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BIOBIO

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Report on the contribution of the stakeholders to the selection of the biodiversity indicators for organic and low input farming systems
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Report on the contribution of the stakeholders to the selection of the biodiversity indicators for organic and low input farming systems

Final Version

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Solagro

16th July 2012

Executive summary:

Stakeholders have been strongly involved in the BioBio, from the start to the end of the project, to make sure that their needs are adequately taken into consideration in the selection of biodiversity indicators for organic and low-input farming systems. The stakeholder advisory board (SAB) consists of 20 experts from major interest groups. The SAB operates as a full work package of the BıoBıo project (WP7). In addition to the central SAB, local stakeholder groups were affiliated to each case study.

Five major stakeholders' interest for biodiversity indicators were identified: (i) To assess the impact of farming practices on biodiversity; (ii) To design and implement agro-environmental policies; (iii) To label agricultural products; (iv) To raise public awareness on biodiversity; (v) To offer standardized protocols and indicators throughout Europe

The SAB has operated through three workshops. They also joined the scientific project meetings whenever possible in order to foster mutual exchanges and the understanding of their respective requirements. The first BioBio meeting (SAB I) aimed at formalizing the stakeholders' requirements in order to include them in the selection process of the candidate indicators. Eleven requirements were formulated: (i) Easy to implement; (ii) Affordable cost; (iii) Easy to use and interpret; (iv) Large scope and adaptable to numerous biodiversity issues; (v) Integrate emblematic species; (vi) Take into account functional biodiversity; (vii) Endorsed by farmers, consumers and administrations; (viii) Assess the progress of agricultural policies and of management of farms; (ix) Adapted to all types of farming systems; (x) Applicable at different scales (field, farm, landscape throughout Europe); (xi) Take into account existing indicators and tools to assess biodiversity in agriculture and observatories.

47 indicators were selected on the basis on the eleven practical requirements. They were then audited by the second SAB meeting (SAB II) and the project coordination committee agreed on a shortlist of 41 candidate indicators to be tested in the field. Factsheets were elaborated for the 23 indicators that could be reliably measured across Europe, that were not be too correlated with other indicators and that could be easily interpreted. The factsheets included a description, their strengths and weaknesses, the collection method, skills and cost required for its measurement, the correlation with the other indicators as well as elements for its interpretation.

Stakeholders audited the 23 indicators during the SAB III and recommended to keep all of them in the final BioBio indicator set. The SAB comments and recommendations were condensed in a list of seven final recommendations.

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1.1 The objective of the SAB

Stakeholders have been strongly involved in the BioBio project to make sure that their needs are adequately taken into consideration in the selection of candidate biodiversity indicators for organic and low-input farming systems. Major criteria are the attractiveness of indicators to specific stakeholder groups and the feasibility of the monitoring. The SAB has supported the BioBio research team by formulating their main expectations and criteria for useful biodiversity indicators on the one hand and auditing candidate indicators on the other. The SAB also plays an important role in the dissemination of project results.

1.2 The composition of the SAB

The stakeholder advisory board consists of 20 experts from major interest groups. The SAB operates as a full work package of the BIOBIO project (WP7), led by Philippe Pointereau (SOLAGRO, Toulouse). In addition to the central SAB, local stakeholder groups were affiliated to each case study.

TABLE 1. Composition of the SAB

NAME	ORGANISATION	DESCRIPTION	COUNTRY
NGO Nature protection and environment - 5 representatives -			
Schuboth Jörg	NABU	NGO, Nature protection and environment	Germany
De Miguel Beascoecha Eduardo	Fondation Global Nature	NGO, Nature protection	Spain
Still Kate	Plantlife International	NGO, Nature protection	England
Bruner Ariel	Bird Life International	NGO, Nature protection	Belgium
Marin Simeon	Green Balkans	NGO Nature Protection	Bulgaria
NGO Consumers' association – 1 representative -			
Oppliger Barbara and Klemm Urs	Consumer Forum	Consumers' association	Switzerland
Farmer organization – 3 representatives -			
Fabian Thierry	INAO/OriGIn	Farmer organisation (PGI and OF)	Europe
Corral Eva and Benithes Cyntia	Copa-Cogeca	Farmer organisation (OF)	Europe
Ruppol Patrick and Godden Bernard	IFOAM/BioForum Wallonia	Farmer organisation (OF)	Europe World
Territorial and national administration - 3 representatives -			
Mayrhofer Peter	Department for Rural Development of Lower Austria	Territorial administration, Agro-environment Policy	Austria

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De Paola Claudio	Parco del Ticino - Team Europe	Territorial administration, Agro-environment actions	Italy
Baylis Mark	DEFRA	Agri-environmental Policy - ELS	UK

Farmer adviser and Agrarian Institute - 2 representatives -

Walot Thierri	GIREA-UCL	Farmer adviser on biodiversity AEM	Belgium
Zemechis Romualdas	Lithuanian Institute of Agrarian Economics	Agrarian Institute	Lithuania

European institutions - 6 representatives -

Biala Katarzyna	European Environment Agency	European Agency (Biodiversity)	Europe
Selenius Johan	DG ESTAT	European administration, (Agri-environmental indicators)	Europe
Paracchini Maria Luisa	JRC/EIS	European administration (LIFS, HNV),	World
Zaunberger Karin	DG Environment	European administration (Nature and Biodiversity)	Europe
Canenbley Christiane	DG agriculture	European administration (Environment, GMO and genetic resources)	Europe
Cinti Stefano	DG agriculture	European administration OF	Europe

1.3   Process to account for the SAB recommendations

The SAB has accompanied the project from the start to the end. The SAB has worked through three workshops, (named SAB I, SAB II and SAB III meeting in the present report). They also attended the scientific project meetings whenever it was possible. Both types of meetings were open to both researchers and SAB members so as to foster mutual exchange and understanding of their respective requirements. Fig. 1 shows the process for the selection of BioBio indicators; its successive steps are presented below.

In addition, 15 local stakeholder groups were formed, one for each case study region. Each local group met twice: (1) during the planning phase of the case study work in order to become aware of the project and of the indicators to be tested and (2) after the fieldwork when first results were available in order to comment the suitability of the indicators and the interest of the results. Those comments were summarised and made available to the SAB.

1.3.1   Elaboration of the SAB practical requirements

SAB I meeting was the first BioBio meeting, which took place in Zurich on March 25th 2009. It was attended by eleven members of the SAB and representatives of all partner institutions. The objective

of this first meeting was to formalize the stakeholders' requirements in order to include them in the selection process of the candidate indicators.

To do so, each stakeholder had to express their main expectations regarding biodiversity indicators for organic and low-input farming system. These statements were subsequently transcribed into "practical requirements", forming a list of criteria that would later be used for the selection of potential indicators. These practical requirements were the intended result of the SAB I meeting and are detailed in deliverable 7. 1 (1).
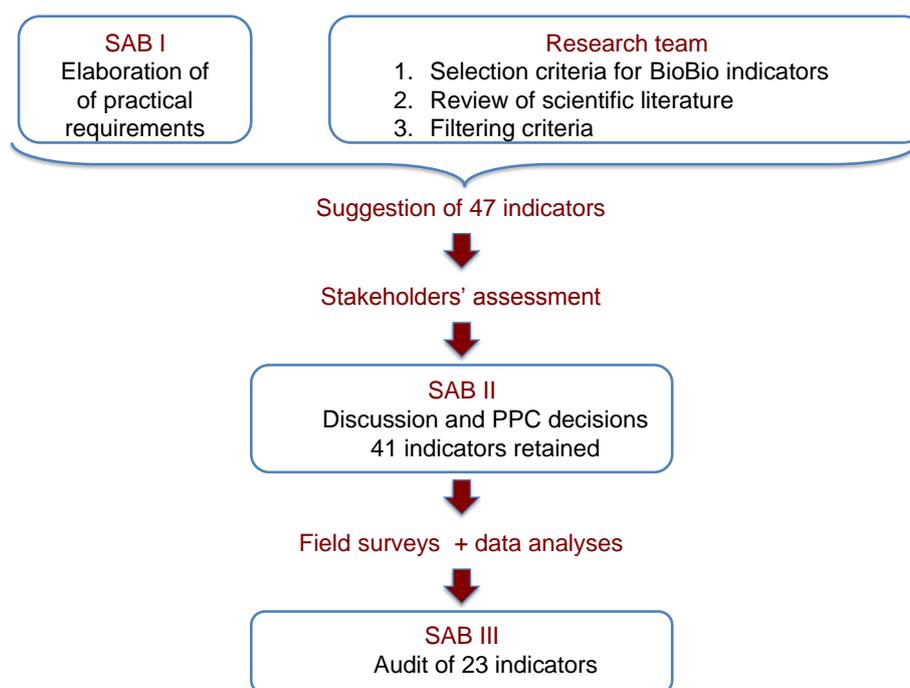

Fig. 1 Selection process of the BioBio indicators

1.3.2 Selection of candidate indicators

The scientific team of the project performed an extensive review on potential indicators for biodiversity (see BioBio Deliverable 2.1). Direct indicators were chosen to represent:

A. Livestock breeds, grassland and crop varieties (genetic diversity)
B. Domesticated and wild animal and plant species (species diversity)
C. The mixture of cultivated crops, pastures and semi-natural habitats on farmland (habitat diversity)

The review also included indirect biodiversity indicators based on farm management and farm accounts information where there is a proven connection between farm management information and the levels of genetic, species and habitat diversity.

