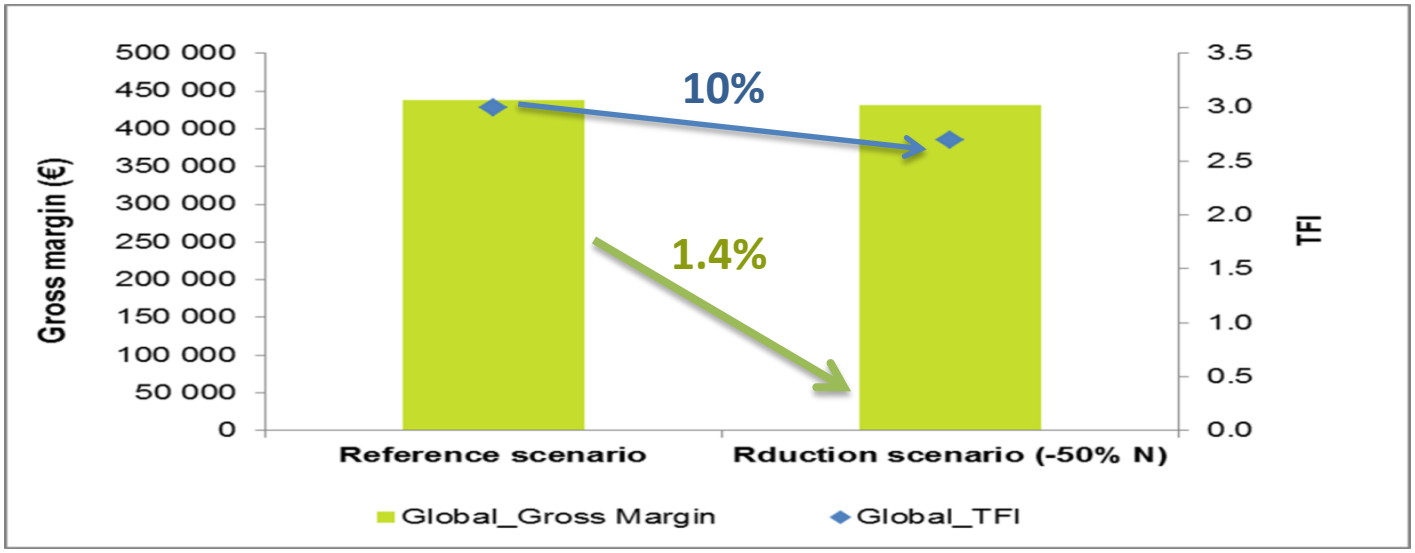
Results and discussion





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Results and discussion

Data base based on activity concept

→ The use of the « activity concept » does not only allow the exploration of complex scenarios, but also the building of a large and shared database with local stakeholders.

Crop	Previous crop	Irrigation	Soil_useful reserve (mm/m)	Soil tillage	Herbicide resistance	Yield (qx/ha)	TFI (Treatment frequency index)	Total cost_TFI (€/ha)	Ferti_N (kg/ha)	Ferti_P (kg/ha)	Ferti_K (kg/ha)	Irrigation dose (mm/ha)	Labor (per day)		
Durum wheat	Soya	Dry	162.45	Simplified tillage	NR	52	4.3	358	148	100	0	0	0.26	0.12	0.09
Soft wheat	Grain maize	Dry	162.45	Simplified tillage	NR	57	4	234	191	80	0	0	0.26	0.1	0.09
Soft wheat	Meadows	Dry	162.45	Simplified tillage	NR	58	3.6	234	139	110	90	0	0.26	0.1	0.09
Soft wheat	Soya	Dry	162.45	Simplified tillage	NR	58	3.6	234	122	0	110	0	0.26	0.1	0.09
Soft wheat	Sorghum	Dry	162.45	Simplified tillage	NR	57	3.6	234	191	70	70	0	0.26	0.1	0.09
Winter barley	Durum wheat	Dry	162.45	Simplified tillage	NR	59	4	234	96	30	0	0	0.26	0.1	0.09
Soya	Meadows	Irrigated	162.45	Simplified tillage	NR	35	2	108	0	100	160	100	0.35	0.17	0.09
Soya	Soft wheat	Irrigated	162.45	Simplified tillage	NR	35	2	108	0	90	180	100	0.35	0.17	0.09
Sunflower	Winter barley	Dry	162.45	Simplified tillage	NR	21	2	108	45	80	70	0	0.35	0.17	0.09
Grain maize	Meadows	Irrigated	162.45	Simplified tillage	NR	100	1.8	111	122	0	0	180	0.35	0.23	1.2
Sorghum	Soft wheat	Dry	162.45	Simplified tillage	NR	70	1.8	108	148	40	0	0	0.35	0.21	0.68

Thank you for your attention

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