



Request for Proposals (RfPs): “Enhancing Biodiversity & Resilience in Cropping Systems”

Dear Sir or Madam,

Biodiversity and agriculture are intimately intertwined. Biodiversity is under threat and agriculture is one important driver for the loss of biodiversity - be it through the direct expansion of agricultural lands or through the loss, degradation and fragmentation of habitats within agricultural landscapes. Likewise, agricultural land presents great opportunities to finding solutions in addressing habitat loss. Bayer Crop Science (BCS) endeavors to take a leading role in the conservation and restoration of biodiversity in agricultural landscapes. We would like to contribute to the call of IPBES to develop ‘systemic and transformative change’, and more specifically on its recommendation to promote natural and semi-natural habitats within and around cropping systems. We strive in various ways to reduce crop production-related biodiversity loss while bringing commercial value to farmers and landowners. Through the specific RfPs we would like to better understand the potential contributions that the creation of habitats could provide not only to biodiversity conservation but also in support of crop production and its resilience. In addition, we would like to better understand supportive incentives and new and innovative financial mechanisms that enable farmers to create such habitats. To close this knowledge gap, we invite you to participate in the RfPs that seek to answer the following questions:

RfP 1: What are the dually beneficial ‘habitats’ / ‘cover crops’ that enhance biodiversity and resilience in crop production and which can be created as an integral part of crop management and of a landscape planning approach for use within and beyond cropped fields?

RfP 2: Which innovative, financial mechanisms / benefits and incentives are needed for farmers to create ‘habitats’ / ‘cover crops’ to enhance biodiversity and resilience in crop production?

In order to prepare a responsive proposal, please review the contents of the attached document that provides requirement parameters and a glossary explaining the meaning of the terms used in the RfPs.

Interested applicants are welcome to send any queries with regard to this RfPs up to 5 days prior to the date for submission of the pre-proposal to

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May 6, 2020

Dr. Bärbel Hundt

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Page 2 of 15

my e-mail address: **baerbel.hundt1@bayer.com**. The BCS biodiversity core team will reply to them as soon as possible.

To get a better understanding about the way you intend to work on one, on parts or on both RfPs, we kindly ask you to send us your pre-proposal by June 5st. Details on what the pre-proposal needs to entail are explained in the requirement parameters and in Annex II. Please send your pre-proposals to my e-mail address: **baerbel.hundt1@bayer.com**. Applicants will be notified about the status of their pre-proposal by July 5th 2020.

We are convinced that conserving and restoring biodiversity and [agro-] ecosystem services is a value that farmers, biodiversity and society at large can benefit from. Let's combine expertise and knowledge to make it happen. We are looking forward to your inspiring ideas!

On behalf of the biodiversity core team:

Yours sincerely,

A handwritten signature in blue ink, appearing to read "B. Hundt", with a stylized flourish at the end.

Bärbel Hundt



Request for Proposals

“Enhancing Biodiversity & Resilience in Crop Production”

Bayer AG, hereafter Bayer Crop Science (BCS), would like to invite you, hereafter "RfP-Applicant", to participate in a Request for Proposals (RfPs). See below more details on Requirement Parameters and the meaning of terms used in this RfP under Glossary. Terms defined therein are underlined in the text.

Key Dates	Milestones
5/2020	RFP issued to potential applicants
6/2020	Pre-proposals due to BCS
7/2020	Applicant notified of preproposal status
9/2020	Full proposals due to BCS
12/1/2020	Proposal awardees notified; contract is established
January 2021 – Dec 2021	Project Period
March 2022	Final Report due BCS

Scope

BCS, as a crop solution developer is keen to contribute to the call of IPBES to develop ‘*systemic and transformative change*’, and more specifically on its recommendation to promote natural and semi-natural habitats within and around cropping systems. Our understanding is that mainstreaming biodiversity into crop production adds resilience over time and scale. Therefore, BCS would like to contribute to the promotion of the creation/restoration of habitats and the cultivation of cover crops that serve dual purposes to crop production and conservation¹. These dual-purpose habitats and cover crops are marked with ‘backquotes’ hereafter: ‘habitats’ / ‘cover crops’. ‘Habitats’ are only a shortlist of all habitats recommended for conservation purpose by various stakeholders and policies for implementation by farmers in different countries. In addition, as ‘habitats’ / ‘cover crops’ implementation is a challenge, innovative incentives/financial mechanisms need to be explored jointly to be successful.

