



Implementation of biodiversity measures
Experience of cereal and crop-livestock pilot
farms in France



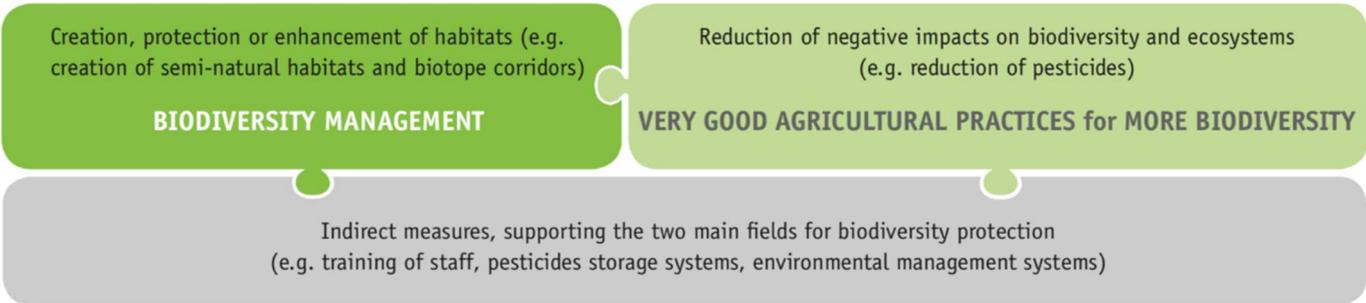
Content

1. Introduction	3
2. The Pilot Projects.....	4
2.1. Flower strips.....	5
2.1.1. Benefits and experiences.....	6
2.1.2. Auditing Tips	6
2.1.3. Lessons learned and recommendations	6
2.1.4. Quick Note	7
2.2. Tree Hedges (> 7 m of height, min. 4 m-width).....	7
2.2.1. Benefits and experiences.....	8
2.2.2. Auditing Tips	9
2.2.3. Lessons learned and recommendations	9
2.2.4. Quick Note	9
2.3. Cover crops.....	10
2.3.1. Benefits and experiences.....	10
2.3.2. Auditing Tips	11
2.3.3. Lessons learned and recommendations	11
2.3.4. Quick Note	11
2.4. Trainings and monitorings	12
2.4.1. Benefits and experiences.....	12
2.4.2. Auditing Tips	13
2.4.3. Lessons learned and recommendations	13
2.4.4. Quick Note	13
3. Conclusion	14
3.1. Acknowledgement.....	14
4. Outlook	14
5. Overview of the EU LIFE Project.....	15

1. Introduction

The LIFE Food & Biodiversity project supports food standards and food companies to develop efficient biodiversity measures and to implement them in their pool of criteria or sourcing guidelines.

In this paper on the French cereal and crop-livestock pilots in the LIFE Project, we provide information on our experiences gained in France in terms of implementation of recommended biodiversity measures. All pilots within the project were subject to a specific biodiversity consultation and measures were put in place that are based on the two pillars for biodiversity-friendly agriculture: Biodiversity Management and Very Good Agricultural Practices (figure below).



This publication targets agents who assess the implementation of requirements regarding cultivation methods (standard advisors, cooperatives, suppliers). We wish to communicate the challenges we experienced in our pilot projects and point out the observed benefits of the measures, as well as the pitfalls and related cost. This may be taken as a guide to avoid similar pitfalls and to enhance the benefit for biodiversity.



