



Implementation of biodiversity measures
Experience of cereal pilot farms in Germany



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European Project Team



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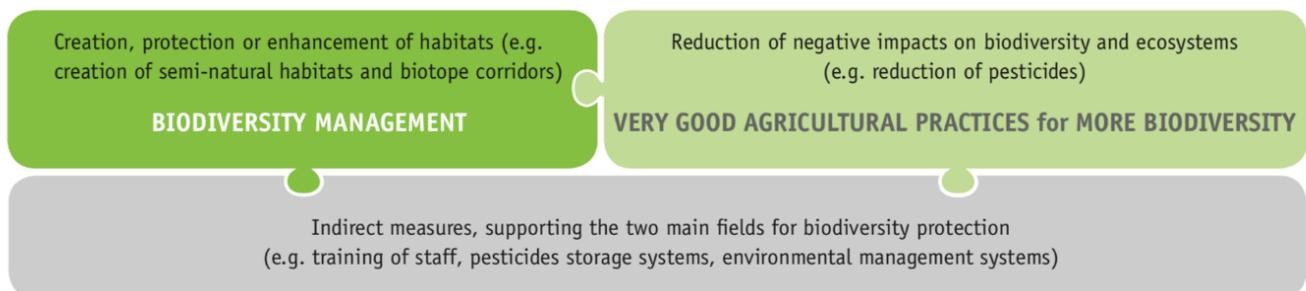


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1. Introduction

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 we provide information on our experiences gained in the cereal pilot projects in Germany 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). Cereal pilots implemented measures dedicated to Biodiversity Management (table on page 4).



1 Sustainable Agriculture (BAP), Design: Didem Senturk

This publication targets product managers, 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. You may take this as a guide to avoid similar pitfalls and to enhance the benefit for biodiversity.



Picture 1

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 recommended measures were subject of testing over a longer time and by different stakeholder. During these trials, they all proved their benefit for biodiversity. To further deepen our understanding on the regional effects on biodiversity, 18 of the recommended measures were taken up by crop specific pilots in Spain, Portugal, France and Germany.

In Germany, 15 pilot farms from two different regional producer associations, KraichgauKorn® and Linzgau Korn®, participated.

Most farms supplying Linzgau Korn® produce following the quality label Qualitätszeichen Baden-Württemberg (QZ BW). A few farms produce organically according to Demeter/Bioland criteria. Besides these standard systems, Linzgau Korn® as an association requires some biodiversity measures of their own, which all farmers have to follow.

Farms of KraichgauKorn® all produce under the QZ BW label. Additionally, the cereal they grow for KraichgauKorn® is pesticide-free in the growing season.

All farmers cultivate cereals for their association and implemented biodiversity measures on their plots. Starting in the growing season 2017/2018, actions were applied and constantly improved. The table on the right gives an overview about the actions that the pilot farms in Germany tested

The aim of this publication is to give an overview about the actions taken, the lessons learned, the benefits for biodiversity and the challenges faced during implementation. In this document, we focus

on a few measures that were applied by the biggest number of farmers and describe them in detail, including costs and effort.

Action	Number of pilots that applied measures	
	2017/2018	2018/2019
Production Integrated Actions		
Drill gaps - wide rows	2	3
Light fields	5	6
Skylark plots	5	6
No harrow	1	1
Fallow land or strips sown with wild flowers (total)	15	15
- Fallow land sown in	6	4
- Annual flower strips	13	15
- Perennial flower strips	5	5
High cut in clover grass	2	2
Not managed strip in clover grass	2	2
Catch crop kept over winter	7	11
Extensive cultivations	2	2
Landscape Elements		
Hedges	5	6
Stone- and deadwood piles	10	9
Solitary trees	1	1
Field margins	5	3
Nesting aids for birds and bats	3	5
Nesting aids for wild bees	4	5

Kraichgau: (orange oval)

The Kraichgau refers to the hilly region between the foothills of the northern Black Forest and the ascent to the small Odenwald forest south of the Neckar. In the west, the Rheingraben forms a border (Wiesloch-Bruchsal-Karlsruhe) in the east the Neckar valley from Heilbronn to Obrigheim. Characteristics of the Kraichgau, with its about 1500 km² large area, are the gentle hills and flat valleys. The Kraichgau is one of the oldest agricultural areas in Europe, it is particularly fertile due to its loess soil and is therefore one of the granaries of southern Germany. Fruit and wine cultivation (especially on the Keuper heights around Sinsheim and Sulzfeld) are also widespread. Potatoes, sugar beet and tobacco are also cultivated.