The scope of the RfP is international, however we would like to focus on finding solutions on the creation of ‘habitats’ / ‘cover crops’ and incentives in the major arable field crops, wheat, corn/maize and soybean, grown by large farm enterprises in intensified and thus often simplified landscape areas in Brazil, US and EU (France, Germany). These simplified landscapes contain only small fragments of natural, non-crop, or semi-natural habitats² and, as in the case of soybean, may be associated with deforestation in some countries³. It is anticipated that prioritizing ‘habitat’ creation and restoration in these simplified landscapes, crops and regions would lead to a better connectivity at landscape level and with it generate improved conservation outcomes. Our choice on the crops and regions is guided by the decision that starting management excellency in some key crops and regions is supportive of acquiring expertise in developing services and tools before extending solutions to other crops and regions.

¹ Schulte Moore L, Niemi J, Helmers M J, Liebman M, Ar bucklee JG, James DJ, Kolkag RK, O’Nealh M E, Tomer M D, Tyndalla JC, Asbjornseni H, Drobneyj P, Nealk J, Van Ryswykl G, Witte C. 2016. Prairie strips improve biodiversity and the delivery of multiple ecosystem services from corn–soybean cropland.

² Tsharntke T, Klein A-M, Kruess A, Steffan-Dewenter I, Thies C. 2005. Landscape perspectives on agricultural intensification and biodiversity - ecosystem service management. Ecology Letters 8.

³ Byerleea D, Stevenson J, Villoria N, 2014. Does intensification slow crop land expansion or encourage deforestation? Elsevier Global Food Security 3 92-98. Doi.org/10.1016/j.gfs.2014.04.001



Page 4 of 15

BCS is aware that the research on 'habitats' / 'cover crops' and incentives represents challenges due to the diversity of cropping systems, legal contexts, lack of key words attributed to 'habitats' and that finding a one-size fits all solution may not be possible. However, currently the creation of conservation habitats is often established as parallel measures and does not reflect a mainstreamed, dually beneficial approach that is crucial to address farmers' economic needs. These habitats often also have limited biodiversity outcomes at landscape level, as their implementation have not been spatially prioritized⁴.

We have two key questions for which we seek a more thorough understanding of the current knowledge at international level and which form the basis for these RfPs.

1. What are the dually beneficial 'habitats' / 'cover crops' that enhance biodiversity and resilience in crop production and which can be created as an integral part of crop management and of a landscape planning approach for use within and beyond cropped fields?
2. Which innovative, financial mechanisms / benefits and incentives are needed for farmers to create 'habitats' / 'cover crops' to enhance biodiversity and resilience in crop production?

RfP I: Dually beneficial 'Habitats' / 'Cover Crops' for Conservation and Production

Objectives: 1. Identify peer-reviewed scientific literature, science-based reports, technical papers and potentially master thesis and dissertations across the world, which describe 'habitats' that have dual benefits from a farmer's economic, agro-ecosystem services provisioning (especially those serving real-world agriculture) and from a biodiversity conservation perspective. Possibly also include expertise of farmers and farm-advisors, e.g. gathered through interviews that are based on well-established social science expertise.

Deliverables:

- Provide an international meta-analysis on 'habitats' / 'cover crops' that reviews and summarizes published literature and other information gained as described.
- Identify a set of e.g., agronomical, socio-economic, and ecological criteria that define 'habitats'
- Elaborate on the benefits of 'cover crops' that provide temporary 'habitats' for some species or benefit crop management, including financially as they have the advantage of being easily integratable into common crop management practices.
- Elaborate on potentially other beneficial approaches that may be suitable or have not been tested yet (beyond common Good Agricultural Practices (GAPs) and natural resources conservation measures).

