Interplay: a serious game to design and evaluate the introduction of cereal- legume intercrops in cropping systems

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Challenges

- For most farmers, intercropping = mixtures with both species sown and harvested together
- Many more options (e.g. relay cropping)
- Field experimentations and computer simulations cannot quickly provide locally-adapted knowledge.

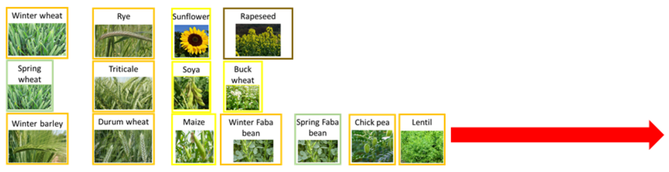
➔ Building on innovative farmers' knowledge

Objectives

- One way to get this knowledge elicited and shared is the use of serious games

➔We are developing **Interplay, a serious game allowing farmers to explore locally the diversity of intercropping options** given expected services and constraints at the cropping system level

Select crop cards to build the crop rotation/sequence and position the mixed crop



Step 1: Define the crop rotation

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D	J F M A M J J A S O N D

Step 2: Prioritize the services expected from the intercrop and define the levels of services expected

Most expected					Least expected
Grain production	Weed control	Pest control	Disease control	Erosion control	N supply
Cereal: 1-1.5 t/ha | 1.5-2 t/ha | 2-2.5 t/ha | 2.5-3 t/ha | >3 t/ha	No expectations | Expected | Highly expected	No expectations | Expected | Highly expected	No expectations | Expected | Highly expected	No expectations | Expected | Highly expected	No expectations | Expected | Highly expected	<25 kg/ha | 25-50 kg/ha | 50-75 kg/ha | >75 kg/ha
Legume: 0.5-1 t/ha | 1-1.5 t/ha | 1.5-2 t/ha | 2-2.5 t/ha | >2.5 t/ha						

Prioritize and define the levels of ecosystem services expected from the mixed crop using ecosystem service cards

Specify when each service is expected

Soil structure	Cereal protein content
Deterioration	Low
Neutral	Medium
Improvement	High

Intercrop level	
Rotation level	
Both levels	

Step 3: Design intercrop management

Design mixed crop management by defining management parameters

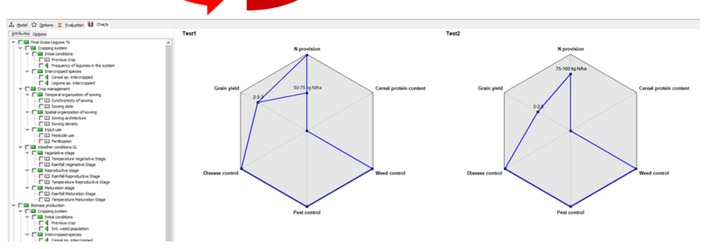
Cereal cultivar		Legume cultivar	
Small	Tall	Small	Tall
Soft	Stiff	Det.	Indet.
Early	Late	Early	Late

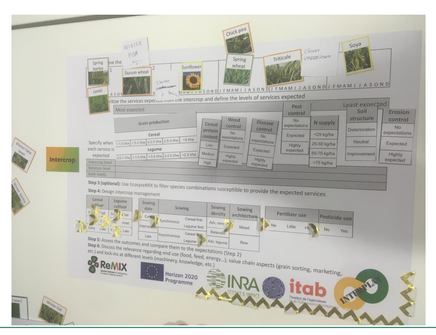
Sowing date	Sowing		Sowing density	Sowing architecture
Early	Synchronous	Cereal first	Adv. cereal	Mixed
		Legume first		
Intermediate			Balanced	
Late	Asynchronous	Cereal first	Adv. legume	Row
		Legume first		

Fertilizer use			Pesticide use	
No	Little	High	No	Yes

Step 4: Assess the outcomes and compare them to the expectations (Step 2)
Step 5: Discuss the relevance regarding end use (food, feed, energy…), value chain aspects (grain sorting, marketing, etc.) and lock-ins at different levels (machinery, knowledge, etc.)

Assess the levels of ecosystem services provided by the mixed in the cropping system designed on the game board using a qualitative Dexi model





Main steps

1. Define the crop sequence
2. Prioritize and define the levels of ecosystem services expected
3. Design intercrop management (cultivar choice, sowing date…)
4. Assess the outcomes with a qualitative Dexi model and compare them to the expectations (Step 2)
5. Discuss the relevance regarding end use (food, feed, energy…), value chain aspects (grain sorting, marketing, etc.) and lock-ins at different levels (machinery, knowledge…)

Iterations allow exploring scenarios and stimulate discussions

Next steps, expected results and benefits for end-users

- Ongoing finalization of a first prototype which will be tested in France and in Scotland in 2020
- Developing and calibrating locally the Dexi model on such an under-explored topic is challenging
- Interplay addresses the impacts of the management of intercropping on the cropping system
- It will promote co-learning through virtual experimentation, enriching discussions among researchers, advisors and farmers with visual and quantitative information

ReMIX Species mixtures for redesigning European cropping systems

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