

# **Agricultural innovative practices and impacts of the supply chain:**

## ***An ex-ante study of the logistics of agricultural cooperatives to estimate the acceptability of durum wheat-grain legumes intercrops***

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Cowan, R. & Gunby, P. (1996) « Sprayed to Death: Path Dependence, Lock-in and Pest Control Strategies », *The Economic Journal* ;  
 Vanloqueren, G. & Baret, P. V. (2008) « Why are ecological, low-input, multi-resistant wheat cultivars slow to develop commercially? A Belgian agricultural "lock-in" case study », *Ecological Economics* ; Vanloqueren, G. & Baret, P. V. (2009) « How agricultural research systems shape a technological regime that develops genetic engineering but locks out agroecological innovations », *Research Policy*

# How does lock-in effect work ?

## SELF-REINFORCING MECHANISMS

- Increasing returns
  - Economies to scale
  - Network/Learning effects
- Supply chain organization
- Switching costs
- Knowledge state
- Uncertainty
- Government Support
- Property Rights...

PATH DEPENDENCY

Earlier choice of a technology A at  $t_0$



*QWERTY design invented in 1870 (Sholes & Glidden) to prevent typebars clashes*

Earlier choice of A prevails in  $t_0 + t_1$



*QWERTY prevails even with electronic*

&

Alternative B could be preferred but is not chosen



*More efficient Dvorak's keyboard not chosen*

*"A technology is not chosen because it is the best one but it became the best one because it has been chosen" → SUBOPTIMAL CHOICE*

*"Once a solution is reached, it is difficult to exit from" → LOCK-IN PROBLEM*  
 Arthur (1994)

# Can Agroecological practices be adopted ?

## *Context and questions*

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### □ **Context:**

- There is efficient innovative solutions for low input systems
- There is a social request to set up these solutions
- Actors of the supply chain slightly integrate these innovations due to structured and stable organization of the supply chain around the conventional technological paradigm

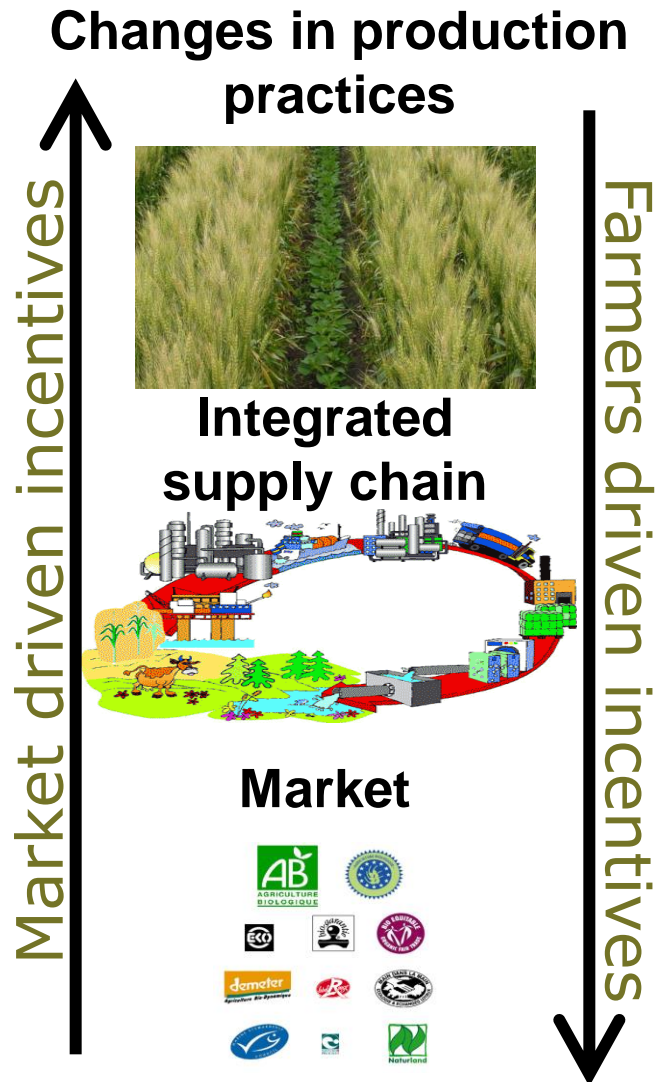
### □ **Questions ?**

- Are farming systems lock-in ? Why ?
- Which acceptability of these alternatives by the supply chain ?
- Which evolution for farming systems ?
- How to switch from conventional to agroecological paradigm ?