A list of forty-seven candidate indicators was drawn from this review taking into account both the scientific and stakeholder criteria, *i.e.* the practical requirements established from the SAB I meeting.

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1.3.3 Audit candidate indicators by the SAB

The forty seven indicators were evaluated by the SAB in two steps: a survey form was first sent to the members of the SAB two weeks before the SAB II meeting for discussion. The objectives were (i) to ensure that the SAB would have a good acquaintance of the selected indicators, (ii) to take into account the opinions of the stakeholders that could not attend the SAB II meeting, and (iii) to get a preliminary overview of the SAB answers in order to focus discussions on the controversial indicators.

1.3.4 Selection of a short list of indicators to be tested in the field

The results of the SAB evaluation were discussed during the SAB II meeting that took place in Brussels on October 21st 2009. The objectives were (i) to cross-check if the indicators complied with the criteria laid down in the minutes of the SAB I meeting; (ii) to take into account the feedbacks of the stakeholders from the national case studies and the ICPC countries and (iii) to make recommendations for the selection of candidate indicators to be tested in the field. Subsequently, the project coordination committee agreed on a shortlist of 41 candidate indicators.

1.3.5 Final audit from the result of the field testing

The forty-one selected indicators were tested in the field in all case studies. Factsheets were elaborated for the 23 indicators that could be reliably measured across Europe, that were not too correlated with other indicators and that could be easily interpreted. The factsheets included a description, their strengths and weaknesses, the collection method, skills and cost required for their measurement, the correlation with other indicators as well as elements for their interpretation. The twenty-three factsheets were sent to the stakeholders prior to the SAB III meeting, which took place in Brussels on January 26th 2012, with a view to their final auditing. Also, the comments from local stakeholder groups were made available to the SAB. All indicators were deemed valuable and it was decided to keep all of them for the final list of the BioBio indicators.

2 Stakeholders' criteria and recommendation for the BioBio indicators

2.1 Stakeholders' interest for biodiversity indicators

Indicators specifications were elaborated in relation to one or several purposes. Several needs were identified from the discussions among national and local stakeholders groups. Sentences in italic refer to quotations of stakeholders' say :

- **To assess the impact of farming practices on biodiversity.** All stakeholders are interested in evaluating the sustainability of modern agriculture. As biodiversity is a major component of sustainability, there were recurrent inquiries on the impact of farming practices on biodiversity: *"Farmers are interested to test and see if any of their usual practices are in fact supporting biodiversity or not"*. Indicators would allow *"to compare the consequences in terms of biodiversity of the different farming systems and farming practices"*. Also, farmers want *"indicators that serve as an early warning of adverse farming practices"*. Conversely,

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there is a need to quantify the extent to which biodiversity benefits the productive capacity and resilience of ecosystems: "*Farmers interpret indicators as useful to assess the health of the agricultural systems and to evaluate the productive potential of the farm*".

- **To design and implement agro-environmental policies.** A better understanding of the effects of farming practices on biodiversity would help the design of relevant agro-environmental policies. The availability of sound indicators would "*facilitate the diagnosis of the state of the farms*". Knowing which practices are beneficial, managing authorities would be able to "*correct farming practices through specific measures*", "*assist the elaboration of new agri-environmental management prescriptions or even development of absolutely new measures*". This way, "*biodiversity indicators would ultimately serve spending public money efficiently for sustaining agricultural ecosystems*".

- **To label agricultural products.** Certification and labelling are important levers to sustain biodiversity in agricultural lands: "*Concerned consumers stated that it is important to have more information about the environmental performance of the farms where they buy organic products*". Yet, it was considered necessary to ascertain the benefit of organic and low-input farming practices on biodiversity before thinking of developing labels: "*It is assumed that organic farming and extensification promote biodiversity. If in this project, it is shown that this is not automatically the case, biodiversity should be formulated as a separate mandate and in this case, indicators would be needed to monitor these measures*". Also, creation of new labels is impeded by the great number of already existing labels: "*Producers which want to use biodiversity as selling point should create a label, but new labels are not demanded, they would need a high communication input*", "*The Swiss Bio label "bud" is very known throughout Switzerland, there is no need for a new label in organic farming.*"

- **To raise awareness.** Working with common and recognized indicators is considered important to raise the awareness of consumers: "*Consciousness for biodiversity is growing, but knowledge concerning biodiversity among consumers is still low*". Spanish administrations and public authorities "*highlight the usefulness of indicators to demonstrate to society the great biodiversity treasured within subsidized agricultural systems*". The monitoring of indicators was also deemed useful to "*encourage farmers to view biodiversity as an advantage to increase the productivity of their farm*"; there is the example of one organic farmer to whom the BioBio field research activities "*have provided new pieces of information that have changed his way of thinking about the use of his areas. Indicators therefore by their pure information character might even help changing famers' perceptions to use their land in more landscape and biodiversity friendly ways*".

- **To offer standardized protocols and indicators throughout Europe.** Scientists and public authorities mentioned the benefit of having standardized protocols and indicators: "S*uch indicators could be useful to measure biodiversity in a uniform way, on national as well as on European level*", "*standard methods are needed to assess biodiversity indicators across all farming sectors, especially those that can help highlight benefits of organic/low-input farming to ecosystem services*". It would allow to "*to link research projects and share data*".

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2.2 Definition of practical requirements

The criteria that were derived from the SAB expectations are presented below. Sentences in italic refer to quotations of stakeholders' say.

✓ **Easy to implement**. Indicators should be easy to implement, *i.e.* with a simple and detailed protocol to measure them on farms, and not too demanding regarding the skills required for the measurements. There is a risk that indicators that require high taxonomy or laboratory skills would not be much used. Also, "*the ability to measure indicators at any time within the general sampling period (e.g. weather constraints on sampling of wild bees)*" should be taken into account.

✓ **Affordable cost.** Efforts to collect and interpret data ought to be low or moderate. This is a major constraint for the choice of indicators to monitor biodiversity in environmental programs throughout Europe.

✓ **Easy to use and interpret.** The results of indicator measurements should be easy to interpret. "*It should be possible to compare our experience with others through indicators*". Identified risks of misinterpretation should be specified in the indicator factsheets, for example "*We have to be careful with indicators that score well only because of land abandonment and natural afforestation*" or "*Mole plague caused by irrigation can increase the number of birds of prey, which in this case would not be a good biodiversity indicator for extensive farming*". However, the simplicity of interpretation was said to depend on the level at which indicators will be used: "*if they are to be used as common indicators in the context of EU support programmes, then they need to be easy to measure and understand*".

✓ **Large scope and adaptable to numerous biodiversity issues.** The same indicators should be applicable in relation to different biodiversity issues. Since **"***European countries have different definitions of low impact farming systems*", there were questions about how to account for this diversity. In all cases, it was felt important the indicators should offer a "*an integrated image of biodiversity*".

✓ **Integrate emblematic species.** It was deemed important to have indicators taking into account flag-ship-species to raise the public awareness.

✓ **Take into account functional biodiversity.** Farmers and technicians pointed out their wish to have indicators that could assess the sustainability of their practices on the productive capacity of their farm and "*to evaluate the health of the agro-ecosystem, and the soil in particular*", that "*could provide insight into general ecosystem health*" and also "*which have relevance for functional biodiversity in regulating pests*".

✓ **Endorsed by farmers, consumers and administrations.** This is a prerequisite for the indicators to be used. One conditions is that "*indicators should mean something practical (obvious, that could be seen or touched) for the farmers*". NGOs and consumers stated that "*scientists should*

make an effort to simplify the communication with laypeople". It was recognised that *"scientific soundness may clash against simplicity, but in this case soundness should be preferred"* .

✓ **Assess the progress of agricultural policies and of management of farms.** This is a major request of public authorities, with questions like *"How to evaluate the environmental impact of our geographical indication products?"*, *"The Ecopoint system is developed as a subsidy system for farmers for the upkeep of cultivated landscape and for the promotion of environmentally friendly farming methods and low intensive farming, including biodiversity in the countryside and quality of landscape elements. Can we measure the direct impact on biodiversity of our scheme?* *"Response indicators"* were deemed important *"to measure what efforts farmers have been doing towards better practices"*. However, it was said that *"indicators must not be used as a rule"*.

