

PREAR project – Farmer questionnaire
Predicting and enhancing the Resilience of European Agro-ecosystems
to environmental change using crop Rotations

Name / first name:	Country :
Date :	Location/Postcode* :
Interviewer :	Duration :

**Postcode: A way to identify the location of the farm. The beginning of the UK postcode for example is enough. Precision at approximately 5x5km.*

The following questionnaire is part of the PREAR project. This project works exclusively on crop rotations. It aims to find crop rotations that allow farmers to be more resilient in the face of climate change. These crop rotations will have to balance agro-ecosystem services and crop productivity. The preservation of agro-ecosystem services, due to an increase of biodiversity supported by changed crop rotations, could give comparable yields and financial return but with reduced use of products and inputs (e.g. agrochemicals). However, these changed crop rotations will have to be practicable/acceptable for farmers.

In this questionnaire, we consider “crop rotation” practice alone. We want to examine the crop successions that occur in individual fields. Each succession constitutes a rotation that is distinguishable from a simple crop sequence in that it is planned based on agronomic expertise and with particular objectives.

Previous studies have demonstrated that there are a lot of interactions between, on the one hand, crop rotations and farmland plants, and on the other hand strong interactions between farmland plants and biodiversity. Thus, crop rotations could be a good management practice for mitigating negative climate change effects, especially on agro-ecosystem services (provisioning, production and regulation services) and on biodiversity. The latter have an influence over soil seed bank and self-propagating plants development. This is why, we initially current crop rotations, followed by farmer criteria and objectives that determine their choice. This should allow us to discuss and potentially conceive new, changed crop rotations which respond to the main objectives of the PREAR project.

This questionnaire has two main purposes: it has been conceived to determine your current objectives and crop rotations; and, it will help us to understand what changes to crop rotations you might make when faced with climate change.

The questionnaire is separated into three main parts.

First, we are going to deal with your farm, your land, your crops and your crop rotations.

Then, we are going to talk about your objectives and your agricultural practices. We are going to understand how your crop rotations allow you to attain your objectives. It is important for us to understand your criteria and constraints that explain your decisions for particular crop rotations.

Finally, two climate change scenarios will be presented. One is pessimistic and the other is optimistic. The purpose of this part is to examine how climate change might affect your farming practices.

This questionnaire will be used in 3 countries: United Kingdom, Denmark and France. An analysis will follow the observations done in these 3 countries and, once this is complete, we will give you both specific and general feedback from the conclusions of the study.

This questionnaire has been created and trialed with the help and support of French farmers.

I) The farmer and the land

A. General information:

Age: < 30 30-40 40-50 >50 years old

How long have you been a farmer? <5 5-10 10-20 >20 years

Main farm activity: *field crop / mixed farming-livestock / market gardening / mainly livestock*

Off-farm income: *YES / NO*

[List details of sources of off-farm income]

Tillage: *conventional (ploughing) / minimum tillage / direct drilling / sowing under a vegetative cover*

Inputs (fertilizer + plant protection products): *Intensive / Integrated / Organic*

Legal Status/Legal structure: *sole proprietorship / tenant / successional tenant / partnership / limited liability company / non-profit.*

Sources of technical advice:

Sources of weather and climate information:

Utilized agricultural area: *(in ha in 2019)*

Total:

Arable:

