Research Group Leva

Legumes, Crop Ecophysiology, Agroecology

Unité sous contrat

INRA SCIENCE & IMPACT

eSA École supérieure d'agricultures Angers Loire

Isara lyon

Une école d'ingénieurs au cœur de la vie

LEGTIMES

LEGume Insertion in Territories to Induce Main Ecosystem Services

Agence Nationale de la Recherche

ANR

Trajectories of legumes insertion in farms

Methodological framework for the analysis of long-term changes

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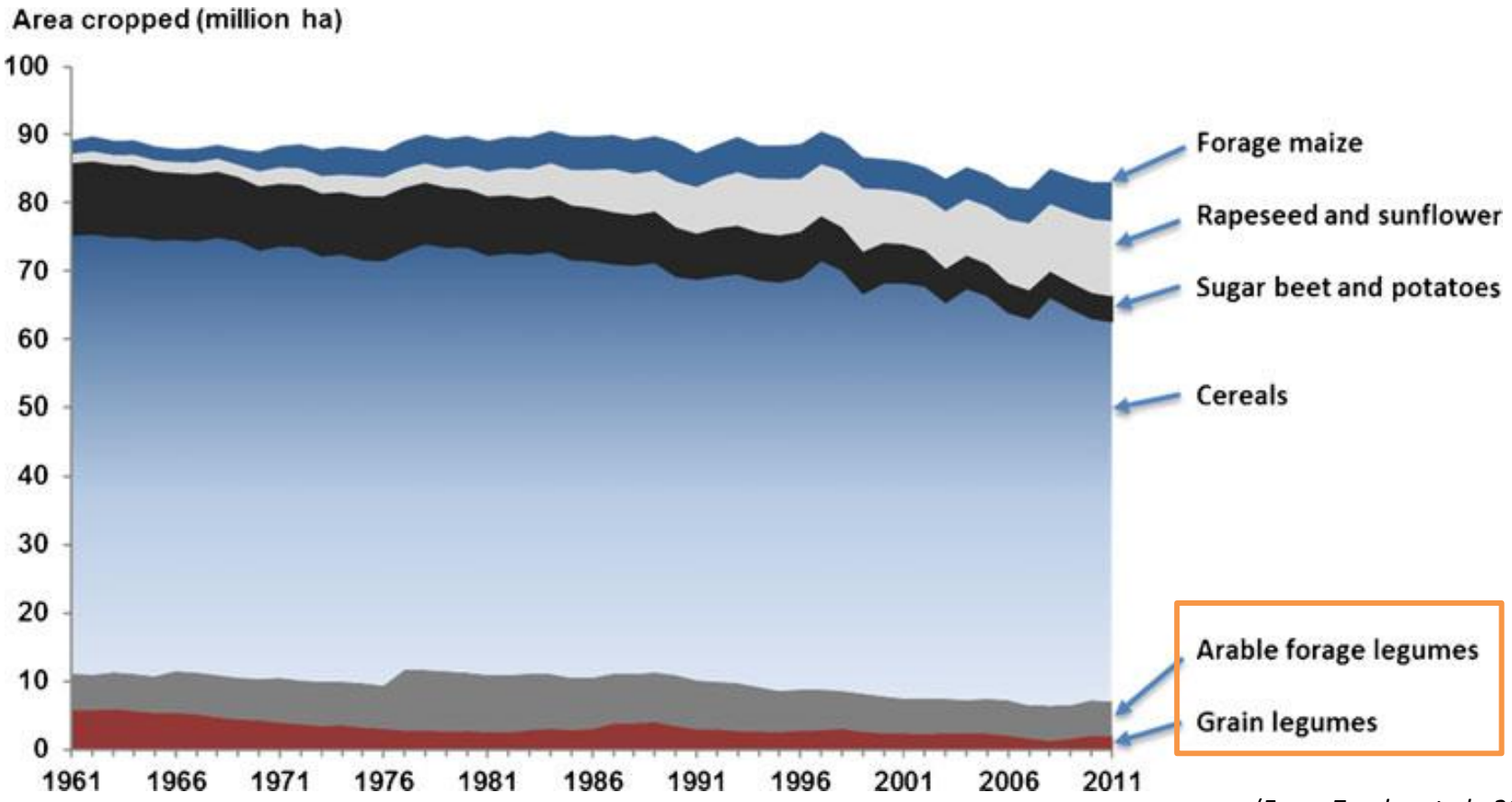
aab Association of Applied Biologists