✓ **Adapted to all types of farming systems.** This criteria was debated: one the one hand, *"common indicators for all type of farming type would be more practical, because it would be easier to generate protocols of measures and to have a sound technical basis and staff for biodiversity measurement"*. On the other hand, *"stakeholders think that indicators should contemplate the specificities of each type of agriculture and eco-region. For instance, in semi-dry areas (e.g. dehesas) the state of water in ponds and streams is crucial for livestock; hence indicators should include an aquatic taxon."* The possibility that the same indicators would be both generic and sensitive enough to allow comparing farming systems and/or farming practices within the same system throughout Europe was questioned.

✓ **Applicable at different scales (field, farm, landscape throughout Europe)** It was felt important to detect change in biodiversity on a larger scale than the farm, for example with *"landscape-scale taxa, like birds using mosaic of habitats"*. Indicators reflecting biodiversity at different scales are needed if the objective is *"a large-scale assessment of biodiversity within a region and of the single farms"*.

✓ **Take into account existing indicators and tools to assess biodiversity in agriculture and observatories.** To facilitate the endorsement of new indicators by the member states**,** *"already existing tools ought to be used"* and *"the same data or methods should be used as used in conservation habitats guidelines"*.

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3 Evaluation of indicators by the SAB

3.1 Rating of candidate indicators

Forty-seven indicators were submitted to the SAB for audit on the basis on the eleven practical requirements detailed above. The results and recommendations were subsequently discussed during the SAB II meeting.

The following sections present the results of the 47 candidate indicators rating by the SAB:

- 10 indicators for genetic diversity (Group A)
- 12 indicators for species diversity (Group B)
- 13 indicators for Habitat diversity (Group C)
- 12 indicators for Farm management (Group D)

Scores were calculated from the answers suggesting the retaining, provisional retaining, or the skipping of the proposed indicators, they are presented in Figures 2 to 5. Stakeholders' comments on individual indicators are transcribed in the boxes of Appendixes 2 to 5.

3.1.1 Genetic diversity indicators (Group A)

Ten candidate indicators were proposed. They were very briefly discussed, because they were not commonly used by the stakeholders, but a third of them wished to retain the genetic indicators and all the ten indicators were eventually retained. Figure 2 presents the percentage of answers regarding the stakeholders' recommendations. The SAB comments on each indicator are given in Appendix 2.
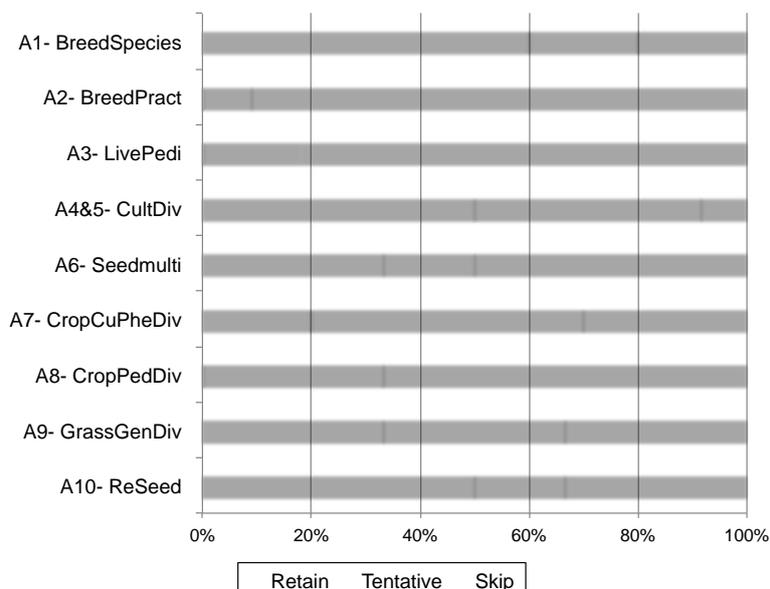

Fig. 2 SAB rating for the selection of genetic indicators for biodiversity.
Percentages refer to 14 answers recommending to retain, temporary retain or discard the proposed indicators.

3.1.2 Species diversity indicators (Group B)

Stakeholders recommended that the species indicators should be grouped in categories according to the scale: indeed, they considered that birds and butterflies were useful only at a landscape scale and that the list of the final indicators should cover different spatial scales, account for different ecosystems services and link farm management with species or habitat indicators. A need of more indicators was felt, *e.g.* for the Spanish case studies, other taxa were suggested, such as Coleoptera in dehesas (Carabidae for excrement recycling, Curculionidae as pests...). They discussed on the interest to use aquatic species indicators. Stakeholders agreed that it would be difficult to relate the management of an individual farm to the aquatic species observed *e.g.* at a specific location of a river (impact of upstream management).

Generally, the proposed species indicators in BioBio were found difficult to collect, costly and required high expertise to be identified and interpreted. Also, farmers considered the proposed indicators abstract and difficult to use and understand. To their opinion, they seemed more fit to academic purposes rather than practical ones.

Eventually, four taxa out of the twelve proposed were retained. Recommendation scores for species indicators are given in Figure 3. The SAB comments on each species indicator are given in Appendix 3; see in particular the comments regarding farmland birds.
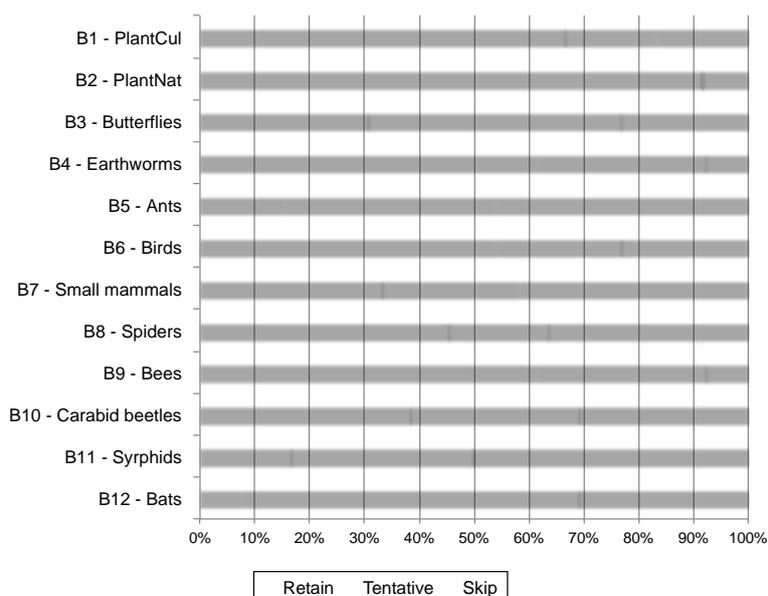

Fig. 3 SAB rating for the selection of species indicators for biodiversity
Percentages refer to 14 answers recommending to retain, temporary retain or discard the proposed indicators

3.1.3 Habitats diversity indicators (Group C)

It was said that the fact that special documents were needed to describe the mapping method was an indication of complexity of this approach. Thus, one stakeholder proposed either to skip the habitat mapping or to allow a simplified approach in order to distinguish between the major land use types in agriculture. Also, there was a debate and diverging interpretations of the term *"habitat"*. For the scientists, any landscape feature (line, plot) of the landscape is considered a habitat, including arable

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fields such as maize or potato fields. For the majority of the stakeholders, *"habitat"* refers to semi-natural structures where they expect comparatively higher species diversity, such as hedgerows or extensively managed grasslands. This interpretation of the term *"habitat"* is further promoted by national and EU legislation, *e.g.* the "Habitats Directive", etc. In the BioBio project, "*habitat"* will be used in its first (scientific) sense.

Thirteen proposed habitat indicators were retained for the field testing. Indicators C11-*Cover of flowering plants* and C14-*Multispecies grassland swards* were neither selected nor discussed, and are not presented here. Recommendation scores for habitat indicators are given in Figure 4. The SAB comments on each habitat indicator are given in Appendix 4.
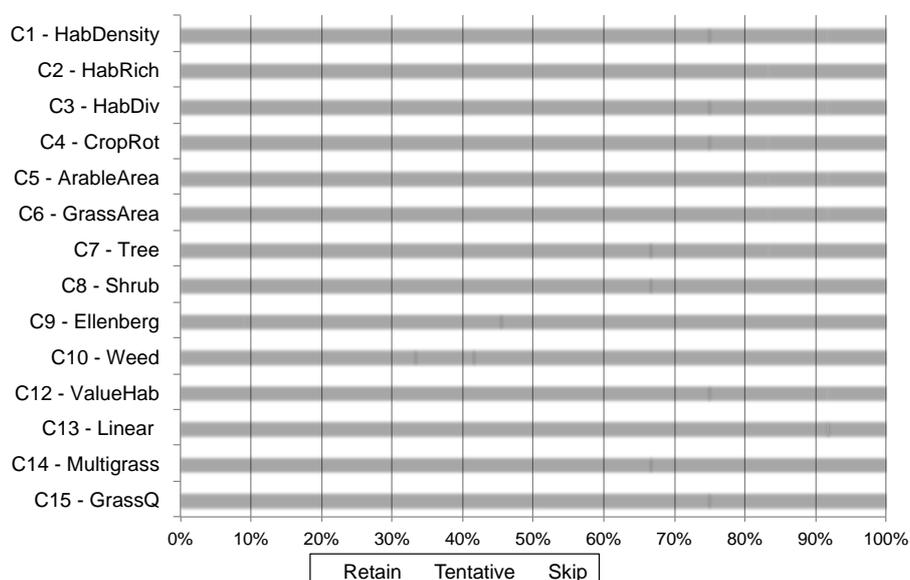

Fig. 4 SAB rating for the selection of habitats indicators for biodiversity.
Percentages refer to 14 answers recommending to retain, temporary retain or discard the proposed indicators.