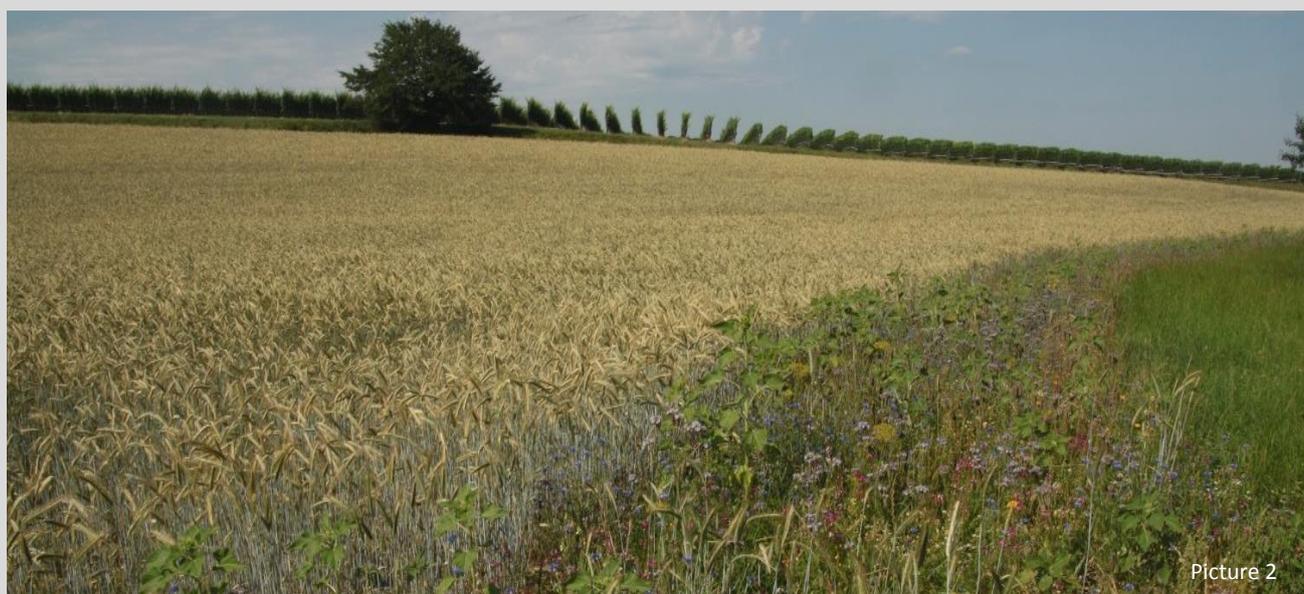
Linzgau: (blue circle)

The Linzgau is a landscape in the south of Baden-Württemberg. The Linzgau reaches in the south to the Lake Constance and in the east to the Schussen. To the west the Linzgau is framed by Überlingen and to the north by Pfullendorf. Characteristic of the upper Linzgau region are the long moraine ridges made of alpine rock material deposited at the end of the glacier. Large moor and reed areas and smaller lakes dominate the landscape, especially in the northeast. This results in a small-scale and diverse landscape and a correspondingly large natural diversity.



2.1. Flower strips – the All-rounder

Flower strips sown with wild flowers provide nectar and pollen for wild bees, bumblebees and other insects. Strips with a minimum width of 3 metres and various autochthonous plant species were sown on the pilot farms. Flower strips further aim on providing habitat and wintering grounds for small game such as hares. Therefore, they are especially valuable for biodiversity. You find more information on flower strips 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.



Picture 2

The implementation (2017/18: 15 out of 15 farms | 2018/19: 15 out of 15 farms)

Flower strips were sown mainly in late April/beginning of May after a fine-grained seedbed was prepared. The seeds were incorporated shallowly into the soil, so that light-dependent plants are able to germinate. The flower strips were not mown but were retained over winter and ploughed during soil preparations for the following year's spring crop. Only few farms tested the perennial flower strips, which were mown once late in the year after flowering. In this cases mulch was removed

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.

For example, one farmer experienced increased corn production in the place where a perennial flower strip was before (see Picture on the right).



Picture 3

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

Seed mixture: ranging from 400 €/ha with the use of recommended certified autochthonous seeds (for Germany e.g. RegioZert®) to 50 €/ha if species-poor mixtures of phacelia and mustard are used

Opportunity Cost: up to 1500 €/ha for yield loss, 70 €/ha for sowing

2.1.2. Quality Elements

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 (for perennial flower strips)
- 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

The goal of a well-implemented flower strip is a rather extended flowering period with a high structural diversity, which is achieved by including plant species flowering at different times of the season into the seed mixture. Seed mixtures need to be autochthonous. Perennials are 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.

In most EU countries, the creation of flower strips is a subsidised action within the legal agri-environmental scheme. In Germany, for instance, most federal states support the creation of flower strips with a minimum width of five or six meters (width indications vary by federal states), widely covering the implementation costs. As there are many opportunities for the farmers to get support from agri-environmental schemes in place (at least in the EU), we recommend companies to support their farmers to find out about the current environmental program of the state/country and follow the requirements in order to get subsidized.

2.1.4. Quick Note

The experiences gained in the cereal 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	Benefit for biodiversity	complexity of implementation and management
		
1 out of 3	3 out of 3	2 out of 3

„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. Light fields – drill gaps and reduced sowing densities – promoting wild herbs

Light fields constitute valuable habitats for many wild flora and fauna species. There are two ways to implement this measure: Either by sowing cereal with reduced sowing densities or with so called drill gaps – sowing the cereal in wider rows. This measure supports light depending herbs, giving them the chance to germinate. It also benefits insects by providing pollen and nectar, as well as birds. You find more information on light fields in the [Action Factsheets for advisors, auditors or quality managers](#), which describe the measures in detail.



Picture 4



Picture 5

The implementation (2017/18: 7 out of 15 farms | 2018/19: 9 out of 15 farms)

Sowing densities was reduced to 50–60 % of the conventional densities on at least one plot by one or two working width (5–6m) or on the same area two seeding rows remained unseeded, followed by three rows seeded normal. Some farmers implemented this measure on the whole plot but reduced the sowing densities only to 80% in order to avoid major yield losses. In order to achieve an increased wild herb establishment, this measure needs to be combined with the abandonment of any weed management, such as harrowing or application of herbicides. Furthermore, the reduction of fertilizer benefits wild herbs considerably.

2.2.1. Benefits and experiences

Cereals and wild herbs naturally grow together and develop a “plant community” whereby symbiosis arise, e.g. increase of water availability, increase soil fertility by nitrogen bonding. Evidence state that cereals can achieve a better nutrient uptake when wild herbs are present. Some farmers testing this measure reported increased grain qualities due to lower densities and fewer problems with funguses and other diseases.

Farmer’s concerns

1. increasing pressure from weeds, which may also invade the whole plot
2. not acceptable yield losses

Costs

Opportunity Cost: barely any if implemented only on parts of the plot. Elsewise minor yield losses depending on the culture may appear.

2.2.2. Quality Elements

The auditor can check the following quality aspects of light fields:

- Reduced sowing densities: Visually noticeable lower crop density in comparison to the rest of the plot
- Wide rows can be checked best at the beginning of the growth stage of the crop: If an audit takes place during this time, the row distance can be verified. During the vegetation period, wild herbs should have established within the cereal rows
- Area measure implemented should measure at least 15m², ideally 20m²

2.2.3. Lessons learned and recommendations

The goal of this measure is to give light dependent wild herbs the chance to germinate, improving also habitat quality for insects and birds. Even though many pilots had their concerns about the yields at the beginning, some even noticed increasing quality of the light standing cereals, e.g. bigger grains or decreasing fungicides required. On the other hand, the light stands also give space for problem weeds such as corn thistle (*Cirsium arvense*), bearbind (*Convolvulus spec.*) and dock (*Rumex spec.*). Those may be combated locally with a backpack sprayer or by hand.

2.2.4. Quick Note

The experiences gained in the cereal pilot farms go along with the notions of related nature conservation and biodiversity projects. Light fields have a considerable positive impact on the wild herb flora.

In general, light fields can be described as follows:

Cost



0 out of 3

Benefit for biodiversity



3 out of 3

complexity of implementation and management



1 out of 3

2.3. Catch crop kept over winter – providing wintering habitat

As a retreat, diverse catch crops that are left over winter are particularly important for wild animals. If the catch crop is sown early in the year (e.g. July) then they get to flower. This makes the measure particularly interesting for insects. Also small game animals such as hare find here a valuable wintering habitat. You can find more information on this action in the [Action Fact-sheets for advisors, auditors or quality managers](#), which describe the measures in detail.



The implementation (2017/18: 7 out of 15 farms | 2018/19: 11 out of 15 farms)

This measure was implemented by many pilots already, as it is well-known as a method to improve soil fertility. However, during the project, quality of implementation improved. Pilots were asked to sow diverse mixtures of legumes e.g. Mustard, phacelia, summer rape, summer vetch, which are likely to freeze off. Even though the plants get damaged, the organic material remains on the field and guarantees easy soil cultivation in spring.

2.3.1 Benefits and experiences

Catch crops in general are beneficial for soil fertility, structure and health. For on-land biodiversity, the value of this measure lies within the provision of habitat during winter. A diverse species mixture of the catch crop ensures root penetration in different soil depths, which results in an improved soil structure for the following culture.

Farmer's concerns

1. Additional working operation required

Costs

Catch Crop: 70-80 €/ha for a diverse mixture whereas canola only costs around 50-60 €/ha

Opportunity Cost: depending on the machinery farmers own, an additional working operation is required.

2.3.2 Quality Elements

The auditor can check the following quality aspects of catch crops:

- Diverse mixture is used
- Catch crop remains over winter
- Farm register book

2.3.3 Lessons learned and recommendations

Catch crops kept over winter are a very easy but effective measure for biodiversity. While increasing soil fertility plots are providing valuable wintering habitat for small game but also birds and insects. Thus, catch crops should remain as long as possible on the plots, ideally until late march.

In some EU countries, sowing diverse catch crops are subsidised actions within the legal agri-environmental scheme. In Germany, for instance, most federal states support catch crops with a defined mixture of at least 5 species which are widely covering the implementation costs. 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 companies to support their farmers to find out about the current environmental program of the state/country and follow the requirements in order to get subsidized.

2.3.4 Quick Note

The experiences gained in the cereal pilot farms go along with the notions of related nature conservation and biodiversity projects. Catch crops kept over winter have a considerable positive impact on biodiversity, especially small game and invertebrates.

In general, catch crops kept over winter 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. Stone- and deadwood piles – supporting heat-dependent animals

Stone and deadwood piles are dry and warm habitats and therefore important biotopes for various native species. They provide valuable hiding, nesting, hibernation places and winter quarters for many different heat-dependent animals, such as different amphibians and insects. Piles are also providing ground for thermophile plant species. You find more information on this action in the [Action Factsheets for advisors, auditors or quality managers](#), which describe the measures in detail.



Picture 7



Picture 8

The implementation (2017/18: 10 out of 15 farms | 2018/19: 9 out of 15 farms)

This measure is a very easy, though effective action targeting heat-dependent species. Pruning residues or stones originating from the plot, which need to be removed for agricultural activities, can be used. Pilots collected those during their field operations and piled them up on a sunny place on the field margin, along hedges or other landscape elements. Once a year, piles need maintenance in order to keep them free of overgrowing vegetation.

2.4.1 Benefits and experiences

Stone and deadwood piles promote many different beneficial animals. Starting with wild bees, which find nesting habitats and constitute important pollinators, up to small predators such as marten, fitch and weasel, which may help controlling the mice population. Amphibians and reptiles such as sand lizard, common toad and blindworm feed on pests. Thus, this measure can contribute to the reduction of pesticides.

Farmer's concerns

1. Additional work
2. host of pests

Costs

Opportunity Cost: one working hour a year for maintenance.

2.4.2 Quality Elements

The auditor can check the following quality aspects of stone and deadwood piles:

- Diameter of about 1,5–2 m (deadwood); 2–3 m² (stone)
- Piles are maintained and not overgrown with vegetation
- stones/wood originates from the area
- ideally, a small grass margin surrounds the pile
- no pesticides are applied within a 3 m distance to the pile

2.4.3 Lessons learned and recommendations

Stone and deadwood piles are a very easy but effective measure for biodiversity. As farmers usually remove rocks from the plots, it does not mean any additional work to construct a pile. The same accounts for deadwood piles in case farmers maintain hedges or trees, as it is the case for all our pilots. Maintenance of the piles needs to be done at least once a year in order to avoid overgrowing. We recommend doing so in the early morning in order to avoid disturbance of animals.

2.4.4 Quick Note

The experiences gained in the cereal pilot farms go along with the notions of related nature conservation and biodiversity projects. Stone and deadwood piles have a considerable positive impact on heat-dependent animals such as insects and amphibians, but also some plant species.

In general, stone and deadwood piles can be described as follows:

Cost



0 out of 3

Benefit for biodiversity



3 out of 3

complexity of implementation and management

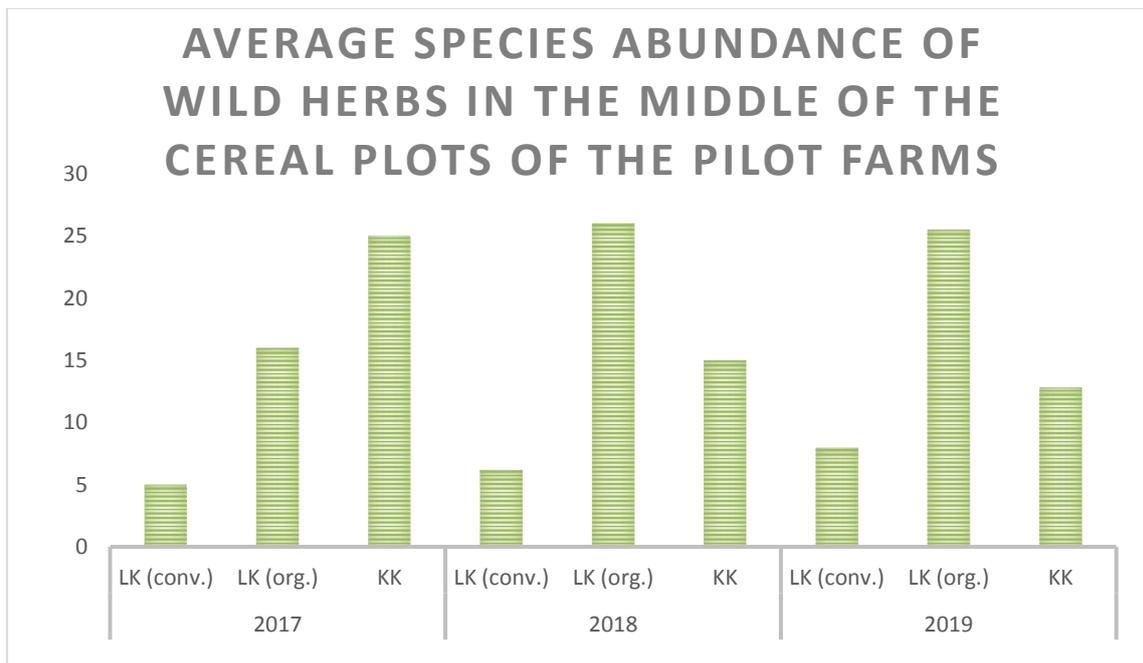


0 out of 3

3. Conclusion

Overall, 18 different actions were tested by pilot farms within the LIFE Food & Biodiversity Project. In this document, we describe only a few of them more in detail, knowing that the other measures contribute to biodiversity, too. Farmers considered most of the measures as easy to implement and with comparable low cost. Many of the measures were additionally subsidized by national or regional agri-environmental schemes.

The monitoring implemented by the project show first trends of a slight increase of wild field herbs on the plots of the pilot farms (graph below). In fact, plots where the cereal was not treated with plant protection products (organic Linzgau Korn® and all plots of KraichgauKorn®) show higher species abundance than treated plots. Due to the edge-effect, species abundances were greater at the plot boundaries compared to the middle of the field (not shown in this graph).



One challenge for all actions enhancing biodiversity is their funding. In case of KraichgauKorn® and Linzgau Korn®, the cereal produced under the label are sold for a slightly higher price to the mill, as the bakery sells the breadstuff for a few cents more per unit. This, however, still does not cover all the opportunity costs. 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!

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 farmer associations Linzgau Korn® and KraichgauKorn®. Pilot farms voluntarily implemented measures in order to increase biodiversity on farm level. We are grateful to the time and efforts these farmers dedicated to the implementation and evaluation of biodiversity measures. Additionally, the expert knowledge the farmers put into the project contributed greatly to the success of all activities.



“For the production of high quality, regional products biodiversity plays an extraordinary role. Therefore, we try to enhance habitats and protect the environment by abandon pesticides in the cereal production.”

Roland Waldi, farmer and founder of the KraichgauKorn® association



“Biodiversity concerns us all! We at Linzgau Korn® try to contribute to the protection and enhancement of biodiversity, among others, with wide, species-rich flower strips. These measures also maintain soil fertility.”

Joseph Baader, baker and founder of the Linzgau Korn® association

4. Outlook

Two Nestlé Germany producers for cereals started in summer 2018 with the elaboration of individual Biodiversity Action Plans. Whereas one pilot farm already applied a few measures in order to enhance biodiversity, the other will start with the implementation in 2019, and thus profit from the lessons learned by farmer colleagues.

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

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Organisations contributing to the pilot project with pilots and their expertise



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