⁴ Früh-Müller A, Bach M, Breuer L, Hotes S, Koellner T, Krippes C, Wolters V, 2019. The use of agri-environmental measures to address environmental pressures in Germany: Spatial mismatches and options for improvement. Land use policy 84 347-362. Doi.org/10.1016/j.landusepol.2018.10.049



Page 5 of 15

Objective 2. Out of the scope of the above meta-analysis identify those ‘habitats’ that are applicable at landscape level in the identified major arable field crops and regions of this RfP. Possibly differentiate their creation by agronomical (crop/crop rotation) conditions, region and other aspects, and if they are fit for purpose, suitable in view of local ecological conditions (landscape surrounding).

Deliverables:

- Elaborate on crop (wheat, soybean, corn) and region-specific (US, Brazil, France, Germany) short lists of ‘habitats’ that can be created within and beyond fields (landscape level), as different needs may occur. Elaborate on their ability to increase resilience of crop production over time and scale (some benefits may only materialize after some years).
- Review existing data for quantitative information on financial benefits / crop profitability of the identified ‘habitats’ / ‘cover crops’, opportunity costs / benefits (yield, produce quality, soil quality improvement in surrounding areas), costs (labor, time e.g., ease of creation within standard crop management practices, no additional machinery needed), extra costs (seeds, additional crop protection measures). Information on these benefits may be difficult to find. In this case, propose a way to deal with the scarcity of the information (can proxies, models etc., be used instead?)
- Rank the measures identified under Objective 1 according to their farm viability, economic performance aspects in terms of e.g., financial benefits, profitability and costs.

Objective 3. Provide practical, on-the-ground recommendations to BCS on how to integrate the creation of the “three/five” best ranked ‘habitats’ / ‘cover crops’ within or around cropping systems per identified crop / region.

Objective 4. Provide a list of those habitats recommended most commonly for implementation in various cropping systems by government policies, authorities, scientists or other stakeholders and explore why they do not qualify as ‘habitats’ (costly, generating disservices to cropping systems) and whether they provide biodiversity outcomes at scale.

Objective 5. Provide in addition to the final report for BCS (could also include a scientific publication, a publicly available publication) a synthesis report of key findings, that includes illustrations/infographics, to facilitate outreach.

RfP II: Financial Mechanisms / Benefits and Incentives for ‘Habitats’ Creation

Objectives: 1. Identify the best financial mechanisms / benefits and incentive models (may possibly include penalty systems to not destroy natural habitats or legal restoration requirements) at international level that increase farmer engagement to create ‘habitats’ / ‘cover crops’.

Deliverables:

- Provide an international meta-analysis that reviews and summarizes financial mechanisms / benefits and incentive models for the creation of habitats based on existing peer-reviewed



Page 6 of 15

literature or policy recommendations and identify, which components and reasons led to their successful creation.

- Identify innovative models that are currently developed, which add value for farmers (e.g., increasing profits, saving costs, additional revenues) that enable the creation of 'habitats'. Which technological prerequisites need to be fulfilled (e.g. verification via remote sensing, proof of evidence, others?).
- Provide practical recommendations to BCS on the best models to increase farmers' engagement to create 'habitats'.

Objective 2. Identify potential reasons why farmers do or do not create habitats

Deliverables:

- Identify reasons why farmers engage in 'habitats' / 'cover crops' creation beyond economics (e.g., farmers may engage in flower strip creation as an image or a cultural services provisioning tool).
- Provide a summary of the main components and reasons (no value attributed, too expensive, too labor intensive, monetary incentives too low, administrative effort too high etc.) why habitats are not created and what needs to be done to increase adoption rates of 'habitats'
- Invisible factors such as farmers' attitude and awareness of sustainable development / biodiversity conservation – the likers and the do-not likers are guiding 'Habitat' creation. What makes up an early adopter, a follower or a holdout? Other key aspects? Add such qualitative aspects if available from social science research.