3.1.4 Farm management indicators (group D)

The SAB suggested that more indicators were necessary for a better description of the farming practices in relation to the feeding system, manure management and tillage practices. They also required that the ecological compensation area (landscape elements), which are commonly used by many stakeholders, should be taken into account. It was said that this area could be calculated by summing different habitat diversity indicators, including trees, linear elements and extensive grasslands. They required that farm management indicators should be better presented in the fact sheets, and that Group D could be labelled as "parameters" instead of "indicators". One stakeholder demanded that *"the indicators should be much more specific and give better guidance to farmers for how to maintain better biodiversity"*. Recommendation scores for farm management indicators are given in Figure 5. The SAB comments on each farm management indicators are given in Appendix 5.
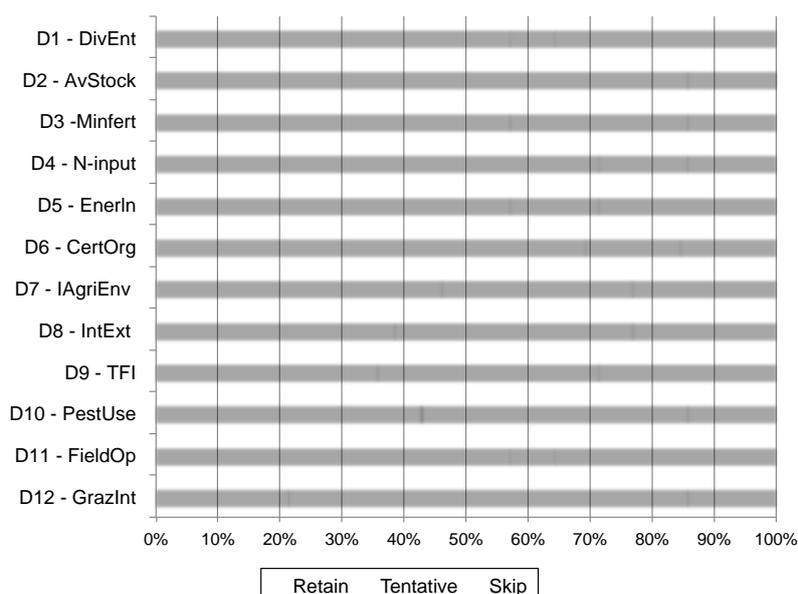
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Fig. 5 SAB rating for the selection of farming practices indicators for biodiversity. Percentages refer to answers recommending to retain, temporary retain or discard the proposed indicators.

3.2 Rating of final indicators

The forty-one indicators were measured in the case studies and their mutual relationships were analysed. Provisional results were presented at SAB III meeting, which took place in Brussels, on January 26th 2012. The objective of the meeting was to audit and validate the final set of 23 indicators which had passed the screening in the case studies. Data analyses were still undergoing at the time of the meeting and some results needed consolidation or warranted further data analyses.

Most of the time was dedicated to the presentation of the field testing results. The SAB members were asked to rate each indicator with a score between 1 (poor) and 3 (good). Average score are given in figure 6. Eventually, all indicators were deemed complementary and thus all were retained.
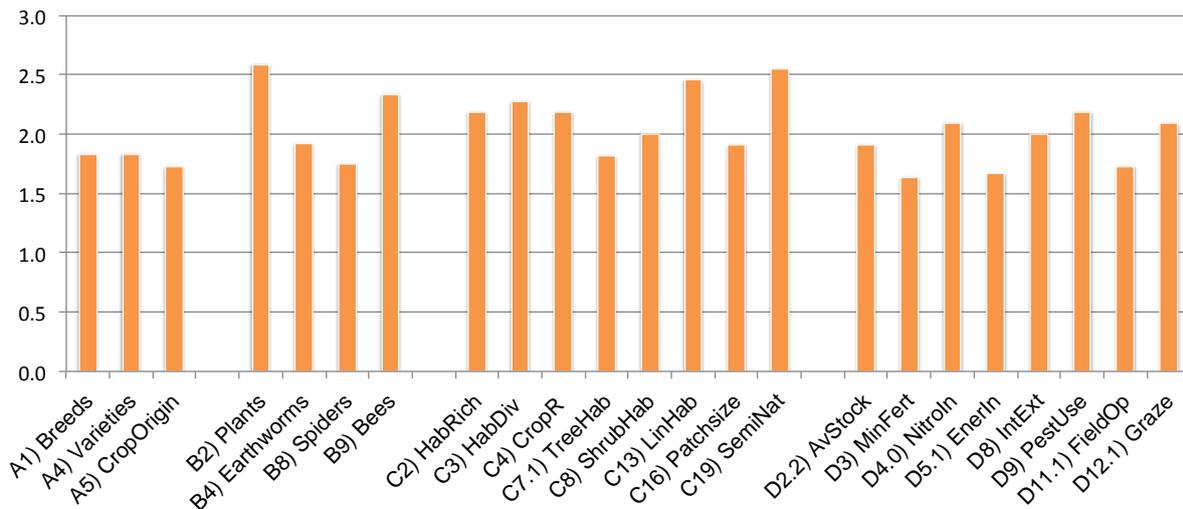
Fig. 6 Final rating of the BioBio indicators.

3.3 Final Recommendations

The SAB comments and recommendations are condensed in the following list:

1. **All the 23 indicators submitted to the SAB ought to be retained**. Indeed, they were deemed complementary in giving a comprehensive view of biodiversity.

2. **The significance of indicators should be explained**. They were recurrent questions about what the indicators tell us about biodiversity and about the health/resilience/productive capacity of the agrosystem?

3. **Contextual information should be given to help interpret the indicator values.** There were several requests for regional references against which to compare the indicators measured on one farm. Indeed, it seemed more important to compare farm biodiversity within the same farm type and ecological context but with various levels of intensification, rather than comparing the biodiversity between contrasted farm types. Also, the need was felt to differentiate between species of interest and invasive/ubiquitous species, which should not be given the same status.

4. **The respective effect on biodiversity of farming practices and of the share of semi-natural habitats should be further analysed**. Indeed, they can be managed independently and there is a need to clarify their individual effect and interaction on the global biodiversity at the farm scale.

5. **Costs should be detailed to help decision makers select the best type of monitoring for their purpose and possibility of finance**. It should include the training of the field agents, data collection, interpretation and data handling. Cost is indeed a major criterion that limits

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biodiversity surveys in many countries. Means to optimize the costs of biodiversity indicators should be clearly presented to increase the number of biodiversity monitoring programs.

6. Considering the previous recommendations, **the indicators factsheets should include:** (i) a clear description of the indicator and its significance; (b) its unit of measurement (a species diversity indicator for spider could be "Number of spider species" or "Composition of spider community" or "Number of specialist spiders", etc); (c) its significance (what does it tell about diversity), the mechanisms relating the indicator and biodiversity on the farm; (d) the protocol for data collection; (e) the method to calculate the indicator and to extrapolate the measurements at the plot scale to the farm level and from the farm level to the region; (e) Information on the possible use of the indicators is needed: To what question can they answer? In which context?

7. For communication, individual indicators should be used instead of attempting to calculate an overarching **biodiversity index**. Such an index would be difficult to interpret and it would be impossible to use it for practical recommendations for farm management.

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Appendix 1 - Brief description of the organizations involved in the SAB

NABU - Germany -

Contact: SCHUBOTH Jörg

NABU (Naturschutzbund Deutschland) - Nature and Biodiversity Conservation Union
- Work for threatened habitats, flora and fauna, climate protection and energy policies
- 450.000 members, 30.000 volunteers in practical work and 1.500 local groups (district and region)
- 75.000 young members – NAJU

Niederosterreichische Agrarbeziksbehörde – Austria -

Contact: MAYRHOFER Peter

N A is the "administration for agriculture and rural development" of the provincial government of Lower Austria (LA). There we try to develop, implement and realize subsidies and payments for LA farmers.