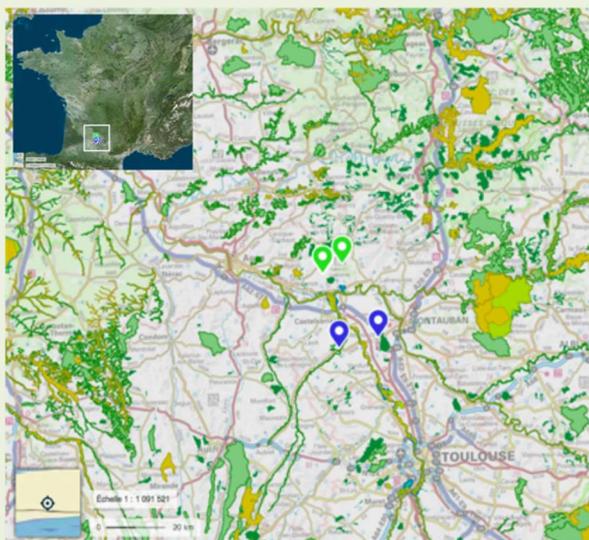
2. The Pilot Projects

Within the LIFE Food & Biodiversity project, “Recommendations to improve biodiversity protection in policy and criteria of food standards and sourcing requirements of food companies and retailers” were published. This Guideline includes a catalogue of measures to enhance biodiversity, out of which farmers may chose actions to enhance their farming practices. All of the measures were tested over the years by different stakeholders in different projects and proved their benefits for biodiversity. To further deepen our understanding on their regional effects on biodiversity, some measures were taken up by crop specific pilots in Spain, Portugal, France and Germany.

In France, 12 pilot farms were studied. We defined the action to implement in their farm according to their objectives. Indeed, in Aubrac region, we monitored 3 dairy farming systems. Main actions were about preserving pasture practices, biodiversity flora and fauna. However, in Languedoc region, we monitored 9 crop-livestock/crop farming systems. Main actions were about preserving mosaic of crops and agro-ecological infrastructures by implementing flowering strips, cover crops and hedges. The 9 pilot farms are involved in two EEIG, environmental and economic interest groups “COM.A.CO” and “CUMA du Buguet”, driven by Qualisol. This is one of the most dynamic cooperatives regarding agroecology and environmental protection in Tarn-et-Garonne. They want to improve soil fertility, reduce the erosion risks by working on cover crops and long crop rotations and are very interested in inputs reduction and biodiversity at farm level.

The aim of this publication is to give an overview about the actions, the lessons learned, the benefits for biodiversity and the challenges faced during implementation/management in these 9 farming systems. In this document, we focus on a few measures that were applied by the biggest number of farmers and describe them in detail.

Action	Number of pilots that applied measures
Landscape Elements	
Hedges	9
Groves	6
Underwood	1
Nesting box	1
Perch	1
Ponds	7
Fallow land	9
Permanent grassland	9
Watercourse or ditch	9
Buffer strips	9
Perennial flower strips	4
Product Integrated Actions	
Diversification	6
Cover crops	8
Direct seeding	4
No tillage	4
Shallow tillage	8
Fodder autonomy	2
Socio-economic Actions	
Trainings	9
Biodiversity monitoring	9
Soil quality monitoring	6
Bees monitoring	9



Territory description

The pilot project territory corresponds to the French department of Tarn-et-Garonne, situated in the south-west of France. In 2010, the department consisted of 5 280 farms with an average UAA of 40 ha (regional average: 48 ha). Productions are very diversified: fruits, vegetables, wine, livestock and arable crops. The main production, arable crops, represents 40 % of the UAA. Almost half of the farmers irrigate their crops (essentially corn and permanent crops). Organic farming is observed in 6% of the UAA of the department.

The climate is oceanic with soft and wet winters and dry and hot summers. The Quercy area (North West of the department) is characterized by colder winters and hotter summers.

The pilot farms are close to a great number of preserved areas (Green and orange areas in the map) dispatched in the territory, which are mainly situated along rivers (Garonne, Tarn) and wooden/steep areas. The biodiversity issue is that of the continuity of habitats, which means preserving an ecological corridor between preserved areas. Special attention should be focused on the preservation of a mosaic of crops and of agroecological infrastructures. The whole area is in Nitrate Vulnerable Zones.

Group of pilot farms from GIEE COM.A.CO (blue pins) and GIEE “Mutualisation des risques” (green pins)

Farmers involved in the pilot project are mainly located on hills areas with steep slopes where the erosion risk and fertility issues are high for superficial clay limestone soils. The steep slopes could increase the risk of pesticides and nitrates transfer into the environment.