# Can Agroecological practices be adopted ?

## *The organizational design of the supply chain*



- ❑ Market can implement changes at farm level (e.g. with labels) but only through an integrated supply chain
- ❑ New farmers' practices (even leading to strong changes) can be adopted if leading to small adaptation of the supply chain

→ **Segmented supply chain may impeded the change of practices and generate lock-in**

→ **Lock-in effects can be overpassed by analyzing the supply chain (actors & functioning) to reveal:**

- ❑ Resilient structures allowing the management of new practices
- ❑ Inflection points susceptible to constitute primers to the transition

# Case study : durum wheat supply chain and durum wheat-grain legume intercrop

## Durum wheat

- A supply chain economically important in southern France
- Many grain quality criteria difficult to satisfy in low input

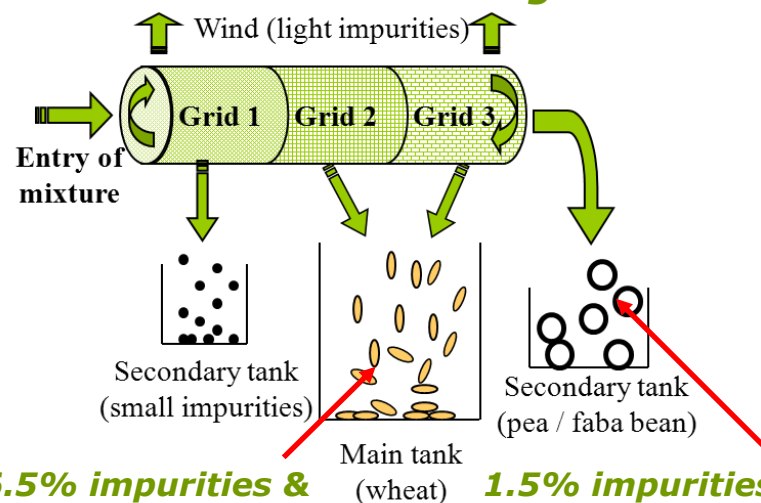
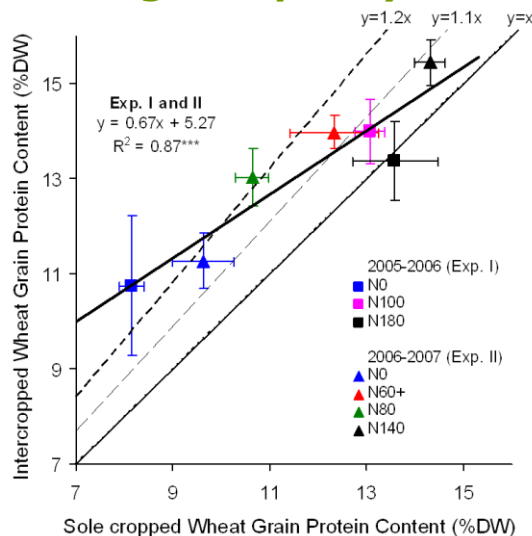
## Grain legume

- Reduce the dependency on proteins
- Valorize the ability of legume to fix atmospheric N<sub>2</sub>

## Intercropping

(Bedoussac & Justes 2010a,b)