Since 1990, this is since almost 20 years; we develop(ed) the Ecopoint system as a subsidy system for farmers for the upkeep of cultivated landscape and for the promotion of environmentally adequate farming methods and low intensive farming. Since Austria joined the EU in 1995, the Ecopoint system is part of the Austrian environmental program (called ÖPUL), it is an independent program in LA – the farmers can choose to take part in the overall program ÖPUL or in the Ecopoint program. Now, in this year 2009, around 6700 farmers are part of the Ecopoint program (from around 34000 farmers in LA).

Foundation Global Nature - Spain-

Contact: DE MIGUEL BEASCOECHA Eduardo

Global Nature is a non-profit organisation founded in Spain in 2001. It develops pilot projects such as transhumance routes, sustainable management of dehesas in Caceres and restoration of wetlands in la Nava and Villacanas, in Palencia and Toledo. Global Nature works mainly on habitat restoration (9,000 ha) with farmers and landowners (public and private). The strategy is to sign agreements with land owners so that they take care for the land and preserve its ecologic value.

GIREA-UCL - Belgium -

Contact: WALOT Thierri

GIREA (Inter-Universities Group for Research in Applied Ecology) is a study Group (NGO) that mainly helps regional authorities developing and applying environmental legislation (Impact assessment, management plans for natural sites, N2000, Ecological maintenance of road verges, agro-environment, …). In the field of agro-environment GIREA coordinates the assessment and the development of the scheme and also contributes to the coordination of the advisers who help farmers making contracts (targeted part of the AES).

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Plantlife International - England/Europe -

Contact: STILL Kate

Plantlife International is a charity dedicated exclusively to conserving all forms of plant life in their natural habitats, in the UK, Europe and across the world.

Parco del Ticino - Italy -

Contact: DE PAOLA Claudio

Goal of Parco del Ticino was to have a new approach in farming systems, maintain a good level of income, as well as diversify their production. We support 437 farms involved in sustainable agriculture (integrated agriculture, landscape management, product labelling and direct marketing). We develop the multifunctionality of the farms.

Bird Life International - Europe -

Contact: BRUNER Ariel

BirdLife International is a global Partnership of conservation organisations that strives to conserve birds, their habitats and global biodiversity, working with people towards sustainability in the use of natural resources. BirdLife Partners operate in over one hundred countries and territories worldwide.

Green Balkans - Bulgaria -

Contact: MARIN Simeon

Green Balkans is a leading organization in the field of conservation of rare species and habitats in Bulgaria. The Organization was established in 1988 being Bulgaria's oldest nature conservation NGO. For its almost 20 years' existence, Green Balkans has won recognition from international and national institutions, authorities, and donors as a welcome partner and a highly reputable and competent organization. This is proven by the public confidence in the Organization and its almost 4,500 Bulgarian and foreign members.

Thanks to Green Balkans' hundreds of volunteers and experts, as well as the international and national support, the Society achieved significant results in the preservation of Bulgaria's unique natural heritage. More than 110 projects have been implemented, as their investment in nature conservation exceeds $ 3,5 million. Green Balkans operates in accordance with the Non-Profit Legal Entities Act.

Green Balkans is a NON-profit, NON-governmental, and NON-political organization. For that reason, and based on the principles set out in the Organization's Statutes, Green Balkans does not deal with political issues, neither does it participate in the political forces' campaigns. For its almost 20 years' history, Green Balkans has proven to be a genuine and impartial defender of Bulgaria's nature, regardless of the political parties in power and the policy they proclaim, and despite the risks of collisions with the political forces or the managing institutions.

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DEFRA - United Kingdom -

Contact: BAYLIS Mark

Defra (the Department for Environment, Food and Rural Affairs) is a Government Department in the UK. The overarching challenge for Defra is to secure a healthy environment in which we and future generations can prosper.

As we build a low carbon, resource efficient economy, Defra helps people to adapt to changes, deals with environmental risks and makes the most of the opportunity we now have to secure a sustainable society and a healthy environment. This will help see us through the difficult economic times, volatile food and energy prices and a changing climate which all make us more aware that we can't take our environment for granted.

Defra's strategy has been formalised in the Comprehensive Spending Review. The creation of the Department for Energy and Climate Change in October 2008 gave rise to our revised set of Public Service Agreements and Departmental Strategic. Policy is developed by the core Department and delivered through Defra's delivery network partners, both working together. Defra delivers its services working in partnership with our delivery network.

Consumer Forum - Switzerland -

Contact: OPPLIGER Barbara and Klemm urs

We belong to the regional group of the Swiss consumers association from 1992-1996 and in that capacity also member of the Swiss board of the consumers association. Since the year 2001 we participate to the advisory expert committee of the research agronomic station, and member of the the FECB (federal expert commission on Biosafety), a permanent federal advisory committee, that advises the Federal Council and the federal agencies on the drafting of laws, ordinances, guidelines and recommendations.

Lithuanian Institute of Agrarian Economics - Lithuania -

Contact: ZEMECHIS Romualdas

The Lithuanian Institute of Agrarian Economics was founded in 1990 after reorganisation of the former Lithuanian Research Institute of Agricultural Economics, establishment of which comes back to 1959. The founder of the Institute is the Ministry of Agriculture. 40 researchers are engaged in scientific work including 19 holders of a PhD.

High importance is determined to analysis and prognosis of micro and macro processes in the field of scientific research and information management. The Institute is also working on important issues of agricultural and rural development. During last years the researchers pay special attention to agricultural policy survey, taking into consideration Lithuania's integration into the EU.

Institut National des Appelations d'Origine contrôlée – INAO (France) /Origin (Europe)

Contact: FABIAN Thierry

The French National Institute for Origin and quality products (INAO) is responsible for the management of quality and origin signs (AOC/PDO; PGI; Organic Farming; TSG; Label Rouge). INAO is a public sector organisation operating under the aegis of the Ministry of Agriculture.

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Copa-Cogeca - Europe -

Contact: CORRAL Eva and BENITES Cyntia

COPA (Committee of Professional Agricultural Organisations) is made up of 60 farmer organisations from the countries of the European Union and 36 partner organisations from other European countries such as Iceland, Norway, Switzerland and Turkey. This broad membership allows COPA to represent both the general and specific interests of farmers in the European Union. Since its inception, COPA has been recognised by the Community authorities as the organisation speaking on behalf of the European agricultural sector as a whole.

COGECA (General Committee for Agricultural Cooperation in the European Union) also includes fisheries cooperatives. COGECA's Secretariat merged with that of COPA on 1 December 1962. COGECA is made up of 35 full members and 4 affiliated members from the EU. COGECA also has 36 partner members.

The objectives of COPA-COGECA are:

- To examine any matters related to the development of the Common Agricultural Policy
- To represent the interests of the agricultural sector as a whole
- To seek solutions which are of common interest, and to maintain and develop relations with the Community authorities and with any other representative organisations or social partners established at European level.

BioForum Wallonia/IFOAM - Europe -

Contact: RUPPOL Patrick and GODDEN Bernard

Our goal is to assess the organic production as a sustainable production.

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Appendix 2 - SAB comments on genetic diversity indicators

ANIMAL HUSBANDRY

A1- Breeds	Livestock breeds: Number and amount of different breeds per species	Farm questionnaire

Favourable comments

- The number of native/indigenous breed's indicator should be developed
- Measures to maintain specific landraces should be encouraged, *e.g.* in agro-environmental measures (using FAO indicators for races: "critical", "endangered", "vulnerable"…)

Objections

- This information is extremely difficult to obtain
- We will get a lot of different and not comparable stock types all over Europe with no clear link to species diversity

Additional comments

- There is a Convention on Biological Diversity indicator (CBD)
- Need to know the status of each livestock species (landrace)
- There often is a high heterogeneity in the phenotype of old breeds (in many cases without herding book)
- What is the environmental impact of the landrace? Is it possible to join a landrace with livestock practices (breeding, feeding,...) ?
- Farmers have in general an in-depth knowledge of their breeds and crossbreeds. In case of different species (*e.g.* sheep and goat) on one farm with one breed of each, the positive effect on biodiversity is not taken into account

A2- Liveprac	Livestock breeding practices: Information on breeding practices ("on-farm" bull, artificial insemination,...)	Farm questionnaire

Favourable comments

-

Objections

- Not a relevant indicator
- No clear link with species diversity
- Farmers with rare breeds are more likely to use artificial insemination, to get new genes, hence the indicator would be difficult to interpret

Additional comments

- Not only breeding practices should be considered, but also feeding, indoor/outdoor, transhumance

A3 - LivePedi	Livestock pedigrees : Pedigree of the herd	Farm questionnaire

Favourable comments

-

Objections

- Not applicable in every European country
- Comparability is impossible across countries
- Information not available, or extremely difficult to obtain
- Not a relevant indicator

Additional comments

•	Pedigree of cows and horses is well known, but sheep, pigs, rabbits, and poultry?