Legumes are locked-out of agrifood systems

Decline of legumes in Europe, especially since the 1990s

(Zander et al., 2016)



(From *Zander et al., 2016*. Data source FAOstat, 2013)

Change in the areas of production of key arable crops in the EU-27

Legumes are locked-out of agrifood systems

Decline of legumes in Europe, especially since the 1990s
(Zander et al., 2016)

… despite agronomic, environmental and nutritional benefits
(Preissel et al., 2015; Voisin et al., 2014)

A "**technological lock-in**"
(Magrini et al., 2016; Meynard et al., 2013; Voisin et al., 2014)

- Interesting framework to understand change at agri-food, territory and supply-chain level

… but not the **on-going processes of change at farm level**

Why and **how** do farmers change their practices to introduce legumes in their farming systems?

Analysis of long-term changes in cropping practices, in farms that introduced legume crops

Methodological framework

1. **Conceptual background**
2. **Content**
3. **Application to a farm**
4. **Research perspectives**

Why and **how** do farmers change their practices to introduce legumes in their farming systems?

Application to a large sample of farms

Levers to support farmers toward more legume cultivation

Methodological framework

1. **Conceptual background**
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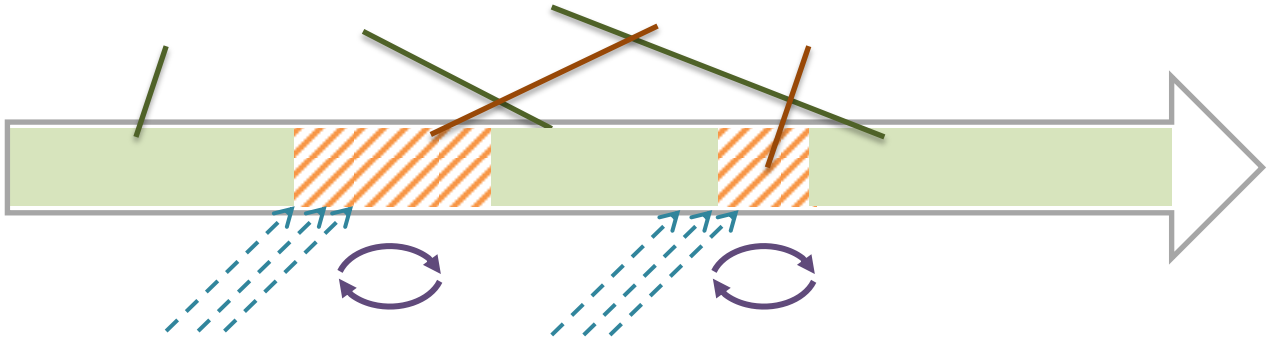
Our main concept: the farm trajectory

(Chantre et al., 2015; Madelrieux et al., 2002; Moulin et al., 2008)