Objective 3. Provide in addition to the final report for BCS (could also include a scientific publication, a publicly available publication) a synthesis report of key findings, that includes illustrations/infographics, to facilitate outreach.

Requirement parameters

- **Scientific approach:** as an R&D based solution developer we endeavor to base our future developments on a scientific base. How can you ensure this?
- **Synthesis report on key findings / publication:** as important as the scientific report for BCS (and potential other types of publications) is a synthesis report that highlight the key findings in concise language and in terms of illustrations/infographics or other valuable communication outreach tools. Indicate if a synthesis report can be provided as part of the RfPs.
- **Interdisciplinarity / scientific areas:** we consider that different scientific areas need to be included in the meta-analyses: agronomy; agricultural economics, agro-ecosystem services experts, weed/pest/disease control (i.e., agricultural disservices); ecology of weeds, pests, non-target and beneficial organisms; precision conservation/agriculture; land restoration, ecology/conservation; environmental economists; landscape ecology & landscape planning; agricultural policy/subsidies experts; socio-economic considerations. If you consider other disciplines to be important, please suggest their additions. Which steps do you intend to take to identify experts?
- **Consortium:** both RfPs request international and inter-disciplinary collaboration. We anticipate that the best way forward would be to assemble a consortium of experts who work together under one



or more coordinating entities. If you have worked this way before, are there key learnings that you could apply to the RfPs and / or how would you suggest engaging on the RfPs?

- **Trade-offs and synergies:** mainstreaming biodiversity into crop production at landscape level requires a thorough trade-off and synergy discussions. Creation of semi-natural 'habitats' on productive land addresses two public goods: food production and conservation. What are the key points to be addressed in this discussion? How can you ensure that this discussion is achieved?
- **International scope:** the scope of the RfPs should be international as 'habitats' / 'cover crops', incentives and financial mechanisms are very different by country or region and can be learned from. The focus of the 'habitats' / 'cover crops' implementation would include but is not limited to the crops identified in this RfP (wheat, corn, soybean) and the indicated regions. However, these crops have been identified as a starting point. If you feel more comfortable in providing nationally or regionally focusing RfPs this is possible as well. There may be valid reasons to only submit geographically limited RfPs. Our focus lies on the quality of the proposals.
- **Full RfPs or part RfP submission:** the RfPs consist of two separate research questions / meta-analyses (RfP I and RfP II). Working on both at a time could bring benefits as they are complementary. However, they do not necessarily have to be addressed jointly. Applicants may apply for either or both RfPs or for parts of them. If the focus of your research only covers specific elements of an RfP area and you are interested to participate please indicate accordingly.
- **Pre-Proposal:** (maximum 5 pages) short summary on the scope of the work; includes key experts / consortium involved, (names, affiliation, expertise, role & responsibilities); project description, overview; description of methodology applied; work plan and deliverables; international scope; timelines and budget estimation broken down by phases/milestones (funding partners / matching contributions if applicable). Indicate if a synthesis report can be provided, if you can convene different stakeholders for subsequent implementation and what type of pre-study / scoping study or evidence synthesis can be provided? (template in Annex II)
- **Phased approach:** at the beginning of the project a **pre-study / scoping study** or an **evidence synthesis** would be a valuable milestone to identifying how much information is available on 'habitats' and on how to best retrieve the information beyond open literature (e.g., by interviewing experts). If you could prepare such studies what do you expect in terms of budget and timeframe? We would prefer to have an overall phased, step by step approach to delivering the RfPs' objectives. From your point of view, and if you propose for both RfPs what would be the best way forward in providing the requested deliverables in a phased approach? In case you may only want to provide one or parts of the RfP indicate how to proceed.
- **Funding:** BCS is eager to address existing knowledge gaps and therefore has envisaged to invest in these RfPs. However, should RfP-Applicants need to demonstrate matching funds or require other funding structures these can be accommodated. The focus areas should however preferably be maintained.
- **Eligible RfP-Applicants:** universities, international research institutes, government affiliated researchers, non-governmental research entities and international organizations.
- **Evaluation criteria:** all proposals will be screened for relevance, accuracy, and completeness. Proposal selection may also be based on other considerations such as geographic balance, balance



Page 8 of 15

among objectives between crop production and conservation, reflection of real world needs of each RfP.