ARABLE CROPS, LEGUMES AND TREES

A4 +A5 - **CultDiv**	Cultivar diversity: Number, amount and origin of different cultivars / landraces / accessions per species	Farm questionnaire

Favourable comments
- The origin of cultivars is crucial to allow for reliable estimation of genetic diversity
- Number and amount of native/indigenous varieties indicator should be developed

Objections
- Not a relevant indicator
- It could be difficult to determine the origin of cultivars
- Different cultivars do not a priori imply high genetic diversity
- The difference between open-pollinated varieties and hybrids would be a better indicator

Additional comments
- This indicator has to be elaborated based on published knowledge
- Please replace "legumes and trees" in the heading by vegetables, fruits and crop trees (forest trees are out of scope)
- Indicators should cover crop species and in addition a number of varieties per species at farm level. The diversity of crops as an indicator for potential biodiversity should not be underestimated
- Indicator is crop-dependent: specific number of rare species in cereals are different from those in other crops like potatoes or maize

A6- **Seedmulti**	On-farm seed multiplication: Information on seed propagation practices (on farm multiplication, sharing with neighbours, etc)	Farm questionnaire

Favourable comments
- The more on-farm seed multiplication the better it seems.
- It is an important element for the conservation of some rare arable plants

Objections
- Not a relevant indicator

Additional comments
- When dealing with landraces cultivated on farm, the possibility to use farm saved seeds is essential, unfortunately, legal requirement make it difficult
  Are farmers allowed to produce they own seeds?

A7- **CropCuPheDiv**	Crop cultivar phenotypic diversity: description of the cultivars based on IPGRI descriptors (through the farmer)	Farm questionnaire

Additional comments
Needs more details and explanations

A8- **CropPedDiv**	Pedigree based on genetic diversity: Pedigree information on the cultivars grown	Farm questionnaire

Favourable comments
-

Objections
- Pedigree information is only available for few species and mostly for publicly available cultivars
- Collection of information is labour intensive, and is not worth its cost

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- Not a relevant indicator
- Criteria very difficult to use

GRASSLAND SPECIES

A9- **GrassGenDiv**	Genetic diversity of grassland species: number and amount of different cultivars	Farm questionnaire
Favourable comments		

Favourable comments

- It is a good indicator
- May be a valuable indicator if it is benchmarked with natural occurrence

Objections

- Collection of information is labour intensive, and not worth the cost

Additional comments

- Cultivars are difficult to identify. Is molecular genetics an adapted tool?

A10 – ReSeed	Reseeding of grassland: information on seed propagation practices and amount of re-seeding	Farm questionnaire

Favourable comments

- It is a good indicator
- Very easy and simple as an indirect indicator showing the intensity and environmentally soundness of grassland management

Objections

- It is difficult to obtain reliable information

Additional comments

- Should be an species indicator (Group B)

Appendix 3 - SAB comments on species indicators

INDICATORS RETAINED FOR THE FIELD TESTING

B2 – PlantNat	Flowering plants of semi-natural habitats	X-plots (patches) or rectangular plots (linear features) of vegetation survey

Favourable comments
- Indicator could be retained if a clear definition of semi-natural habitat is given

Objections
- A great number of different flower plant in a poor status is not in line with an improved biodiversity

Additional comments
- Needs to determine regional reference values

B4 – EW	Earthworms	Soil samples in vegetation plots

Favourable comments
- It would be relevant to keep it
- Very interesting indicator because related to soil activity and soil fertility

Objections
- Too costly
- Needs a lot of capacity development. Needs a lot of additional laboratory work for determination of the species.
- A lot of farms in the mountain range (Bulgaria) are with stony and sandy soils where this method is not applicable
- Earthworms species diversity is only to a very limited extend a result of farming practices, and the earthworms abundance is also dependant on the soil characteristics that can only – if any – be modified at medium to long term

Additional comments
- This is an interesting indicator, of which there are not many examples in literature
- The absolute weight of earthworms without regionalisation is not a good indicator (e.g. there are big differences depending on earthworm species, soil type, seasonality, etc). The question is, if to count the number and weight of the biomass per unit is enough or if a species list of the earthworms is necessary
- But how to build a relevant indicator (biomass/m2, number of species, specialist species...); Both the diversity and abundance of earthworms should be taken into account to assess soil quality
- Amount of biomass per area per square metre for specific soil and crop types should be realized. A European standardisation of the biomass determination methodology is needed to make comparisons

B8-SPID	Araneae- Spiders	Suction sampling in vegetation plots

Favourable comments
- It is a very interesting group to test but very few taxonomists can develop this work. It is only feasible if it is paid and promoted by the Administration as a global research

Objections
- Needs a lot of additional laboratory work for determination of the species
- Needs a lot of capacity development
- This indicator is most likely to reflect the agriculture landscape at its all rather than the cultivated plots themselves in particular regarding arable land, but also on grassland the presence of landscape elements is more important than the type of grassland itself

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B9-Bees	Hymenoptera – Wild bees	Walked transect and net capture in vegetation plots

Favourable comments

- Given the raising importance of the ecosystem services approach, this indicator (which relates to pollination) is very relevant; very important for the farming sustainability
- Bees are easier to catch and cheaper, do not need too much field work

Objections

- Good but low expert's capacity; needs a lot of capacity development
- Needs a lot of additional laboratory work for determination of the species

Additional comments

- What more is scientific proof of their positive correlation with biodiversity (especially if considering the wild species)
- The link to landscape structure and variety should be tested in some case study areas
- Bees need very specific site for reproduction that is rarely the agricultural land itself therefore this indicator is most likely to evaluate the landscape in general rather than at farm level itself

DISCARDED INDICATORS

B1 – PlantCul	Flowering plants of cultivated forage and food crops	X-plots (patches) or rectangular plots (linear features) of vegetation survey

Favourable comments

- Strengths: there are well-established link with faunistic diversity, it is sensitive to agricultural practices, and organic farming in particular, and it can include highly emblematic species
- Very relevant to assess pesticide pressure in an area
- This indicator is very important and can be divided in different indicators using the plant traits that relate to animals (bees, syrphidae, butterflies…).
- It is a relevant information that is linked to agricultural practices. Need to find relevant indicators (number of seeds/m2, number of species, scoring with the plant status, functional groups based on specific traits...)

Objections

- Weaknesses: Care is needed to differentiate between threatened species and common weeds. Farmers may be reluctant to appreciate weeds (which reduce yield) as a positive feature
- Gives too much attention to the cultivated lands

Additional comments

- Explain the relation with C10 Weeds in crops, C15 Grassland quality. Overlap with indicator ' WEED', which could be considered a sub-indicator under PlantCUL (C10). This should include all wild flowering plants - there is no need really to have the additional WEEDS indicator - as dominant species can just be identified within this species status assessment
- Pernicious weed is not a good terminology to be used in this project. The issue "are all species equal" is very pronounced for this group, where many of the species are "weeds". The analysis will account for this, distinguishing between species of conservation concern and pernicious weeds
- And what about gramineous? It could also be made the assumption that if you have some kind of plant then you will have certain birds or bees, etc.
- Needs to determine regional reference values

B3 – Butterfly	Lepidoptera: Butterfly	Walked transects

Favourable comments

- There is a lot of data available
- If we look at biodiversity as a whole for farming we should include butterflies. There are many things that are unknown, therefore we should concentrate on the things we know a little bit and in this case butterflies should be included
- Butterflies are popular. Very appropriated by consumers
- Butterflies could be used to assess the natural value of permanent grasslands and measure the impact of ecological infrastructures

Objections

- Too costly
- Needs a lot of capacity development
- It gives a good indication of the regional biodiversity but not useful at farm level
- If we select B1, B2 (including grassland) and C15 (ecological quality of grassland) we will get enough information on floristic and faunistic diversity and we can spare all the rather difficult and expensive indicators B3, B5, B6, B7, B8, B9, B10 B11 B12.

Additional comments

- Butterflies are weather dependent. So we need a trend

B5 – ANTS	Hymenoptera: Ants	Pitfall/Baits

Favourable comments

Very good if can be simplified (to eliminate laboratory work and to adapt/develop a method only using field survey)

Objections

- Ants do not have a good public image; few people have information compared to bees
- Ants do not really occur in many agricultural lands; therefore they should be left aside
- Needs a lot of additional laboratory work for determination of the species. Needs a lot of capacity development.

B6 – Birds	Birds species richness	Point counts

Favourable comments

- Birds should be applied; there is a lot of data available; there are many things that are unknown, therefore we should concentrate on the things we know a little bit and in this case bird should be included.
- Birds are a widely recognised biodiversity indicator

Objections

- Bird should not be assessed once more
- Per se this is a relevant indicator, but many data already exist. So the project partners should decide whether investing in this indicator or try to shed light on other -less investigated- indicators.
- Birds are only used because they are emblematic, but not because they are important for the farming system; birds are not good indicators for farms activities.
- Can be used only on landscape scale

Additional comments

- The only reason to use the birds is because of their popularity and acceptance by public and relatively low costs and available expert capacity
- Weather dependent, so we need a trend
- It is necessary to consider other birds than those included in the farmland birds index.