Agronomic-coherence phase: practices and decision rules are stable

Transition phase: strategies and practices change



Farm trajectory

Drivers of change:
Events triggering the change

Processes of change:
Implementation & Learning

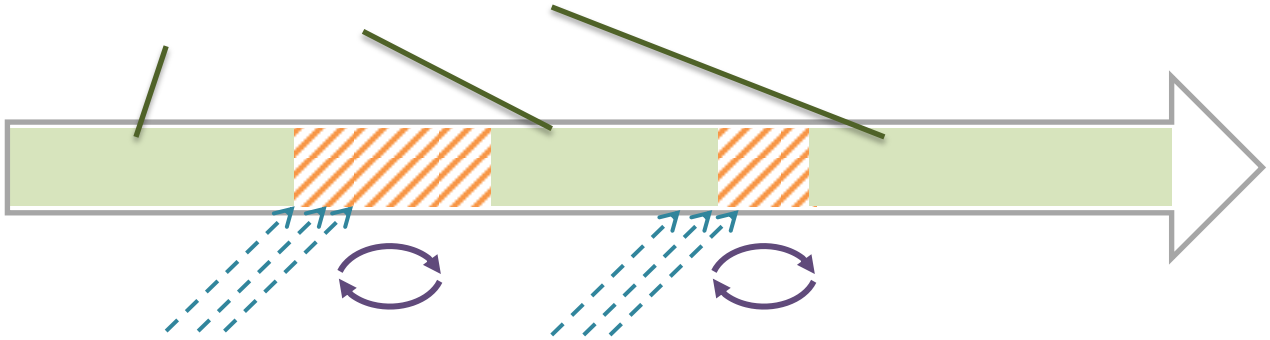
Our main concept: the farm trajectory

(Chantre et al., 2015; Madelrieux et al., 2002; Moulin et al., 2008)

Agronomic-coherence phase: practices and decision rules are stable

⇨ **Formalise classes of legumes insertion in farming systems to characterise these phases**

Farm trajectory



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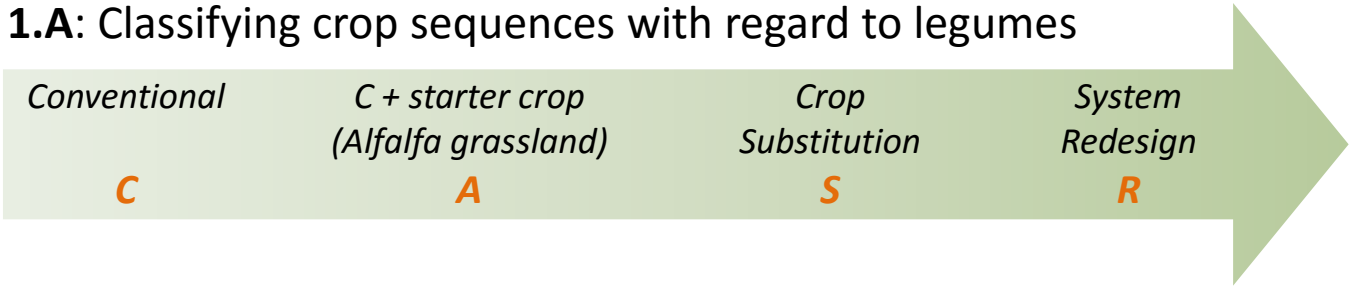
Building the formalised agronomic-coherence classes

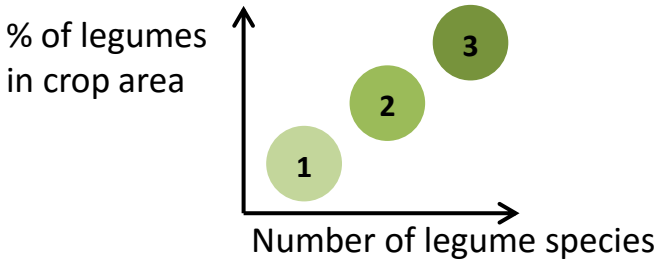
Literature on:

- Legumes insertion in cropping systems (Jeuffroy et al., 2015; Nemecek et al., 2008; Schneider et al., 2015; Voisin et al., 2014)
- Efficiency, Substitution, Redesign (ESR) framework (Hill & MacRae, 1996)