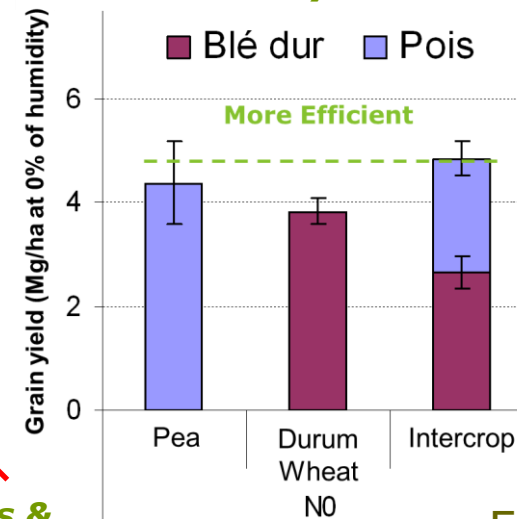
*Difficult to sort out the grains*



**6.5% impurities & 8.5% broken peas**

**1.5% impurities & 1.5% durum wheat**

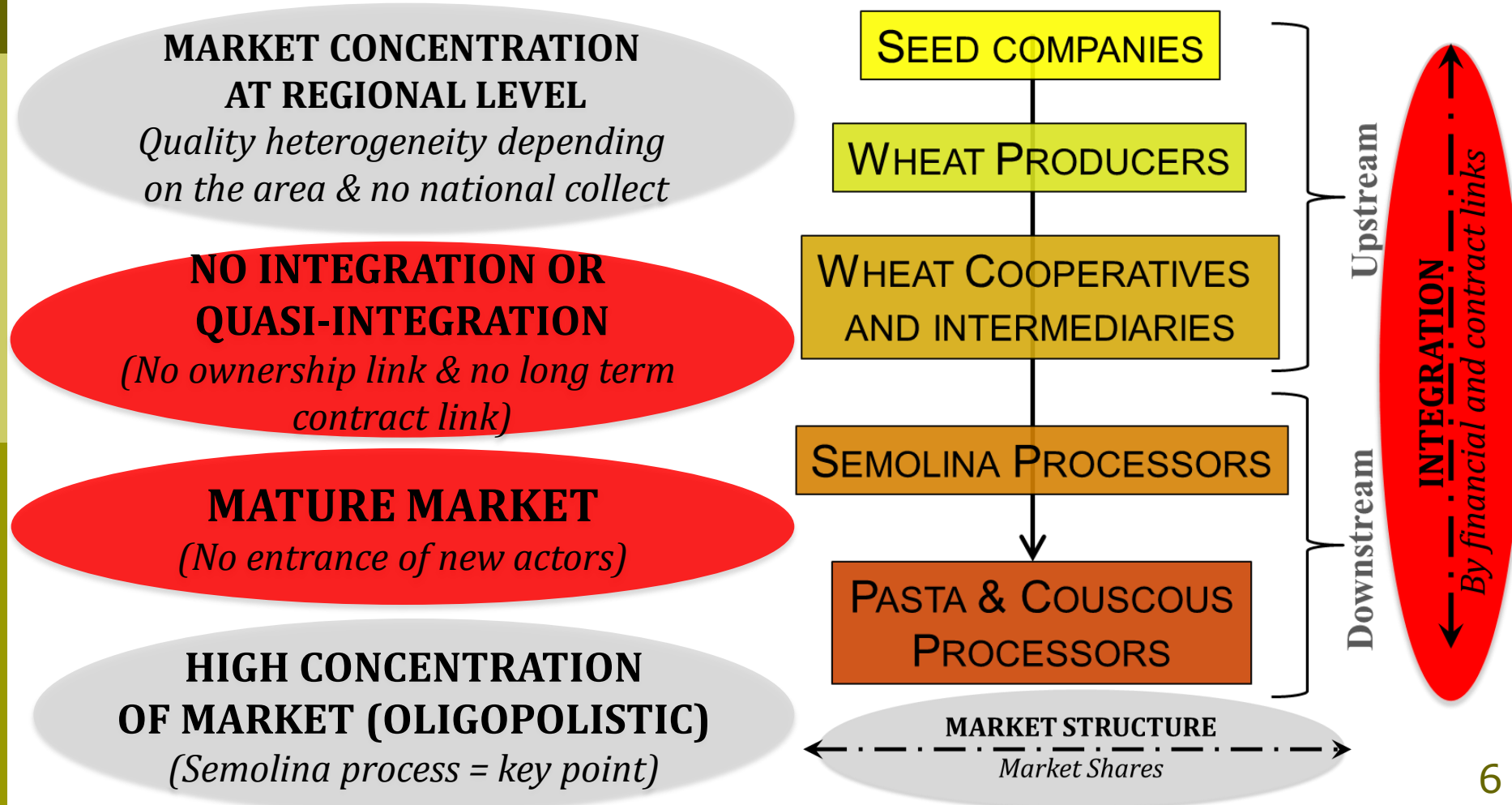
**Higher grain yield in low N systems**





# Organizational design of durum wheat supply chain: *a concentrated downstream one leading to lock-in*

- Organizational design of supply chain
- Identification of main actors



# Can intercroops be adopted by farmers?

## *The cooperative's logistic*

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- ❑ **Adoption of intercroops by farmers must be compatible with cooperative's logistic** (ex: abilities to the collection, grading and marketing of the two species)
- ❑ The **logistic of cooperatives can be an obstacle but also a competitive advantage** (in a context of products differentiation by quality)
- ❑ **Analyzing the diversity of cooperatives** in the SW France region (volumes & species collected, sites, transport...)
- ❑ **Assess ex-ante the characteristics of the logistics of agricultural cooperatives** likely to promote the adoption of new practices such as intercropping