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- Species richness is not always the best indicator; better to focus on specialist species as the community specialization index or the farmland bird indicator (trend).
- You can just get the available data and try to link it to the farmland system and somehow analyse it

B7- SMamal	Small mammals	Traps

Favourable comments
- Should try to keep it – trough choosing acceptable species (hares) or easy field methods - counting voles (Apodemis spp.) holes/density.

Objections
- It is a very expensive indicator which needs a lot of expertise
- They are not very popular

Additional comments
- Abundance can be confused with a pest promoted by bad farm practices (monocultures for example)
- It would be best to deal with mammals' diversity

B10-Cara	COLEOPTERA- Cabarid beetles	Pitfall traps, suction samplers, sil samples

Favourable comments
- Good but low expert's capacity

Objections
- Needs a lot of additional laboratory work for determination of the species
- Needs a lot of capacity development.

Additional comments
- It seems necessary to explain the place of carabid species in biological control
- If carabid beetles are not retained, we recommend making use of existing literature to include the diversity of carabides at least in the discussion of the project findings.

B11-Syrphids	DIPTERA- Syrphidae, hoverflies	Malaise trap

Favourable comments
- Very useful in fruit production
- Good but low expert's capacity

Objections
- Needs a lot of additional laboratory work for determination of the species
- Needs a lot of capacity development

B12-Bat-Act	Bat Activitiy	Transect with bat detector

Favourable comments
- Worthwhile using it where national bat monitoring schemes are implemented
- Bat richness may be based, not only on insect diversity, but also on insect pests due to other factors (see mosquito outbursts)

Objections
- Can be used only on landscape scale
- Expensive indicator due to equipment used and special skills needed for identification afterwards

Appendix 4 - SAB comments on habitat indicators

C1- HabDensity	Habitat Patch density Number of habitat patches per hectare	Farm habitat mapping

Favourable comments

- In Lower Austria there is also a method to count (number and size) of different habitats respectively landscape elements developed
- This method of the "Ecopoints program" could be useful for standardisation for an European wide indicator within the BIOBIO project.

Objections

- Can be used only on landscape scale
- This criteria does not account for the "ecological value or "Ecological quality" of the habitat

Additional comments

- It should not be retained as single indicator. It should be part of a combined indicator on landscape features.
- Where are the limits between semi-natural habitats and crops?
- Increase in habitat patch density can have very different meaning in different landscapes (fragmentation of grassland which tends to be negative or increase in landscape elements which is often positive)

C2- HabRich	Habitat Richness: number if habitat occurring on a farm	Farm habitat mapping

Favourable comments

-

Objections

- No clear definition for this indicator and great regional variation
- To be replaced by indicator on landscape features
- Much more difficult to apply to grassland systems than to arable, mixed and permanent crops

Additional comments

- Explain the relation with B2
- Needs development of a clear definition of "habitats" used here
- Take into account the state of conservation of habitats versus N2000
- It seems necessary to take in account only the used agricultural area of the farm

C3- HabDiv	Diversity of farm habitats, accounting for both the occurrence and relative proportion of the total farm area	Farm habitat mapping

Favourable comments

-

Objections

- No clear definition for this indicator and great regional variation
- To be replaced by indicator on landscape features

Additional comments

- Needs development of a clear definition of "habitats" used here
- Its relevance depends very much on which indicator is selected, *e.g.* Shannon index is not easily understood by non experts

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C4- CropR	Number of crops in rotation versus Crop richness	Farm habitat mapping and farm questionnaire

Comments

- More details must be collected for the indicator to be useful, for example types of crops in a rotation (wheat on maize on wheat is not good)
- Different rotations can exist in a single farm
- Integrate the share of permanent grassland: For example, there are short rotations in the mountains but the crops account for less than 10% of the UAA
- How to calculate a relevant indicator? Scoring taking into account the percentage of each crop, grouping similar crops (durum wheat and spring wheat, maize grain and silage maize...?
- Crop richness does not take into account the peculiarities of specialized crops such as rice or hops that makes it difficult and even impossible for farmers to have other crops within their farm

C5- ArableArea	Share of arable land	Farm habitat mapping

Favourable comments

- Easy to measure as all farms record this information
- Very general and will give an overview on the farm. Very useful basic indicator
- For this and other indicators the European level is very interesting, but information must be available at EU level on an appropriate reference area (landscape, 1 km, 5 km or 10 km cells)

Objections

- C5 is important, however do that really describe biodiversity? Are there not other indicators that describe the link better?
- Can be misleading in landscapes dominated by grasslands, permanent crops, forests etc.

Additional comments

- Retain only if establishing a combined indicator including C4, C5 and C6
- Also should be checked the average size of field plots (in ha)

C6 – Grass Area	Share of permanent grassland	Farm habitat mapping

Favourable comments

- Very general and will give an overview on the farm. Very useful basic indicator

Objections

- C6 is important, however do they really describe biodiversity? Are there not other indicators that describe the link better?
- Quality of grassland (semi natural/ heavily modified) is often more relevant. It is recorded in national agricultural census statistics at NUTS5 level

Additional comments

- Retain only if establishing a combined indicator including C4, C5 and C6. Easy to measure as all farms record this information
- The "community" pastures (outfields, common lands) should be counted as separate "farms" in the whole landscape. Only grazed areas should be counted; usually close pastures are used instead of distant one as herds do not graze further than 3 km from settlements. For these grazed pastures grazing density could be found dividing grazed area by the number of livestock in the settlement

C7 - Tree	Percentage of tree cover	Farm habitat mapping

Favourable comments

- Very useful basic indicator
- Indicator is good and necessary for completing the lists of habitats and landscape elements
- Can be a very useful indicator of intensity and habitat quality in olive groves etc.

Objections

- C7 is important, however do they really describe biodiversity in order to be considered? Are there not other indicators that describe the link better?
- An indicator on landscape features would have been more relevant
- It would be much better to measure the number of trees and the number of varieties per hectare

Additional comments

- It has to be clearly defined what is crop and what is tree. Any shrub higher than 5 meters is considered as a tree
- This indicator is not related to native trees or shrubs, so it would be interesting to associate it with the tree species diversity
- Should be avoided; the productive trees are already considered under the C4 indicator
- A differentiation per tree group (cultivated fruit trees, wild trees etc.) would be good

C8- Shrub	Cover of shrub layer	Farm habitat mapping

Favourable comments

Objections

- An indicator on landscape features would have been more relevant, C8 and C13 should not be considered separately, they are the result of the different regions across Europe and both can result in a same degree of biodiversity being present

Additional comments

- Very useful basic indicator. The definition/description needs to be improved considerably. Use as unit the % of shrubs of all habitats respectively % of farmland area covered by shrubs. If the size of all habitats is also counted (indicator C1) it is easy to count the % of shrubs of the habitats. Can be a useful indicator of abandonment at one end and of habitat heterogenity and extensive use at the other. But needs careful interpretation according to context. Is it an indicator for increasing biodiversity or for loss of biodiversity. It depends on the situation. Erosion control is a must in the South of Europe. The maintenance of shrub and grassland coverage is very interesting in some systems (olive yards, dehesas, etc.)

C9- Ellenberg	Nitrogen, pH, moisture as Ellenberg values	X-plots (patches) or rectangular plots (lienar features) of vegetation survey

Favourable comments

- It is a very detailed indicator. Needs a lot of capacity development which can be worthwhile after all

Objections

- A very complex indicator and therefore difficult to use, not useful
- High costs, seems rather difficult to implement, needs specialists and exact definition

Additional comments

- If to be used then to be classified under B Species Diversity indicators
- Needs adjustment (regionalization) /development

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C10- Weed	Weeds in crop	X-plots (patches) or rectangular plots (lienar features) of vegetation survey

Favourable comments

- This indicator gives good information about the potential for biodiversity at local level
- The higher the amount of seeds (especially the smaller ones), the easier it is to increase biodiversity by changing land use practices
- Generally weeds could be refuges for animal species and play a role of stepping stones. It is good to motivate farmers to have them – through leaving uncultivated poor soil patches, etc

Objections

- This criterion is difficult to interpret. An organic farmer can obtain crop without weeds and let grow weeds in other places
- To be replaced by a indicator on soil seedbanks

Additional comments

- Explained the relation with B1
- What is the relation between intensification and weeds?
- Distinguish between main weed type (e.g. broadleaf/grass, annual/perennial), as this is important from an organic farming perspective with regard to management
- The degree of coverage (in percentage) by selected key indicator weed species might be sufficient instead of counting.
- The coverage is important for certain ground beetles like carabides.