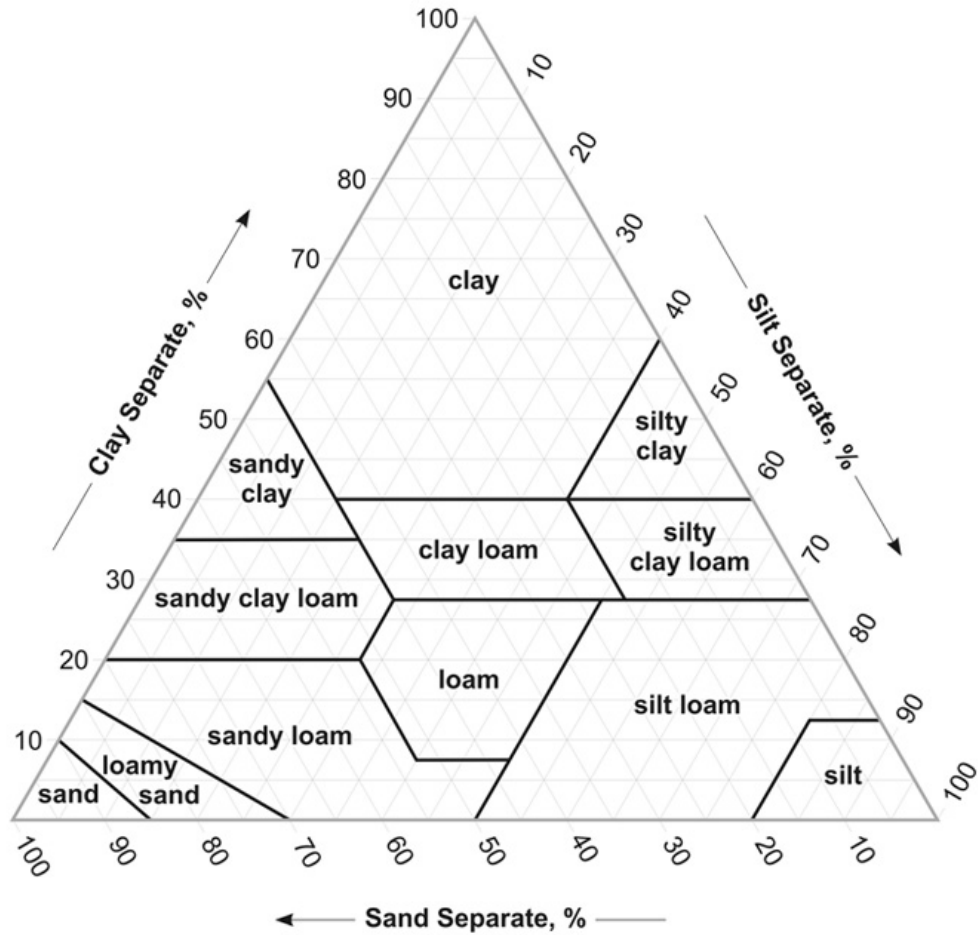
Irrigated area: *(in ha in 2019)*

Total:

Arable:

B. Your soil:

[This is going to allow us to understand better your main soil constraints that guide your choice of crops. It is also useful for us to know what new crops could be cultivated in your farm We can use the soil texture triangle to describe the predominant soils.]



Soil N°1:

- Texture:
- Stone content:
- Drainage: YES / NO
- % utilized agricultural area with this soil type (arable)

Soil N°2:

- Texture:
- Stone content:
- Drainage: YES / NO
- % utilized agricultural area with this soil type (arable):

C. Your crops:

Crop	Area (hectare)

D. Your crop rotations:

Do you use crop rotations to achieve particular objectives? YES / NO

[Discussion in answer to this question:]

If yes, then do you plan with a particular length of the crop rotation cycle, or does it vary across your land? How long is it?

Your main crop rotations:

- Rotation 1:
- Rotation 2:
- Rotation 3:
- Rotation 4:
- Rotation 5:

How flexible are your rotations in the face of annual changes in conditions?

[It might help us understand your attitude to longer-term flexibility.]

- Very inflexible (would rarely change my rotation plan)
- Quite inflexible (I usually stick to my plan, but do sometimes change it)
- Quite flexible (I have a rough plan, but will be flexible where I can see it would be beneficial)
- Very flexible (I respond to the annual conditions as much as possible, rather than considering the history of the use of the field)

How are you flexible? What changes would you consider making, or would definitely not make?

[free text]

What would cause you to change your rotational cropping plan?

[free text, e.g. prices, weather etc.]

II) Farming practices, objectives, limits:

A. We would like to understand your current agricultural practices, and those you have recently adopted (and are considering adopting):

[The ideas listed came from farmers who a trialed this questionnaire in France –therefore some may not be applicable and others may be missing.]