2.1. Flower strips

Flower strips sown with wild flowers provide nectar and pollen for wild bees, bumblebees and other insects. Strips with a minimum width of 3 meters and various autochthonous plant species were sown on the pilot farms.



The implementation

Flower strips were sown mainly in late April/beginning of May after a fine-grained seedbed was prepared or for one farmer, by direct seeding. The mixture is composed by: *Achillea millefolium*, *Agrostemma githago*, *Calendula arvensis*, *Centaurea jacea*, *Centaurea scabiosa*, *Cyanus segetum*, *Daucus carota*, *Glebionis segetum*, *Kanutia arvensis*, *Leucanthemum vulgare*, *Lotus corniculatus*, *Matricaria inodora*, *Medicago sativa*, *Onobrychis vicifolia*, *Origanum vulgare*, *Poterium minor* (ou *sanguisorba minor*), *Scabiosa columbaria*, *Silene latifolia*, *Tragopogon pratensis*, *Vaccaria hispanica*.

Flower strips further aim on providing habitat and wintering grounds for small game such as hares. Therefore, they are especially valuable for biodiversity. More information on flower strips can be found in the [Action Factsheets for advisors, auditors or quality managers](#), which describe the measures in detail and give insights in their correct management and implementation.

2.1.1. Benefits and experiences

Flower strips reduce water erosion; they serve as buffer and habitat corridor. Furthermore, farmers benefit from enhanced soil fertility besides improved biological pest control.

Caution, direct seeding in spring is not ideal to have a good implementation. For this farmer, the flowering strip didn't implement well because of other weeds competition.



Farmer's concerns

1. Increasing pressure from weeds
2. Complicated and weather dependent implementation
3. Timing of mowing is rather inconvenient as it overlaps with other agricultural activity peaks
4. Cost

Costs

Tailored seed mixture for natural enemies of aphids: in our case, the cost is 0,18€/m² for a targeted seed mixture, with recommended certified autochthonous seeds and adapted to Western/Southern climate. The cost for an implementation of flowering strips of 50 m x 4 m = 200 m², is 36€ or 1800 €/ha.

More information on : http://herbea.org/fr/downloads/7352/muscari_fiche-w.pdf

2.1.2. Auditing Tips

The auditor can check the following quality aspects of flower strips:

- Flowering strips: minimum width of 3 m
- Flowering aspects can be found even in the second or third year of implementation
- Structural diversity of the strips and plots (not just a grass community)
- High diversity of flowering species
- Natural, autochthonous seeding mixtures should be used
- Mown in September after flowering

2.1.3. Lessons learned and recommendations

In most EU countries, the creation of flower strips is a subsidised action within the legal agri-environmental scheme. As there are many opportunities for the farmers to get support from the legal agri-environmental scheme in place (at least in the EU), we recommend farmers to inform themselves about the current environmental program of the state/country and follow the requirements in order to get the full subsidy.

The goal of a well implemented flower strip is a rather extended flowering period with a high structural diversity, which can be achieved by including plant species flowering at different times of the season into the seed mixture. Perennials are therefore preferred because of their higher species- and structural diversity. The value for biodiversity is considerably increased in perennial flower strips and we recommend the implementation of this action for the longest possible timeframe.

2.1.4. Quick Note

The experiences gained in the cereal and crop-livestock pilot farms go along with the notions of related nature conservation and biodiversity projects. Flower strips have a notable positive effect on biodiversity, especially on invertebrates and bird populations.

In general, flower strips can be described as follows:



„Cost“ relates to the monetary and time expenses caused by the measure.
 “Benefit for Biodiversity” symbolizes the positive effect of a measure for biodiversity.
 “Complexity of implementation and management” describes the amount of work related to the implementation and the maintenance of a measure.

2.2. Tree Hedges (> 7 m of height, min. 4 m-width)

Hedgerows serve as habitat for many different species. They feed and hunt within different radius, but most of them just reaching 30 m from their retreatment area. Thus, with proximity to hedgerows the need of pesticides is reduced.



The management

This measure is very costly with important implication of the farmer for the implementation, and then the management. For these 9 farmers, we can count about 11,3 km of tree hedges (> 7 m of height), min. 4 m-width (m)). The composition is very diverse over the farm. There are usually indigeneous species with dominance of conifers as oak tree. However, some farmers implemented other species in order to add biodiversity value in their landscape. One farmer impemented also hedge in the middle of one plot to reduce the size of this one. Another one implemented early flowering species for pollen production as *Acacia* and *Prunus Avium*.

Woody linear elements, such as hedgerows and lines of trees can help to reduce wind and water borne soil erosion, and hedgerows are particularly important in steep terrain as they can reduce the risk of landslides. This ensures sustainable yields. Hedgerows also reduce the nutrient input on water bodies. Effect of hedgerow on the wind protected side extend on the 10 to thirtyfold length of its height, e.g. an 1m high hedgerow influences the surrounding on 10 to 30 m.

2.2.1. Benefits and experiences

The multilayered structure of hedgerow (soil-, herb-, shrub- and (if any) tree layer) facilitates a potential high **species diversity**. Hedges support **structural diversity**, act climate regulating and as a **windbreak** (which is e.g. in favor of heat-dependent species such as butterflies).

Many species also use hedgerow as **winter quarters** (hedgerow, Common Toad, ...), **hiding place** (Hare, Birds, ...), **forage** (e.g. already in early spring for wild bees and other insects; berries and other fruits in autumn), as well as **territory border** (e.g. perches and song post for birds, such as red-backed shrike, barred warbler, brown linnet, greater white-throat).



Farmer's concerns

1. Sunlight competition
2. Complicated and weather dependent implementation
3. Cost

Costs

Minimum cost to implement a hedge (certified plants, protection, mulching) is about 15-20 €/linear meter (workload of planting not included).

The main cost is about the certified plants and the fruit tree choice (from 0.9 € to 13.5€/tree for fruit tree).

According [AFAC-Agroforesteries](#), the average management cost is about 3,32 €/linear meter for a manual management (with a basket and a chainsaw) and about 0,23 €/linear meter for cutter bar management.

It depends of the species you chose to implement. In France, some Regional and Departmental councils as well as Departmental federations of hunters give subsidies to farmers for hedges implementation through hedge planters associations gathered into a national network [AFAC-Agroforesteries](#).

Additional cost for Label Haie could be proposed to advisors, people in charge of implementing and manage hedges:

- Training session for bocage management plan and label Haie : 1,2 day / farmer
- Performing a bocage management plan: 2,4 day / farmer
- Performing a pre-labeling audit: 1 day / farmer

Focus on "Label Haie"

In France, the annual disappearance of 11;500 km of hedges in France is a direct cause of the collapse of biodiversity and the amplification of climatic accidents visible in our territories. Aware of the importance of saving bocage because of the multitude of ecological services provided by hedgerows, farmers have created a label to provide a framework for good hedge management practices and their enhancement by sustainable and local suppliers: the "Label Haie".

Its official launch took place on 4 October 2019, at the Ministry of Ecological and Solidarity Transition, in partnership with AFAC-AGroforesteries.

For the first time, this standard provides a framework for the mobilization of wood outside forests. It requires a **traceability system to guarantee the local origin of wood as well as it is a sustainable resource provided without overexploitation**. By

certifying the hedgerow-wood sector, supplied by the farmers who manage their hedgerows, the label helps to give an **economic value** to the wood from the hedgerows and to favour local wood supply chain in the territories.

This label is an additional tool proposed to the farmers, wood managers to better know the ecological functioning of the hedgerows related to adapted farming practices, through a technical monitoring at the bottom of the hedgerows, in a continuous approach with a first stage of pre-labeling (a visit, assessment and bocage management plan). To be able to enter into the label, 100% of mandatory basic indicators must be achieved in the first level; then at the end of 6 years, 100% of the indicators of the level 2 must be met; at the end of 10 years, 80% of the indicators of the level 3 must be met.

2.2.2. Auditing Tips

The auditor can check the following quality aspects of flower strips:

- Hedgerow of at least 3–4 m width
- Number of species per hedgerows
- Length of hedgerow
- Complexity of the structure: grass shrub and tree elements are present
- Works should be avoided during sensitive period of biodiversity, usually a potential high species diversity

2.2.3. Lessons learned and recommendations

Hedgerows are permanent and complex structures distributed along the perimeter of fields or dividing them. From the ecological point of view, the more complex these structures are, the more ecological habitats they hold, and therefore the more they contribute to biodiversity.

Hedgerows do not only serve as refuge for biodiversity but contribute to the provision of key ecosystem services of high interest for farmers such a thermal regulation, protection from winds, biological control, prevention of soil erosion or pollination.

2.2.4. Quick Note

The experiences gained in the cereal and crop-livestock pilot farms go along with the notions of related nature conservation and biodiversity projects. Hedges with indigenous species and conifers majority have a notable positive effect on biodiversity, especially on bird populations. In general, tree hedges (> 7 m of height), min. 4 m-width (m)) can be described as follows:

Cost	Benefit for biodiversity	complexity of implementation and management
		
2 out of 3	3 out of 3	2 out of 3

2.3. Cover crops

Cover crops provide multiple potential benefits to soil health and the following crops, while also helping maintain cleaner surface and groundwater. They prevent erosion, improve soil physical and biological properties, supply nutrients to the following crop, suppress weeds, improve soil water availability, and break pest cycles. Some cover crops are able to break into compacted soil layers, making it easier for the following crop's roots to more fully develop. The actual benefits from a cover crop depend on the species and productivity of the crop you grow and how long it's left to grow before the soil is prepared for the next crop.



The implementation

This measure was implemented by many farm pilots, as it is a well-known method to improve soil fertility. Cover crop are generally sown after spring cereal (wheat, barley) or corn. Diverse mixtures were sown, according to seeds availability in their farm or in the cooperative. For one farmer, it was a mixture of horse bean, grass pea and fodder sorghum, all farm-seeds except fodder sorghum. Another one, unique specie as mustards or phacelia for pollination, and fodder sorghum or horse bean for soil structure and fertility. The final composition of cover crop was oat-horse bean or forage radish. Fodder sorghum was also implemented for “useful cover” as a second crop after barley (early harvest).

2.3.1. Benefits and experiences

The addition of **cover crops** increases plant **diversity** and helps to support **biodiversity** in soil microbes and beneficial wild-life. **Cover crops** also help protect **biodiversity** off the farm by holding nutrients such as nitrogen and phosphorus in the fields, which protects water and other downstream ecosystems. There is diversity in space—having multiple plant and animal



species occupy the same plot of land at the same time. There is diversity across scales—having multiple land covers and animals occurring on different parts of the farm. There is also diversity across time—having different plants or animals in a certain plot of land at different times of the year.

<p>Farmer’s concerns</p> <ol style="list-style-type: none"> 1. Water competition 2. Weeds invasion 3. Complicated and weather dependent implementation 4. Seeds availability 5. Cost 	<p>Costs</p> <p>In our pilot, most of our farmers use their own farm-seeds to limit costs. Total cost is comprised between 75 to 280 €/ha (average about 140 €/ha)</p> <ul style="list-style-type: none"> • For Seeds: variable from 15€/ha (oat, sunflower, mustard) up to 60-80 €/ha (mixtures of legume/poaceae/Brassicaceae) • For soil preparation and sowing: 30 to 130 €/ha (in relation with material used) • For destruction: 15 €/ha (rolling down), 20 to 45 €/ha (stubble cultivation, scalping machine) <p>Some subsidies could be provided for material (PCEA), agri-environmental measures, water agencies, other collectivities...</p> <p>Through this action, economy saving for N inputs for the next crop is about 5 to 50 €/ha.</p>
--	---

2.3.2. Auditing Tips

The auditor can check the following quality aspects of flower strips:

- Density of sowing
- Presence of legumes in the mixture
- Length of cover (from July or autumn)
- Destruction method
- Following crop (not mustard before rapeseed for example!)

2.3.3. Lessons learned and recommendations

Since 2013, the Common Agriculture Policy (CAP reform) introduced a new set of measures to make the financial support system to the European farmers more eco-friendly. These measures are called greening measures. They include an obligation to farmers with arable land exceeding 15 ha to manage at least 5% of this area as ecological focus area (EFA), in order to obtain a subsidy. In some EU countries, e.g. the Netherlands, it is required to mix at least two species of cover crop species to receive EFA-subsidies.

Cover crops can also be sown solely during the fallow period. In northwest Europe, such cover crops that fill up the fallow period are known as “winter cover crops”. They are sown at the end of summer or early autumn after harvest of the main crop.

2.3.4. Quick Note

The experiences gained in the cereal and crop-livestock pilot farms go along with the notions of soil quality: structure and fertility and biodiversity projects. Cover with legumes that are present during winter are the best way to have biodiversity function of fauna refugee. In general, cover crops can be described as follows:

Cost	Benefit for biodiversity	Complexity of implementation and management
		

1 out of 3

2 out of 3

1 out of 3

2.4. Trainings and monitorings

Participatory science with farmers in this project aims for increasing biodiversity awareness of farmers. It could be resulting also for implementing easy protocol to better understand the local and common biodiversity (targeted species: earthworms, wild bees, butterflies, invertebrates).



The implementation

Three training sessions were organized with the pilot farmers. The purpose of these one-day trainings with half day on field, were to promote beneficial arthropods on their farms. Exchanges were about what landscaping would be promoting biodiversity in their farm. Then, working session had for goal to recognize main families of predators and parasitoids and their key role for agriculture.

These training sessions have been supported also by biodiversity or soil monitoring tools. The biodiversity monitoring tool is from the “Observatoire Agricole de la biodiversité” <http://observatoire-agricole-biodiversite.fr/> and is useful for observing arthropods and pollinators. Also, some messicole monitorings were done on different plots of the 9 farmers. Wild bees and butterflies were highlighted in fallow and buffering strips to characterize favorable landscape elements for pollinators.

2.4.1. Benefits and experiences

These trainings aim for better understanding of local and common biodiversity (air and soil biodiversity) and of ecosystem services provided (pollination, soil fertility, biological control of organisms...). Some groups of farmers created **their own soil monitoring protocol with auger surveys**. The objective is to make some **local references** for



their soil. This common action between farmers for better understanding their local environment have very good benefits for biodiversity. First for soil biodiversity then for aboveground, by repercussion.

Farmer's concerns

1. Very interested
2. Lack of time to do it by themselves
3. Lack of knowledge but awareness about natural enemies (wild pollinators, carabidae...)

Costs for trainings

Cost of one day for people in charge of the formation (780 €/d).

Furnitures for material for training: 100 to 200 € (game, printing...)

Costs for biodiversity monitoring

- Messicole monitorings were provided by the Conservatoire Botanique National as they were in charge of the Regional Plan on Messicoles and in charge of a project Messiflore.

Cost for protocols for OAB (8 farmers):

- Material for pollinators (32 tubes and wooden stakes; 2 per plot), for invertebrates (wood boards; 3 per plot): between 15 to 28 €/plot according the type of wood.
- Monitoring performed by a trainee (from another project budget) : 3420 € for 8 months (personal cost) + 1200 € for travel costs

2.4.2. Auditing Tips

The auditor can check the following quality aspects of training strips:

- Number of farmers
- Exchanges between farmers during the sessions
- Implementation of new actions

2.4.3. Lessons learned and recommendations

Participatory approach gives a very interesting space for farmers to exchange their own knowledge. These moments are very rare for farmers, as they are used to work alone on their farms. This approach allows also to create common measure to fulfill common objective. For example, the area where they cultivate present heterogeneous soil nature. Mutualizing soil samplings in the territory is very interesting for creating common local references of their soil. Also, it allows to divide the cost of the monitoring. For training, they should be organized during winter, when farming activities are lower than during spring and summer.

2.4.4. Quick Note

The experiences gained in the cereal and crop-livestock pilot farms go along with the notions of soil quality: structure and fertility and biodiversity projects. In general monitoring and training can be described as follow:

Cost	Benefit for biodiversity	complexity of implementation and management
------	--------------------------	---



1 out of 3



2 out of 3



1 out of 3

3. Conclusion

Overall, different actions were tested by our pilot farms. In this document we describe only a few of them in more detail, even though all the others are also contributing considerably to biodiversity. Most of the measures are supported by national or regional agri-environmental schemes. More information can be found on www.business-biodiversity.eu/en/biodiversity-training/advisors.

One challenge for all actions enhancing biodiversity is their funding. In future, biodiversity measures must be priced in, in order to establish a common willingness of farmers to manage their plots in a biodiversity-friendly way!

All pilot farms of the LIFE Food & Biodiversity Project test the Biodiversity Performance Tool (BPT), an online tool that helps to create a farm-specific Biodiversity Action Plan and thus supports the farmer in planning, adjusting and monitoring the measures for biodiversity on the farm. Furthermore, it helps auditors to assess the quality of the implemented measures.

3.1. Acknowledgement

Our special thanks go to the two environmental and economic interest groups “COM.A.CO” and “CUMA du Buguet”, driven by Qualisol. They accomplish the measures very passionately and take their time to evaluate the implementation in regular consultations. Thus they contribute considerably to the project not only with their actions on the farm but also with much expertise. We are very grateful to all the farmers! And a special thanks to the local cooperative Qualisol who was very present interesting by all the actions and mesures implemented for improving biodiversity in the territory.

4. Outlook

For further actions to improve biodiversity in these 9 pilot farmers, planting new hedges or implementing buffer strips along hedges would prevent erosion and soil drag by runoff. This could allow to create continuity of habitats, which means preserving an ecological corridor between preserved areas. In France, Departmental federation of hunters give subsidies to farmers for hedges implementation. They also propose farmers to restore water ponds in their farms. The presence of permanent water points, either of natural or anthropic origin (rafts irrigation, drinking troughs for livestock, ditches, wells, fountains, etc.) provides water for wild fauna, target for hunters. Then, we agreed with Qualisol that 3 farmers would be engaged for labeling their farm for High Environment Value. It is a voluntary approach which aims to identify and promote particularly environmentally-friendly practices applied by farmers.

5. Overview of the EU LIFE Project

The EU LIFE Project Food & Biodiversity “**Biodiversity in Standards and Labels for the Food Industry**” aims at improving the biodiversity performance of standards and sourcing requirements within the food industry by

- Supporting standard-setting organisations to include efficient biodiversity criteria into existing schemes; and encouraging food processing companies and retailers to include biodiversity criteria into respective sourcing guidelines
- Training for advisors and certifiers of standards as well as product and quality managers of companies
- Implementation of a cross-standard monitoring system on biodiversity
- Strong communication to raise awareness among all stakeholders in the industry

The project has been endorsed as a “Core Initiative” of the Programme on Sustainable Food Systems of the 10-Year Framework of Programmes on Sustainable Consumption and Production (UNEP/FAO).

Editor: LIFE Food & Biodiversity; Lake Constance Foundation

Photo credit: © Didem Senturk, Picture 1 and 2, © Solagro

Organisations contributing to the pilot project with pilot and their expertise



www.food-biodiversity.eu

European Project Team



Supported by

Recognized as core initiative by



EU LIFE programme



eat with care

Sustainable Food Systems



www.food-biodiversity.eu