1.A: Classifying crop sequences with regard to legumes



1.B: Classifying the level of legumes insertion



2.: Formalising the agronomic-coherence classes

Four agronomic-coherence classes

Agronomic-coherence class	Legume insertion	Crop sequence
0	None	*Conventional*
1	Low: < 10% UAA*; 1 sp.	*Conventional* or *"Alfalfa"*
2	Intermediate: 10-20% UAA; 1-2 sp.	*"Alfalfa"* or *Substitution*
3	High: > 20% UAA; 2-5 sp.	*Substitution* or *Redesign*

*Utilised Agricultural Area

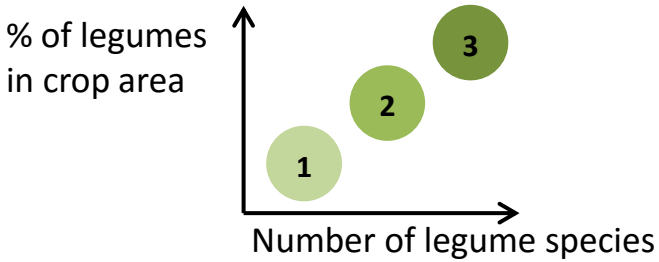
Building the formalised agronomic-coherence classes

Literature

1.A: Classifying crop sequences with regard to legumes

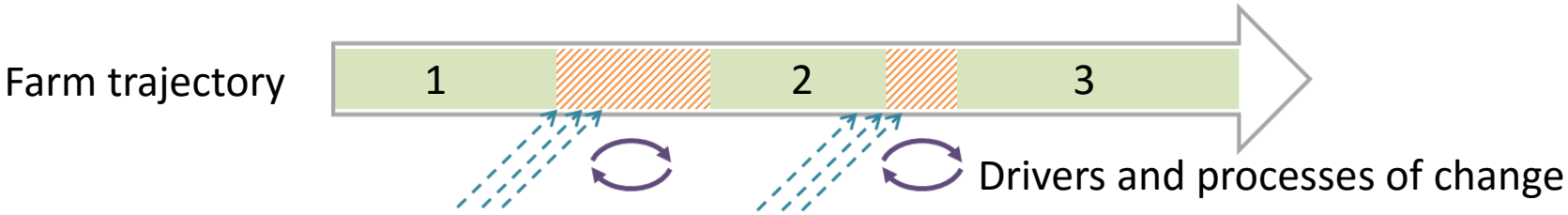
Conventional	*C + starter crop (Alfalfa grassland)*	*Crop Substitution*	*System Redesign*
C	***A***	***S***	***R***

1.B: Classifying the level of legumes insertion



2.: Formalising the agronomic-coherence classes

Outputs



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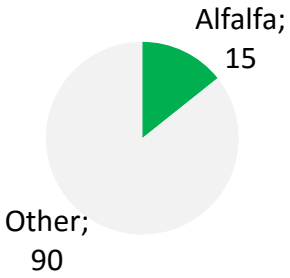
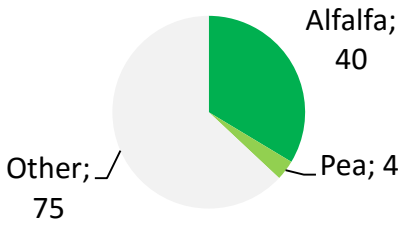
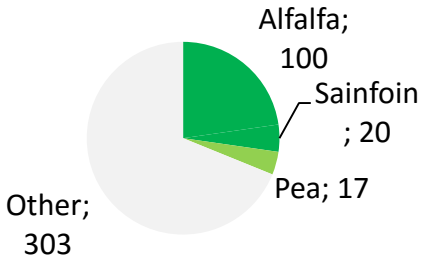
Agronomic-coherence and transition phases

A means to identify the changes that question the farm's strategy regarding legumes

Crop areas (ha)