C12- ValueHab	Share of valuable habitat	X-plots (patches) or rectangular plots (lienar features) of vegetation survey

Favourable comments

- Very good, but only applicable to farms falling into Natura 2000 sites

Objections

- Habitat mapping is very expensive and complicated. Difficult to envisage as general tool outside Natura 2000 sites

Additional comments

- Could be left and applied only to those farms which are located in the Natura 2000 sites.
- Could also be used in those countries that have their national habitat mapping. Anyway, in relation to Art.17 of the Habitats Directive, states should have such mapping so that it could be used for this indicator.
- In addition to the Habitats of Annex I of Dir 92/43/EEC habitats of national importance could be taken into consideration (Germany, Spain…). "Black-and-white" indicator, but simple and good for a coarse level

C13-Linear	Linear elements	Rectangular plots

Favourable comments

- It is the most important and valuable indicator
- Must always be taken into account
- Good and necessary indicator in addition to C1 "Habitat patch density" and C7 "Tree cover" to complete the lists of habitats and landscape elements.

Objections

- To be replaced by indicator on landscape features

Additional comments

- How to operate with field coppices, how to integrate woodland fringes?
- Would this also include cultivated margin habitat or sown strips of pollen & nectar or wild bird seed mix?

• C8 and C13 should not be considered separately, they are the result of the different regions across Europe and both can result in a same degree of biodiversity being present		

C15 - GrassQ	Ecological grassland quality	X-plots (patches) or rectangular plots (lienar features) of vegetation survey

Favourable comments

- Good
- Only few other faunistic indicators additionally necessary
- This indicator is described as "based on the structure of grasslands, on the abundance and diversity of colours of flowers and butterflies, the abundance of grasshoppers, land snails and additional arthropod groups two weeks before the first cut, the ecological quality of a meadow or pasture is assessed"), there will be enough information on floristic and faunistic biodiversity. If we can find a key for all European countries, this indicator could be the faunistic key indicator in combination with the indicators B1 "PlantCUL" and B2 "Plant"Nat" (extended to all grassland)

Objections

- Require very heavy data collection and processing, so unlikely to be useful for large scale monitoring
- Ecological quality is not of much interest. Production potential would be interesting and it is also linked to ecological quality
- Not applicable in Bulgaria

Additional comments

- No clear definition of quality of grassland; different possible definitions (ecologic vs. economic)
- Quality should be defined according to the type of plants; Plant communities have to be considered
- Grassland Quality: the name is not correct, because farmers will not necessarily understand what is really means

Appendix 5 - SAB comments on farm management indicators

D1-DivEnt	Diversity of entreprises on the farm	Farm questionnaire

Favourable comments
- The more enterprises the higher the enterprise diversity the better it is
- Good indicator
- Easy to collect

Objections
- D1 is not important at all for biodiversity

Additional comments
- The term "enterprises at the farm" should be changed to "activities at farm level"

D2-AvStock	Average stocking rates	Farm questionnaire

Favourable comments
- Very useful
- Livestock Units (stocking density) per ha is a very good indicator.

Objections
-

Additional comments
- Two stocking rates are to be distinguished: 1. LU/ha UAA, 2. LU/ha forage land
- Should be put in relation to grassland and be considered in connection with A9
- Average grazing load can hide important differences in timing, pattern, herbivorous species
- There is already a good database available for such indicator

D3-MinFert	Area of land without use of mineral-based fertilizers	Farm questionnaire

Favourable comments

Objections
- Difficult to prove; data from farmers questionnaire are not reliable
- Not a useful indicator without looking at the amount of organic N fertilization

Additional comments
- The indicator should be extended: 1. % of UAA without mineral-based fertiliser, 2. % of UAA not fertilised
- Why only mineral fertilizers? Some farmers can spread large amount of organic nitrogen
- In the Fact sheets the definition is misleading.

D4- NitroIn	Nitrogen input	Farm questionnaire

Favourable comments
- Useful to assess low input systems
- Very good indicator for the degree of intensification of a farm
- Overall a very good indicator to characterise the intensification level of farms

Objections
- Difficult to prove; data from farmers questionnaire are not reliable

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- N-surplus is a better indicator and it is recorded (e.g. in Nitrates Vulnerable Zones, NVZ)

Additional comments
- Should be associated to a nitrogen balance; should include organic and mineral N, but also symbiotic N
- Never forget when calculating the N input the amounts of N out of manure and also N brought into the system by grazing

D5- EnerIn	Input or Direct and Indirect Energy for crop production	Farm questionnaire

Favourable comments
- It describes the intensity level of the farming systems
- Good indirect indicator for intensity of land use

Objections
- Energy indicator (D5) has not a direct link to biodiversity
- The whole system should be taken into account and not only the crops
- Taking into account not only direct energy but also indirect energy makes this indicator quite challenging

Additional comments
- It very much depends on the farming system (e.g. energy used in the stable, farm house…)
- Consider if this indicator should also include all the Energy input for animal husbandry (e.g. via concentrated feed stuff)
- For the future consider if this indicator should be extended to an indicator for green house gas emissions (then there should be also included CH_4 emissions from animal keeping and N_2O emissions out of dung)

D6 – CertOrg	Certified as Organic	Farm questionnaire

Favourable comments
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Objections
- Should not be in the list: it should be the baseline for selecting the farm
- Farm practises do not only depend on a certification as organic

D7- AgrEnv	IRENA indicator 1: area under agri-environment support	Farm questionnaire

Favourable comments
-

Objections
- Is a not a good indicator at the farm scale
- Some AEM are not liked to a surface
- Some AEM do not have any impact on biodiversity
- AEM all over Europe are not comparable: for example in Austria (almost) all areas are under contract. But there is per se no significant relation to farmland practises or biodiversity
- Coverage by AE schemes is mostly meaningless as schemes' quality, ambition and objectives are extremely variable. 100% of a region may be covered by AE commitments but this gives no real insight if these schemes are effective, controlled, etc.

D8- IntExt	IRENA indicator 15: intensification/extensification	Farm questionnaire

Favourable comments

-

Objections

- Is a very difficult indicator, because it has to be linked to the area
- It is a complex indicator as it requires farmers to open their books with all their expenditures (very bureaucratic)
- There would be important differences between different regions in the definition
- Europe there is a great variation of the fuel price, the cost for fertilizer, pesticides, concentrate fodder; the location near harbours has a major impact in the price, therefore taking into account the expenditures may be misleading

Additional comments

- There is no clear definition of intensification and extensification
- D8 could be provided by a set of indicators (D2, D3, D4, D5, D9); Intensity/extensiveness can better be derived indirectly from the other parameters, such as synthetic nitrogen input, use of pesticides and grazing intensity. The number of Euros spent per hectare should therefore not be considered

D9- PestUse-TFI	Pesticide use – Treatment frequency indicator	Farm questionnaire

Favourable comments

- Frequency of application is very important

Objections

- Difficult to prove. Data from farmers' questionnaire is not reliable
- If you want to address pesticides (D9, D10) you have to have the active ingredient, if not it does not have sense to integrate it
- The number of application can give only a rough idea; some of the more recent pesticides formula require repeated application because of the limited persistence in the environment / rapid degradation while some of the older formula persist and might have a major impact on biodiversity

Additional comments

- Should pesticides used in organic farming be taken into account?
- This indicator is relevant, however the number of applications need to be assessed per crop and not at farm level (for instance if the farmer has one field of potato with 7 applications and the other field of cereals with one application…)
- What about the treatment for animals as ivermectine and seed treatment?
- The distinction between pre-emergence herbicides versus use of post-emergence herbicides (in per cent) would be good

D10- PestUse-Area	Area of land without or with reduced use of pesticides	Farm questionnaire

Favourable comments

-

Objections

- Only the land "without pesticide use" is a good indicator

Additional comments

- The basis to which this indicator relates is unclear, it is necessary to precise the exact meaning of "with reduced use of chemical"

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- D10 can be provided by D9 if the farming practices are registered cropwise
- area farmed without plant-protecting measures, or using only biocontrol agents and/or use of specialised products without side effects on non-target organisms (e.g. mating disruption, skinning inhibitors, etc.) would also be an interesting indicator.

D11- FieldOP	Frequency and timing of field operations	Farm questionnaire

Favourable comments

Objections
- No clear link with biodiversity
- Likely to become less and less meaningful as more farming types are aggregated
- There are many different types of field operations with different impacts on biodiversity: tillage, manure application, mechanical weeding system… field operations must be specified, otherwise it would not be of much use
- Some extensive and traditional farming systems include elaborated field operations, and they are considered good habitats. Other intensive systems may have less but more dangerous operations

D12- GrazInt	Grazing intensity of livestock	Farm questionnaire

Favourable comments
- Good indicator but seems to overlap with D2

Objections
- It seems difficult to get good data on grazing per plot. So the better indicator is to count species richness on all grassland (indicator B2) in combination with the ecological quality of grassland (C15)

Additional comments
- Feeding system is missing as an indicator
- Is grazing activity going to be assessed as an average? Because this can be misleading. Grazing intensity will not be seen as an average. It will be done according to the stocking density
- Grazing intensity depends on the region's climate. It's difficult to compare Normandy and south of Spain
- The connection with distribution is important at farm and regional level (under-grazing should be considered alongside over grazing