# Construction of an indicator of resiliency of agricultural cooperatives logistic

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## **Cooperative size and diversification**

- ❑ Number of species collected
- ❑ Collected volume
- ❑ Ratio collected volume / number of species collected

## **Durum wheat importance and quality strategy**

- ❑ Amount of durum-wheat collected
- ❑ Number of durum wheat classes

## **Flexibility**

- ❑ Storage capacity
- ❑ Storage at farm
- ❑ Ratio storage capacity / collected volume
- ❑ Capacity to sort out grains

## **Dynamic**

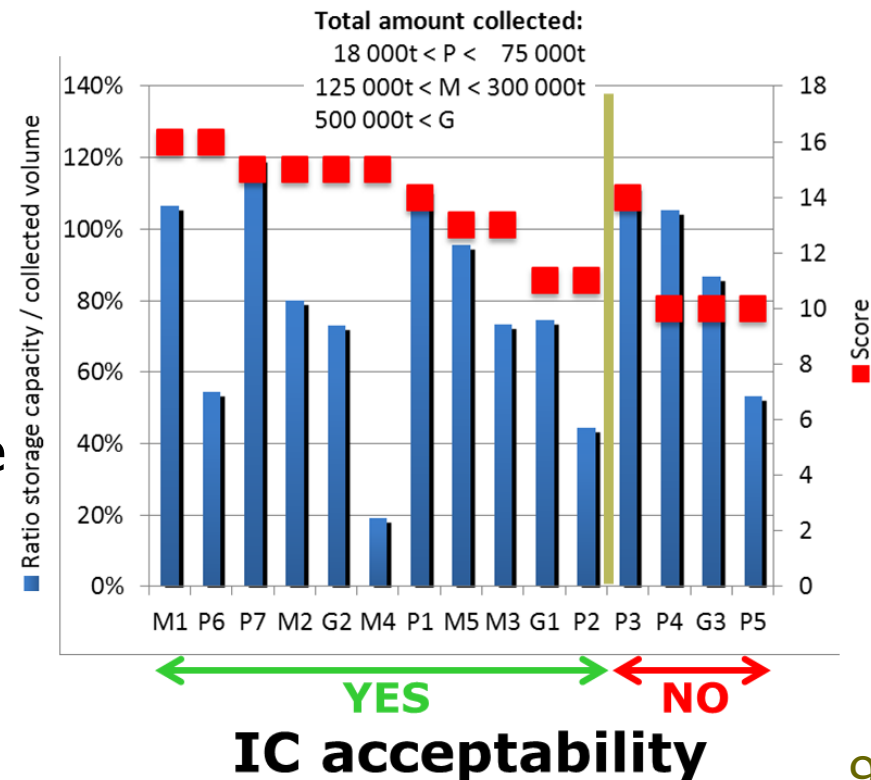
- ❑ Investments perspectives

→ **Score depending on technico-organizational criteria**



# Conclusion: links between cooperative's logistic and intercrops acceptability

- ❑ **Intercrops acceptability depends on quality strategy:**
  - ❑ Competencies and technical means (material, grading...)
  - ❑ Number of durum wheat classes
- ❑ **Size and flexibility seems not discriminant**
- ❑ **Needs for the development of intercrops:**
  - ❑ Sufficient volumes
  - ❑ Homogeneous species choice
  - ❑ Commercialization capacity of the 2 species
  - ❑ Capacity to sort out grains



# Hvala (thank you)

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## **POSTERS :**

- **Reducing biotic stresses in legumes through intercropping with durum wheat.** Laurent Bedoussac, Etienne-Pascal Journet and Eric Justes
- **Breeding legume to improve durum wheat-grain legume intercrops efficiency.** Bochra Kammoun, Laurent Bedoussac, Etienne-Pascal Journet and Eric Justes

## **ORAL (session 9) :**

- **Are durum wheat-grain legume and sunflower-soybean intercrops efficient solutions to produce legume in low input systems?** Laurent Bedoussac, Etienne-Pascal Journet, Hélène Tribouillois, Grégory Vericel, David Champclou, Nathalie Lande and Eric Justes

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