	Have you recently/ do you currently do this?	If yes		If no	
		Since when?	Have you done this in the past 5 years? How often do you do this?	Are you considering doing this in the next few years?	Not applicable
Lengthened rotations					
Diversified rotations					
Direct drilling					
Addition, modification or abandonment of a specific infrastructure <i>(e.g. Infrastructure for on-site processing ...)</i>					
Agroforestry					
Organic agriculture					
Irrigation					
Companion cropping <i>(growing crops together for associated benefits e.g. pollination or pest control)</i>					
Inter cropping <i>(two or more crops planted together to increase yield per unit of land)</i>					
Cover crops <i>(Crops planted to protect/enhance soil between main crops)</i>					
Cover planting <i>(sowing a mixture that includes species to create cover and protection for main crop)</i>					

Reduced tillage frequency					
Reduced inputs: fertilization and / or plant protection products					
Mechanical or mixed weeding					
Other					

[Record any discussion about this...]

B. Now we would like you to consider the role of crops and rotations in your farming.

[If the farmer uses crops rotations, these might have a specific objective. In the first part, “a. Crops”, we just want to know why specific crops are chosen in terms of objectives and constraints. In the second part, “b. Crop rotations”, we want to know why/how rotations are planned in terms of objectives and constraints. The key point here is to understand if there is a difference between choosing crops and planning rotations.]

a. Crops

How important are each of the following objectives when choosing a specific crop to grow in the next season?

Objective	Not at all important ----- Very Important						
	1	2	3	4	5	6	7
Secure / diversify income							
Maximize income							
Limit operating costs <i>(such as inputs / fuel)</i>							
Use of available infrastructure <i>(optimize the use of equipment / buildings)</i>							
Reduce working time							
Distribute working time							
Limit the environmental impact							
Improve the quality of my soils							
Have financial independence.							
Have equipment independence							
Have livestock feed autonomy							
Response to a very important constraint <i>(e.g. an increase in insect pest pressure)</i>							

How much of a constraint are the following when choosing a specific crop to grow in the next season?

Constraint	Not at all a Constraint ----- Key Constraint						
	1	2	3	4	5	6	7
Soil quality							
Soil water reserve							
Equipment available							
Available market/demand							
Irrigation capacity							
Weed pressure							
Insect / mollusc pressure							
Game / rodent pressure							
Disease / fungal pressure							
Frequency of possible sowing of a key crop							
Climate							
Regulation/laws							
Finance							

b. Crop rotations

[The purpose is to know why the farmer plans crop rotations, and what their main motivation is. It may be that the objectives and constraints on planning crop rotations are different from the objectives and constraints on individual crops.]

How important are each of the following objectives when planning a rotation?

Objective	Not at all important ----- Very Important						
	1	2	3	4	5	6	7
Secure / diversify income							
Maximize income							
Limit operating costs <i>(such as inputs / fuel)</i>							
Use of available infrastructure <i>(optimize the use of equipment / buildings)</i>							
Reduce working time							
Distribute working time							
Limit the environmental impact							
Improve the quality of my soils							
Have financial independence.							
Have equipment independence							
Have livestock feed autonomy							
Response to a very important constraint <i>(e.g. an increase in insect pest pressure)</i>							

How much of a constraint are the following when planning a rotation?

Constraint	Not at all a Constraint ----- Key Constraint						
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Soil quality							
Soil water reserve							
Equipment available							
Available market/demand							
Irrigation capacity							
Weed pressure							
Insect / mollusc pressure							
Game / rodent pressure							
Disease / fungal pressure							
Frequency of possible sowing of a key crop							
Climate							
Regulation/laws							
Finance							

Do you have any further comments on the objectives or constraints of establishing crop rotations, including the inclusion of current or new crops?

[free text]

C. Considering how you have changed your practices or crops or rotations, or are planning to do so, and considering the objectives and constraints: are any of these connected to your experience of changes in the weather/climate (such as your opinions about the longer-term changes in weather or its predictability). If so please describe this:

[free text]

Climate Scenarios

Currently, we know your agricultural systems, your practices and your priorities, which explain your choices about crops and crops rotations. Now, we would like to study the evolution of these choices in case of two climate change scenarios.

Currently, IPCC and others international organisations are working on the global issue of climate change and consider different possibilities about evolution of temperatures, precipitations and frequency and violence of natural disasters. According to their research, various scenarios of climate change are predictable. We focus on two of them, one optimistic (the first) and one pessimistic (the second).

