WEBINAR

Developing a Comprehensive Response to Climate Change for EU Farming Systems

Climate Change Vulnerability and Sustainable Adaptation Strategies

Monday, 16th March 2020

Our agenda today

2:00	**Introduction**
	Presentation of the LIFE AgriAdapt Project Patrick Trötschler, Lake Constance Foundation
2:10	**Final vulnerability assessment of 120 pilot farms across Europe** Nicolas Métayer, Solagro
2:25	**Sustainable Adaptation: General Proposals per Farming System (over the four Climate Risk Zones)** • **Arable Crops,** Carolina Wackerhagen, Lake Constance Foundation • **Livestock,** Ragnar Leming, Estonian University of Life Sciences • **Permanent Crops**, Vanessa Sánchez, Fundación Global Nature • **Synthesis**, Sylvain Doublet, Solagro
3:00	**Increasing farmer´s adaption competence: the Adaptation Training Pack and AgriAdapt Webtool for Adaptation (AWA)** Vanessa Sánchez, Fundación Global Nature Nicolas Métayer, Solagro
3:25	**Closing Remarks** Patrick Trötschler, Lake Constance Foundation

Our webinar instructions

1. **All presentations will be available after the webinar.**
   We'll send you a download link.

2. **Microphones will be muted during presentations.**
   You can ask questions by chat function.

3. **You can ask questions by microphone after the last presentation by unmuting your microphone**.
   Please ask questions! Please do not give a co-presentation! ☺

LIFE AgriAdapt

Principle Project Ideas

Demonstrate that the 3 main farming systems (livestock, arable and permanent crops) can be more climate resilient by implementing sustainable adaptation measures and strategies.

Show how climate change can be an important and powerful driver for the necessary shift towards a more sustainable agriculture

LIFE AgriAdapt

SPECIFIC OBJECTIVES

TO IMPROVE THE KNOWLEDGE BASE FOR THE DEVELOPMENT, ASSESSMENT AND MONITORING OF THE CLIMATE CHANGE VULNERABILITY AT FARM-LEVEL

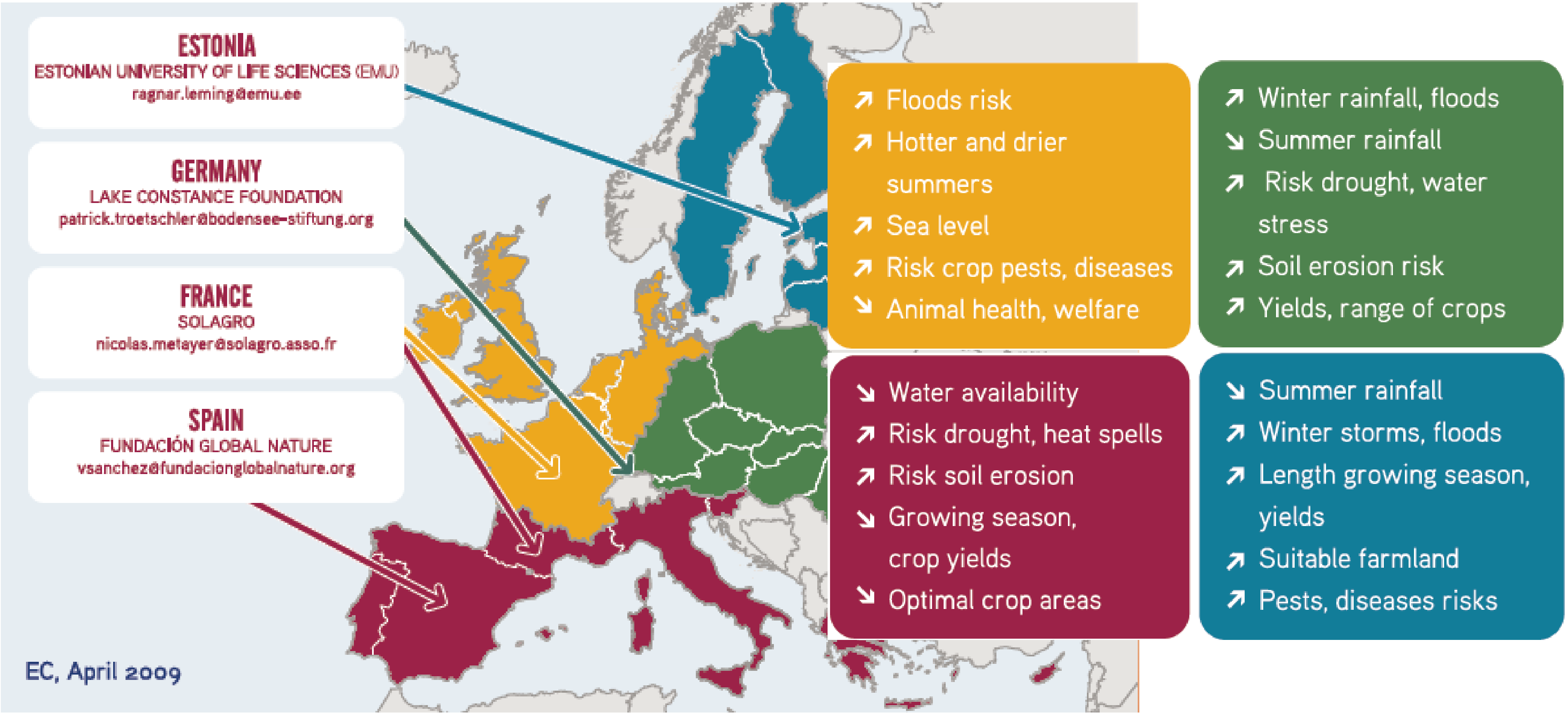
TO TEST SUSTAINABLE MEASURES AND MANAGEMENT APPROACHES ON 120 PILOT FARMS.

TO PROMOTE SUSTAINABLE ADAPTATION MEASURES BY DEMONSTRATING AND DISSEMINATING ACTIONS

TO RAISE AWARENESS AND KNOW-HOW OF CURRENT FARMERS AND FUTURE FARMERS FOR SUSTAINABLE ADAPTATION OPTIONS

TO CONTRIBUTE TO THE DEVELOPMENT AND IMPLEMENTATION OF EU, NATIONAL AND REGIONAL POLICIES ON CLIMATE CHANGE ADAPTATION

LIFE AgriAdapt

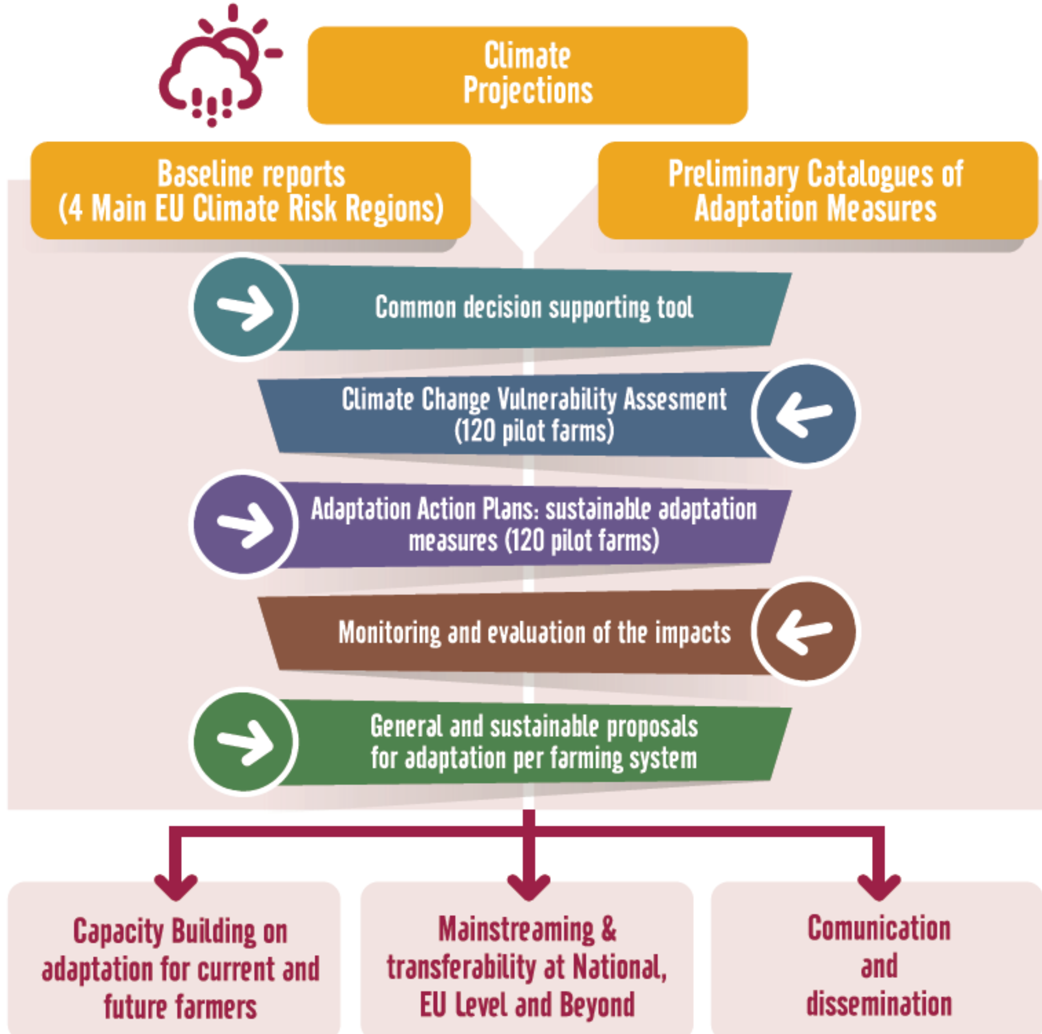


4 PROJECT PARTNERS IN 4 EU CLIMATE RISK AREAS

44 MONTHS
09/2016 – 04/2020

OVERALL BUDGET
2.150.000 EURO

LIFE AgriAdapt

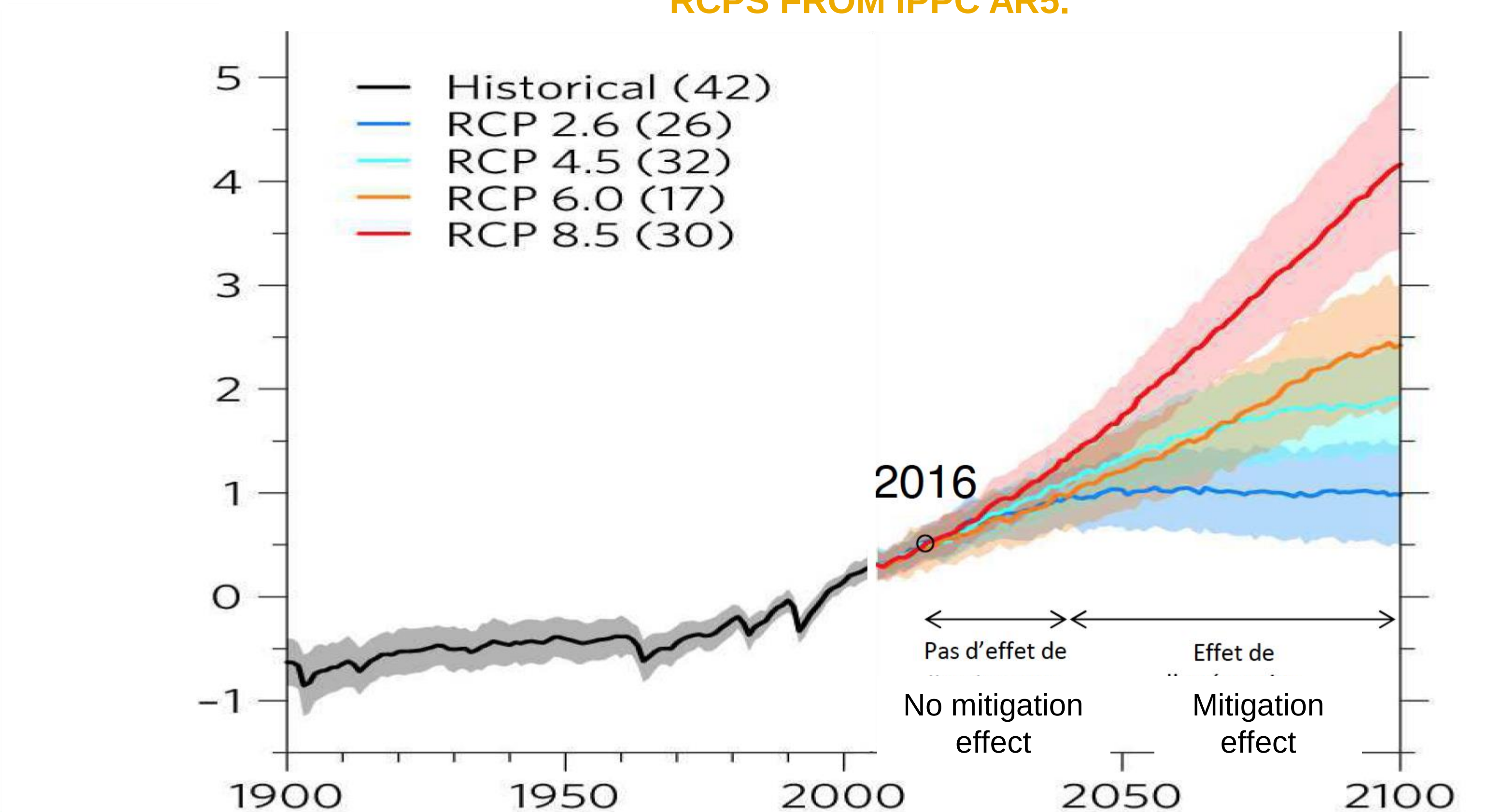


Final vulnerability assessment of 120 pilot farms across Europe

ADAPTATION & CLIMATE POLICIES

For the near future (time horizon 2050), few differences exist within the different RCPs scenarios which makes adaptation *a necessity* for farmers.

REPRESENTATIVE CONCENTRATION PATHWAY SCENARIOS
RCPS FROM IPPC AR5.



KEY CLIMATIC PARAMETERS FOR CROPS

From a physiological point of view, a crop needs for its development and growth: radiation, CO_2, an accumulation of high temperatures, an accumulation of low temperatures (for some of them) and water.

4 MAJOR WEATHER EVENTS

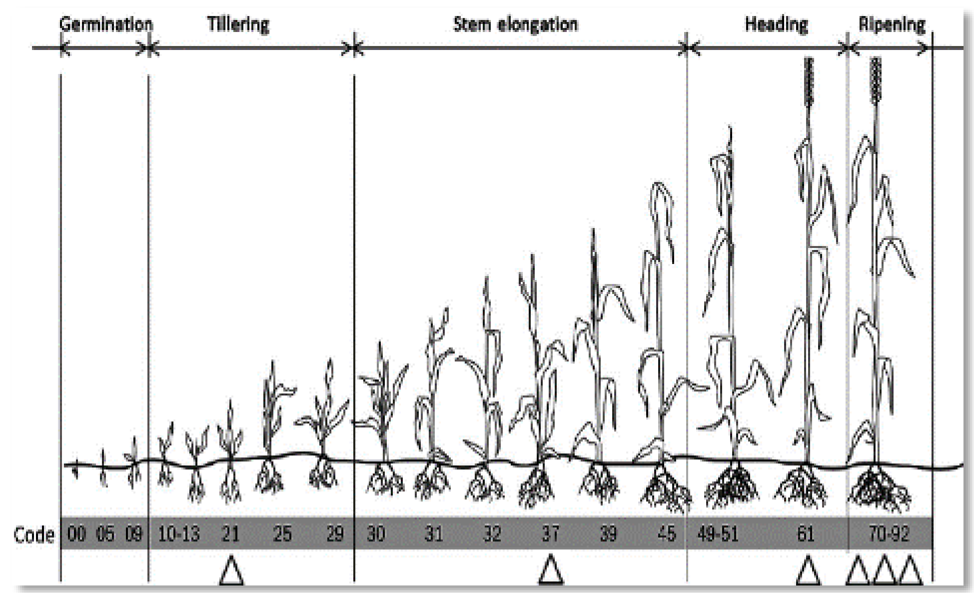
High temperatures

Low temperatures

Water deficit

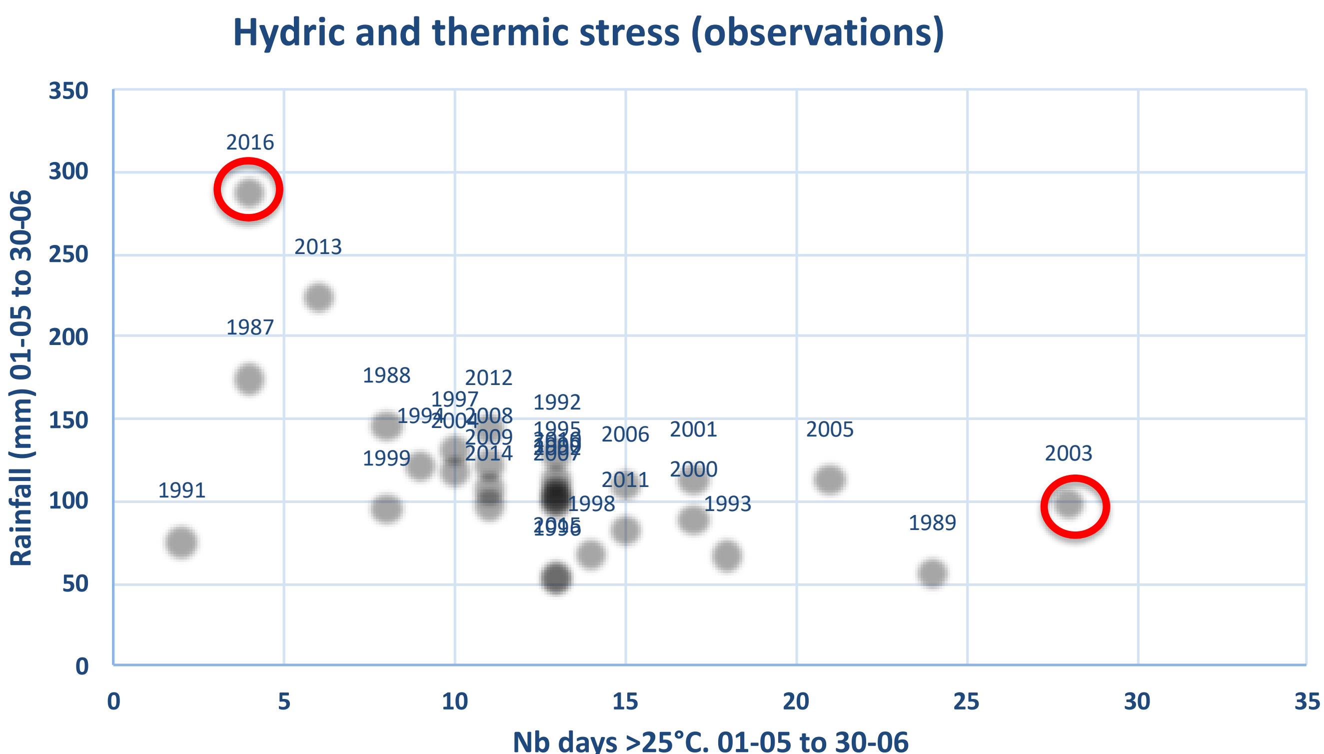
Excess water

DEGREE DAYS: ENGINE OF PLANT DEVELOPMENT



YIELD COMPILATION

Soft wheat - Marne (France)

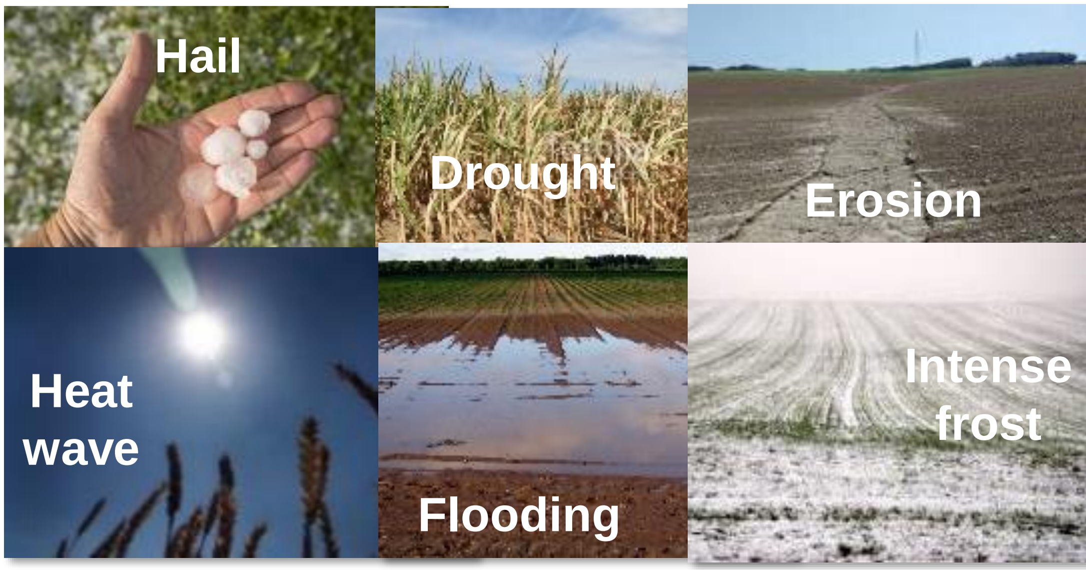


Solagro from Agri4Cast

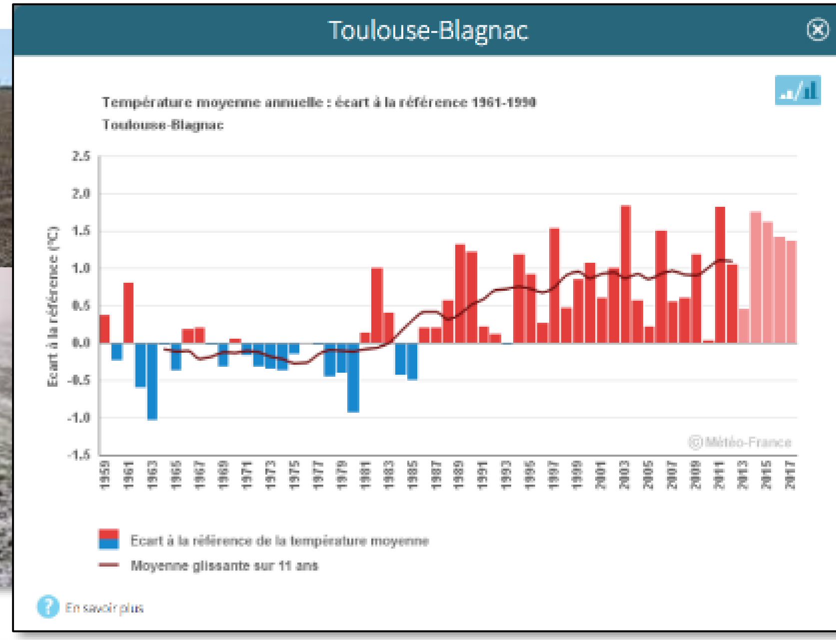
Yields 2000 - 2017	
2000	86,0
2001	84,0
2002	87,0
2003	74,0
2004	94,0
2005	82,0
2006	79,0
2007	80,0
2008	77,0
2009	89,0
2010	87,0
2011	84,4
2012	79,6
2013	88,1
2014	93,8
2015	95,9
2016	56,1
2017	81,0

FROM VULNERABILITY TO ADAPTATION: A LEARNING PROCESS FOR FARMERS

CLIMATIC HAZARDS...



… AND CLIMATE TRAJECTORIES



AGRIADAPT ROADMAP FOR ADAPTATION

2017

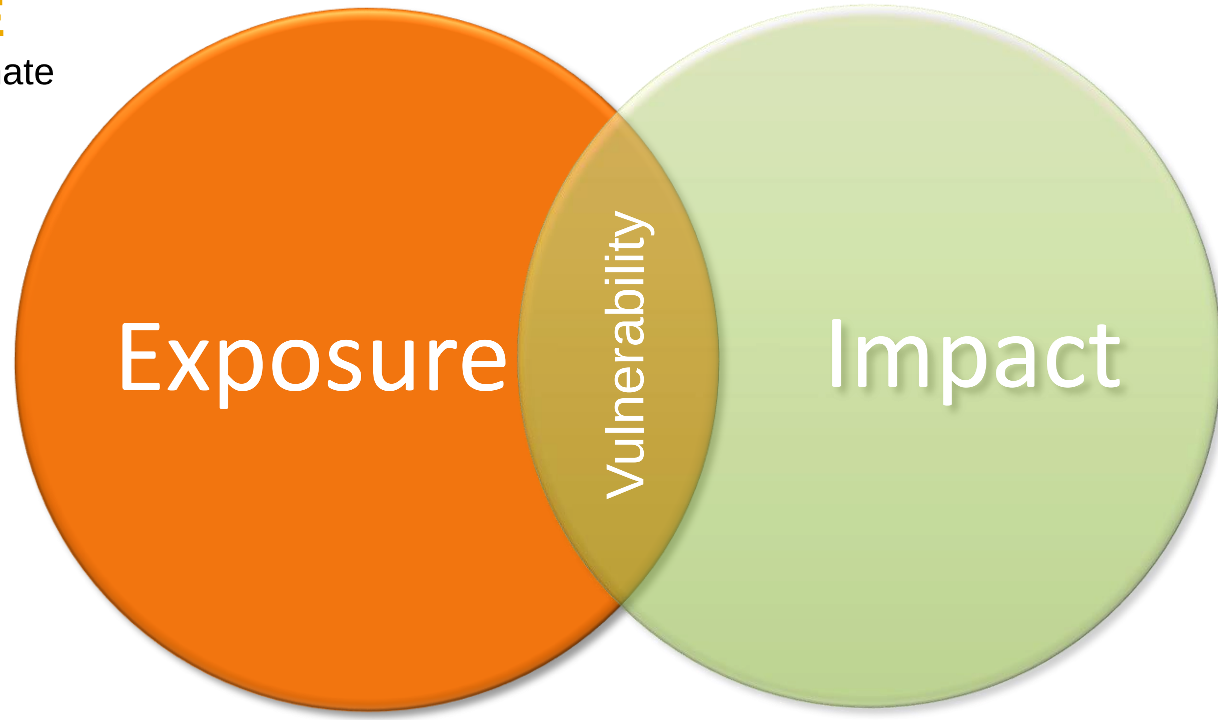
- Vulnerability unknown
- Awareness of Vulnerability, but no solutions identified
- Awareness of Vulnerability, solutions identified but no idea of their efficiency
- Awareness of Vulnerability, solutions identified and their efficiency (advantages and disadvantages) is quantified

2020

AGRIADAPT VULNERABILITY ASSESSMENT

The vulnerability level (or risk level) combine the probability of occurrence of climate stress (exposure) and the extent of the consequences (crop impact).

EXPOSURE
Frequency of climate stress
(i.e., key climatic parameters)



IMPACT OR SENSITIVITY
% of crop yield reduction experienced

VULNERABILITY = EXPOSURE x IMPACT

AGRIADAPT VULNERABILITY ASSESSMENT

The assessment helps to prioritize the level of vulnerability.

No scientific unit to measure a risk. To assess the levels of Exposure and Sensitivity, qualitative evaluation through rating scale is required.

AGRIADAPT VULNERABILITY MATRIX

Frequency	Exposure Score						
>50%	6	6	12	18	24	30	36
41-50%	5	5	10	15	20	25	30
31-40%	4	4	8	12	16	20	24
21-30%	3	3	6	9	12	15	18
11-20%	2	2	4	6	8	10	12
<10%	1	1	2	3	4	5	6
	Impact Score	1	2	3	4	5	6
	% Yield Reduction	0-10%	10-20%	20-30%	30-40%	40-50%	50%

COMMON DECISION TOOL: RELEVANT POINTS

CROP YIELDS

- **Regional level** (statistics):
Anual yields fot the last 15 years
- **Farm level**
(average, minimum and maximum)

CLIMATIC DATA

- **Daily climatic observations** (last 30 years)
for the Recent Past (RP)
- **Daily climatic projections** (30 years)
for the Near Future (NF)

COMMON DECISION TOOL

FARMER INTERVIEW

- **Agronomic data, livestock, economic and climatic data**

CLIMATIC RISK SCORING

- **Qualitative information**
(agronomic experts and bibliography)
and quantitative information

CLIMATE DATA

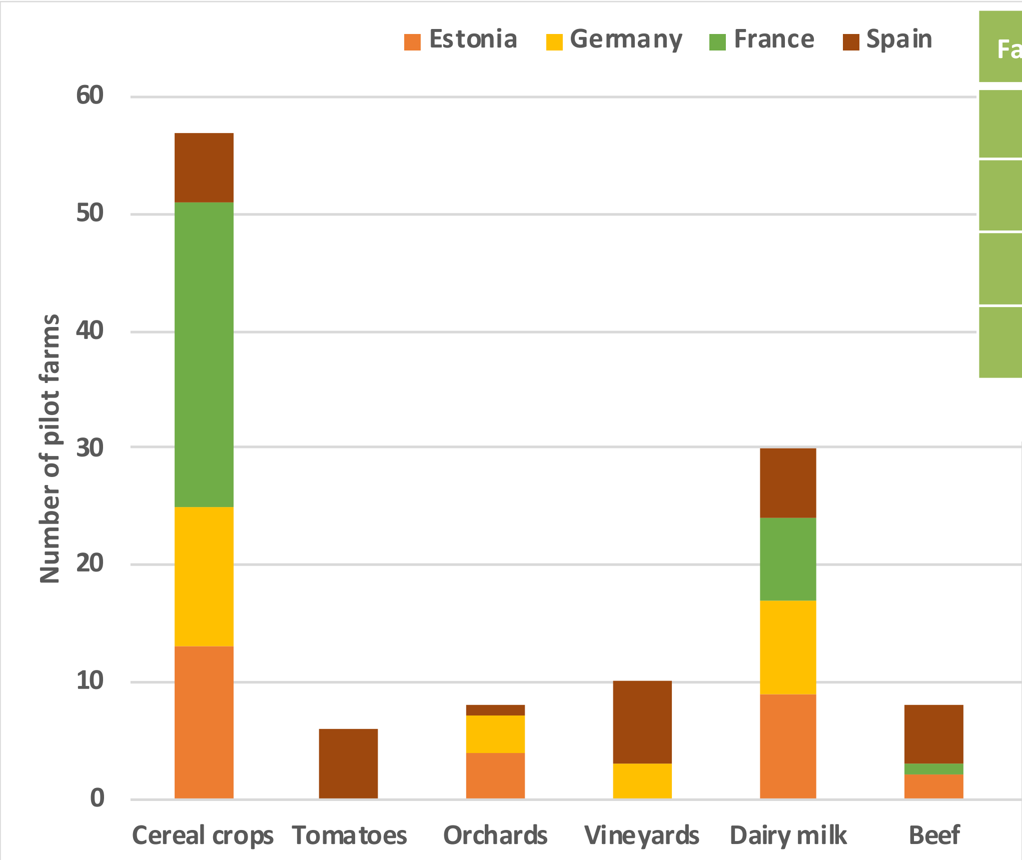
AUTOMATIC CALCULATION OF MORE THAN 75 ACI

- **Generic indicators:** rainfall, , temperatures, etc.
- **Fodder indicators: d**ate for grass regrowth, date for 1st grazing , etc.
- **Cereal crops indicators:** end of cycle thermal and hydric stress, etc.
- **Summer crops indicators:** temperatures > 32° C, summer hydric deficit, etc.
- **Rapeseed crops indicators:** drought at sowing, etc.
- **Vineyards and orchards indicators:** date of late frost, Huglin index, etc.
- **Animal indicators: te**mperature-humidity index, etc.

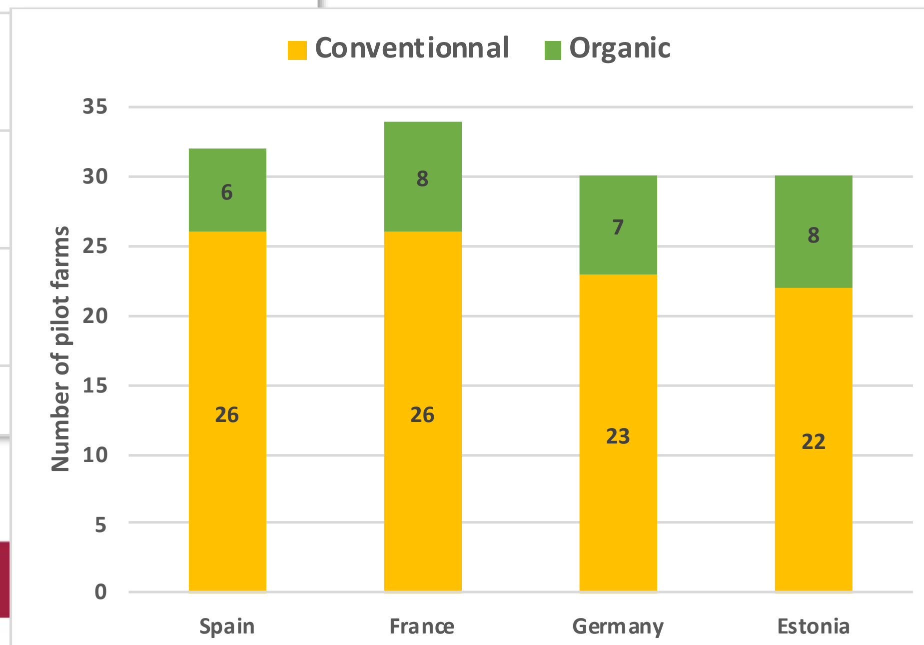
AgriAdapt pilot farms

Pilot farms characteristics

- Farming systems, farm size, farming practices

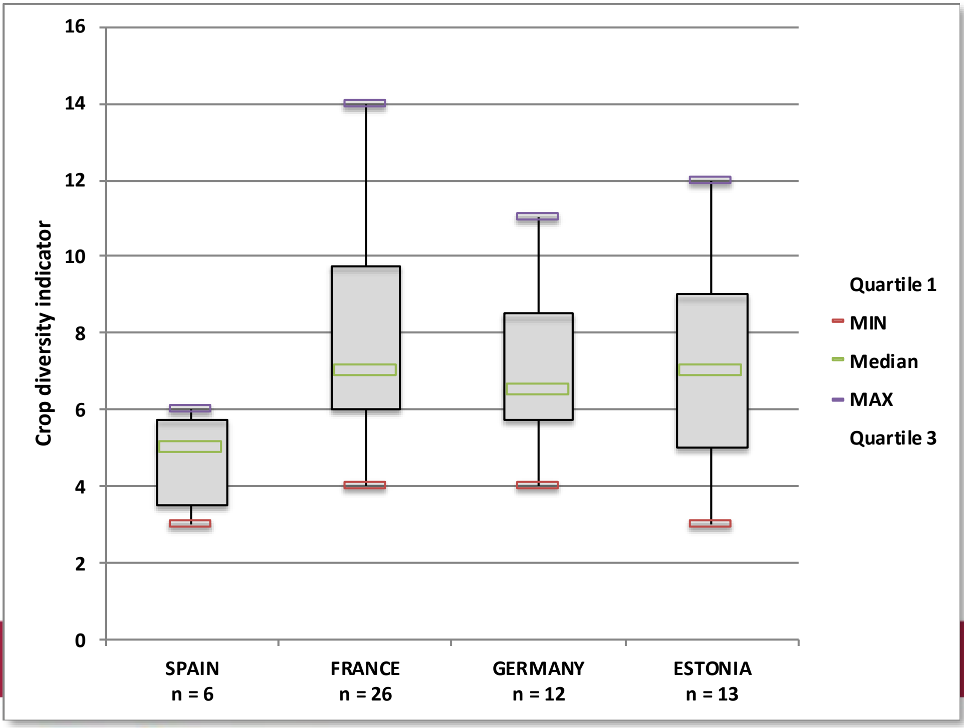


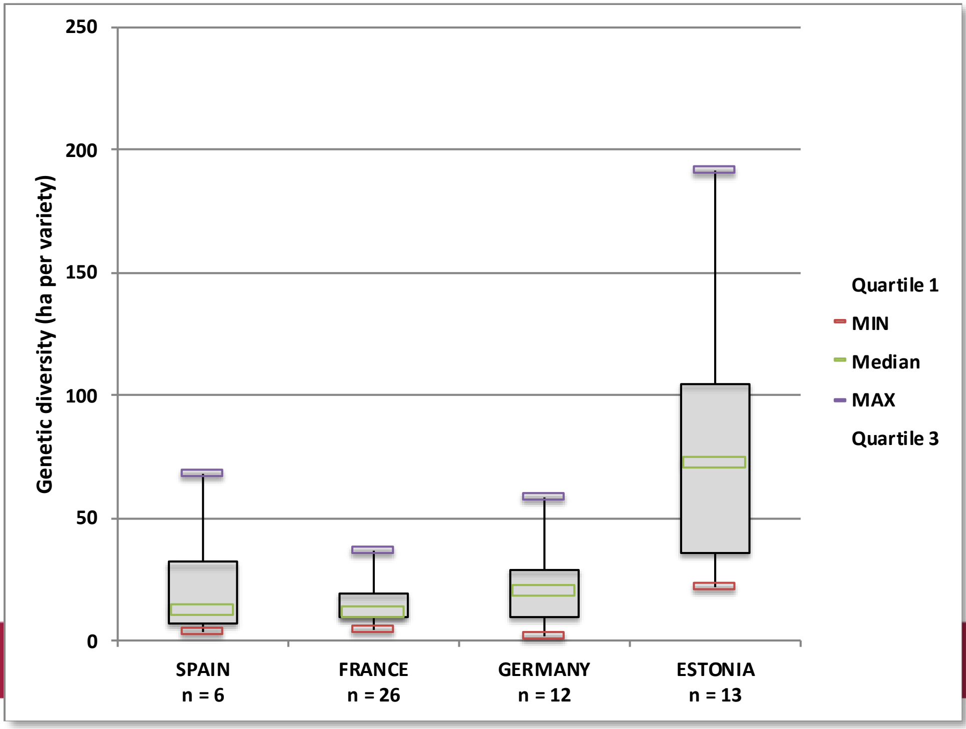
Farm size (ha UAA)	Minimum	Average	Maximum
Spain	1	235	1 715
France	48	164	380
Germany	6	113	322
Estonia	10	725	3 770



Cereal crop pilot farms

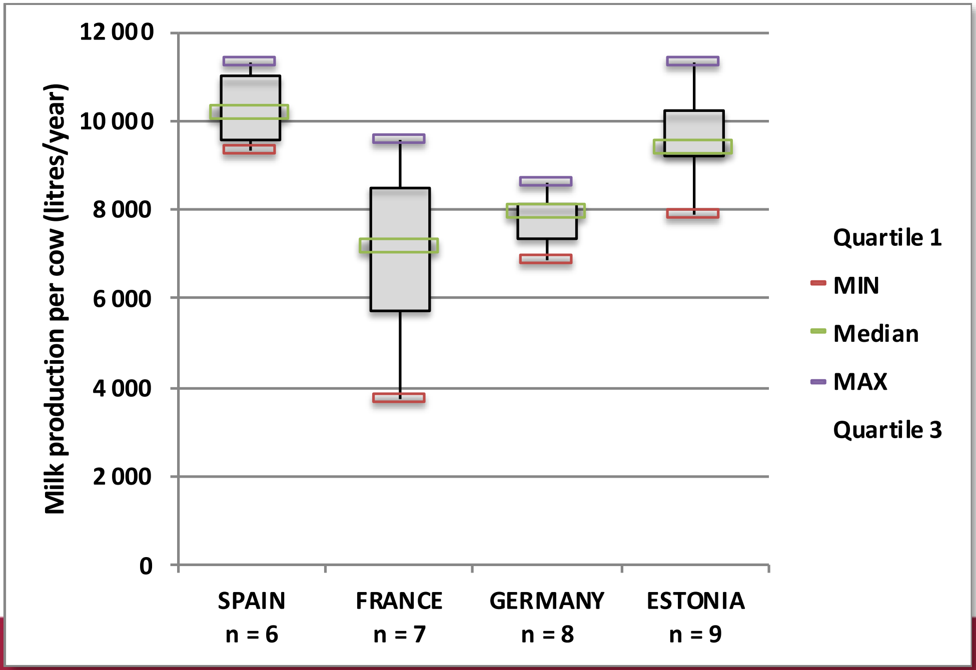
Farm size (ha UAA)	Minimum	Average	Maximum
Estonia (n = 13)	65	1 026	3 770
Germany (n = 12)	31	185	527
France (n = 26)	76	160	380
Spain (n = 6)	11	146	400

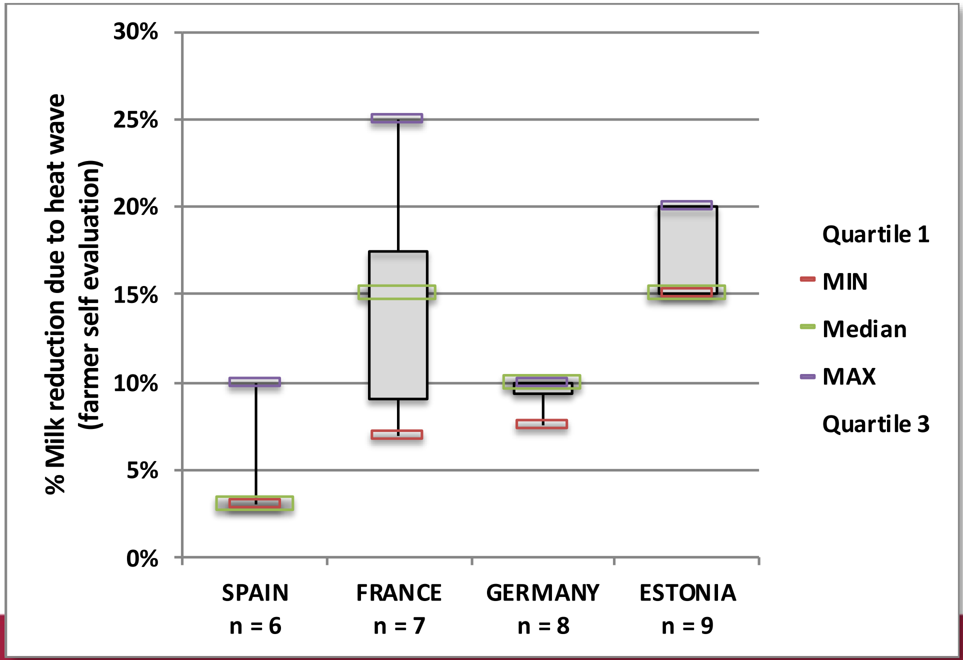




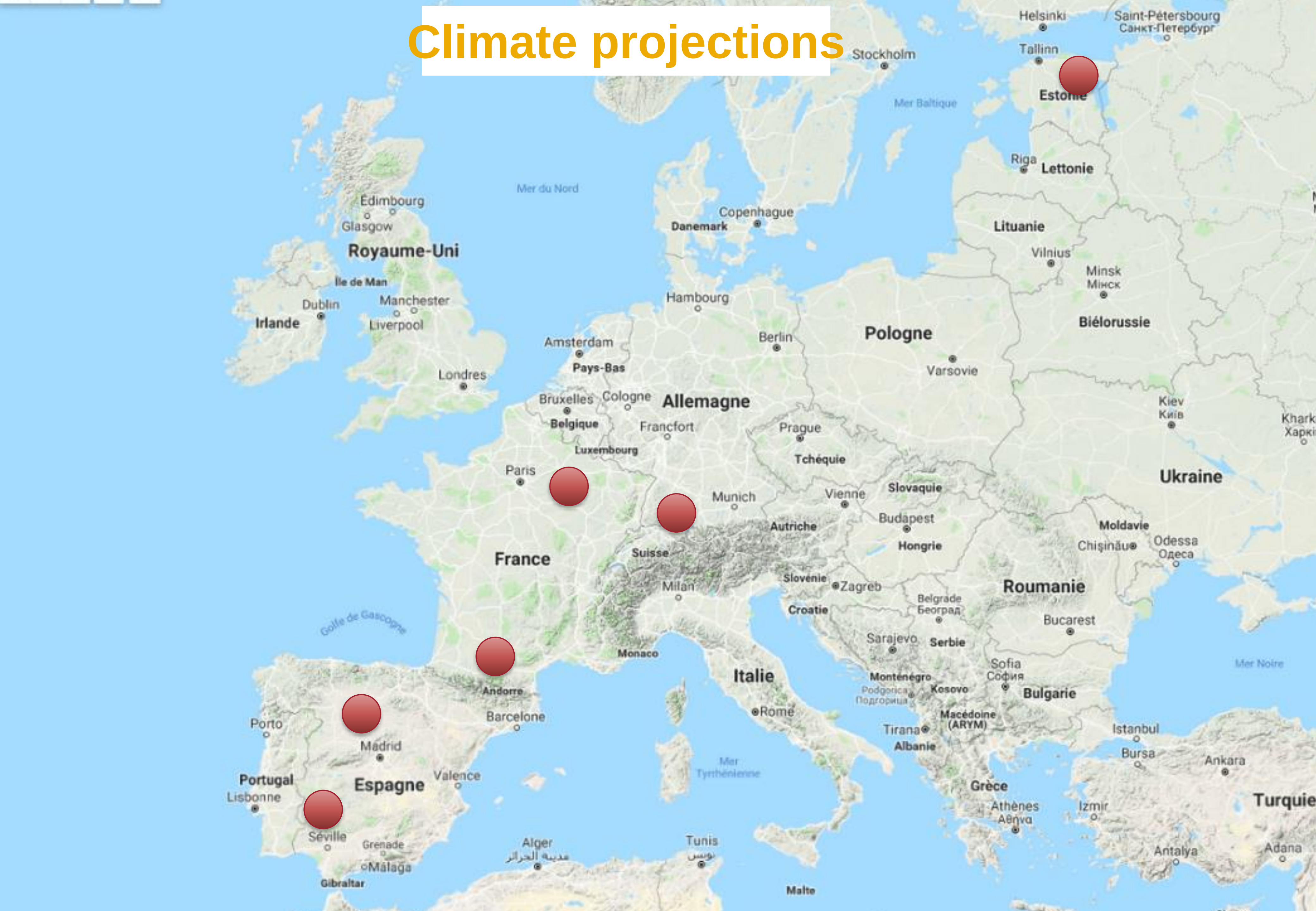
Dairy milk pilot farms

Number of dairy cows	Minimum	Average	Maximum
Spain (n = 6)	87	156	230
France (n = 7)	32	94	240
Germany (n = 8)	74	117	250
Estonia (n = 9)	65	448	1 819

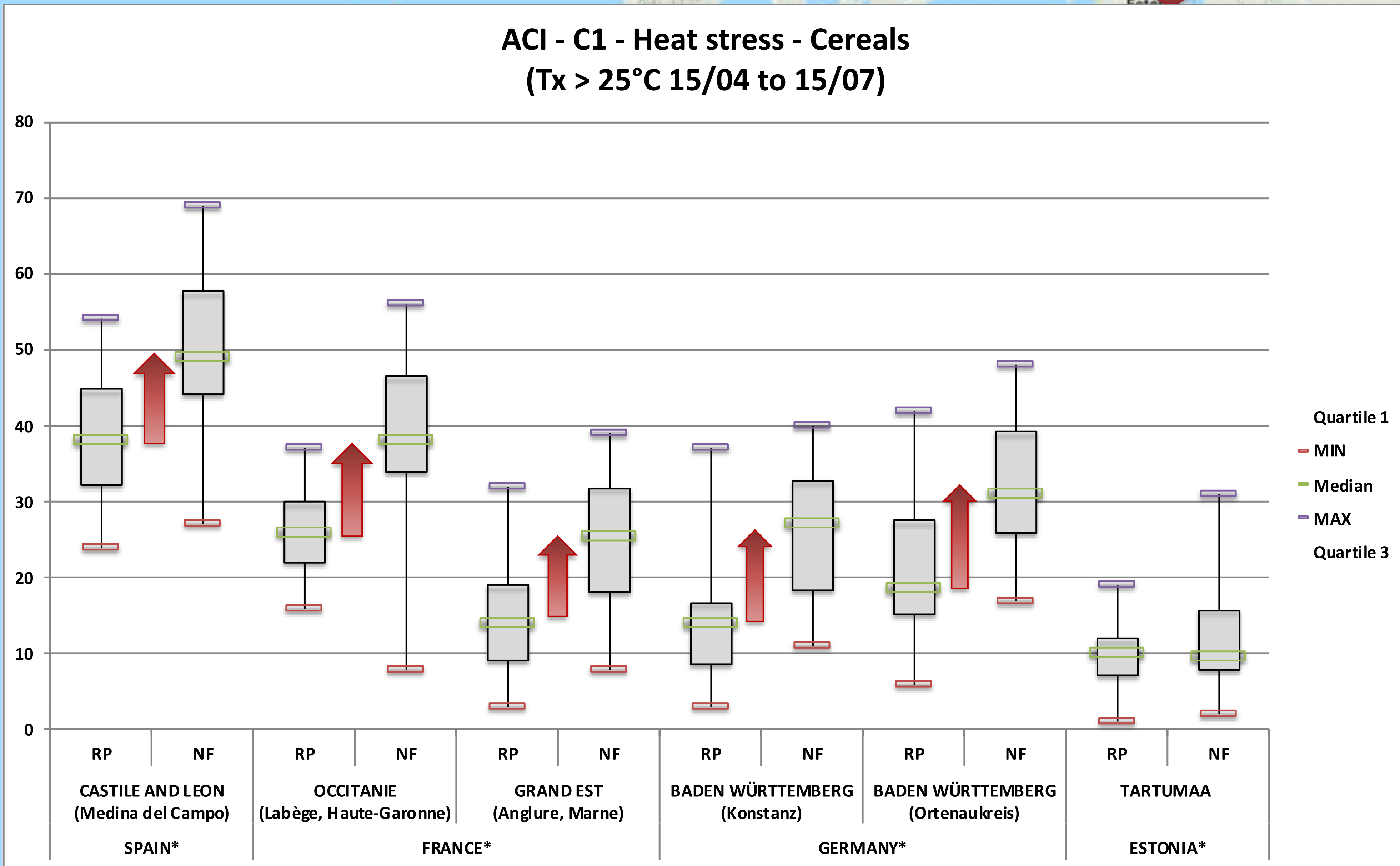




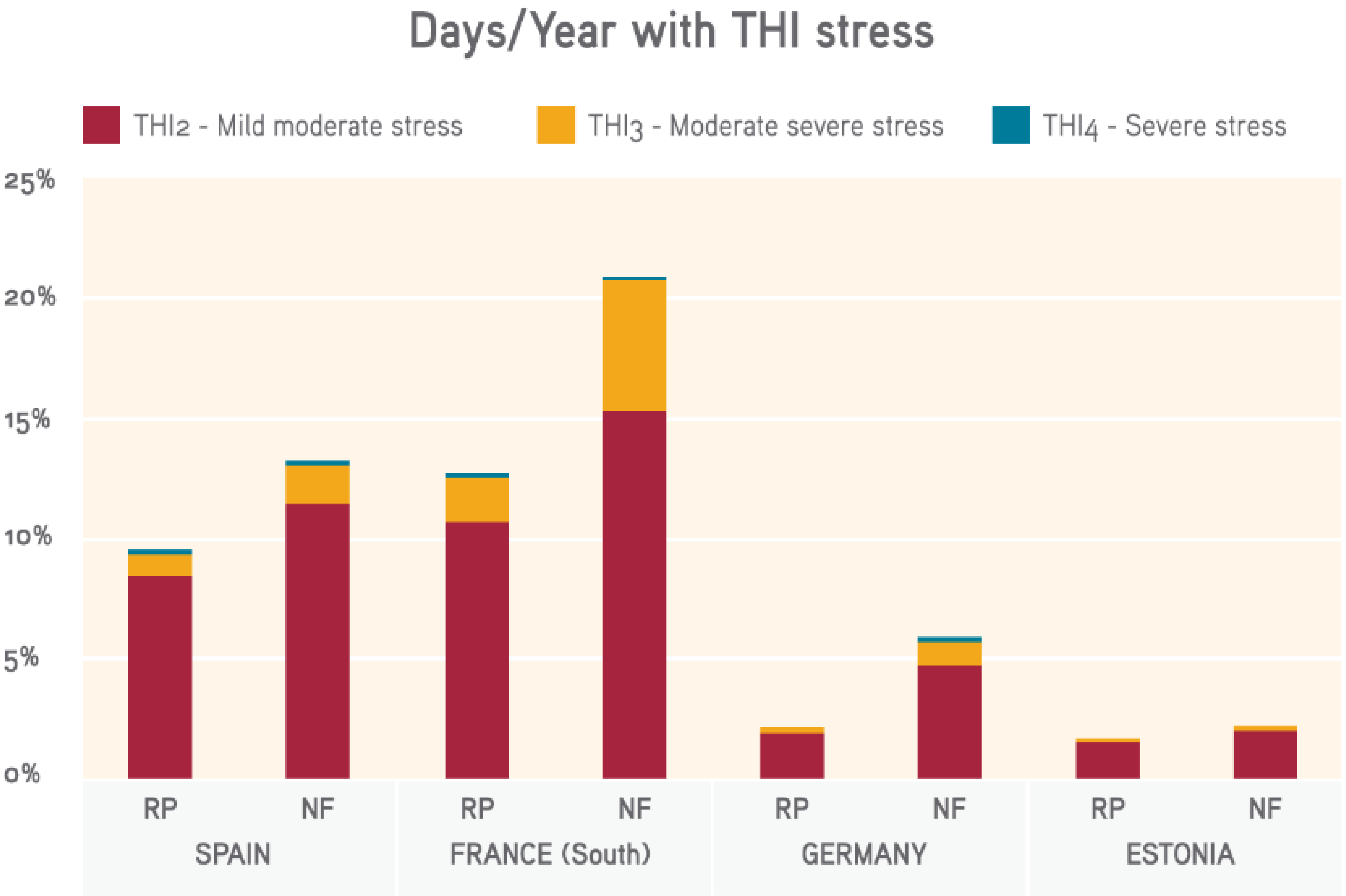
Climate projections



Climate projections - Cereals



Dairy milk pilot farms



Pilot farms SWOT analysis (1)

Region	Strengths	Weaknesses
Southern	• Agricultural insurance • Well adapted varieties • Farming systems with diverse crops, extensive agroforestry systems	• Increasing dependence on monocultures • Insufficient management of grasslands
Atlantic	• Diversified cropping systems • Good fodder management • Irrigation	• Inadequate crops cultivated and/or low genetic diversity • Irrigation restrictions • Insufficient thermal comfort for animals
Continental	• Use of catch crops before spring crops • Income from various pillars • High fodder autonomy of dairy farms	• High share of one specific crop • Inadequate use of plough as main soil tillage management • Only three crops in rotation (especially dairy farms)
Northern	• High crop diversity and suitable soils for permanent crops • Range of varieties grown • High fodder autonomy	• No irrigation used in permanent crops • Low availability of suitable fallow fields for arable farms • Poor soil drainage on livestock farms

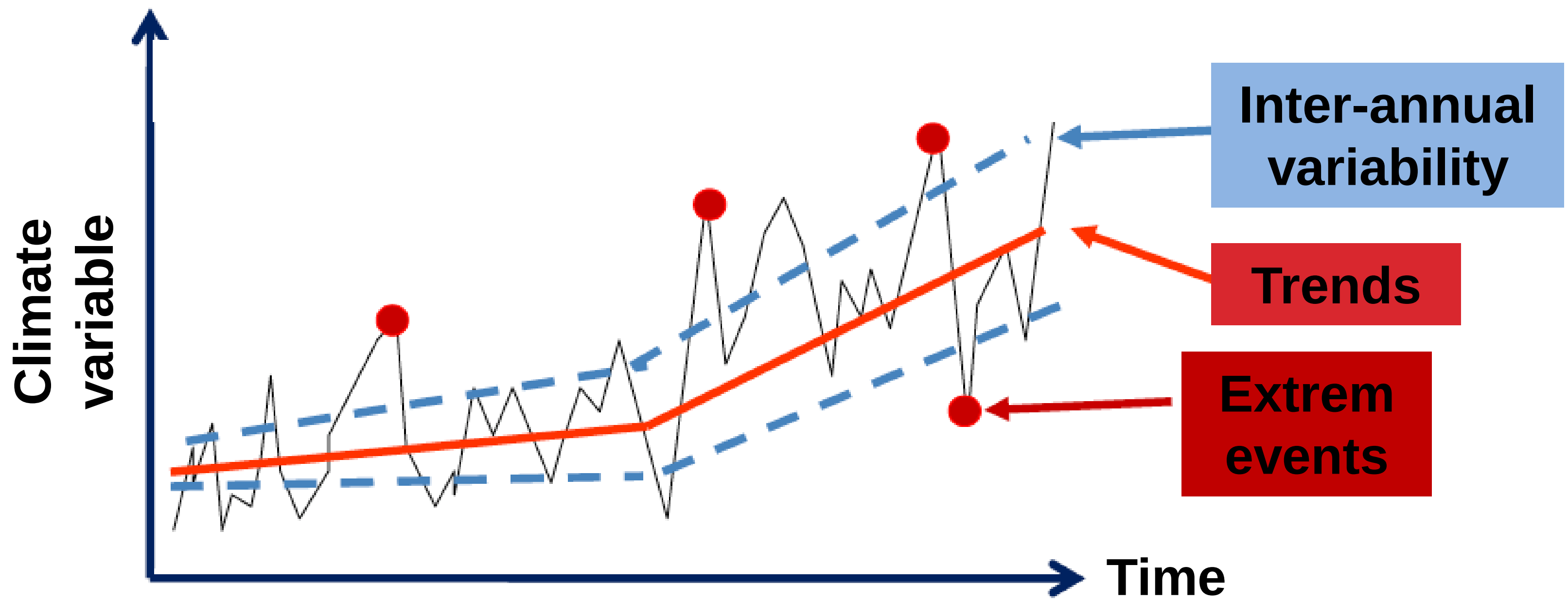
Pilot farms SWOT analysis (2)

Region	Opportunities	Threats
Southern	• Higher productivity in temperature-limited areas if water is ensured • Increased pasture production in autumn/winter due to increased temperature • Possibility for new crops through warmer winters	• Increase in heat waves in spring and summer: increase in yield variations and heat stress for animals • Less rainfall in winter-spring • Increase of hydric deficit in spring and summer
Atlantic	• Better climatic conditions in autumn • Significant decline of the number of frost days/ year • Possibility for new crops through the increase in GDD	• Increase in yield variations due to climate stress in May/June • Increase of hydric deficit in spring and summer • Increase in heat stress for animals
Continental	• Opportunity for new crops or varieties • Longer vegetation period positive for grassland and tuber crops • Reduction of moisture loving pathogens	• Higher variability in yields • Increase in heat stress for dairy cows • Risk of more and new pests/diseases/weeds due to higher temperatures and longer vegetation period
Northern	• Longer growing period, potential increase of yields and quality • Diversity of crops and varieties increased • Energy needed to heat livestock buildings is reduced	• More climatic extremes expected, higher risk for permanent crops • Increasing risk of new pests and diseases with new cultivars • Lower performance of livestock due to heat stress, especially outdoors

Sustainable Adaptation:

General proposal per Farming System

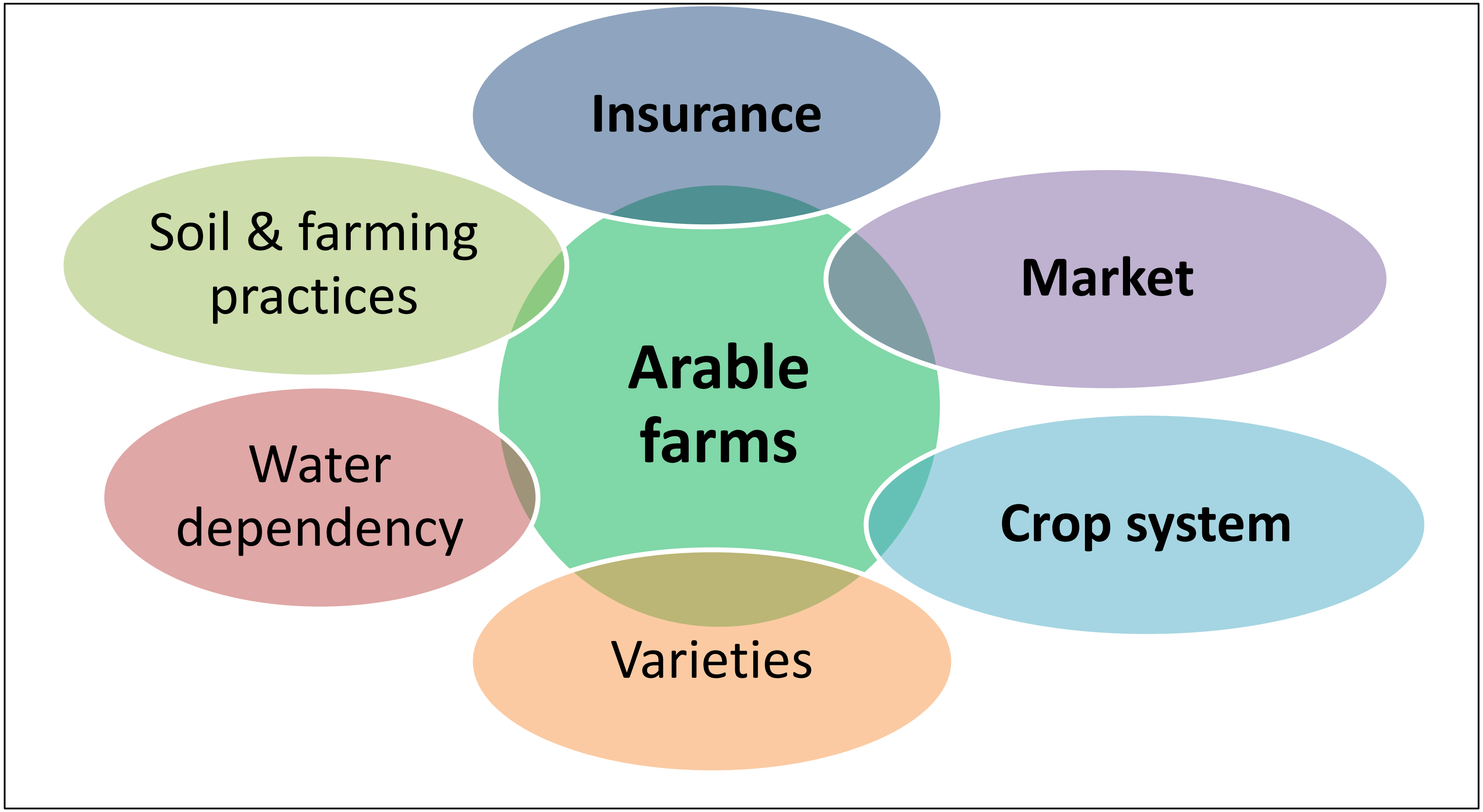
Adaptation issues



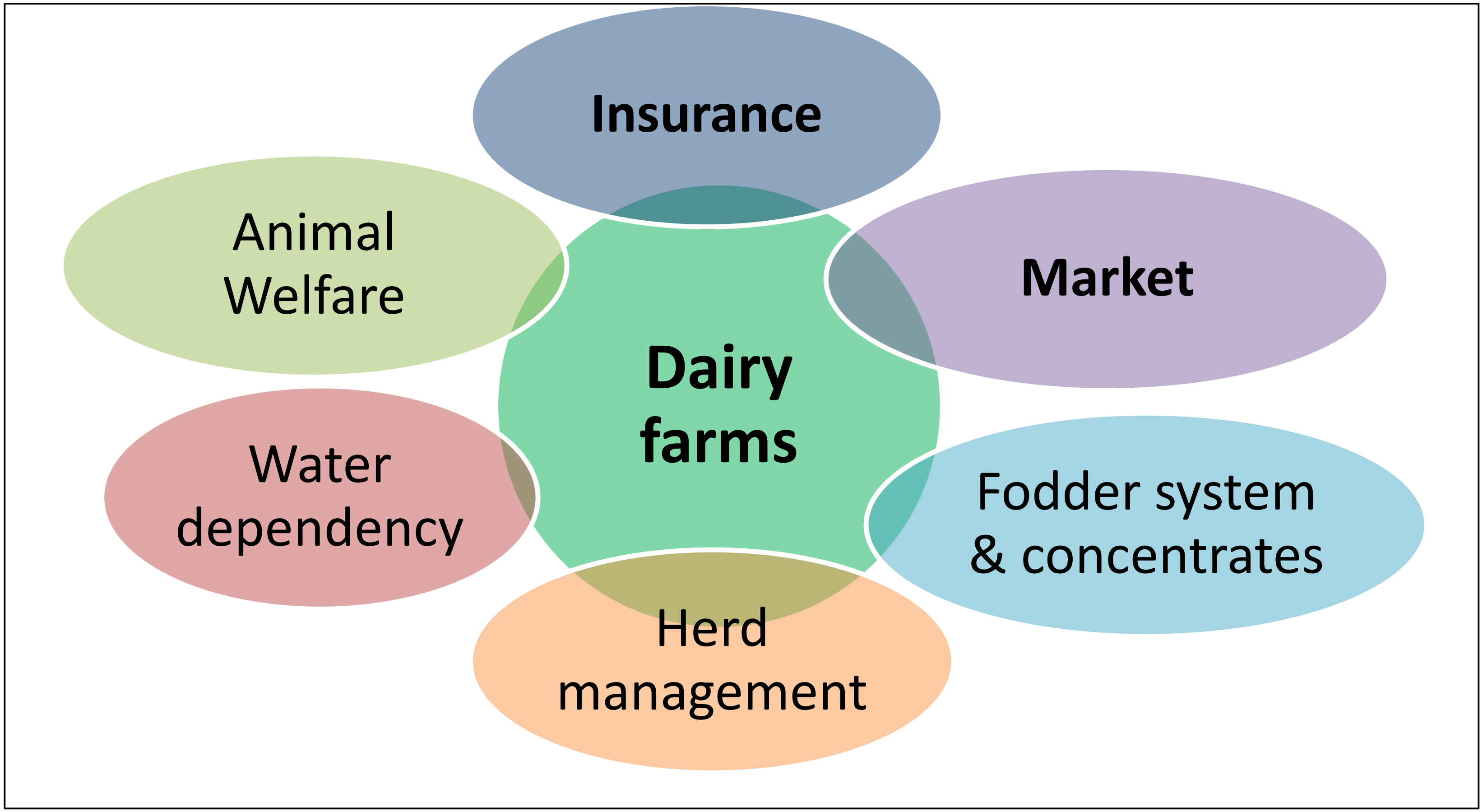
Adaptation is :

- **1 - Adapting to a trend**
- **2 - Reduce inter-annual vulnerability**
- **3 - Face extrem events**

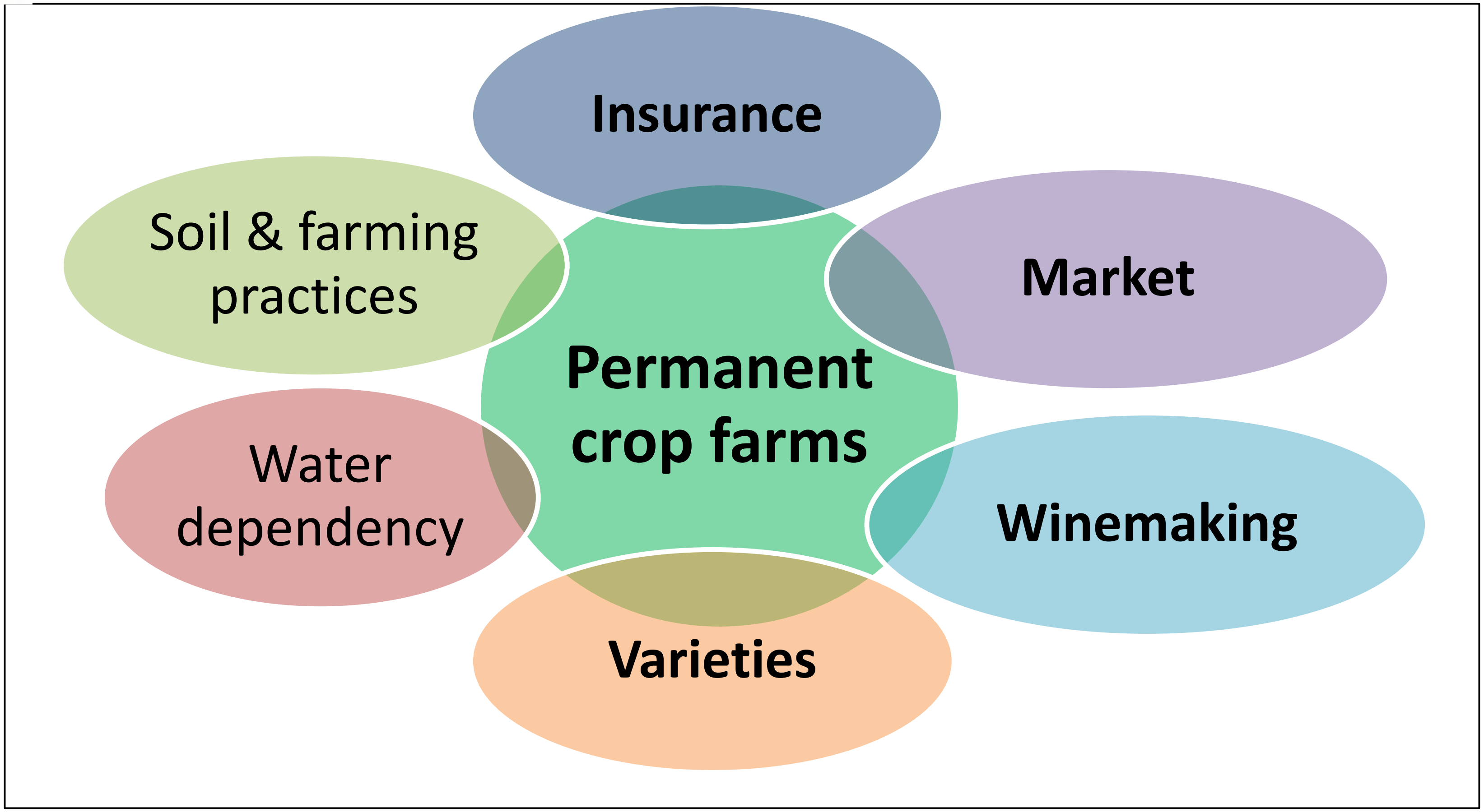
Farm vulnerability components / Farm level



Farm vulnerability components / Farm level



Farm vulnerability components / Farm level



Adaptation measures / 3 levels

Efficiency

- The objective is to **optimize the current agricultural process**, the changes concerned are therefore quite **limited**

Substitution

- The objective is to substitute **components** of the system without changing the orientation. The **changes are more important** and therefore more complex to implement

Re design

- The objective is to rethink the **overall farm process** more suited to climatic constraints.

Examples:
Adjustment of the cultivated **variety** (more resistant to heat or water stress). Sell animals following a fodder deficit.

Examples:
Substitution of crops such as corn with sorghum
Diversify forage components

Examples:
Re-conception of rotation (new crops) Create a **new economic activity** on the farm.

Key adaptation measures

Soil and farming practices
- Max. soil cover
- Reduce soil tillage
- Improve organic matter content

Crop system
- Adapted sowing date
- Crop diversification
- Mixed cropping

Varieties
- Select suitable varieties
- Limit area sown by variety
- Set up a mix of varieties at field scale

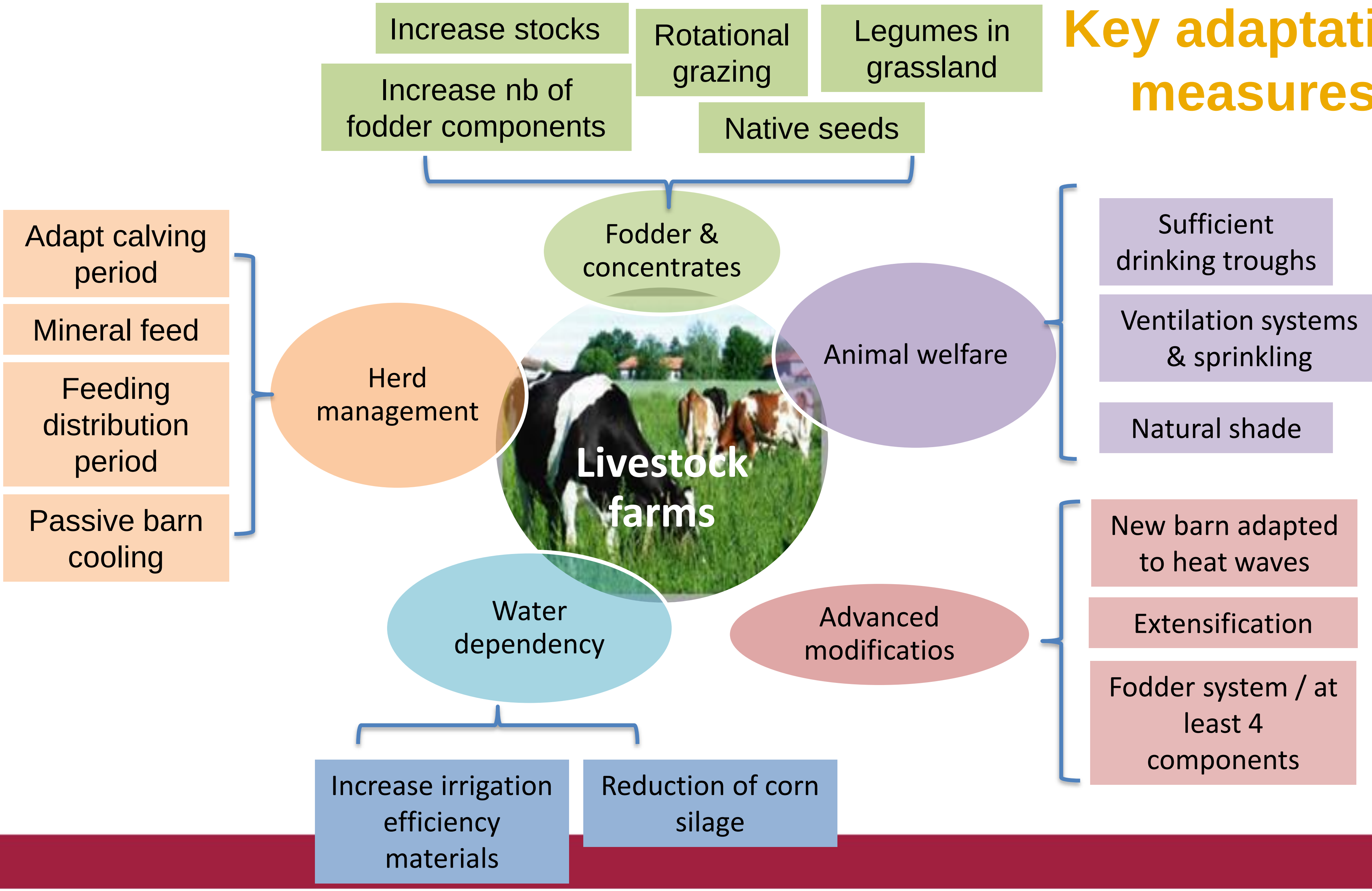
Water dependency
- Increase irrigation efficiency
- Crop substitution
- Improvement of resource management

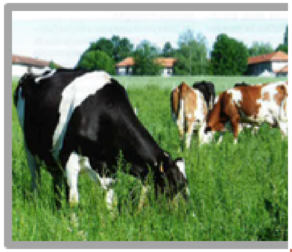
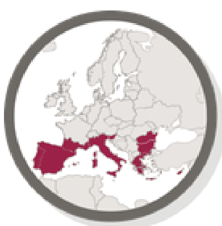
Advanced modifications
- Wide and diverse crop rotation
- Direct seeding with cover
- Organic farming
- Complex mix of varieties

	Crop system		Varieties		Soil & farming practices		Water dependency		Advanced modifications
	Crop diversification	Mixed cropping	Limit area sown by variety	Set up a mix of varieties at field scale	Soil cover	Reduced soil tillage	Improvement of resource management	Crop substitution	Long and diverse crop rotation Complex mix of varieties Direct seeding under cover crop
	Optimize growth regulator and - stimulators	Introduce of catch- & cover crops and diversification of crop rotation	Select varieties more suitable for local conditions	Invest into stabile varieties that provide the yield in the local climate	Site specific agrotechnology, transition to precision agriculture	Optimize technological field capacity; Invest into improving the soil fertility	Restore the soil amelioration systems	Operate for land reclamation consortia to manage landscape scale water systems	Adaptation of new varieties, technologies and methods to follow the dynamic progression of the research and development
	Cultivation of diverse catch crop mixtures	Cultivation of new crops	Cultivating different varieties of one crop	Using varieties more drought/heat tolerant	Crop residues remain on the field	Reduced soil tillage	Soil cover throughout the year	Efficient watering systems	Good soil structure by optimized fertilization, diverse crop rotation with adapted crops, soil cover throughout the year, organic fertilisation and a careful soil tillage
	Changes in sowing dates	Crops diversification	Prove different varieties (different cycles)	Set up a mix of varieties at field scale	Soil cover	More Organic matter	Crop substitution	Deficit irrigation	Long and diverse crop rotation Complex mix of varieties Test different combinations of phenology, sowing dates, and varieties.

Short term | Mid term | Long term

Key adaptation measures



	Fodder system & concentrates		Herd management		Animal welfare		Water dependency		**Advanced modifications**
	Build up a fodder safety stock in a favorable year	Increase the number of fodder components	Adapt the feeding distribution period	Avoid heat peaks for calving	Using ventilation fans, sprayers, sprinklers	Creating and facilitating natural shade	Increase efficiency of irrigation equipment	Reduce the proportion of corn silage	Reduce the number of cows Develop a fodder system based on minimum 4 components Rotational grazing Building adapted to heat waves
	Increase diversity of fodder crops	Increase fodder storage capacity	Adjust grazing management	Biosecurity measures	Shelters for grazing animals	Installing cooling systems	Sprays for cooling	Drought resistant crops (corn for silage)	Restoring the drainage systems Backup power generators
	Legumes in grassland	Fodder stocks and portioning	Higher share of mineral feed	Passive barn cooling	Sufficient drinking troughs	Roof greening and sprinkling	Water sprays for cooling		New barn adapted to heat waves
	Native seeds sowing (extensive livestock)	Rotational grazing (extensive livestock)	Transhumance (extensive livestock)	Regeneration of trees in agroforestry systems. (extensive livestock)	Ventilation systems in barn and milking parlour (dairy)	Fodder production autonomy though diversification and other techniques (dairy)	Water sprays for cooling animals (dairy)	Grain production autonomy (dairy)	Keyline design (extensive livestock)

Short term | Mid term | Long term

Key adaptation measures

Farm
- Focus on traditional varieties
- New varieties from warmer cllimates
- Adapt wine making techniques

Permanent crops

Field
- Leaf and grape management
- Adapt pruning
- High quality vs high yield

Soil & farming practices
- Max. soil cover
- Improve organic matter content

Water dependency
- Increase irrigation efficiency materials
- Supplementary irrigation
- Improvement of resource management

Advanced modifications
- Vine format
- Vine orientation
- New locations (cooler areas)
- Modification of PDO specifications

	Field		Farm		Soil & farming practices		Water dependency		**Advanced modifications**
	Leaf management	Modification of pruning	Adapt oenological practices	Try new varieties	Organic matter	Soil cover	Improvement of resource management	Supplementary Irrigation	Reorganize plantations Change altitude Modification of PDO specification
	Leaf management	Modification of pruning	Using info services for pest monitoring	Varieties more suitable for local conditions	Organic matter	Soil cover	Restore soil amelioration systems	Supplementary irrigation	Restoring drainage systems, Using hail nets and/or winter covers to minimize crop damage
		Adaptation of the site to ensure outflow of cold air	Using agricultural info services (especially pest control)	Insurances for extreme weather events	Organic matter	Shallow soil tillering	Soil cover	Using adapted varieties	Diverse and adapted varieties, good soil structure by organic fertilizer, effective hail protection (hail nets); cultivating different sites (also in cooler areas)
	Leaf and grape management	Focus on high quality grapes instead of high yield	Focus on traditional varieties	Try new varieties from warmer climates	Organic matter	Soil cover	Irrigation efficiency	Supplementary Irrigation	Vine format and/or orientation Explore rootstock/varieties combinations Expand to cooler areas Winemaking techniques

Short term | Mid term | Long term

REASONS NOT TO IMPLEMENT MEASURES

- **Cultivation aspects**
  - cultivation of alfalfa with less cuttings
  - tall fescue (drought tolerant) – difficult to sow into the grass
  - drip irrigation – not efficient for cooling the potato-ridges
  - late pruning (vineyards) risks are higher than possible benefits
  - reduced soil management: less effective herb management, higher disease pressure
  - Permanent cover crops or green covers (in Southern Region, due to water deficit)

- **Financial and social efforts**
  - rotational grazing, outlet
  - changing feeding times
  - introducing agroforestry
  - hail nets (low cost/efficiency)
  - wider crop rotation
  - investment in pressure regulator (tyres)
  - high quality vs high yields (permanent crops)
  - New locations for permanent crops
  - investments in drainage systems or any other long term measure, because of high share of rented land

REASONS NOT TO IMPLEMENT MEASURES

- **External regulations**
  - requirements from clients for certain varieties
  - uncovered outlet
  - shading trees (→ fellling permits)
  - licensing procedures difficult and expensive for watering (e.g. for frost protection)
- **Uncertainties in weather**
  - changing seeding times
  - watering (not enough water in surface water)
  - undersowing
- **No „benefit“ for farm**
  - introducing legumes (except for Southern region)
  - cultivation of meslins, clover-grass, legumes

4 Key measures
« No regret adaptation »




Diversification

Livestock buildings

Soil conservation

Extensification



The Adaptation Training Pack & AgriAdapt Webtool for Adaptation (AWA)

Farming Adaptation Training Pack
CONTENTS

A. The project
B. European Agrarian Sector Vulnerability to Climate Change
  - 1 European Context
  - 2 Atlantic Climate Zone
  - 3 Continental Climate Zone
  - 4 Southern Climate Zone
  - 5 Northern Climate Zone
C. Project Methodology
D. Sustainable Adaptation Measures
E. The relationship between: adaptation to climate change and farm competitiveness, environmental synergies, regulations compliance & market opportunities. Communication tools
F. Study cases on pilot farms (Short videos and documents)
G. Posters for training

Is this training pack useful for you?

TARGET PUBLIC:

- Agrarian Structures: cooperatives, unions, associations
- Training entities, Capacity building
- Agrarian Insurance companies
- AgriFood Labels and Standards



TRAINING PACK FORMAT

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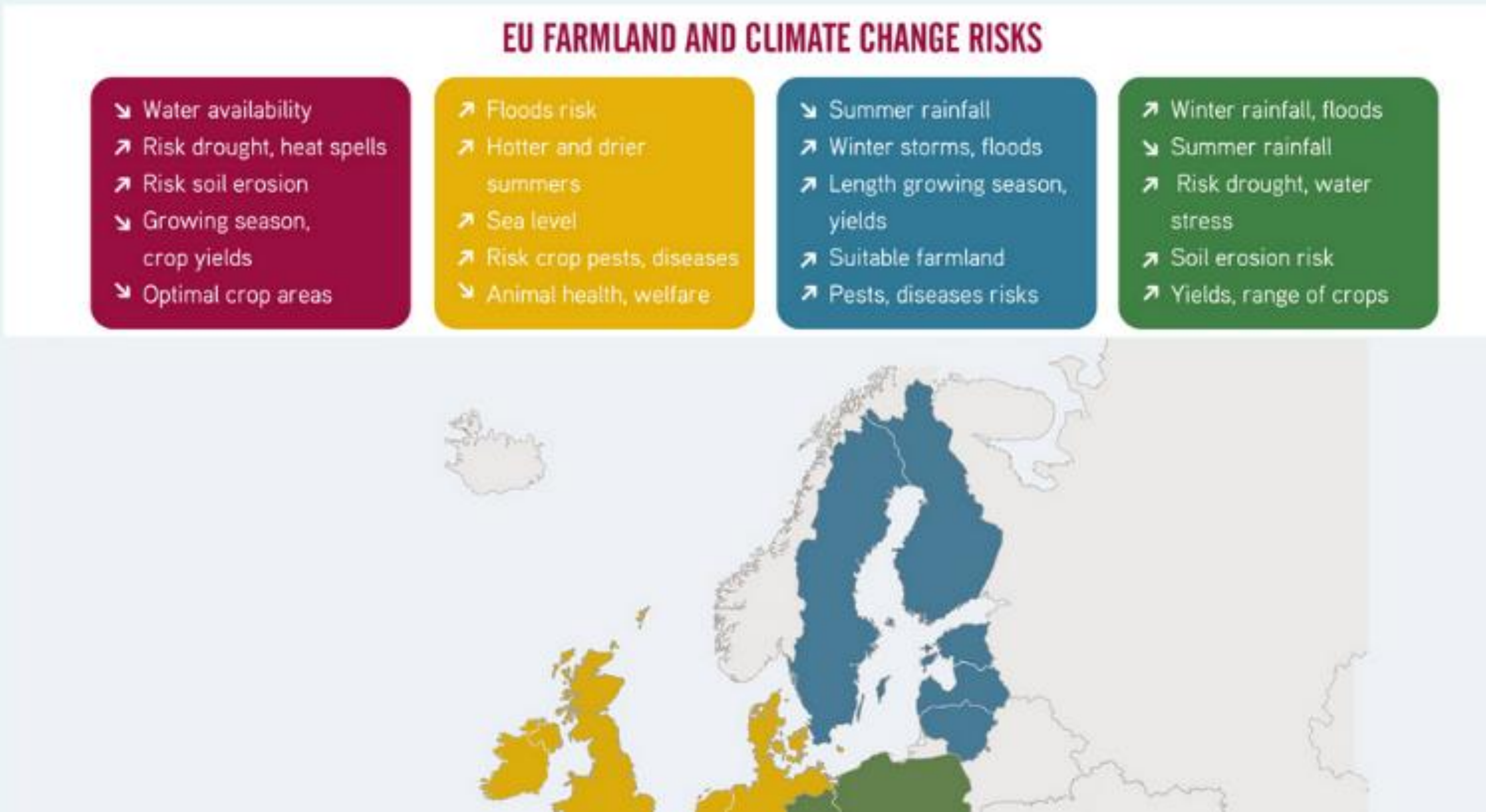
English

AWA - AgriAdapt Webtool for Adaptation

One of the main challenges facing the world, and the agricultural sector in particular, is climate change. Even if some of the changes in climate could be beneficial for some European agricultural production, most of the changes have had negative impacts and disproportionately affect regions already concerned by other environmental problems. European farmers have and will have to adapt to a changing climate, through measures that go beyond simple adjustments to ad hoc practices. In order to limit the vulnerability of their farms to increasingly variable climatic hazards, adaptation must first of all be designed and undertaken in a sustainable manner.

It was in this context that the European AgriAdapt project was born, supported by the LIFE program of the European Commission. It brings together French, Spanish, German and Estonian partners, who represent four areas constrained by different climatic risks.



Farm vulnerability and adaptation Quiz

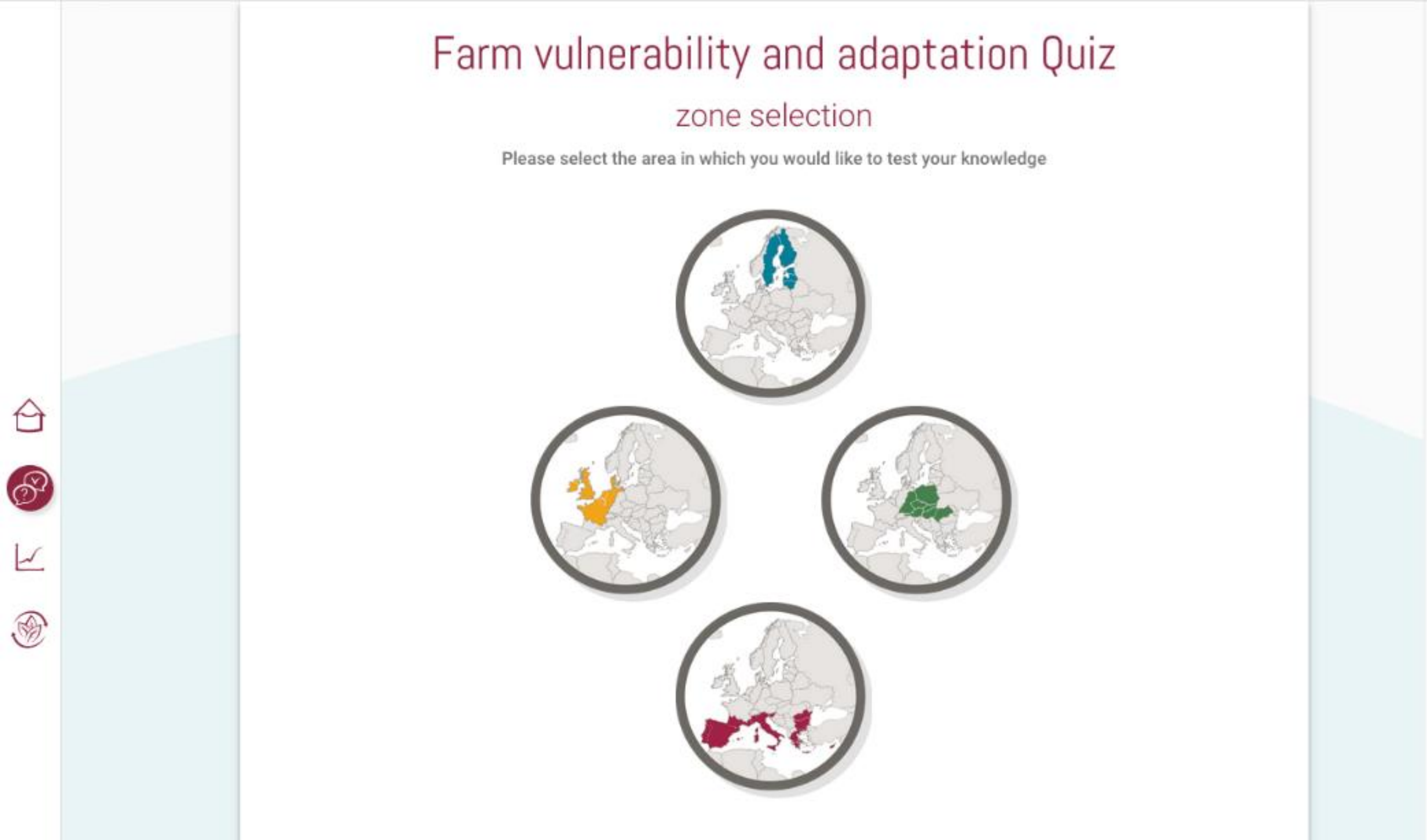
Through around thirty different questions, you will be able to test your knowledge of climate change, agricultural impacts of the climate on different agricultural productions and possible adaptation measures at farm scale.

4 different quizzes are offered, each corresponding to the geographic location of the 4 countries involved in the project (France, Germany, Spain and Estonia), all representative of a major climatic influence in Europe: Mediterranean, Atlantic, continental, and Nordic areas. Each quiz is systematically available in English as well as in the language of the country it represents.

For each question, one or more correct answers are possible among the 4 proposals. Just click on your choice (only one possible) to know if your answer is correct. An explanation will then appear at the bottom of the screen and you can deepen the subject even further if you wish by clicking on "Learn more".

At any time during the quiz, you can continue to the next question if you do not wish to answer any of the questions. Once the quiz is finished, a summary will indicate the number of correct answers obtained for each of the 3 categories: climate change, agricultural impacts and adaptation measures.

START QUIZ


Farm vulnerability and adaptation Quiz
zone selection
Please select the area in which you would like to test your knowledge

Farm vulnerability and adaptation Quiz

climate-change

How long is the minimum period to talk about climate?

10 years

30 years

50 years

100 years

NEXT QUESTION

Farm vulnerability and adaptation Quiz

climate-change

How long is the minimum period to talk about climate?

- 10 years
- 30 years
- 50 years
- 100 years

✓ Correct !

Explanation

The concept of climate refers to all of the variables that characterize the average state of the atmosphere. It is defined on the basis of statistics over a long period (often thirty years) while the concept of "weather forecast" refers to the weather conditions of a given instant or a short period (a day, a week, etc.).

LEARN MORE

NEXT QUESTION

Farm vulnerability and adaptation Quiz

agricultural-impacts

Over the last 20 years, what was the trend of the average yield of common wheat?

- Increased by 10%
- Increased by 5%
- Stagnation
- Reduced by 10%

PREVIOUS QUESTION   NEXT QUESTION

Farm vulnerability and adaptation Quiz

agricultural-impacts

Over the last 20 years, what was the trend of the average yield of common wheat?

- Increased by 10%
- Increased by 5%
- Stagnation
- Reduced by 10%

✓ Correct !

Explanation

The past two decades have seen a decline in the upward trend in cereal yields in many European countries. Climate change (heat stress, drought) being one of the major explanatory factors. The harvest 2016 being one of the worst years in recent past, in which climate severely impacted yields.

PREVIOUS QUESTION NEXT QUESTION

Yield & Climate (observations and projections)

This module consists of a map entry proposing the consultation of agronomic (yields) and climatic (observations and projections) data for different geographic locations throughout Europe.

Just move the map to the area of interest, then zoom in to more accurately identify the place you are flying over. Each small orange square (or grid point) on the map then lets you view local data with a single click.

For each grid point, a compilation of annual yields from different crops (2000-2017 period) first shows the variability in performance in terms of yields. Then, the description of the past climate (observations for the period 1987-2016) is presented through different graphs for several variables: temperature, precipitation, number of days of freezing, etc. Finally, climate projections illustrate in the form of 10 graphs the climate changes for the near future period (2017-2046), then supplemented by 19 agro-climatic indicators specific to cereals, fodder, animals, vineyards and orchards.

GO TO THE MAP

Norway
Bergen
Oslo
Tampere
Petrozavodsk
Helsinki
Saint Petersburg
Stockholm
Kristiansand
Estonia
Pskov
Latvia
Tver
North Sea
SCOTLAND
Glasgow
Denmark
Lithuania
Moscow
NORTHERN IRELAND
United Kingdom
Ireland
Gdansk
Vilnius
Smolensk
Hamburg
Belarus
Bryansk
WALES
ENGLAND
The Netherlands
Berlin
Poland
Brest
London
Germany
Dresden
Belgium
Luxembourg
Czechia
Kyiv
Lviv
Kharkiv
Le Havre
Ukraine
Slovakia
Vienna
Munich
Dnipro
Donetsk
France
Zurich
Austria
Hungary
Moldova
Switzerland
Romania
Bay of Biscay
Lyon
Milan
Venice
Croatia
Belgrade
Bordeaux
Bucharest
Sevastopol
Bosnia and Herzegovina
Serbia
Constanta
Florence
Marseille
Black Sea
Bilbao
Kosovo
Bulgaria
Italy
Spain
Barcelona
Tirana
Samsun
Naples
Albania
Thessaloniki
Istanbul
Ankara
Madrid
Valencia
Portugal
Turkey
Izmir
Greece
Palermo
Konya
Seville
Algiers
Tunis
Constantine
Adana
Malta
Sousse
Oran
Cyprus
Syria
Mediterranean Sea
Casablanca
Tunisia
Lebanon
mapbox
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Active site detailed information card

Yield compilation | Climate observations | Climate projections

The yield level of a crop can be extremely variable from one year to another, even for the same geographic locality. To see this variability, it is necessary to use **yield compilations over several years**.

Below, the average annual yields of different categories of crops are compiled from the **harvest 2000 to harvest 2017**. A color gradient ranging from green to red helps to detect visually the level of annual performance. For the worst years appearing in red, it is then possible to wonder about the limiting climatic factors as well as their current trends.

Bad · Fair · Good · Excellent

year	Winter soft wheat	Winter durum wheat	Winter barley (and/or six rowed barley)	Maize for grain rainfed	Grain Sorghum	Winter rapeseed	Sunflower	Soybean	Spring field peas	Maize silage	Temporary grasslands	Permanent grasslands	Apple	Vineyards
	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	100-kg-ha	Hl-ha
2000	58	54	54	86	65	28	26	29	35	114	62	30	410	53
2001	51	52	47	87	58	31	22	28	36	117	56	32	410	54
2002	58	51	50	80	65	31	23	28	38	112	63	34	410	44
2003	49	42	43	68	34	26	19	20	29	92	46	34	380	38
2004	58	52	50	81	55	28	23	25	26	110	62	42	410	53
2005	54	50	52	86	50	32	21	26	30	105	66	48	429	54
2006	52	48	47	97	56	30	21	28	36	103	64	44	420	47
2007	45	40	38	96	55	27	23	26	28	140	79	53	647	42
2008	57	50	56	100	63	34	26	30	38	101	70	52	442	42
2009	45	43	42	91	49	27	21	27	31	71	65	51	474	52
2010	56	54	49	98	55	29	24	29	35	90	68	50	543	46
2011	48	47	44	105	70	25	26	29	31	136	56	51		61
2012	63	59	59	103	55	30	23	27	40	133	54	43	435	52
2013	52	49	50	98	58	29	21	26	30	119	80	61	493	36
2014	52	52	47	109	64	30	22	32	40	153	93	74	451	54
2015	57	54	52	96	54	25	16	29	35	78	64	51	460	51
2016	60	59	54	102	82	32	24	23	35	78	66	48	460	64
2017	59	59	53	107	62	28	26	29	30	80	67	55	477	35
Minimum	**45**	**40**	**38**	**68**	**34**	**25**	**16**	**20**	**26**	**71**	**46**	**30**	**380**	**35**
Maximum	**63**	**59**	**59**	**109**	**82**	**34**	**26**	**32**	**40**	**153**	**93**	**74**	**647**	**64**
Average	**54.11**	**50.83**	**49.28**	**93.89**	**58.33**	**29.00**	**22.61**	**27.28**	**33.50**	**107.33**	**65.61**	**47.39**	**455.94**	**48.78**

SEE MEASURES | RETURN TO MAP

Active site detailed information card

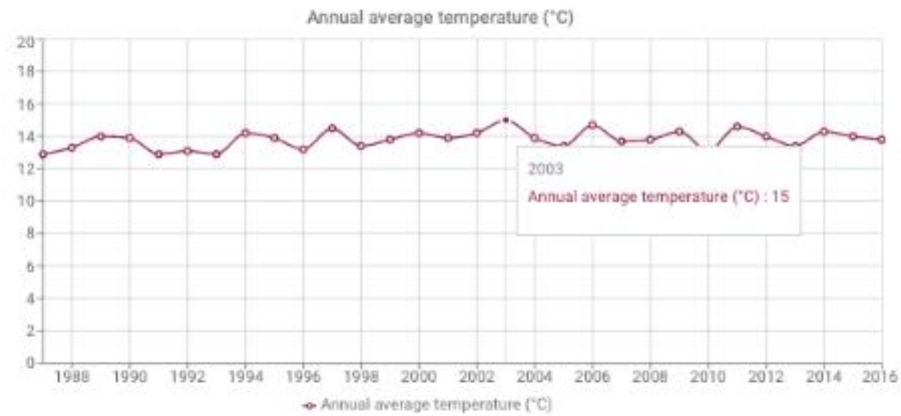
Yield compilation | **Climate observations** | Climate projections

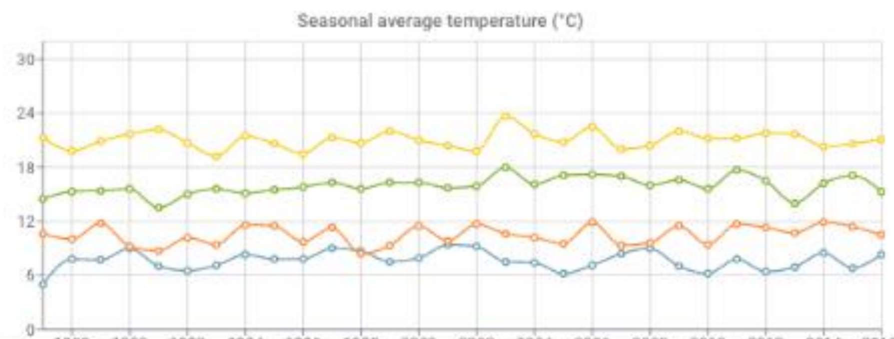
AVERAGE-TEMPERATURE | PRECIPITATION | HYDRIC-DEFICIT | FROZEN-DAYS | ESTIVAL-DAYS

The **annual average of daily temperatures (°C)** is available for the period **1986-2016**.

The results are presented for **an entire calendar year**, then by season according to the following approach: **winter** (January - February - March), **spring** (April - May - June), **summer** (July, August, September) and finally **autumn** (October November December).

For each representation, the **minimum**, **maximum** values and the **median** are summarized.





Active site detailed information card

Yield compilation | Climate observations | **Climate projections**

GENERALITIES | CROPS | FODDER | ANIMAL | VINEYARDFRUIT

The **possible changes in the climate** are offered through graphical representations of **several climatic variables**: rainfall, average annual temperature, water deficit, sum of temperatures, number of hot or cold days per year, etc.

On each graph, the simulations offer a reading of the **Recent Past** (i.e. the past 30 years) as well as the **Near Future** (i.e. the next 30 years). By comparison, it is then possible to observe changes (extreme values, averages, etc.).

Annual average rainfall (mm/year)

Potential Evapotranspiration (PET) - Spring and Summer (mm)

Active site detailed information card

Yield compilation | Climate observations | **Climate projections**

GENERALITIES | **CROPS** | FODDER | ANIMAL | VINEYARDFRUIT

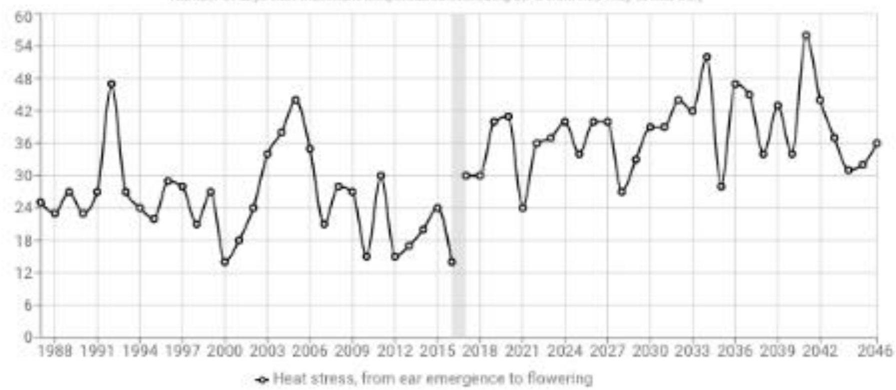
The following agro climatic indicators are all devoted to **arable crops**: straw cereals, summer crops (corn, sunflower, sugar beets), rapeseed.

The possible changes in agronomic conditions are illustrated through **9 indicators**: shriveling, risk of frost, drought, harvest accessibility, etc.

Like the climate general indicators, the simulations offer a reading of the **Recent Past** (i.e. the past 30 years) as well as the **Near Future** (i.e. the next 30 years). By comparison, it is then possible to observe changes (extreme values, averages, etc.).

Heat stress, from ear emergence to flowering

Number of days with maximum temperatures exceeding 25°C from mid-May to mid-July



Frost stress (ear 1 cm)

Number of days with maximum temperatures below -4°C between the 20th of February and the 10th of April

mapbox

Active site detailed information card

Yield compilation | Climate observations | **Climate projections**

GENERALITIES | CROPS | FODDER | **ANIMAL** | VINEYARDFRUIT

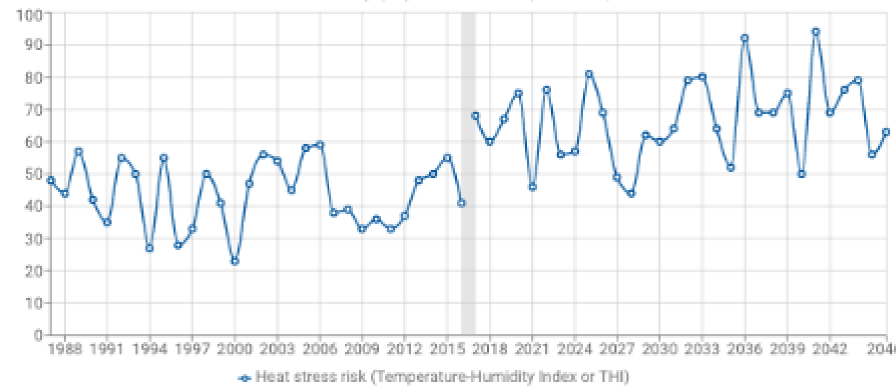
The following agro climatic indicators are all devoted to **animal management.**

The possible changes in climate conditions are illustrated through **3 indicators**: heat stress risk for cattle, heating and cooling needs for animal buildings.

Like the climate general indicators, the simulations offer a reading of the **Recent Past** (i.e. the past 30 years) as well as the **Near Future** (i.e. the next 30 years). By comparison, it is then possible to observe changes (extreme values, averages, etc.).

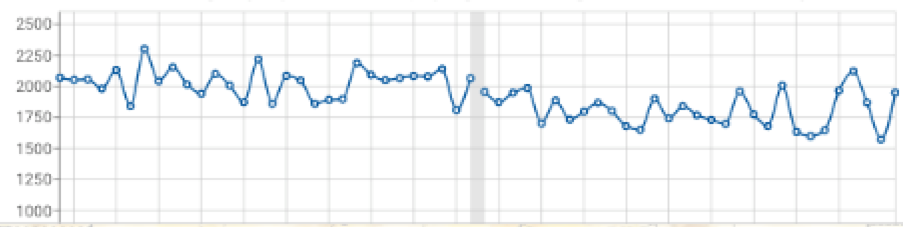
Heat stress risk (Temperature-Humidity Index or THI)

Number of days per year with THI stress (class 2 to -5)



Heating needs

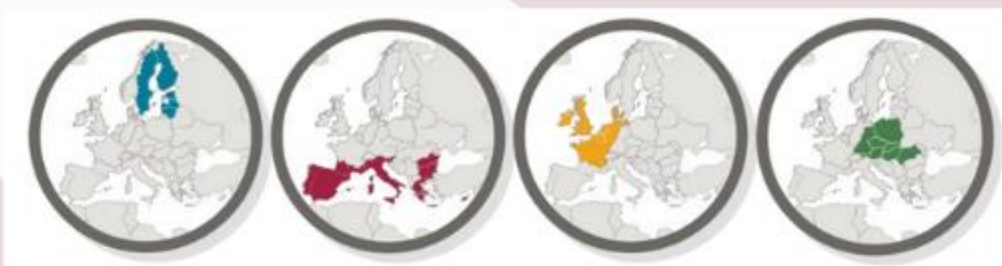
Sum of the average daily temperatures below 18°C, requiring additional heating for the animals from October to May



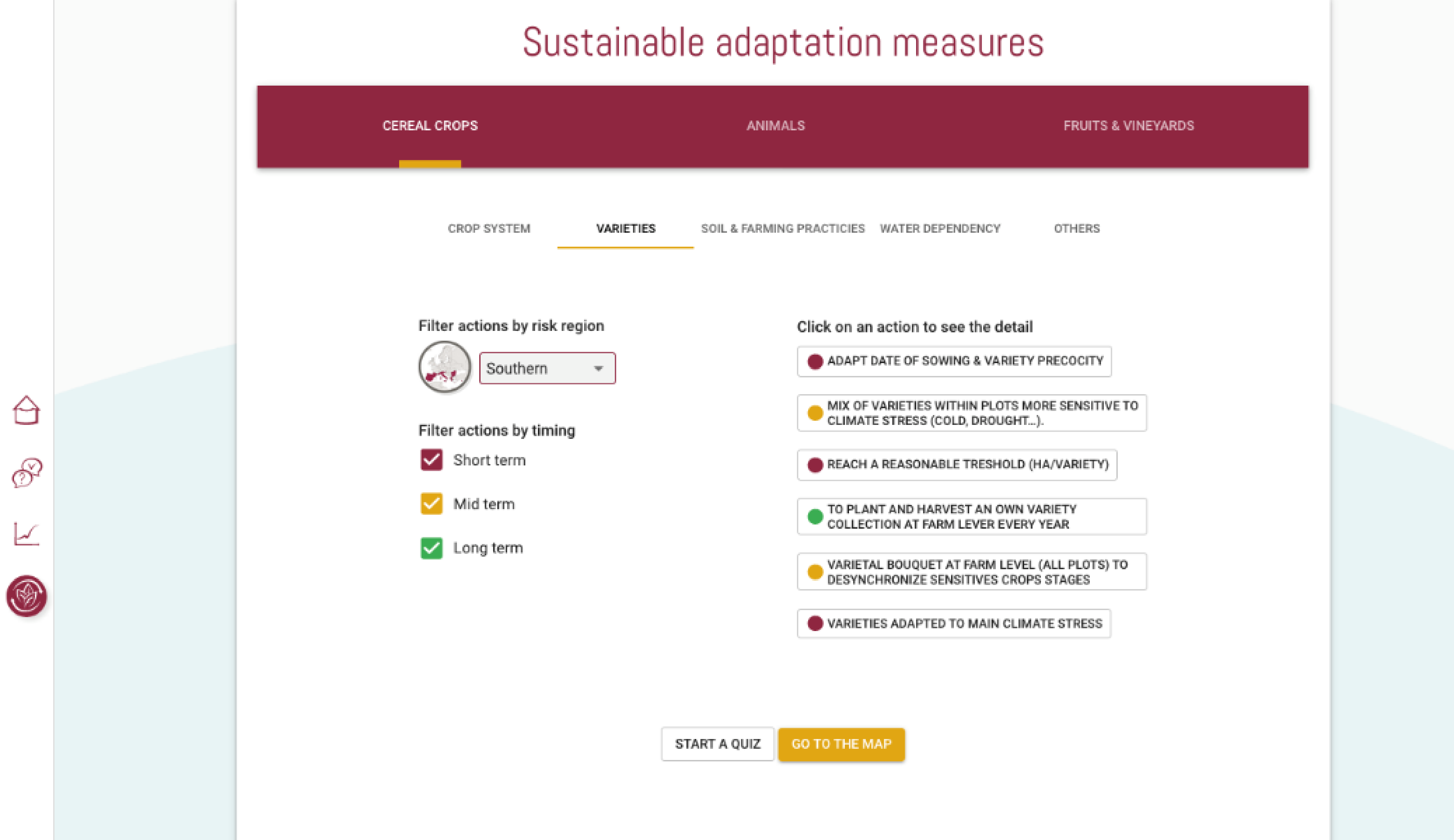
Sustainable adaptation measures

This module is devoted to sustainable adaptation measures that can be envisaged at farm scale. The agro-climatic vulnerability of a farm often depends on several climatic factors, so it is necessary to imagine the implementation of differentiated adaptation measures. Thus, for each of the 3 agricultural systems studied, sustainable adaptation measures are classified according to 4 components of farm vulnerability. For example, in arable crops, the measures proposed will seek to improve the resilience of the cropping system, the varieties cultivated, the water dependency or even the soil and farming practices. The implementation of a strategy for sustainable adaptation to climate change takes place over time.

The proposed measures are therefore distinguished according to the possibility of implementation in the short, medium or long term. For each adaptation measure, it is possible to know more by a simple click: a summary sheet then appears, offering an overview of its overall durability through its possible impact (neutral, positive or adverse) on a set of 9 components: emission of greenhouse gases, air quality, soil, water etc. The sustainable adaptation measures are specific to each of the 4 climate zones proposed. For each zone, the measures are systematically available in English as well as in the language of the country it represents.



SEE MEASURES


Sustainable adaptation measures
CEREAL CROPS
ANIMALS
FRUITS & VINEYARDS
CROP SYSTEM
VARIETIES
SOIL & FARMING PRACTICIES
WATER DEPENDENCY
OTHERS
Filter actions by risk region
Southern
Filter actions by timing
Short term
Mid term
Long term
Click on an action to see the detail
ADAPT DATE OF SOWING & VARIETY PRECOCITY
MIX OF VARIETIES WITHIN PLOTS MORE SENSITIVE TO CLIMATE STRESS (COLD, DROUGHT...).
REACH A REASONABLE TRESHOLD (HA/VARIETY)
TO PLANT AND HARVEST AN OWN VARIETY COLLECTION AT FARM LEVER EVERY YEAR
VARIETAL BOUQUET AT FARM LEVEL (ALL PLOTS) TO DESYNCHRONIZE SENSITIVES CROPS STAGES
VARIETIES ADAPTED TO MAIN CLIMATE STRESS
START A QUIZ
GO TO THE MAP

Varieties adapted to main climate stress

Climate risk region

Southern

Weather event addressed

Farming system

CEREAL CROPS
Cereals, legumes, oilseeds, vegetables

Description

Use of varieties adatped to drought, high temperatures, not need of vernalization

Comments on sustainability

Farmers can't acess to new varieties, economic invests and technical assessment are needed.

Implementation

Short term

Sustainability components

- GHG emissions
- Air quality
- Soil
- Water
- Biodiversity
- Animal welfare
- Economic
- Social
- Technical feasibility

Summary

The implementation of an adaptation strategy is a real learning process in which a progressive advance respecting several steps is necessary. First, defining and understanding the vulnerability of farming is a necessary prerequisite for any adaptation process. It is imperative to identify the weaknesses and / or climatic forces of the agricultural system currently deployed and to be aware of what climate change is and its agricultural impacts.

In a second step, agro-climatic projections for the near future period will offer a reading of new climate opportunities and / or threats defining the new context of the farm. The implementation of an adaptation strategy must therefore envisage improving climate weaknesses and threats to the farm, by mobilizing levers for a wide range of vulnerability components. Planning for adaptation measures must then be carried out to distinguish what can be implemented in the short, medium or long term.

1. Vulnerability unknown
2. Vulnerability understood
3. Adaptation ideas
4. Adaptation plan

START QUIZ

With the contribution of the LIFE financial instrument of the European Union

Contacts

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Eesti Maaülikool (Estonian University of Life

Legal

Partnership

Conclusion
Key Components for Sustainable Adaptation

Soil Management

- Living Soils with a high amount of organic matter can absorb and store water.

Nutrient Management

- Combine organic matter, nutritional needs, soil biota/structure to an integrated nutrition management.

Water Management

- Combination of techniques to reduce water needs, improve water retention/storage in soils, and higher water use efficiency.

Pest Management

- Stronger focus on IPM, reduce chemical pesticides (resistances and decrease of beneficial fauna).

Income and Profit

- Almost every adaptation measure will result in better yields and better profit.

Risks

- Farming adaptation strategies can be supported by an insurance

Animal Welfare

- Adaptation measures to reduce thermal stress in livestock reduce risk of lower production.

Biodiversity

- Biodiversity is an important cross-section element for all other elements above.

Closing Remarks

www.agriadapt.eu

AgriAdapt **Manual**

AgriAdapt **Webtool**

AgriAdapt **Training Pack**

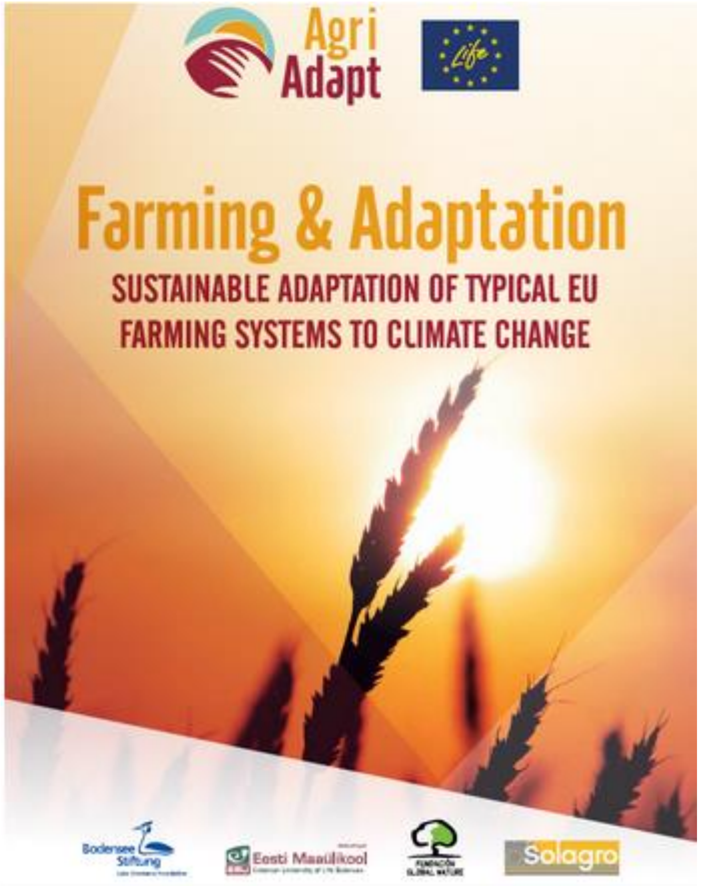
AgriAdapt **Videos**

AgriAdapt **News**

AgriAdapt **Newsletter**

Closing Remarks

AgriAdapt **Manual**



AgriAdapt Training Pack

Closing Remarks

AgriAdapt **Webtool** **awa.agriadapt.eu** (release: end of March 2020)

AWA - AgriAdapt Webtool for Adaptation

One of the main challenges facing the world, and the agricultural sector in particular, is climate change. Even if some of the changes in climate could be beneficial for some European agricultural production, most of the changes have had negative impacts and disproportionately affect regions already concerned by other environmental problems. European farmers have and will have to adapt to a changing climate, through measures that go beyond simple adjustments to ad hoc practices. In order to limit the vulnerability of their farms to increasingly variable climatic hazards, adaptation must first of all be designed and undertaken in a sustainable manner.

It was in this context that the European AgriAdapt project was born, supported by the LIFE program of the European Commission. It brings together French, Spanish, German and Estonian partners, who represent four areas constrained by different climatic risks.

EU FARMLAND AND CLIMATE CHANGE RISKS

- ↘ Water availability
- ↗ Risk drought, heat spells
- ↗ Risk soil erosion
- ↘ Growing season, crop yields
- ↘ Optimal crop areas

- ↗ Floods risk
- ↗ Hotter and drier summers
- ↗ Sea level
- ↗ Risk crop pests, diseases
- ↘ Animal health, welfare

- ↘ Summer rainfall
- ↗ Winter storms, floods
- ↗ Length growing season, yields
- ↗ Suitable farmland
- ↗ Pests, diseases risks

- ↗ Winter rainfall, floods
- ↘ Summer rainfall
- ↗ Risk drought, water stress
- ↗ Soil erosion risk
- ↗ Yields, range of crops

AgriAdapt **Videos**

Closing Remarks

AgriAdapt **News**

The project ⌄ Actions ⌄ News Documents Press ⌄ Mitigation and the farming sector Platform meeting Contact

AGRICULTURE ET CHANGEMENT CLIMATIQUE. Enjeux, impacts, solutions coopératives

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BIOFACH2020

into organic

Climate in the North predicates the adaptation

Rising concerns about climate change and its effects to Nordic agricultural practices were discussed in a scientific practical conference „Agriculture in changing climate" in Tartu. The event created a platform for knowledge transfer between agricultural stakeholders,...

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Two AgriAdapt educational posters on the impact of climate change in agriculture and the adaptation levers to be implemented

One of the specific actions of the Life AgriAdapt project concerns the development of a Training pack (digital resources) for agricultural stakeholders. Its objective is to facilitate the popularization of the impacts of climate change and agricultural practices...

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AgriAdapt

SUSTAINABLE ADAPTATION OF TYPICAL EU FARMING SYSTEMS TO CLIMATE CHANGE

LIFE15 CCA/DE/000072
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