EU CAP NETWORK



# EU CAP Network Workshop

## Enhancing food security under changing weather patterns: farm adaptation

Funded by
the European Union

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# Summary

The EU CAP Network workshop 'Enhancing food security under changing weather patterns: farm adaptation' took place in Bologna, Italy, on 14-15th of March 2023, with the main objective of identifying and sharing farm adaptation solutions regarding climate change and extreme weather events. Climate change is already happening in Europe, climate scenarios like global warming will continue to increase in the coming decades and extreme weather events have always been present. In this context, farmers and the regions in which these farms are based, need to plan farm adaptation and be prepared for an increase in the frequency and intensity of extreme weather events.

The main objectives of the workshop were to:

- Identify challenges and explore potential solutions in dealing with changing weather patterns related to climate change.
- Exchange knowledge on successful practices, opportunities, and tools relevant for adapting farming to changing weather patterns, while increasing farm resilience and enhancing cooperation at both farm and local level.
- Identify needs from practice and possible knowledge gaps that may be informed by research.
- Promote networking among EIP-AGRI Operational Groups and other types of innovative projects, Horizon Europe multi-actor research projects and relevant stakeholders.

In order to set lay the basis for discussions, during the first morning, short presentations on 'setting the scene' were presentedgiven. Emphasis was given to climate change scenarios, based on a global perspective. While focusing on Europe, the impacts on European agriculture, adaptation solutions, response from EU policies and the role of the EU CAP Network and EIP-AGRI in exchanging knowledge and practical experiences were presented. Most of the morning involved was taken up with two breakout sessions where participants had time to reflect on climate change impacts, farm losses in their regions and knowledge gap requirements. In groups, participants shared challenges and solutions, which are presented in a summarised form in this report.

During the afternoon of the first day, the participants joined two field visits to observe farmers and Operational Groups (OGs) working to innovate and adapt their farms to enhance farm climate resilience.

During the second and final day of this workshop, participants were informed about two EU missions relevant to the topic. This included Research and Innovation (R&I) funding opportunities available through the Horizon Europe programme. Cooperation at the farm level was the topic up for discussion at and during the plenary session, with all the participants present. Other discussion topics during the plenary included: What cooperation is needed in order to adapt farming at landscape level? Are there examples or solutions of cooperation at landscape level currently being applied by the participants and projects involved in this workshop? And what alternative solutions of cooperation at landscape level could or should be implemented? The outcomes from this discussion were subsequently used to inform and motivate the participants in the next session.

Finally, the participants were allocated time to explore further collaboration possibilities, integrating their recent discussions on research needs, farm adaptation solutions and replication of such solutions, dissemination of results, piloting and cooperation. Using the Open Space Technology, participants were invited to propose an adaptation topic that they wanted to put forward for further discussion amongst their peers. This was targeted at ideas that they may have for a particular project, or a networking opportunity looking for synergies around preferred discussion topics. Following these discussions and interactions, eight parallel meetings took place. This resulted in more detailed dialogue and more concrete actions and next steps for future collaboration. The future of farming in Europe requires planned adaptation and that requires the creation and sharing of knowledge, innovation and networking.

# Starting our journey together

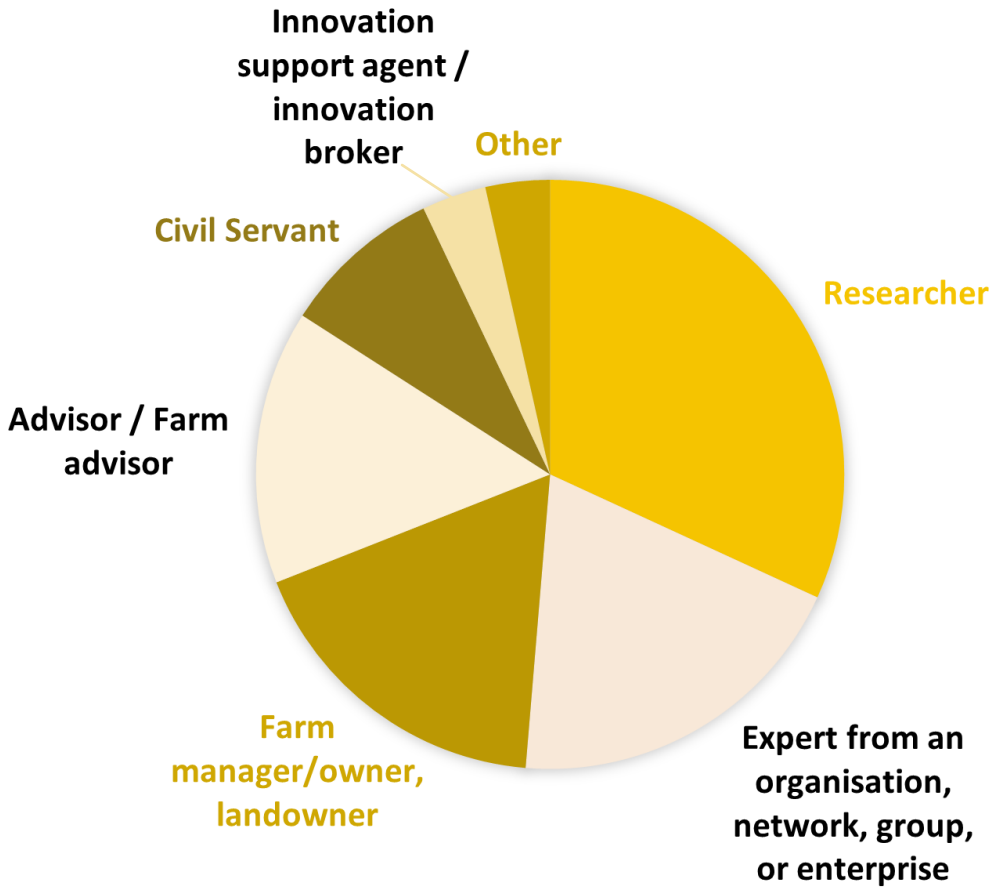
## Participants and projects

Ninety three people attended the workshop: 81 were registered participants who arrived from 20 different European countries. Additionally, there were 12 members from the organisational team, including the main facilitator, the coordinating expert, DG-AGRI, EU CAP Network Support Facility and logistical personnel.

### Table 1 - Number of attendees and speakers per country

| Country | Participants | Speakers |
|---|---|---|
| Austria | 2 | 1 |
| Belgium | 4 | 1 |
| Croatia | 1 | |
| Czech Republic | 1 | |
| Denmark | 3 | |
| Finland | 4 | 1 |
| France | 4 | 2 |
| Germany | 5 | |
| Greece | 8 | |
| Ireland | 3 | |
| Italy | 20 | 1 |
| Luxembourg | 1 | 1 |
| Malta | 1 | |
| Netherlands | 1 | |
| Poland | 6 | |
| Portugal | 6 | 2 |
| Romania | 2 | |
| Slovenia | 2 | |
| Spain | 7 | 1 |
| Sweden | 1 | |
| **Total: 81** | | |

**Figure 2 - Professional background of participants**



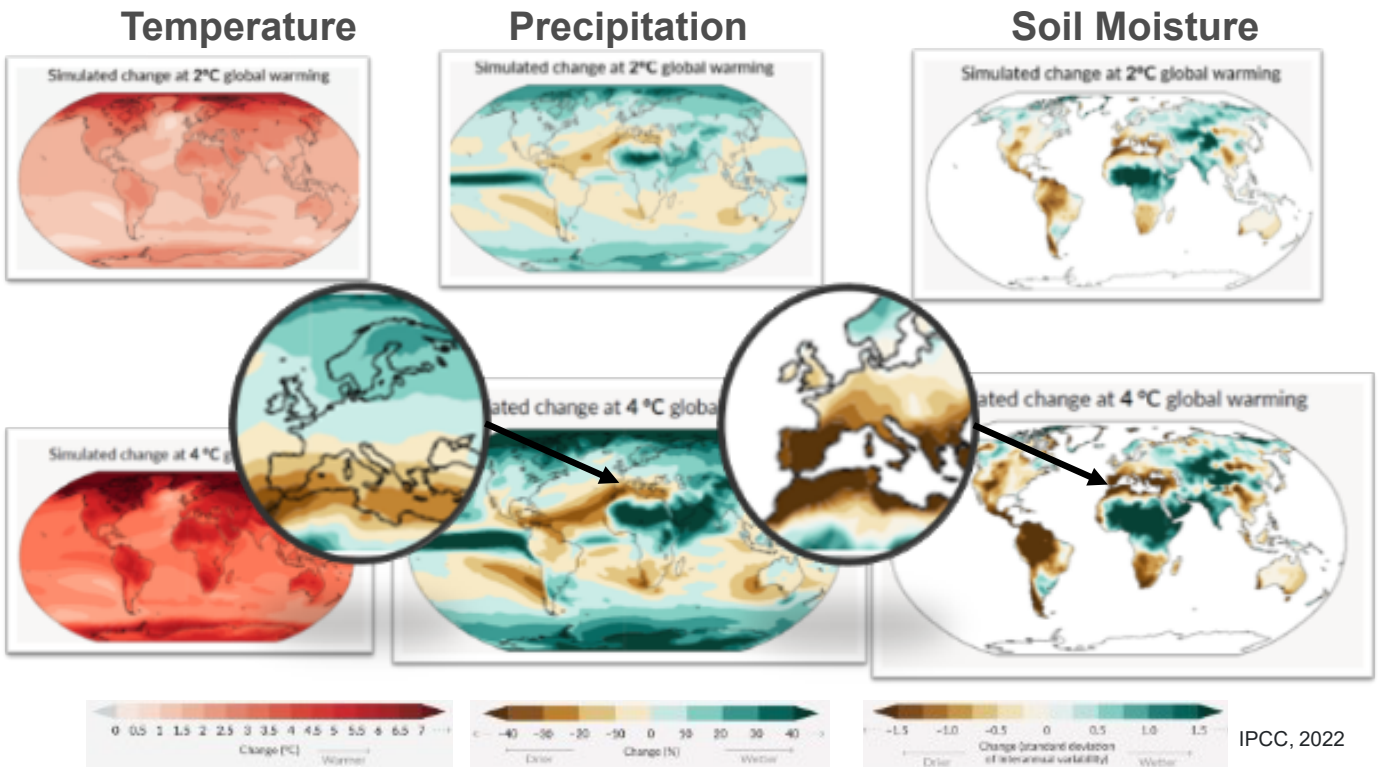

# 1. Challenges

## 1.1 Setting the scene - Climate change scenarios and impacts

In order to discuss and plan climate adaptation at both farm and landscape level, it is important to understand the current state of climate change, including potential future scenarios and probable impacts. Since the first objective of climate adaptation is to reduce exposure and vulnerability to climate change, one can only discuss adaptation solutions after understanding what impacts they are trying to mitigate and or address. The first presentations focused on global climate change scenarios and their impacts on agriculture and forestry.

The global annual temperature of planet Earth has risen by about 1°C, when compared to the temperature of the 19th century pre-industrial period. The increasing levels of Green House Gases (GHG) and other anthropogenic actions such as changes in land use, are the main causes of global warming. Further scenarios predict that global warming can rise but remain stable at 2°C if the goals of the Paris Agreement are met (2°C scenario). However, in a second 'do nothing scenario', temperatures are predicted to rise higher and reach 4°C before the end of the 21st century (4°C scenario), after which a very unstable and uncertain period would occur (see references 1 and 2). This indicates that, on the one hand, adaptation is essential but, on the other hand, mitigation is also crucial, since it is impossible to fully adapt to a global temperature which is 4°C warmer without significant impacts occurring.

**Figure 4 - Maps indicating global temperature, precipitation and soil moisture, according to the future climate change global warming scenarios of 2°C and 4°C until the year 2100. Source: IPCC (1)**

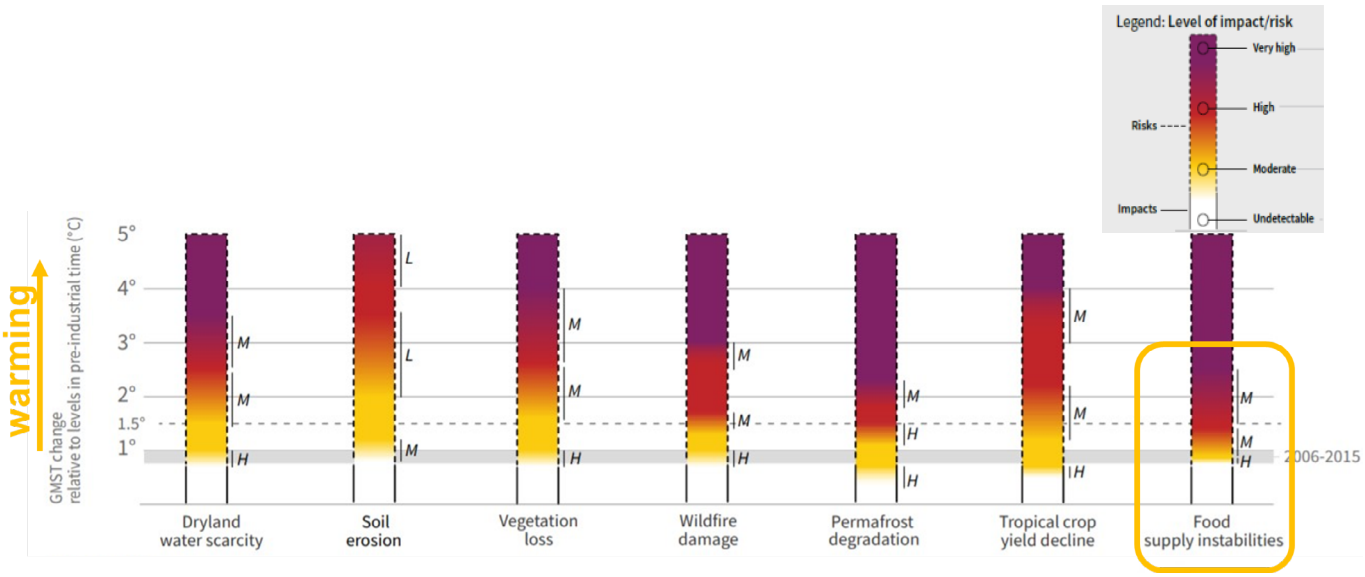



IPCC, 2022

In both of these scenarios, global warming will increase; average and maximum temperatures will increase and there will be an increasing incidence of heat waves, all of which will occur throughout the planet in an uneven manner.

While, the impacts of such climate change scenarios can be local, regional, European-wide and global, the global food system will be affected and be extremely vulnerable. The level of impact and risk is likely to be very high in a global warming scenario of 3°C to 4°C (see reference 3).

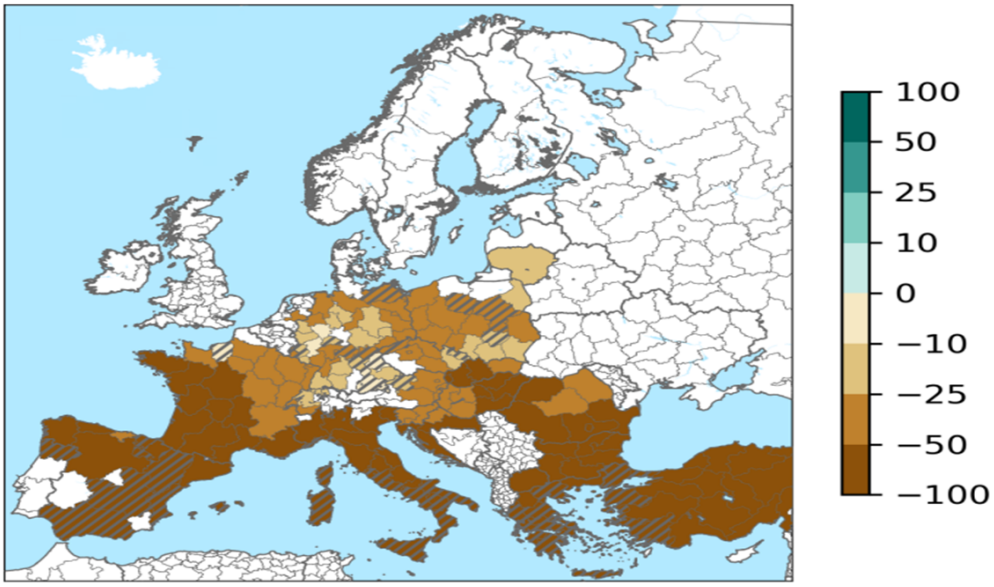
**Figure 5 - Increases in global mean surface temperature affect the processes which contribute to desertification, land degradation and food insecurity. Source: IPCC 2022, p.16 (5)**




In the Mediterranean and southern European regions, average annual **precipitation is likely to decrease but intermittent heavy rains are likely to increase**, since the expectation is that rainfall will occur in greater concentrations over shorter periods of time, resulting in fewer days of rainfall. This also means that, in such scenarios, the number of consecutive days without rain, is likely to increase (see references 1 and 4). In several regions of Europe, especially in the Iberian Peninsula, Southern Europe, the Alps, Eastern Europe, Central Europe, Benelux and British Islands, **droughts will become more frequent**, severe, intense and long-lasting (see reference 5).

According to the **Peseta IV report**, 2050, in the context of climate change the production of rain- fed maize and wheat is likely to fall substantially, as can be seen in the figure bellow (see reference 6). This is an indicator of the negative impacts of climate change predicted for agriculture. This report also presents the possibility of other severe impacts such as the increasing frequency of fires, wind throws and insect outbreaks[1].

**Figure 6 - Simulated Grain maize yield change by 2050 in a scenario with 2oC global warming. Source: (Feyen et al., 2020, p.50)**




[1] Find out more: https://eu-cap-network.ec.europa.eu/events/eu-cap-network-workshop-enhancing-food-security-under-changing-weather-patterns-farm_en#section--resources

## 1.2 From weather changes to farm losses

To reflect, share and discuss the topic of farm adaptation, participants joined one of four groups under the topics of: i) Annual Crops; ii) Permanent Crops; iii) Livestock and Dairy and iv) Overall farm planning and management. In the first breakout session, participants were invited to reflect individually on two questions:

- What are the climate change and extreme weather events that are more likely to cause impact on your farm or on the farms in your region?
- What are the most significant or most important farm losses, that climate change and extreme weather events may cause to your farm or the farms in your region?

The main perceptions of participants regarding these two questions are presented below and clearly illustrate the possible magnitude of present impacts and future potential impacts of climate change oin European agriculture.

### What are the climate change and extreme weather events that are more likely to cause impact on your farm or the farms in your region?

Firstly, participants highlighted **drought and water scarcity** as one of the most severe impacts of climate change. More specifically, the lack of rain and low soil moisture levels during the spring and summer, the long-term droughts, especially when combined with high and extreme temperatures, particularly above 40°C. The **general increase in temperatures**, **the heat waves**, the absence of cold weather, the stronger solar exposure, the very high temperatures, and the increased risk of fire were also mentioned as very significant and notable impacts.

Additionally, participants mentioned the **increasing frequency of heavy rains and floods**. In some areas wet winters with a lack of frost, were highlighted as very significant climate impacts. **Changes in weather patterns**, uneven rainfall patterns and unpredictable precipitation, irregularity in rain, droughts, heat waves, wind periods, i.e. rainfall not well distributed through the year (either too much or too little ), were also confirmed as current and very significant impacts by the participants.

Finally, the increased manifestation of **storms**, hailstorms, thunderstorms, windstorms, tornados, extreme cold and frost, were also considered as very significant and with critical impacts, and which were anticipated to occur with increased frequency and intensity.

### What are the most important farm losses, that climate change and extreme weather events may cause to your farm or the farmers in your region?

All groups of participants clearly identified that farm productivity is/will be severely and negatively affected by climate change and extreme weather events. More specifically, participants identified that **the losses in farm productivity are/will be caused by** soil erosion, soil salinisation and soil degradation, lack of pollinators, reduction of both water quantity and quality, increased level of pests and diseases or direct yield and crop losses due to extreme weather events.

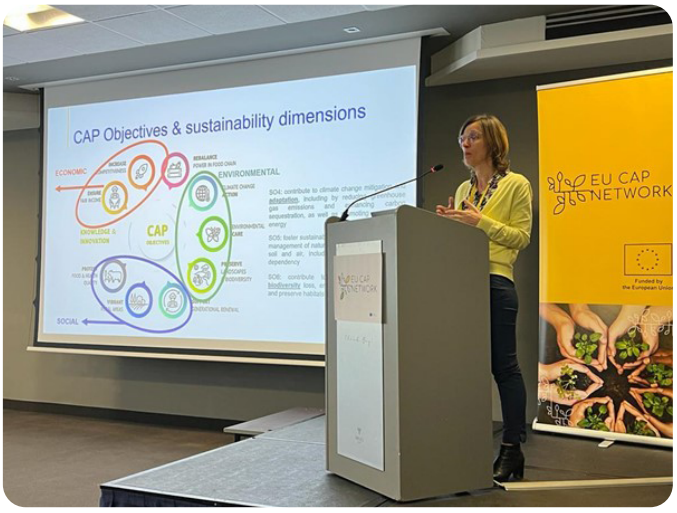
Indirectly farm productivity, for example on livestock farms, will be affected by the reduction of productivity from pastures or forage crops. On all farms, the **reduced productivity**, together with the consequential increase in the cost of inputs, will result in **income losses, increased income volatility, risk and unpredictability for investment**. This will negatively impact farm operations, working conditions, employment, rural development and regional structures. In addition, climate change and extreme weather events on-farm are expected to lead to a reduction in animal welfare, ecosystem degradation, eutrophication, biodiversity loss and the reduction of land availability for cultivation.

# 2. Responses to the challenges

## 2.1 Setting the scene - Policy response at European level

An overview of EU policy priorities, instruments and initiatives to climate adaptation for agriculture was presented. The European Union has a Climate Adaptation Strategy. The European Union clearly addresses adaptation in its Common Agricultural Policy and there is also a strong reference to adaptation in the EU Forest Strategy for 2030, not to mention available funds and programmes. Throughout this presentation, the participants were informed about the EU's intention to promote I) Smarter Adaptation; II) More systemic adaptation; III) Faster Adaptation and concrete specific actions on areas such as:

- Knowledge-based approach, high-tech and nature-based solutions
- Organisational and technical adaptation solutions for drought management
- Robust ecosystem restoration and management
- Natural disaster insurance that incentivises adaptation
- Enforcement of employment legislation on workers' protection from climate impacts.




Innovation and knowledge exchange is key to finding and disseminating innovative solutions. In the final presentation of the 'setting the scene' block of presenters, the aims, approach and achievements of the European Innovation Partnership (EIP-AGRI) and the network structure and knowledge exchange possibilities within the EU CAP Network were outlined.

## 2.2 Farm adaptation solutions

It is not possible to be fully protected against the potential impacts of climate change. This highlights the fact that strong mitigation efforts will be required and that climate change will continue to present strong negative impacts despite adaptation investments. There are many adaptation solutions and investments which can reduce not only the costs but also the socio-economic and environmental impacts of climate change in agriculture and food systems. In some circumstances, planned adaptation can even promote an investment in the regeneration of agro-ecosystems and uncover new opportunities for agriculture, rural development and landscape regeneration. Adaptation investments are required, to not only reduce costs but also to maintain productivity, preserve food security in Europe and make the population of the European Union less vulnerable to the increasing volatilities of the world food supply chain, under various climate change scenarios. In this context, one of the main conclusions from the science literature but also from the workshop is that **mitigation and adaptation need to both exist** if we want to enhance food security in Europe. They can co-exist and it is important to find solutions that contribute simultaneously to both climate change mitigation and adaptation.

The workshop had a specific breakout session dedicated to presenting and discussing farm adaptation solutions. The farm adaptation solutions were discussed in this workshop as part of four breakout groups on the topics of: I) Annual Crops, II) Permanent Crops, III) Livestock & Dairy and IV) Overall farm planning and management. Within each group there was a presentation from a pre-selected project with concrete adaptation proposals and results presented. After these introductory presentations, participants outlined and discussed their adaptation solutions. The objective of this session was to identify the concrete solutions which participants identified as having a high potential to increase farm resilience. In addition, the objective was to share these solutions amongst the participants so as to increase their level of awareness. This would facilitate and provide a basis for in-depth discussion, reflection, further development, identification of research needs and exploring future developments.

## Adaptation solutions identified in breakout groups and projects

The farm adaptation solutions that were identified by the participants were structured into the following groups of strategies:

- **Mitigation** – Local adaptation depends on the global mitigation efforts and therefore all adaptation investments should be as carbon neutral as possible and ideally contribute to mitigation, otherwise they are considered maladaptation. Mitigation includes: I) Reducing Greenhouse Gas emissions, namely through the absolute reduction on the consumption of energy and II) Carbon sink, by keeping and storing carbon in the soil (in organic matter, plant roots) and above ground (in trees, permanent crops and shrubs).
  - In this strategy, workshop participants highlighted the importance of reducing fuel consumption through the reduction of tractor use. This is possible through conservation tillage or permanent pastures instead of forage crops, in the case of livestock farms. Furthermore, participants highlighted the importance of renewable energy production on farm and increasing the carbon sink in soil and trees, with a strong emphasis on agroforestry.

- **Microclimates** – Reducing exposure to extreme climate variability by suitably restricting plant species and crops to their existing microclimates, but also designing microclimates.
  - Participants emphasised the following solutions using live features: I) windbreaks with trees and bushes (to reduce wind and evaporation while increasing biodiversity) and II) planting trees in the shade of rows of bushes and pioneer plants.
  - In addition, participants mentioned the use of non-permanent shade nets to reduce temperatures for plants and the use of photovoltaic panels to create shade for crops.

- **Adequate timing** – Reducing the exposure to changing weather patterns and variations in the duration of growing seasons or fluctuations in heat or moisture can be done by altering the timing of agricultural operations to match the distinct climate.
  - Adapting the time of sowing was mentioned by the participants as well as rotational non-selective grazing / holistic planned grazing (livestock and dairy).

- **Water** - On farm investments to increase water storage capacity, water harvesting, water retention, irrigation or alternatively dealing with floods.
  - To **increase the water availability**, participants highlighted the installation of rainwater harvesting systems and techniques such as Keyline Design but also increasing water storage through reservoirs. Recycling water, locating alternative water sources and reduction of evaporation, such as in reservoirs, were also mentioned.
  - There is a need for **sustainable irrigation systems** with higher efficiency, which may be achieved through smart and precision farming. Prevention of nutrient leaching, erosion and floods were considered important.

- **Soil** – Measures to increase soil life and soil quality, prevent erosion, increase soil organic matter, increase water retention and prevent evaporation.
  - Participants believed that the **permanent covering of soil** is one of the most important strategies to protect the soil, thus making it more resilient in the face of climate pressure. The techniques to do so were named: Perennial crops, Permanent crops, Plant cover and Cover crops, Agroforestry, Minimum tillage, Direct seeding, Non-tillage, Good root systems, Management of grass cover at base of the crop and cover crop termination with roller-crimper.
  - In addition, participants highlighted the associated benefits of increased soil biodiversity, soil organic matter and soil moisture.

- **Diversity** – Diversifying crops and varieties but also using biodiversity and diversified agro-ecosystems (e.g. agroforestry silvopastural systems) to increase resilience. This topic was strongly highlighted by participants, with numerous measures and strategies being suggested.
  - **At landscape level**, participants highlighted the need to avoid monocultures and therefore to cultivate a transformed landscape which boosts biodiversity. The protection of local biodiversity should not be the only action initiated but other measures such as the promotion of agroforestry in livestock management and pastures, agroforestry in marginal land or agroforestry with windbreaks and alley cropping.
  - **At farm level**, participants highlighted the importance of increased diversification of crops, varieties, heterogeneity of rooting systems, integrated pest management, using biodiversity, beneficial insects and auxiliary fauna.

- **Species and varieties** - Use species and varieties that are adapted currently and that are climate proof when it comes to the future.
  - One of the main solutions identified by participants is to try **different crops**, which are adapted to the climate.
  - The second solution is to **use climate-adapted varieties and cultivars**. Within this topic, participants highlighted: I) the protection and promotion of local and native breeds; II) the identification of resistant varieties (e.g. to water stress); III) the use of varieties adapted to low inputs (namely old varieties); IV) the selection and development of new varieties adapted to the differing and or diverse climate (e.g. more resistant to droughts).

- **Good practices** – Using best practices such as grazing, pest management, crop management, precision farming, agroecology.
  - In this context, participants mentioned several solutions which increase the resilience of the agroecosystem, which included: I) use fertiliser produced on-farm or locally (synthetic fertiliser may have a negative impact on crop quality); II) precision farming, variable fertilising through sensor technology; III) Sowing systems: sow in patterns with reduced densities; IV) Work with inducers to make the crop more resistant (e.g. Chitosan vs fughi); V) Tree protection to boost natural regeneration with individual tree guards to protect against livestock damage.

- **Protection** - against potential impacts and extreme weather events. This includes measures such as farm insurance, reinforcing farm infrastructures against potential storm damage, funds to compensate for natural disaster damage, protection against fire. Participants mentioned the need for farm insurance in this context.

- **Adaptation capacity** – Increasing the adaptation capacity of farmers and regions is, in itself, an important adaptation strategy. This involves the implementation of concrete actions such as: increasing knowledge, creating a regulatory framework that does not hinder adaptation investments, obtaining funding for adaptation investments, creating markets and logistics which support

the marketing of products from climate smart agriculture, foster cooperation for farmers and regions when needed, etc. Fostering adaptation capacity can be achieved at farm level, local or regional level, national level, EU level or international level.

- **At farm level**, participants highlighted the importance of individual farms planning and preparing for climate adaptation. They suggested several beneficial approaches, including: keyline design, holistic planned grazing, participatory planning, regenerative techniques, holistic and agroecological practices. Participants also considered it important to provide financial support for farmers focused specifically on climate change.
- **At landscape level**, participants addressed several topics, grouped accordingly into subcategories:
  - **Learning and Training** - Regarding the learning, participants consider that farmers should be the leaders in defining learning needs and learning objectives, with regard to training programmes, workshops, dissemination efforts, capacity building, farm advice and support. Farms and farmers should be better connected, learn more from one another and such networking and collaboration should be promoted. Concrete approaches were suggested: I) Communities of learning and practice; II) Networking among farmers sharing knowledge and technology; III) Training and networking on farming and sustainable practices but including cost-benefit analysis of each practice; IV) Rural schools; V) Strong focus on the practical dimension, the regional-local circumstances and the peer-to-peer learning. Different types of activities were suggested in this regard: a) thematic groups at local level, b) training sessions, c) exchanges of best practices, d) field and farm visits, e) Champion farms, f) workshops, g) specialised advisory services, h) valuing traditional ecological knowledge. Finally, consumers also need to be more informed and educated in order to support climate adaptive farming techniques.

- **Research & Innovation** – Participants considered that research should focus on tangible solutions, at the farm level and use a multidisciplinary approach. Solutions from other regions should be verified before such innovations are supported. There is a need for more research into pests and diseases, and in agroforestry. Researchers should be more engaged in the fieldwork. There is also a need for technology and machinery adapted to the new farm requirements. Such new adaptations should be shared more widely and publicised for wider use and engagement.
- **Data** – Participants request that data should be shared and that there is a need for a sharing system of farm and climate relevant data. Early warning systems and better forecasting at the farm level are, in this context, considered very important.
- **Funding and finance** – In this context, participants considered that the most important deliverable actions include the availability of I) Direct financing to farmers (easier access to funding); II) Support to family farms; III) Payment for ecosystem services and eco-schemes; IV) Quantification of the ecosystem services; V) Funding mechanism to support pilot farms and finally that VI) funding should be based on results and that such funding can also be private in addition to public funding.
- **Marketing** – was considered an essential element by the participants. In this context some of the most relevant actions mentioned included: I) the certification or formal distinction of climate-adapted products; II) marketing the bio-district; III) the use of eco-tourism to add value and also market diversified and climate-adapted agricultural produce; IV) change of diets to balance with produce of climate farming; V) develop business models for implementing new practices and finally VI) enhance market forecasting.
- **Governance & regulations** – Participants suggested that funds for agriculture and rural development should be more differentiated and adapted on a regional basis centred on future climate predictions. Bureaucracy was highlighted as a significant obstacle in accessing funds by farmers. Participants also mentioned that the legal framework for agroforestry, woody landscapes and rainwater harvesting should be enhanced in order to support the implementation of the abovementioned solutions. Finally, participants stated that the regulatory and legal framework should be more flexible to facilitate farms in transition, to ensure that farmers are not inhibited about making innovative decisions with the fear of mistakes and possible failure.

## 2.3 Cooperation for adaptation at landscape level

Understanding, planning, implementing and monitoring of on-farm adaptation requires action at larger spatial levels, mainly at landscape level, local level, regional level or water catchment level. During the morning of the second day of the workshop, all participants and stakeholders engaged in a plenary discussion where the main objective was to understand what the adaptation measures are and the related solutions. Understanding which adaptation measures require cooperation at a landscape level and what are the solutions and best examples of cooperation at landscape level. Participants were asked:

- What are the needs that require cooperation at landscape level?
- What are the cooperation solutions at the landscape level that we are implementing already?
- What are the cooperation solutions at the landscape level that we are still not implementing but which could be implemented in the future?

The outcomes of this plenary discussion are outlined in the following format:

- What are **common needs** at landscape level that would benefit from or require cooperation?
- What **solutions of cooperation** at landscape level are we **implementing or exploring already**?
- What **solutions** of cooperation at landscape level can we **implement in the future**?

- **Preventing soil erosion and protecting the landscape** – Soil erosion occurs at a scale larger than the farm level. Measures to protect the landscape from soil erosion often require cooperation since individual action at farm level will only protect some farms but not the entire landscape within a district for future generations. Some appropriate actions include:
  - Regionalising the issues, taking into account the regional disparities.
  - Cooperation/association to guide and stimulate the local inhabitants and farmers to change/recover their landscape (e.g. replacing monocultures in forestry with traditional flora); rural tourism to increase awareness about the importance of landscape beauty and its influence on rural development.

- **Restoring water cycle** – The water cycle functions at the plant, farm, water catchment and macro level simultaneously. Measures to restore the water cycle should be applied at these fundamental areas, at the same time.
  - Building a local water partnership/strategy.
- **Cooperation for labour force** – The lack of an available labour force may require action and cooperation at a local, regional, national and international level.
- **Data sharing** – is essential but is not happening to the required extent.
  - About data sharing: Existing support to facilitate collaboration and data sharing between relevant former and ongoing projects.
- **Convince/adequately inform the farmers that something works** – requires support.
  - Support and training for groups of farmers and/or other organisations to introduce alternative techniques on-farm or in land management.
  - Demo fields to implement new technologies in the field: organise partnerships with innovative farmers.
    - Joint approach with farmers, where they are needed to facilitate and foster behavioural change together.
- **Find a common meaning for landscape** (common agreement on the type of landscape we want at different levels).
  - Network of municipality technicians to discuss adaptation measures.
    - Create a local identity beyond tourism, integrating farmers, foresters, SMEs etc.
    - Participatory design and planning of the landscape.
- **Implement investment and innovation together** – some investments are larger than the farm level or are more economically affordable at higher level (e.g. water harvesting infrastructure, some relevant machinery, logistical infrastructures).
  - Working together with the private funding sector (private equity) for social/environmental impact.
  - Protecting fruit trees from frost by cooperation with technology developers and farmers/farmer associations. The challenge will be the retention of a long-term commitment.
- **Fast track implementation at a landscape level** – with investment and cooperation implementation at landscape level can be accelerated, as needed.
  - Financial support given to farmers by local communities for the provision of ecosystem services.
    - Payments based on results (example case in Montado, Portugal). Farmers will be paid according to positive impact of their activities.
  - Real engagement/real and timely cooperation (with the capacities) with/by the relevant authorities dealing with adaptation.
  - Financial support to change varieties and other adaptation measures (cover nets…) but small scale farmers sometimes experience difficulties accessing the support -> design funds in a way that small scale farmers can easily avail of them.
  - Bonus for collective implementation of adaptation measures.
  - Taxes for farming practices and products that are not climate-adapted and support for those which are climate-adapted.
- **Organise a 'chain' for legumes**: climate-adapted seeds and varieties – climate-adapted production – market.
  - Strenghtening the seed savers organisations & related research.
  - Public procurement to foster local food chains.
- **Marketing with added value for climate-adapted products**.
  - Protection schemes (PDO – Protected Designation of Origin) can increase cooperation among farmers.
    - Specific certifications for climate-adapted practices (e.g. certification of livestock fed 100% on grass and permanent pastures).
    - Mass media promotional campaign.
- **Motivating, engaging and involving farmers to collaborate with researchers in implementing relevant practices** – This will help to create communities which combine research and practice. Participating research groups require engaged cooperation and action at landscape level.
  - Asking farmers about their needs, easier at landscape level.
    - Engagement of farmers through farmer associations and organisations with projects and activities should be fully linked to their on-farm needs. Advisory services are critical.
    - Researchers familiarise themselves with farmers and their needs.
    - Assessment of farm results by the farmers themselves.

## 2.4 EU research and innovation tools for farm adaptation to changing weather patterns

***(EU missions, ongoing climate adaptation research projects, funding opportunities, research and knowledge needs)***

Research and innovation is key to provide solutions to climate change challenges in farming. An overview presentation provided the participants with the context and funding opportunities for EU Research and Innovation for farm adaptation and food security.

Two EU missions, the EU Mission "A Soil Deal for Europe" and EU Mission Adaptation to Climate Change; their objectives, structures, approach and open calls were presented. Participants were also informed about ongoing climate adaptation research projects funded through Horizon Europe and several funding opportunities related to food security and climate adaptation available through Horizon Europe Cluster 6 'Food, Bioeconomy, Natural Resources, Agriculture and Environment' calls.

### Research and knowledge needs – identified by participants

Throughout the workshop, and in particular during the session dedicated to the discussion around adaptation solutions, several participants mentioned the need for further investment in the dissemination of any existing knowledge and to implement this knowledge rather than engaging in further research. Notwithstanding this, when the participants were asked about research and knowledge needs, they contributed with a very large list of research and knowledge needs, which they consider to be important in order to address, promote and implement farm adaptation in Europe. We have separated research needs from knowledge needs. Research needs are interpreted as topics which require further research while knowledge needs are considered to be topics which require further dissemination, adoption and wider application. For the complete list of research and knowledge needs, please go to the annexes.

# 3. Implementation on the field

## 3.1 Field visits

### A summary of visit A

This field trip consisted of visits to two farms located in the Emilia Romagna Region. Both farms are producing milk for Parmigiano-Reggiano cheese.

The first farm (Pelosi farm), located in Sant'Ilario d'Enza close to the Enza valley, grows traditional permanent meadows for livestock feed, creating the typical landscape of the area. Traditionally, the permanent meadows of the Val d'Enza area are irrigated on the surface, which requires a high level of water usage. This has led to regional problems encountered during hot and dry periods, such as the summer of 2022, to keep their permanent meadows irrigated.

The EIP Operational Group Smart Grassland was created with a vision to keep this production model sustainable both from an economic and environmental perspective, even during particularly hot and dry weather periods. Funded by the Emilia Romagna region through the 2014-2022 RDP, the project has studied and implemented an innovative system with smart gates that facilitates the automation of the surface irrigation of meadows, which optimises the use of water resources and reduces energy consumption. The system is simple and can be managed by farmers both in the field and remotely, with the added benefit of enhancing farmers' working times as well.

The group was informed about the whole farm situation, including the irrigation system, and they visited a prototype of the irrigation system installed within the field. Participants examined the adaptability of the system in the longer term. Since water quantity is expected to decrease even further in the future, some participants advocated further adaptations in utilising alternative grass species which are more tolerant of drier periods of weather.

The second location was at San Martino in Rio. The Ruozzi farm started with conservation agriculture practices some ten years ago, mainly involving sod seeding. The transition to this type of agriculture was achieved subsequent to their participation in the HelpSoil LIFE project (http://www.lifehelpsoil.eu/en/). They began to practise new cultivation techniques on wheat, lucerne, soya, amongst others.

The visit involved a dialogue with the farmer and a field visit to observe a sample of soil results over a ten-year period of conservation agriculture. Results indicated that the soil structure had improved. This improved soil resilience during water stress periods because the new structure allows the soil to retain more water. These conservation practices have also enriched the soil biodiversity so that earthworms are now more frequently observed.

### A summary of visit B

This visit was hosted by the LIFE-ADA project and the farm Azienda Agricola Notari.

The farm business, located in Carpi (Emilia-Romagna Region), involves a grape producer for Lambrusco wine production The farm owner showed his vast knowledge and awareness about climate change dynamics and its current major impact as well as the predicted scenarios for the region. In that context, the farmer explained some of the adaptation measures which are currently being implemented and tested in his vineyards, with a particular focus on pruning and permanent soil cover. The main impacts addressed are linked to changing frost patterns and new diseases, which are currently of major concern. The installation of a new irrigation system is also being considered, although current high prices of all raw materials would require a significant investment, which, according to the farmer, demands a careful cost/benefit analysis. Different management strategies were discussed between the farmer and participants, addressing both current circumstances and future planned developments. In that regard, the farmer pointed to gene editing technologies as potentially providing a breakthrough towards climate change adaptation, in particular to tackling the increasing risk of new plant diseases and weather-induced stress (temperatures, drought, etc.). The group reflected on the challenge to carefully balance adaptation and mitigation measures, since some current adaptation solutions imply an increased use of farm machinery and equipment, leading to more fossil fuel energy consumption (direct and indirect).

The LIFE-ADA project aims at transferring knowledge on climate scenarios together with risk management and adaptive measures to improve farmers' skills in addressing current and future climate risks. It strives to build tools to reinforce the decision-making process by outlining efficient adaptation plans at both farm and supply-chain level. The project also aims to define a coherent political strategy at a regional level which supports adaptive planning by farmers; and promotes an innovative approach for insurers to strengthen the ability to mitigate against risk and guarantee the insurability of farmers in the long term, despite the increased probability of catastrophic and systemic risks. A prototype of the ADA app was shown to the participants. This comprised climatological maps which illustrated present and future risk assessment and a compilation of best practices which can be implemented as part of an adaptation plan at farm level, according to the farm production system.

Participants were also introduced to the more relevant trends and impacts of climate change on agriculture in Emilia Romagna.

# 4. Future collaboration

## 4.1 Open space session on future collaboration possibilities

The last session of this workshop used the Open Space method to create an agenda where participants could meet their peers to discuss future collaboration opportunities. In this session, participants were asked:

- What projects and ideas could be established to enhance farm adaptation and food security?
- Do you have one idea or a project that you would like to invite others to explore today together?
- Do you want to meet on a topic, to network and create synergies?

Based on these questions, participants proposed eight meetings around topics which were of interest to them. In each meeting, one participant facilitated and was responsible for reporting. Each meeting was designed specifically to address the needs of participants with regard to potential future collaboration. Participants were requested to only provide a short note of what was discussed and what were the next steps decided for future collaboration.

**Figure 7 - Agenda of parallel sessions, created by the participants using Open Space, with titles of meetings.**

| PLENARY room | | VERONA room | |
|---|---|---|---|
| TABLE 1 | Bees / Mushrooms (Polish group for international partnership) | TABLE 5 | Rising private money for innovative business |
| TABLE 2 | Climate smart orchards & producer organisations (Social-economic cooperation between farmers, advisors, funders... for adaptation of fruit orchards (small scale farmers) | TABLE 6 | Precision livestock management in grazing (offer and demand side) |
| | | TABLE 7 | Develop framework for community traits which enables optimisation of communities of change |
| **TORINO room** | | **NAPOLI room** | |
| TABLE 3 | Water retention in landscape (HE call) | TABLE 8 | soil care at farm level for Carbon sequestration and water infiltration |
| TABLE 4 | Improving irrigation practices and technologies (HE call) | | |


All groups had 1.5 hours to discuss the topic to a certain level of detail and their main work consisted of further reflection on the adaptation solutions, considering the potential solutions which require dissemination, further development and research. They were also asked to contemplate identifying how to obtain the required information, funding, examples, technology, support and partners.

Following conclusion of the working groups, participants were asked to identify a coordinator to follow up the subsequent steps including networking tasks; farm application; policy makers' interaction; create a group of peers to communicate the common practices that are working; list of emails to share projects; identified funding options and an idea/joint topic; creating a document for developing a project proposal. They were also asked to identify suitable and relevant case studies and to determine what is expected from each partner within a project. From the list of the next steps identified, it is clear that groups were motivated and mobilised to continue to work in the future on some of their ideas that require further development, application, dissemination and, in some cases, research.


## 4.2 Conclusions

It is clear that, despite some regional differences in Europe, all participants were concerned about the uncertainties brought by climate change. These uncertainties include the prospect of increased water scarcity, droughts, heat waves, the increasing prevalence of storms and heavy rains, the increasing unpredictability of climate and changing weather patterns. Participants from the north of Europe and mountain areas were also worried about less snow, more rain, more wet winters, more floods. In general, participants are worried not only about the reduction of productivity and yields, but also about the reduction of area available for farming, and the general reduction in farm income. The probability and frequency of total, 100% crop loss in rain-fed farms increases significantly and this is a major worry for farms and for food security.

Adaptation solutions were identified on all fronts, from mitigation to water harvesting, from irrigation efficiency, to soil conservation, permanent pastures, rotational grazing, adapted species and varieties, best practices and the use of a biodiverse agro-ecosystem. The terms regenerative agriculture, agroecology, agroforestry, holistic planning, climate-smart farming and coupled mitigation-adaptation investments were mentioned regularly. This indicated that stakeholders want more than just sustainable agriculture, adapted to climate change. They want to take this opportunity to change, to transition agriculture into a more friendly and innovative activity which attracts urban and young people into rural areas.

The topic of strengthening adaptation capacity was particularly evident in this workshop. Participants distinctly mentioned the existence of a gap between research, knowledge dissemination and farmers. There is a perception that farmers are not very interested or available to receive information or change their practices, for several reasons, mainly because the information is not applicable, practical, useful or adapted to their context. Participants also indicated that researchers, institutions and farm advisors need to work together with farmers. They highlighted that they need to start working together based on the farms' knowledge needs and not only to try and convince farmers about the solutions. Several participants believe that this is the best method to engage farmers, communities of practice and local partnerships of several types of stakeholders into developing a joined up working approach towards forming a strategy for local adaptation. Successful farm adaptation will not only need the involvement of farmers but also markets, regulation, decision support systems, data availability, research, consumer education, technology development, funding support and more.

This workshop identified a large range of research and knowledge needs. This was particularly interesting since several participants mentioned that we should focus more on sharing, disseminating, testing and demonstrating the existing knowledge rather than focusing too much on new research. The fact is that climate change adaptation still requires plenty of knowledge, namely to support the decision-making of farmers, policies and society. How efficient and effective are the different adaptation solutions? In which ones should we invest? The use of demonstration farms, living labs, OGs and practical experimentation was clearly highlighted as a speedy route to the direct observation and early adoption by farmers of the most visible successful practices.

It was inspiring to see that participants are motivated and stimulated to take the opportunity to avail of existing EU funds and further develop, research, test and disseminate the adaptation solutions to their specific type of farming, in their specific climate. Farm visits, communities of practice, thematic groups, OGs, continued demonstration, applied research and participatory-action-research are requested by the stakeholders of this workshop. They concluded that the future will see many innovative adaptation solutions applied by motivated farmers, working together with society for a civilisation that envisages closer urban-rural relations in balanced and thriving ecosystems.

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# ANNEXES

## Research needs

### Mitigation and adaptation

#### #1 Research need title: Mitigation of GHG and carbon assessment in different farming systems

**Challenge**: Mitigation of greenhouse gases in agriculture is still a challenge, namely regarding GHG emissions of the enteric fermentation of bovine animals, rice fields but also the reduction of organic matter in soils, high fossil fuel consumption of tractors but also the consumption of external inputs.

**Solution**: Storing carbon in the soil by increasing permanent crops (C in roots) and organic matter in the soil.

**What needs further research**: 1) Methodologies for measuring the carbon sink and GHG emissions of farms and support farmers practising mitigation strategies. 2) Assessment of GHG emissions of different methods and contexts of livestock or dairy production and amend policies and incentives for different farming systems depending on the environmental performance.

**Geographical area**: All

**Types of farming systems**: All

### Soil

#### #2 Research need title: Practical implementation of reduced tillage/ no-till and permanent soil cover

**Challenge**: Tilling has several negative environmental impacts such as erosion, compaction, degradation of soil life, reduction of soil organic matter, reduction of soil water holding capacity (see reference 11).

**Solution**: Conservation tillage, direct seeding, direct seeding without herbicides, direct seeding in permanent pastures, no tilling, cover crops, roller-crimped cover crops, shredded cover crops.

**What needs further research**: These alternatives are, on the one hand still new to most farmers, and on the other hand some require research to assess efficacy in different soil conditions, crops and farming systems, assess the cost-benefit and clarify in which situations they may not provide the best solution.

**Geographical area**: All

**Types of farming systems**: All

#### #3 Research need title: Soil life and biotic interactions in different farming methods and crops

**Challenge**: Conventional farming is degrading soil life, soil productivity and the performance of several ecosystem services (see reference 11).

**Solution**: Conservation farming and organic farming practices significantly contribute to improve soil life, soil productivity and ecosystem services (see reference 11).

**What needs further research**: Knowledge on the biological interactions occurring in soil and their associated linkages with a functioning agroecosystem.

**Geographical area**: All

**Types of farming**: All

### Water

#### #4 Research need title: Water harvesting and storing

**Challenge**: With predicted increasing temperatures, decreasing levels of precipitation, increase in droughts, water scarcity and aridity, there is less available water and at the same time a higher demand for water to irrigate, meeting the needs of animals, humans, firefighting and ecosystems. In some months of the year, there is plenty of water and sometimes floods, while the amount of consecutive days and months without rain is increasing. Harvesting water in large scale dams and infrastructures often has high financial, environmental and social costs.

**Solution**: There are many alternatives to large scale dams, namely off-stream dams, lakes and ponds, swales and roads in Keyline (1-2% slope) leading to ponds. Keyline design, different shapes of terrain modelling to harvest water in the soil and aquifers (e.g. swales, terraces, dykes, jessours, gabions, half-moons), mulching, afforestation, etc. Water harvesting at landscape scale can also reduce temperatures (see reference 12).

**What needs further research**: There are several research questions, namely what are the comparable costs and efficiencies of the different technical solutions of water harvesting and storing? There is a need for innovative water storage options to reduce costs for farmers, as water storage is very expensive. Is it better to store water underground or in dams and surface reservoirs? What are the optimal terrain modelling solutions for water harvesting? How can regions move from individual farm off-stream rainwater harvesting to integrated district level off-stream rainwater harvesting? How can roads best serve the water harvesting needs to adapt to climate change?

**Geographical area**: South Mediterranean Europe

**Types of farming**: All

### #5 Research need title: Forests and water cycle at meso scales: can afforestation increase rainfall in Europe?

**Challenge**: Increasing temperatures results in a reduction in precipitation levels since the cloud condensation level is higher at lower temperatures (directly related to Relative Humidity). Decrease in precipitation is a major challenge for southern and central European regions.

**Solution**: Several authors show that afforestation can reinforce the water cycle at a meso scale, allowing rain (warm fronts) to extend through thousands of kilometres (see reference 13). Authors state that there is "good potential for forest facilitated solutions in tackling the global desertification and water security problems".

**What needs further research**: Can large-scale afforestation programmes that create contiguous forests in the ocean and coastal areas increase rainfall in some areas of Europe and provide good adaptation to climate change?

**Geographical area**: All areas, starting from coastal areas, inwards, extending up to thousands of kilometres.

**Types of farming systems**: Agroforestry, Agro-silvo-pastoral systems

### #6 Research need title: Alternative water supplies

**Challenge**: Water scarcity for animals and humans but also for irrigation. Increased aridity.

**Solution**: Alternative water supplies such as fog traps (harvesting water from fog to provide drinking water for animals and humans), recycling of greywaters from urban areas, farms and households. Desalinisation.

**What needs further research**: Research on cost-effectiveness and innovation to achieve cost-effective solutions to implement technologies for alternative water supplies.

**Geographical area**: Southern and Central European regions

**Types of farming systems**: All

## Adapted species and varieties

### #7 Research need title: Knowledge on the climate envelopes and climate adaptation of species, crops, cultivars, varieties and breeds (plants and animals)

**Challenge**: In the context of a changing climate and changing weather patterns, choosing species, cultivars or varieties that are adapted to climate change is a very important adaptation measure. The challenge is that the information on the climate envelope and climate adaptability of each crop is not known or not integrated and available to farmers, researchers and other stakeholders

**Solution**: Research, catalogue and compile knowledge on the climate adaptability of species, crops and varieties. Integrate all the existing knowledge and make it accessible to stakeholders, for example by creating an open-access online catalogue available to farmers, farm advisors and the general public, with the climate envelope and climate adaptability of species, crops and varieties, both plants and animals. By knowing which crops and varieties are more resistant to drought, heat waves, flooding etc, farmers, plant nurseries and seed companies can adapt and produce what is most relevant to improve on-farm adaptation. Modelling and simulations, using these climate envelopes and climate change scenarios, can also help in spatial planning, farm planning, etc. (see reference 14)

**What needs further research**: Studies on the climate envelope and climate adaptability of species, crops and varieties. Articulation of indicators that are relevant for farmers and other relevant stakeholders.

**Geographical area**: All

**Types of farming systems**: All

### #8 Research need title: Selecting, developing and testing climate-adapted species, crops, varieties and breeds (plants and animals)

**Challenge**: Cultivars and animal breeds have been developed for specific purposes and types of farming. Humans have for a long time been selecting and improving species, based on their interest and regional requirements. This process takes time and climate change is evolving rapidly. Climate-adapted breeds and varieties that are required for smart and climate-resilient farming are not available in the market.

**Solution**: Climate-adapted diversified farming is very specific to circumstances and require numerous varieties and breeds and therefore require farmers and/or local/regional partners to select, develop and conserve animal breeds and plant varieties that are best adapted to present and future climates.

**What needs further research**: Through applied-research and/or action-research, in close partnership with farmers (to address their needs), throughout the climate vulnerable regions of Europe. Plant varieties and animal breeds need to be selected, improved, tested and evaluated, in order to be disseminated and promoted as a climate adaptation measure for the different agro-climatic zones and types of farming systems. Research can include genetic variability and new breeding techniques but without the use of Genetically Modified Organisms (GMO).

**Geographical area**: All

**Types of farming systems**: All

### Protection

**#9 Research need title: Pest management for new invasive species**

**Challenge**: As our climate changes, some species, namely pests and diseases, will migrate. New pests and diseases can constitute a serious threat to farming and food security in Europe. Integrated and best practices in pest management are not sufficiently publicised and implemented but, additionally, the potential for an unpredictable mass spread of pests and diseases is expected to escalate in a changing climate and in the context of large scale monocultures and homogeneous farming with reduced crop species biodiversity, and genetic diversity in the agricultural ecosystems.

**Solution**: Apply integrated pest management and best practices in EU farming at a landscape scale.

**What needs further research**: More monitoring on pest and disease spread. How to efficiently prevent, control and regulate new invasive species and diseases?

**Geographical area**: All

**Types of farming**: All

### Adaptation Capacity

**#10 Research need title: Effectiveness, cost-effectiveness and cost-benefit analysis of solutions and Decision Support Systems for climate change adaptation**

**Challenge**: There are many adaptation strategies, with numerous measures and solutions for climate adaptation at farm level. In addition, there are many techniques and variations with significant differences in relation to their effectiveness, cost and their associated positive and negative impacts. Farmers and stakeholders have difficulty in finding and using the appropriate decision support systems when faced with the necessity to invest in measures to adapt and reduce their vulnerability to climate change.

**Solution**: Assess and compare the effectiveness of adaptation measures and solutions at farm level. Analyse the cost-effectiveness and/or cost-benefit regarding the different solutions. Use appropriate decision support systems for the different types of farming systems and the different scales or intensity levels.

**What needs further research**: Assess the effectiveness of the adaptation solutions, namely using indicators that are relevant and applicable for climate adaptation and useful for farmers' decision-making process. Develop, test and streamline indicators and decision support systems to integrate this information and support farmers and stakeholders in decision-making at the appropriate level.

**Geographical area**: All

**Types of farming system**: All

## Knowledge needs

Beside the generation of new knowledge through research, there is also the need for the dissemination of such knowledge amongst farmers, farm advisors, agriculture institutions and other stakeholders of the AKIS.

Participants highlighted the need for specific knowledge dissemination, mainly on the practical solutions, around the following topics:

- **Soil**
  - Soil properties, texture characteristics of their region
  - Patterns of soil microbiology in the different types of farming
  - How to increase organic matter to reduce desertification
  - Understanding the impact of climate change on ground cover in permanent crops
  - How to retain soil moisture
  - How to reduce compaction
  - How to retain soil organisms
  - Plant-soil relationships
  - Mulching
  - Microclimates
  - Soil amendments
  - Water harvesting and water management optimisation
  - Manure management
  - Integrated pest control
- **Water harvesting and storing**
  - District re-modelling for optimal adaptation to climate change
  - Transforming the use of drainage systems
  - Better understanding the water cycle
  - Best practices for water permeation
  - Soil water movement – collecting water during the winter
  - New forms of preserving rainfall water such as reservoirs
  - Knowledge on alternative water sources and quality (related to drinking water for livestock)
  - More knowledge on ways to increase water retention
  - Water management, including water collection and storage at farm and district levels. How to make the best use of water storage/collection systems
  - How to save water during the autumn/winter months and regain a defined level of the ground water courses for irrigation. How to use water from periods of heavy rain (storage) to periods of drought (irrigation needs)
  - Knowledge on big infrastructural projects
  - Knowledge of drainage systems

- **Alternative water supplies**
  - Innovative ways to manage water: hydroponic systems, but some farms are small, and systems are too expensive
  - Recycling of water from urban centres
- **Irrigation**
  - How to apply less irrigation water without compromising the crop yield
  - Digitalisation in irrigation (and how to get funding for them)
  - Efficient implementation of deficitary irrigation (possibly satellite-based?)
  - Irrigation in an economical way by using solar energy system and ponds
  - Innovative irrigation methods
- **Adapted species and varieties**
  - More knowledge on local breeds and varieties
  - More knowledge on varieties adapted to low water availability and to heat
  - Knowledge of tree species' tipping points
- **Biotech**
  - Research and inform the people about when biotechnology can be useful and safe and when to be cautious about biotechnology
- **Diversification**
  - How to diversify practices
  - More knowledge on agroforestry
- **Farming Practices**
  - How to improve crop rotation
  - How to cultivate trees in the context of climate change
  - Regenerative farming (practices, certification)
- **Heat**
  - How to protect crop from heat excess
  - How to protect workers (e.g. harvesters) from hot weather conditions
- **Adaptation Capacity**
  - Tools to think of at a farms/territory level
  - Creating long- and short-term outlooks on forecasts
  - Creating long- and short-term outlooks aimed at raw materials
  - Creating long- and short-term outlooks aimed at supply chains
  - Creating long- and short-term outlooks aimed at markets
  - Investigate the effectiveness of proposed solutions for adapting to climate change
  - Research with a holistic approach towards sustainable farming systems. Focus on science-based solutions. Farm sustainability and sustainable use of agricultural resources and inputs (e.g. carbon farming, precision agriculture)
  - Increasing resilience through a systemic approach: increase the soil humus/SOC to retain water, vegetation, structural design. Integrate a diversified approach towards intensification
  - Promote agroecological best practices. Promote agroforestry best practices and mitigation measures (e.g. shrubs, soil care, grazing)
  - How to promote biodiversity but thinking of the commercial aspects of the farm too
  - Which farm management practices can be exploited to adapt farms towards changing weather conditions
  - Farm management solutions on climate, yields, crops; individual farm management tools, early warning systems technology, cooperation and association
  - Crop selection and adaptation, crop resilience, innovations, technical approaches, combine technical innovations and ecological management systems
  - How to reduce on-farm costs

## Projects' information

Several projects were present in this workshop. Below is the list of these projects.

| Project Name | Country | Project Type |
|---|---|---|
| 1. Rootsplus: Development of novel breeding technology for improved root system, drought tolerance and sustainable plant productions | Belgium / EU | Horizon project / SusCrop ERA-Net Cofund Action |
| 2. Soil force | Belgium | Innovative project |
| 3. Reduction of negative water impact on valuable agricultural land | Denmark | Innovative project |
| 4. Prediction and protection system of fruit crops from frost damage (LIFE FROSTDEFEND) | France / Greece | Life project |
| 5. Klimacrops: Adaptation of arable crops to climate change and their contribution to its mitigation in the Upper Rhine region | France, Switzerland, Germany | Interreg VI |
| 6. KlimaN Crop yield and optimised N fertilisation in a changing climate | Germany | Innovative project |
| 7. ATLAS | Greece | Horizon project |
| 8. IRISS - Innovative greenhouse system for combined agricultural use and production of irrigation water | Greece | Innovative project |
| 9. Elaiorama – Smart farming in early harvest olive oil | Greece | Operational Group |
| 10. L.E.A.F: Live Environmental & Animal Feedback | Italy | Innovative project |

| | | |
|---|---|---|
| 11. PROSIT - Sustainable management and enhancement of viticultural terroirs | Italy | Operational Group |
| 12. SOS_AQUAE: Sustainable farming techniques and renewable fertilisers to combine agriculture, water and Environment. | Italy | Operational Group |
| 13. Silvo arable alley cropping agro-system as climate mitigation strategy | Israel | Innovative project ERASMUS |
| 14. Good Quality Honey | Poland | Operational Group |
| 15. GOOD QUALITY MUSHROOMS | Poland | Operational Group |
| 16. +SOIL+LIFE | Portugal | Innovative project |
| 17. Photovoltaic energy development to irrigation | Portugal | Innovative project proposal |
| 18. GOFORESTS- European innovation partnership network promoting operational groups dedicated to forestry and agroforestry. | Portugal | Horizon Europe project |
| 19. Regenerative Pastures (Pastagens Regenerativas) \| climate adaptation, regeneration and sustainability of extensive livestock systems | Portugal | |
| 20. ADAPTATION OF CROP PRODUCTION TO CLIMATE CHANGES AND SOIL PROTECTION | Slovenia | Operational Group |
| 21. Sun powered water pumps with IOT Sensors for underground irrigation | Sweden | |

| | | |
|---|---|---|
| 22. Growing Green – Circularity in Farming | EU | Growing Green – Circularity in Farming |
| 23. EUWAY: Efficient Use of Water among Agricultural Youth | EU | Innovative project ERASMUS |
| 24. Building momentum and trust to achieve credible soil carbon farming in the EU (CREDIBLE) | EU | Horizon project |
| 25. REECAP: Research Network on Economic Experiments for the Common Agricultural Policy | EU | |

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