Crop sequence

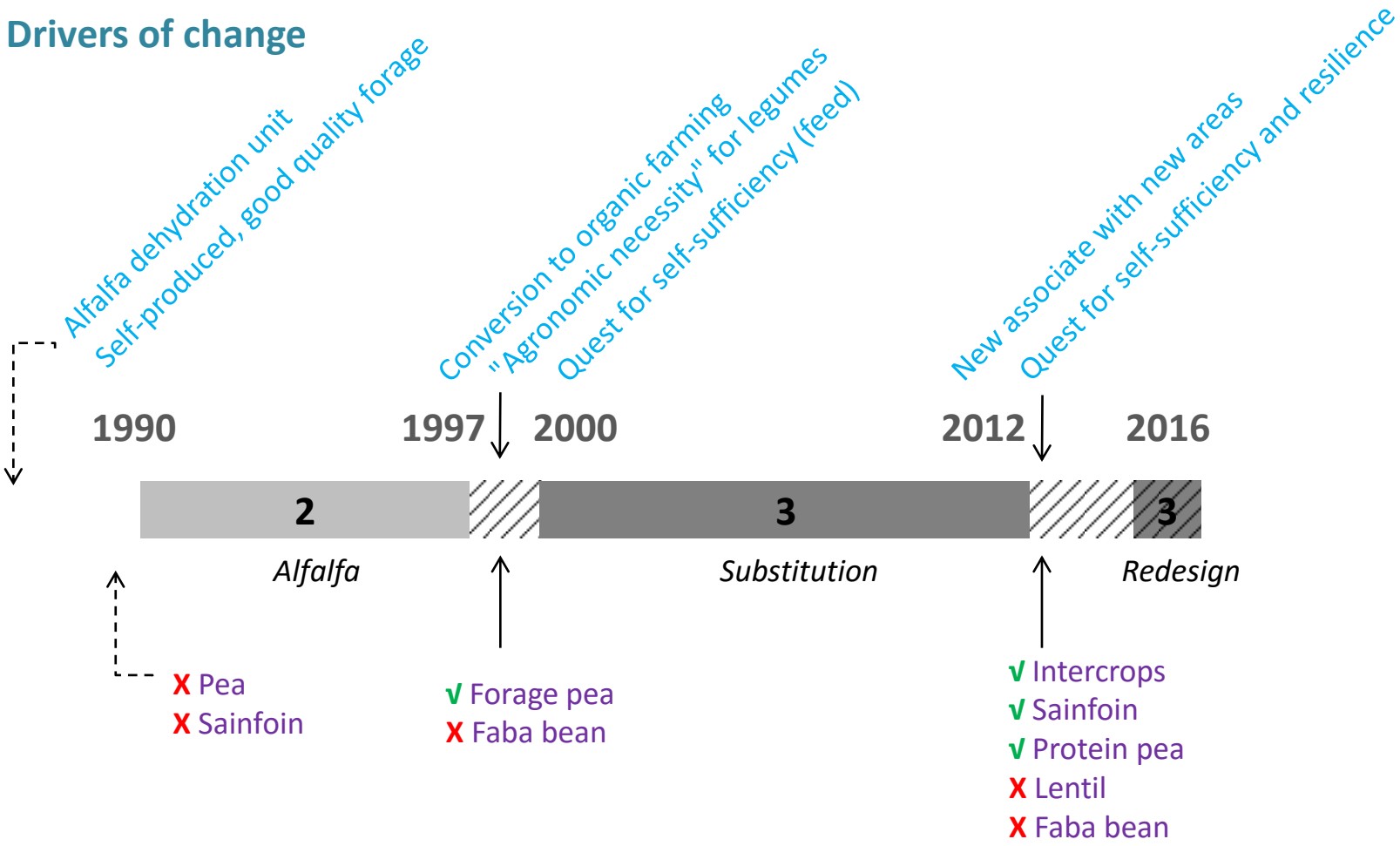
Alfalfa

Substitution

Redesign

Drivers and processes of change

Drivers of change

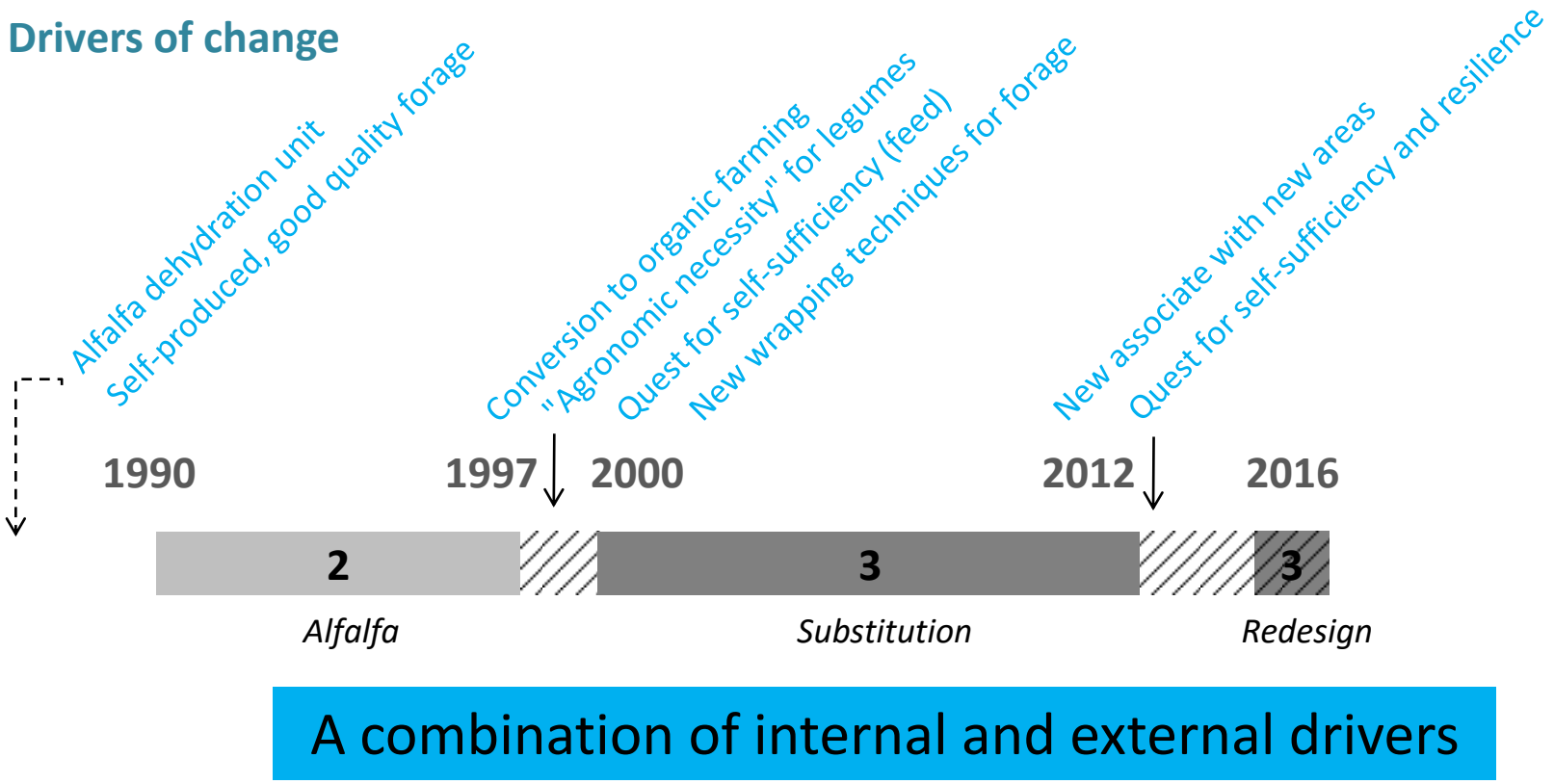


Trials on small areas before expanding a new cropping practice

Exchanges with groups of peers and advisory services

Processes of change

Drivers and processes of change



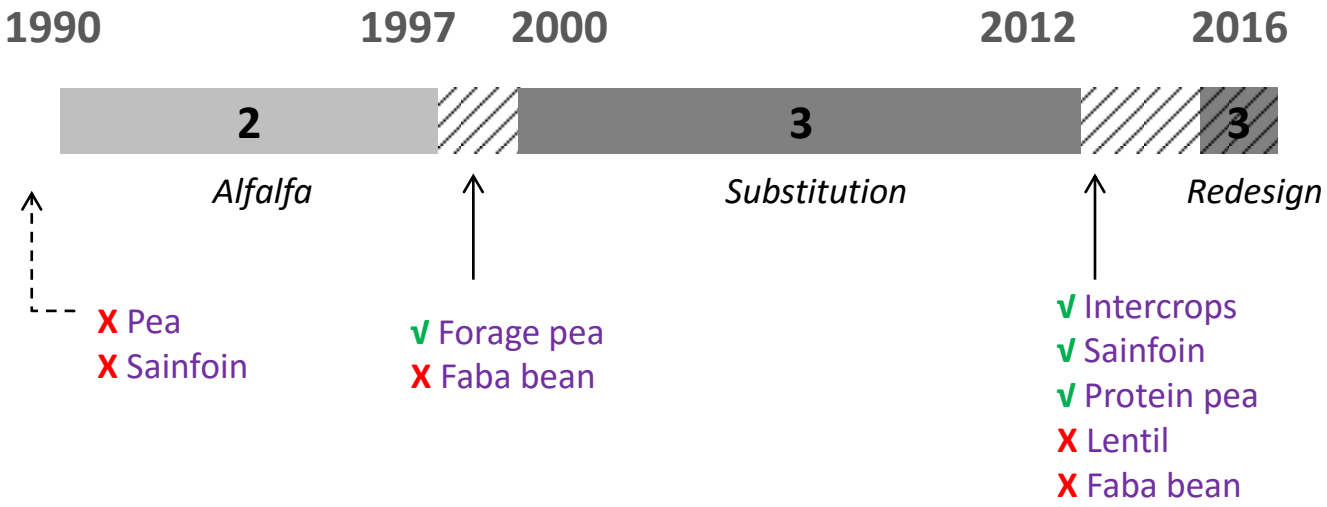
A combination of internal and external drivers

Management of livestock, agronomic benefits of legumes, availability of land and labour

Availability of material and services at the local level

Drivers and processes of change

Importance of experimentation and learning processes



Trials on small areas before expanding a new cropping practice

Exchanges with groups of peers and advisory services

Processes of change

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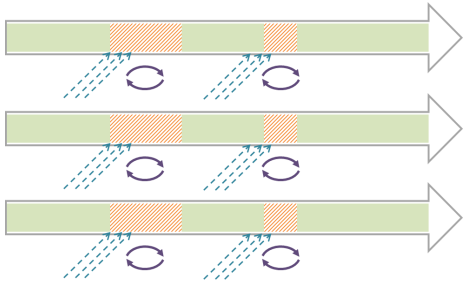
From individual trajectories to a typology of transitional pathways

(Chantre et al., 2015)

Application to 27 farms in 2 contrasted French regions



Group together similar trajectories

- Which transitional pathways lead to high & long-term legume insertion?
- What are the corresponding combinations of drivers and processes of change?

Simultaneous or successive **drivers** leading to a high legume insertion

Processes of change allowing to successfully overcome the technical difficulties encountered

Support to legumes insertion in farms adapted to farmers' pathways of change


Thank you