III) A climatic scenario that presents “opportunities”

Climate change is moderate and has a slightly positive impact on the yield of most crops. There is a decrease in the frequency of early frosts because of the slight increase in temperature. In addition, sowing in spring is earlier. Finally, climate change allows the adoption and integration of new crops from warmer latitudes.

Given this scenario of the opportunities from climate change, we’d now like to ask you about how you might change the crops that you grow and the way that you grow them (as rotations, but also the practices you might use).

1) Which crops do you think you may start growing or start growing more?

[Record the crops the farmer lists and any comments about the crops]

2) Which crops do you think you may stop growing or will grow less?

[Record the crops the farmer lists and comments about the crops]

3) Do you think you would modify your crop rotations?

- Diversification of the crop rotations: YES / NO
- Increase of the duration of crop rotations: YES / NO *[YES = rotation of 7 years instead of 6 years]*
- Decrease of the duration of crop rotations: YES / NO *[YES = rotation of 5 years instead of 6 years]*

4) Would you set up new crop rotations?

[Here the farmer suggests ideas for new crop rotations according to the climate scenario. Record the crop rotations the farmer lists and their comments about them]

- Rotation 1:
- Rotation 2:
- Rotation 3:
- Rotation 4:
- Rotation 5:
- Rotation 6:

5) Would you set up new agricultural practices?

Practice	Would you adopt? (✓ or ✗)	Comments
Lengthened rotations		
Diversified rotations		
Cover planting		
Direct drilling		
Addition, modification or abandonment of a specific infrastructure		
Agroforestry		
Organic agriculture		
Installation of irrigation		
Abandonment of irrigation		
Companion cropping		
Inter cropping		
Cover crops		
Reduced tillage frequency		
Reduction of inputs (fertilization and / or plant protection products)		
Mechanical or mixed weeding		
Water capture/storage		
Other		

IV) A pessimistic climatic scenario that reduces the opportunities for the farmer

[This part follows the same logic as part III.]

Climate change has a negative impact on most crops, because extreme weather events are more frequent and more intense (e.g. droughts, heat waves, hailstorms, storms, floods). The rain is more concentrated in winter, inducing a surplus of water in winter and a deficit in summer. Climate change induces a higher pest pressure (e.g. weeds, fungi, insects, diseases) and more frequent and intense diseases and / or invasions.

1) Which crops do you think you may start growing or start growing more?

[Record the crops the farmer lists and their comments about the crops]

2) Which crops do you think you may stop growing or will grow less?

[Record the crops the farmer lists and their comments about the crops]

3) Do you think you would modify your crop rotations?

- Diversification of the crop rotations: YES / NO
- Increase of the duration of crop rotations: YES / NO *[YES = rotation of 7 years instead of 6 years]*
- Decrease of the duration of crop rotations: YES / NO *[YES = rotation of 5 years instead of 6 years]*

4) Would you set up new crop rotations?

[Here the farmer gives directly new crop rotations according to the climate scenario if he/she has some ideas. Record the crop rotations the farmer lists and their comments]

- Rotation 1:

- Rotation 2:

- Rotation 3:

- Rotation 4:

- Rotation 5:

- Rotation 6:

5) Would you set up new agricultural practices?

Practice	Would you adopt? (✓ or ✗)	Comments
Lengthened rotations		
Diversified rotations		
Cover planting		
Direct drilling		
Addition, modification or abandonment of a specific infrastructure		
Agroforestry		
Organic agriculture		
Installation of irrigation		
Abandonment of irrigation		
Companion cropping		
Inter cropping		
Cover crops		
Reduced tillage frequency		
Reduction of inputs (fertilization and / or plant protection products)		
Mechanical or mixed weeding		
Water capture/storage		
Other		

Which scenario (optimistic or pessimistic) best describes your attitude to the predicted climate change and why?

[Free text]

V. Personal information:

Qualification/level of education:

GCSE

AS/A-level

Agricultural college

Undergraduate Degree

Postgraduate degree

BASIS

Other:

Career path *[Even if lot of farmers have always done this work, it could be interesting to know if it is not the case]:*

The farm financial status is currently a constraint on the development of the business:

1 (totally disagree) – 2 (disagree) – 3 (quite disagree) – 4 (indifferent) – 5 (quite agree) – 6 (agree) – 7 (totally agree).

Comments: