BIOGEA Briefing Number 6

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BIOGEA
Testing BIOdiversity Gain of European Agriculture with CAP greening

Green and Blue Infrastructure, regional variation in CAP implementation and needs: Briefing from the BIOGEA Project

Introduction

This briefing compares the findings from the six BIOGEA case study areas to examine how the greening of pillar 1 of the CAP, a policy designed to be applicable across the whole of the EU, has been implemented differently and had variable impacts in different farming systems. While greening measures are the same across Europe, Member States could make adaptations to suit national and regional conditions. In particular, they could choose which Environmental Focus Area (EFA) measures to make available to farmers. Farmers could also choose which measures to put in place on their farms. While the initial aim of greening was to help meet biodiversity and other environmental goals, the decision-making of national and regional administrations and of farmers themselves was often not focused on achieving environmental targets.

This has relevance for ongoing discussions on the future of the CAP, as the European institutions, member states and stakeholders discuss the balance between allowing flexible implementation to meet the needs of the range of very different farming systems across the EU and how requirements can be standardised across the EU to ensure that all deliver environmental benefits and that farmers in one country are not disadvantaged compared with those in another (there is a level playing field).

Key findings:

The BIOGEA case studies show that:

- ✓ GBI generally benefits biodiversity, but that non-productive measures such as the maintenance of landscape features are generally the most ecologically valuable.
- ✓ Additional GBI provides the greatest benefits in farmland farmed at intermediate intensity, a certain level of GBI is needed before biodiversity benefits are seen.

Implementation in the case study areas has not strongly supported biodiversity:

- Member states, with the exception of Spain, gave farmers a wide range of EFA measures to choose from
- Farmers, however, have generally chosen the measures closest to existing farming practice
- These measures are the more productive measures that provide the least benefits for biodiversity

In the new CAP a better design of the Green Architecture must ensure a minimum level of GBI across EU landscapes.

What is Green and Blue Infrastructure (GBI)?

The term Green Infrastructure (GI) or, where aquatic ecosystems are included, Green and Blue Infrastructures (GBI) can be used to describe a range of physical features (habitats) which can be linked to provide environmental benefits. In agricultural landscapes it includes connectivity features such as hedgerows, field margins, buffer strips, ditches and stone walls as well as landscape elements such as trees and ponds. Likewise, features with clear agricultural purpose can also be part of GBI, if they deliver a wider range of ecosystem services (ES).

Intensification of agricultural practice has led over time to a loss of green infrastructure. This occurred both on the field, farm and on the landscape level (Gámez-Virués et al. 2015). There is significant research to show, however, that maintaining landscape complexity is the key to retaining farmland biodiversity (Benton et al. 2003). The BIOGEA project results have confirmed that a certain amount of GBI, or non-farmed habitat, is needed in agricultural landscapes to meet biodiversity requirements (Concepción et al. 2020). However, the need for additional GBI features depends on the existing landscape structures (Concepción et al. 2012).

How does agricultural policy affect GBI in different locations?

Policy measures exist to maintain existing GBI across the farmed landscape (e.g. cross compliance measures which aim to prevent the destruction of landscape features) or increase GBI in specific areas (agri-environment schemes). Greening should provide an additional mechanism to maintain GBI where it already exists and encourage its creation through the requirement to maintain EFAs.

Greening requirements and flexibility for member states and farmers

Crop diversification
Crop diversification requires farmers with arable land of over 10 ha to grow at least two crops for the areas up to 30 ha, and at least three crops for the areas over 30 ha.
Member states can set the time of year when the groups must be present.

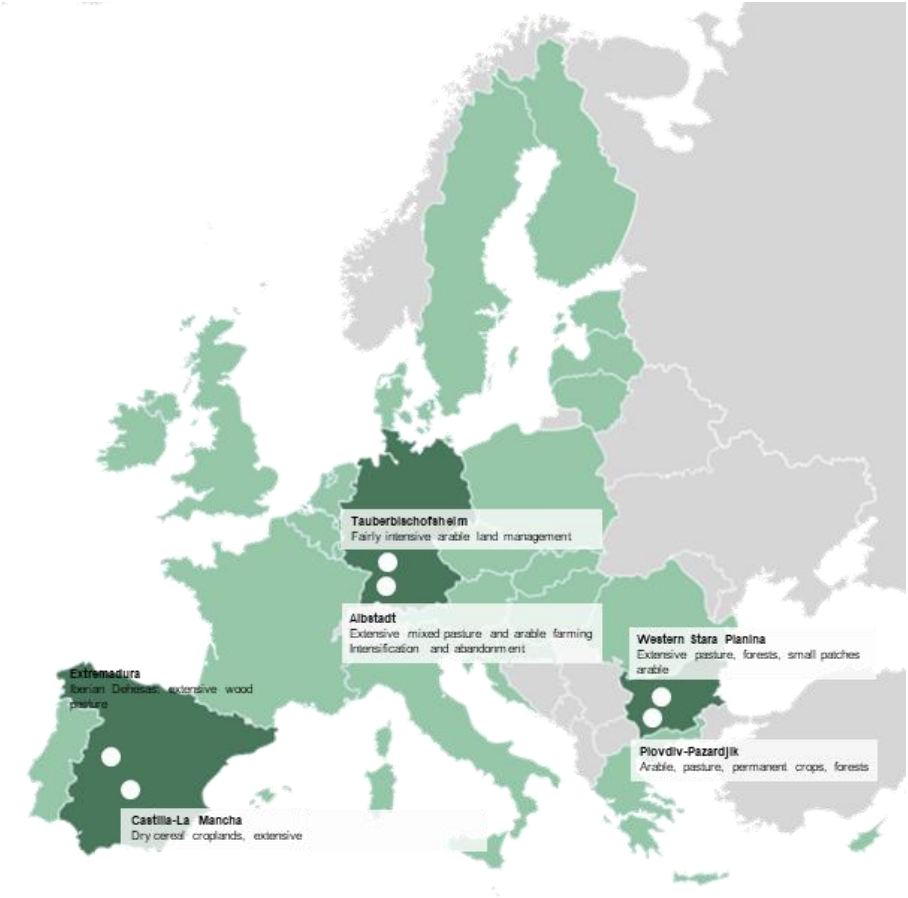
Permanent pasture
The ratio of permanent pasture must be maintained compared to the total agricultural area.
Member states can decide whether this is implemented on the national, regional or farm scale.
Environmentally sensitive grasslands (ESG) which may not be ploughed must be designated.
Member states can decide if this applies purely to Habitats Directive designated grasslands (special areas of conservation, SACs), all Natura 2000 areas (SACs and special protection areas (SPAs) under the birds directive or to a wider range of grasslands.

Environmental focus areas
All non-organic farmers with more than 15 hectares of arable land, applying for CAP Pillar 1 support must put in place ecological focus areas (EFAs). 5% of their arable land must be managed to enhance biodiversity and support eco-system services. The elements that can be counted towards the 5% EFA target include non-productive features such as buffer strips, field margins, trees (isolated, groups, rows), hedgerows, stone walls, fallow land as well as ponds and ditches, but also productive features such as catch crops and nitrogen fixing crops.
Member States have to establish a list of the EFA elements from which farmers can choose to meet their EFA obligations. They can also make certain adaptations to the weighting and conversion factors, which are used to adjust the area of the feature and so the extent to which it contributes to achieving the 5% ratio.
Farmers can choose which elements to apply.

See Marsden et al. (2017) and 2019 for more information on the relationship between GBI and the CAP measures.

How did the BIOGEA project examine implementation choices?

The BIOGEA case studies in Bulgaria, Germany and Spain, examined how greening was implemented in these different countries. The three countries were chosen to represent a range of different biogeographic systems (Mediterranean, continental and Alpine) in southwest, central and southeast Europe and a range of political systems including a new member states, a centralised government, old member states and regionalised approaches.



What choices did Bulgaria, Germany and Spain make on greening implementation?

The three member states made different choices on greening implementation. In particular, Spain chose a much smaller list of EFA options compared with the other countries.

Table 1. EFA Member State choices - EFA measures available in the BIOGEA case study countries (coloured boxes means the measure is available, lighter colour they were available in 2015-2016 but were withdrawn in 2017)

	Bulgaria	Germany	Spain
Crop diversification	Crops must be present 15.7-15.7	Crops must be present 1.6-1.7	Inspections between 1.5-31.7. Can be adapted by region.
Permanent pasture	5% ratio at national level. ESGs cover SPAs and SACs. HNV grasslands are also measured and can be ploughed with permission of the ministry.	5% threshold on the regional level. ESGs cover only grasslands included in the SACs (habitats directive)	5% threshold on national level. ESGs cover SPAs and SACs. Regions can chose to include further grasslands
EFA			

Land lying fallow			
Terraces			
Buffer strips			
Agroforestry			
Strips along forest edges			
Strips along forest edges no production			
Short rotation coppice			
Afforested areas			
Catch crops/green cover			
Nitrogen-fixing crops			
Landscape features:			
• hedges/wooded strips			
• isolated trees			
• trees in line			
• trees in group/field copses			
• field margins			
• ponds / wetlands			
• ditches			
• traditional stone walls			

What choices did Bulgarian, Spanish and German farmers make on greening implementation?

The member states choices affect what farmers can chose. In Spain, where only three options are available, fallow land and catch crops are clearly the most popular of these. However, even in Bulgaria and Germany where a longer list of options is available, the majority of farmers chose just three or four EFA types with fallow, catch crops and nitrogen-fixing crops proving most popular and with variations in uptake Figure 1.

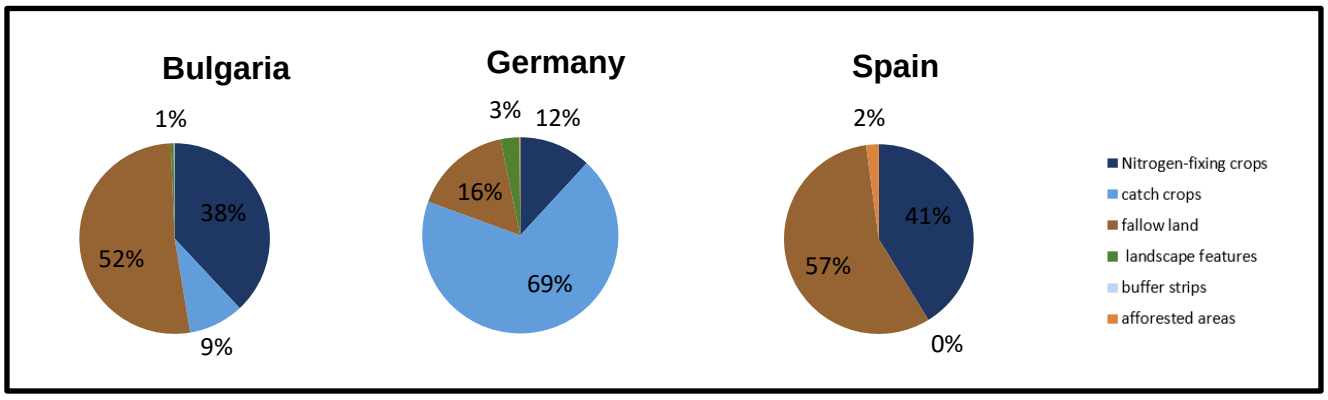


Figure 1. Percentage area of the main EFA types in the BIOGEA case study countries before weighting. Source: (European Commission 2017b)

This is reflected in the situation across the EU where the measures connected with agricultural production (nitrogen-fixing crops, catch crops and fallow areas) are significantly more popular (Figure 2).

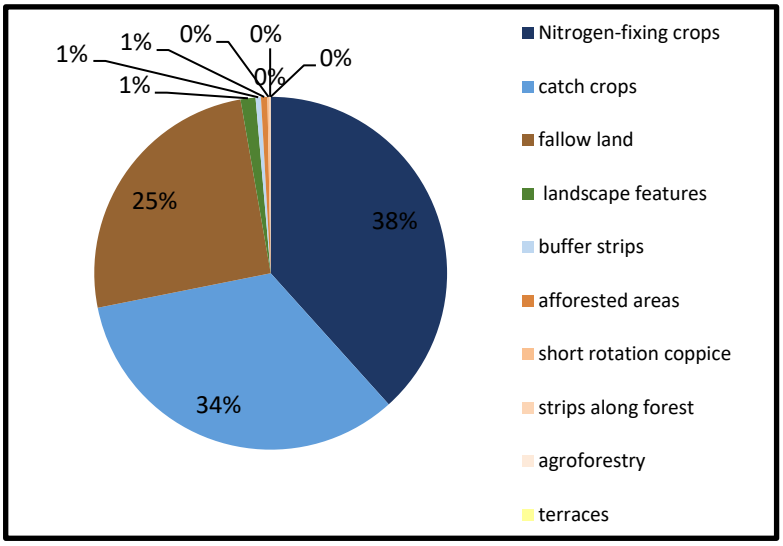


Figure 2. Uptake of EFAs in 2016 across the EU before weighting. (Alliance Environnement and the Thünen Institute 2017)

This is unfortunate as these measures, especially nitrogen-fixing and catch crops are judged to be the least likely to benefit biodiversity habitats (Underwood and Tucker 2016) (Pe'er et al. 2016). The general motivations for farmers choices are explored more in BIOGEA briefing 4 (Marsden et al. 2019).

What choices did farmers make in the case study areas?

The BIOGEA case studies examined what choices farmers made in 6 case study areas representing more intensive and more extensive farming systems and areas with more or less naturally occurring GBI. Interviews were carried out with 100 farmers and 61 stakeholders.

The natural and agricultural conditions are described in Figure 3.

BIOGEA Case study areas

More extensive / High Nature Value farming examples & More intensive examples



Albstadt, Swabian Alps, federal state Baden-Württemburg, SW Germany

614-966m altitude, humid, slopes and plateaus. Most land is forested or grassland with around 1/3 of total



Tauberbischofsheim, Tauberland, federal state Baden-Württemberg, SW Germany

168-372m altitude, humid, slopes and plateaus. Agriculture dominates land use (above 58%) of land

UAA being arable. Trend is for reducing arable land and orchards moving to grassland. Medium to high GBI. Main connectivity GBI: grassy and, especially, woody strips (hedges), streams and ditches. Main in-field elements: N-fixing crops followed by perennial crops. Solitary trees and groups of trees are abundant. Population density of 197 people/km^2.



Iberian Dehesa, Extremadura, Central-Western Spain

Altitude mostly 350-550m (full range 209-781m), Mediterranean climate, gentle slopes. Agricultural area (including agro-forestry, natural grasslands) covers 57% of the area, followed by forestry and scrubland (43%). Permanent pastures make up 2/3 of UAA, while arable land is 1/5. High GBI. Grassy and woody strips, and streams, ponds and stonewalls are abundant. Main in-field elements: agroforestry with variable tree density. Population density is about 11 people/km^2



Western Stara Planina, North-Western Bulgaria

Predominantly mountainous area – forests and scrubland dominate. Agricultural land, including use, followed by forestry (36%). Above 80% of UAA is arable land, with a low share of heterogeneous agricultural area. Low variety of GBI comprised mainly of woody strips (hedges) and grassy strips or dishes. Main in-field elements: N-fixing crops followed by perennial crops. Solitary trees and groups of trees are abundant. Population density of 113 people/km^2.



Dry Cereal Croplands, Castilla-La Mancha, Central Spain

646-836 altitude, semi-arid, flat slopes. Agricultural area (including agro-forestry, natural grasslands) amounts to 96%. Over 90% of UAA are arable land (including permanent crops). Medium GBI. Main GBI types present are isolated trees and groups of trees (small landscape elements), woody and, especially, grassy strips. Main in-field elements are N-fixing crops and fallow land. Population density of 16.8 people/km^2.



Plovdiv-Pazardzhik area, South-Central Bulgaria

Transitional territory: valleys in the North, and mountains in the south of the case study area.

natural grasslands, represents 40% - 65% of UAA is CAP eligible. High GBI. Main connectivity GBI elements are grassy and, especially, woody strips. In-field elements: small amounts of N-fixing crops and fallow land. Population density of 20.6 people/km^2.	Agriculture is the dominating land use (56%) followed by forest and scrubland (31%). Almost 75% of UAA is arable land. Medium GBI. Principal connectivity elements: woody, especially grassy strips. In-field elements: N-fixing crops and fallow land. Abundant agroforestry and perennial crops (orchards). Population density of 113 people/km^2 (in the rural regions).

Figure 3. Description of the CS areas. For more information see the case study descriptions (Kazakova et al. 2019a, 2019b, 2019c, 2019d, 2019e, 2019f).

The choices made in the CS areas reflect those made on national level. Fallow, nitrogen-fixing crops and catch-crops remain the most popular choices. Only in the German more intensive example and the Bulgarian more extensive case, did farmers choose to include landscape features in their EFAs.

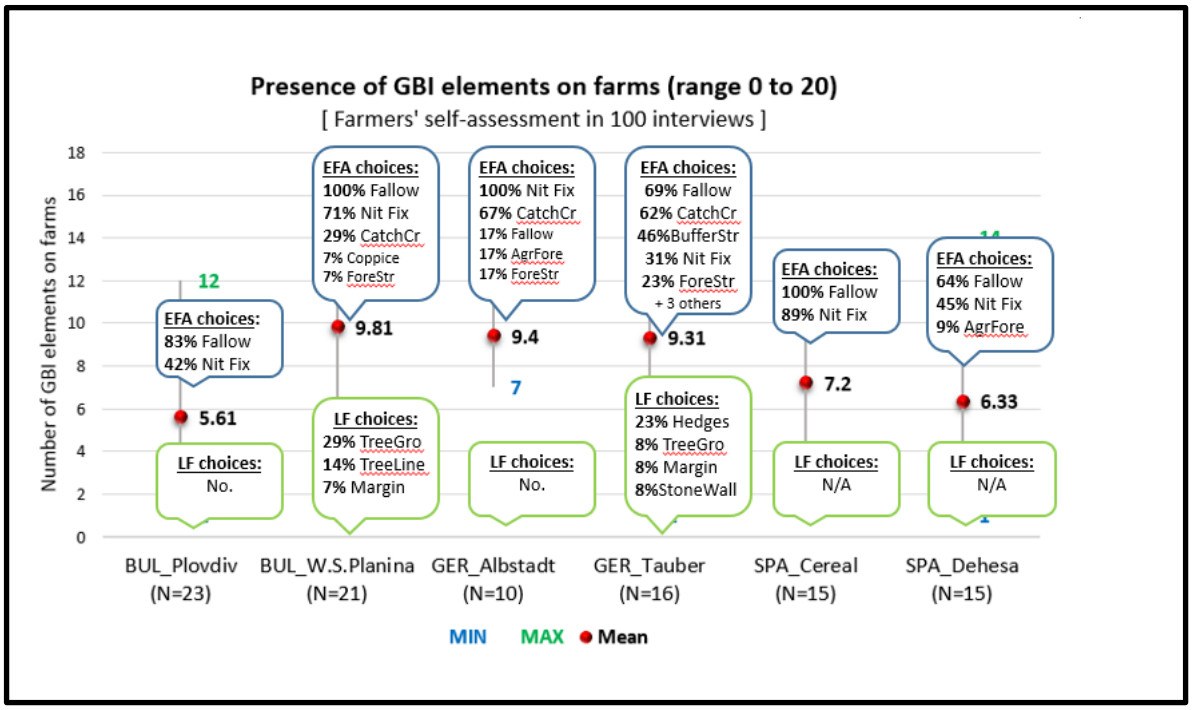


Figure 4 Farmers stated EFA choices in the CS areas (more than one element can be chosen). Landscape feature choices listed separately below. (Kazakova and Stefanova 2020).

Why did farmers chose these options?

Farmers were asked for their reasons for choosing particular EFA options (**Fehler! Verweisquelle konnte nicht gefunden werden.**). Overall environmental concerns were least important, only in the more extensive examples from Germany and Spain (Albstadt and Dehesas) were environmental concerns of medium importance. The most important motivations were closeness to existing practice and understanding of requirements. Economic concerns and agronomic concerns were ranked differently in the different cases. The farmers' comments on their motivations and concerns highlighted the importance of practical issues regarding implementation (administrative, economic, agronomic, controls, environmental). One farmer from Tauberbischofsheim, highlighted the links to agri-environment schemes which meant that catch crops needed to be cultivated in any case. For a farmer in Dehesa, the difficult adaption of nitrogen fixing crops to local soil and climatic conditions were the reason to change to fallow

land as EFA. Likewise choosing EFAs according to (perceived) feasibility, another farmer from Western Stara Planina decided to not include buffer strips because of concern about GPS controls. _CTVL001894528f3e81c477894cf2660cab2d00e

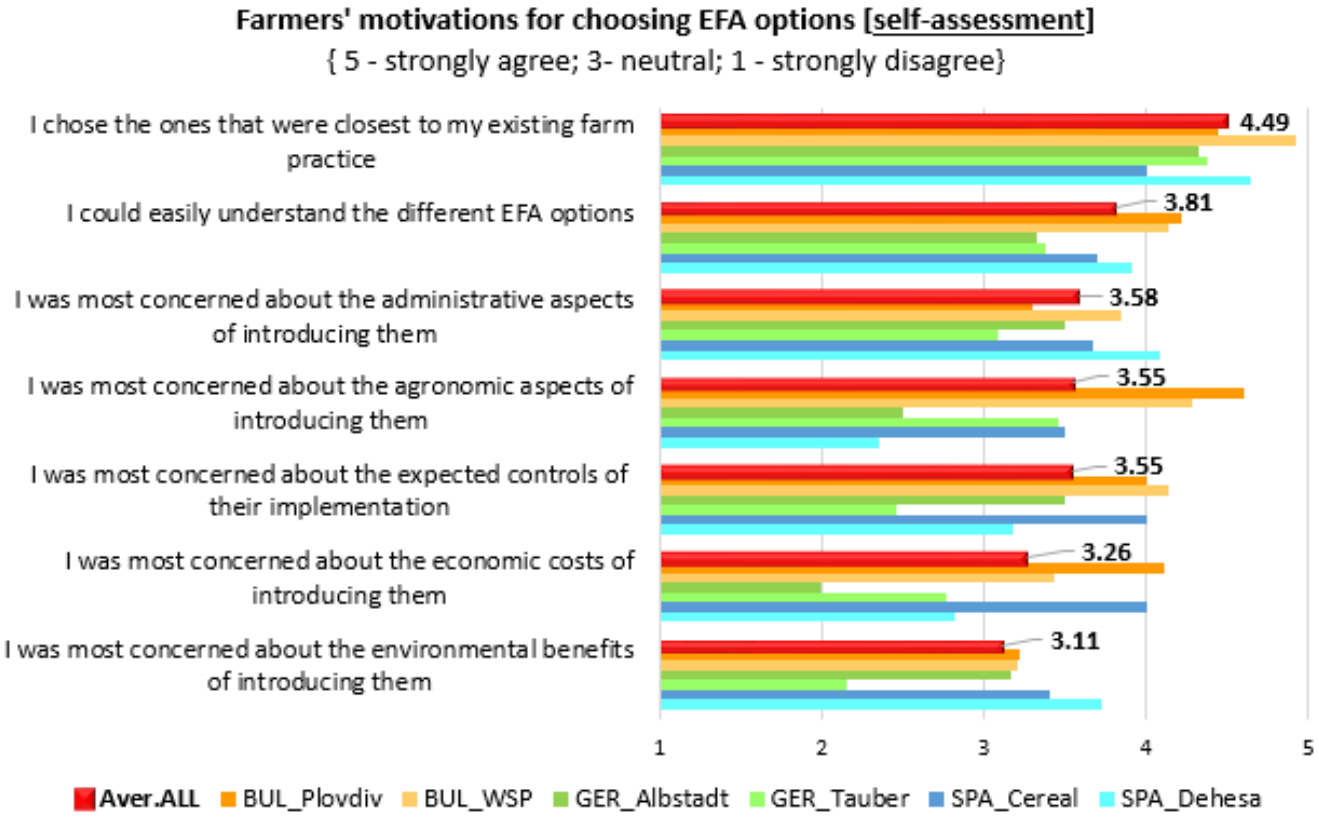


Figure 5. Farmers' reasons for chosing EFA options (Kazakova and Stefanova 2020).

Regarding farmers' beliefs about the effectiveness of Greening measures (Figure 6), farmers thought that the measures chosen would be most useful for improvement of soils. In general, Bulgarian farmers, and also from the Dry Cereals case study area in Spain had a more positive view than their peers on the different aspects of Greening effectiveness except for bureaucracy and implementing costs. Farmers in Tauberbischofsheim had a generally negative view on the effectiveness of greening. Farmers disagreed most in their perception on overall environmental status: in Germany, there was a general disagreement that measures were effective, while in the Bulgarian case study areas, there was overall agreement (Spanish farmers were in between).

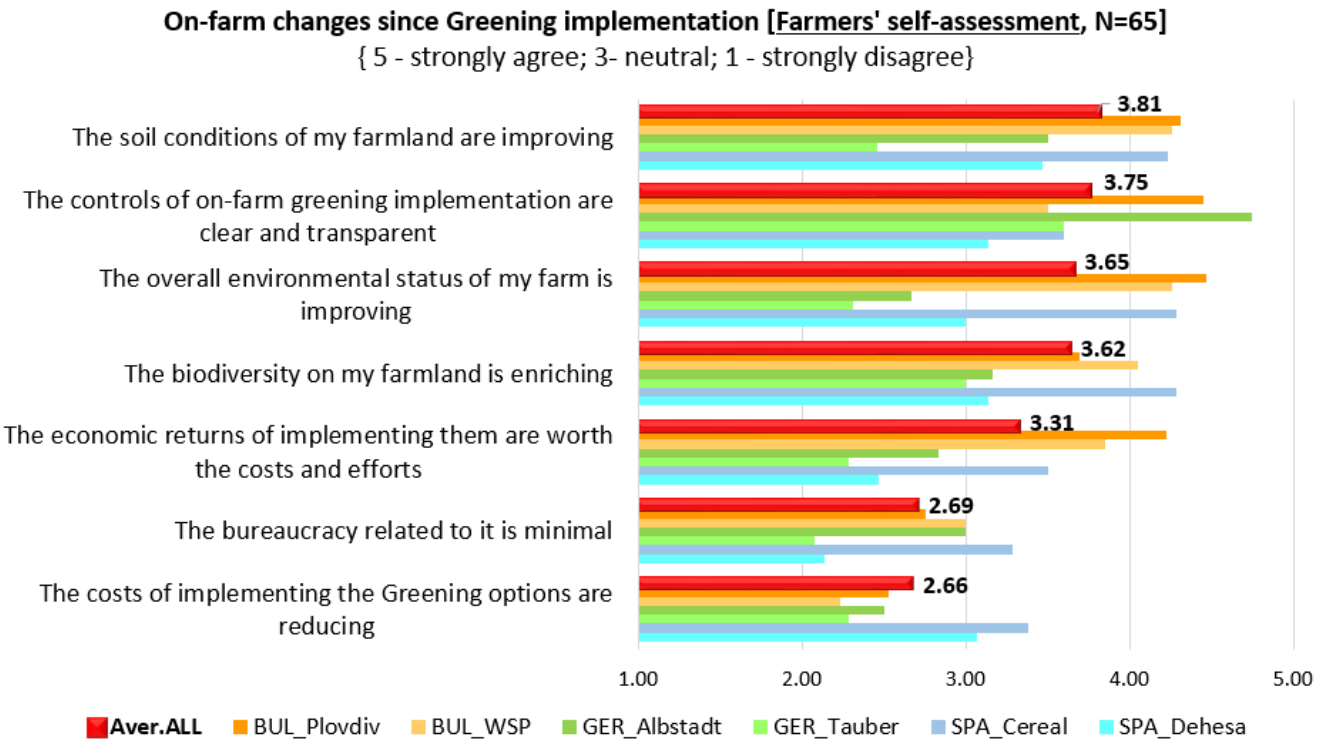


Figure 6. Farmers' beliefs about the effectiveness of greening options (Kazakova and Stefanova 2020).

How well did this fit regional needs?

As has been seen, there are significant differences across the case study areas regarding the uptake of GBI features according to the member state implementations. Similarly the BIOGEA project measured the impacts of landscape features on biodiversity (plant and bird species) and found varying effects of different GBI elements on biodiversity (Concepción et al. 2020). Most non-productive GBI elements such as small-landscape elements and features promoting connectivity benefited biodiversity across the case study areas. Fallow land as present in large shares of the Bulgarian and Spanish case study areas favoured the diversity of specialist farmland species, landscape features such as trees (isolated and in groups) and woody strips were also shown to have beneficial effects. Other features such as grasslands, showed particular benefits in areas where there were lacking e.g. in arable and mixed-farming systems such as those in the Dry Cereals, Albstadt and Plovdiv case study areas. The productive measures, cover crops and N-fixing crops showed few benefits but can in some cases provide useful habitats if they add to the diversity of the landscape for more specialised species.

In general, there is much variation between the case study areas. The positive or negative effects will depend on the existing landscape structure and also on the management techniques used. Generally, the measures that provide the greatest benefits for biodiversity are those that are least often chosen in the case study areas.

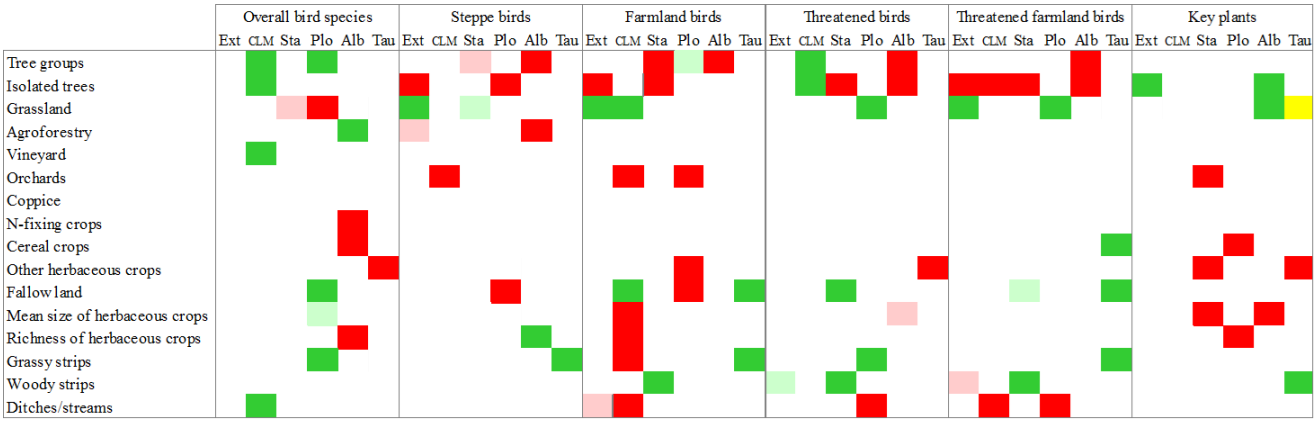


Figure 7 Heat-map of the estimated effects (positive in green, negative in red, and mixed in yellow; marginally significant effects in lighter colours) of the set of GBI habitat indicators for the distinct case study regions: Extremadura (Ext) and Castilla-La Mancha (CLM) in Spain, Western Stara Planina (Sta) and Plovdiv Pazardjik (Plo) in Bulgaria, and Albstadt (Alb) and Tauberbischofsheim (Tau) in Germany (Concepción et al. 2020).

What is the relevance to the green architecture of the new CAP?

The BIOGEA project supports the findings of other researchers (e.g. Pywell et al. 2015, Walker et al. 2018 that the needs for GBI vary depending on what is already in place, but that in general, a certain percentage of non-farmed, ecologically valuable habitat is needed before any benefits for biodiversity are seen. This is significant for the new CAP as it indicates that on the one hand, flexibility is needed to meet regional needs, but on the other, there should be a requirement in all farmed land to have a minimum level of GBI (see the BIOGEA policy recommendations for further details (BIOGEA 2020)).

Discussions on the green architecture of the new CAP are underway. While Greening will not be continued in its current form, the new instruments in pillar 1 (advanced conditionality and eco-schemes) must be designed in such a way that they will protect GBI in more extensively farmed areas and require the creation of new GBI in intensively farmed areas.

Next steps for the BIOGEA project

The BIOGEA project ended at the end of February 2020. All outputs are available on the website which will be maintained until March 2022.

Further reading

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BIOGEA Project

This briefing is a product of the project Testing BIOdiversity Gain of European Agriculture with CAP greening (BIOGEA) which is supported by the BiodivERsA funding programme. It researches the impact of land use change on Green and Blue Infrastructure (GBI) in the agricultural landscape. The impacts of policy on GBI and GBI on biodiversity and ES are examined through policy analysis on the EU and national level and biological monitoring and modelling in six case study areas in 3 Member States (Germany, Spain and Bulgaria) chosen to represent intensive and extensive landscapes in different biogeographic regions. Project outputs will include advisory tools and policy recommendations for the CAP reform.

Partners: adelphi research gGmbH (coordinator), Institut für Agraökologie und Biodiversität (IFAB), National Museum of Natural Sciences (CSIC), Universidad de Extremadura (UNEX), University of National and World Economy (UNWE)

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