- **Convening different stakeholders:** optional. We are aware that a landscape level intended 'habitat' creation approach cannot be achieved by BCS alone. Ideally, 'habitat' creation/restoration will be based on existing landscape plans drawn by governments. Likewise, financial mechanisms / incentives or the payment of a premium price may require supportive government frameworks or payments by private stakeholders. Convening broader stakeholder approaches will be necessary. Potentially the RfP-Applicant could broker convening different stakeholders or recommend some to engage with. Such approaches would help to engaging in new avenues, overcoming obstacles, current paradigms and polarizing views on which cropping systems are better.

About BCS, the context of the RfPs and the scope of what BCS can contribute

BCS's key business model is research and development, and bringing to market science-based solutions, which enable crop production to become more efficient by conserving natural resources per unit area of cropped land. These crop solutions include technologies such as seeds (crop varieties), crop protection approaches, related services and tools. They are part of a whole framework of GAPs, which large or small-holder farmers apply in a diversity of extensive to intensive cropping systems across the world to make crop production more sustainable and resilient. BCS serves all cropping systems such as organic, agro-ecological, regenerative, agro-forestry or sustainable mainstream agriculture and is convinced that the combination of the best inter-disciplinary science, GAPs, crop solutions, 'habitats' / 'cover crops' and others is the way to success in making crop production more sustainable and resilient.

BCS strives to set new standards through its sustainability efforts by delivering innovations, and driving the digital transformation for crop production and conservation, thus bringing enhanced value to its customers around the world⁵. The analysis of the current biodiversity situation and recommendations, the possibility of new digital tools, as well as the scope of what a crop solutions developer can work towards, led to the identification of the two questions addressed here. Their related challenges require more information to close the knowledge gaps upon which BCS can develop appropriate services and tools and build concrete actions that support efficiency, and more systemic and transformative cropping systems. Although empirical information may not yet be available for all parts of the RfP, we would like to invest in them to identify potential reliable trends (more details see Annex I).

⁵ McConnell MD. 2019. Bridging the Gap between Conservation Delivery and Economics with Precision Agriculture. Wildlife Society Bulletin 1-7.



Background biodiversity conservation and crop production

Traditionally, and over centuries, the sustainability of crop production has been managed through GAPs. In addition to GAPs, the conservation of natural resources, such as land, water, and energy equally form the foundation of the diversity of sustainable cropping systems around the world. As habitat loss increases, recommendations for their maintenance or restoration includes agricultural areas.

The [Intergovernmental Science-Policy Platform on Biodiversity & Ecosystem Services \(IPBES\)](#) landmark 2019 Report entitled [Global Assessment of the Status of Biodiversity and Ecosystem Services](#) highlights the scale of continued biodiversity loss. It calls for '*systemic and transformative change*', which includes changing the focus from reducing impact on biodiversity loss (e.g., pollution reduction) to managing the key drivers of loss (enhancing the quality of ecosystems). The Report identifies the 5 key direct drivers of change (changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species), and the indirect drivers of change, such as population growth, production and consumption patterns and others. It showed that changes in land use (which can be related to habitat availability) are the key drivers for biodiversity decline and change. The presence of networks of habitat corridors across landscapes is especially important to ensure connectivity, support refuge, nesting and feeding opportunities (food web needs) for biodiversity to thrive.

The [State of the World's Report on Biodiversity in Food and Agriculture](#) published in 2019 by the UN Food and Agriculture Organization's (FAO) Commission on Genetic Resources for Food and Agriculture (CGRFA) is a key reference document. It is a description of the status quo and does not recommend biodiversity conservation approaches. However, it highlights that implementation of GAPs in crop production has increased, needs to be further increased and that many countries are starting to encourage the creation of flower areas for pollinators.

The [UN CBD Aichi Targets, 2010 here Target 7 on agriculture, aquaculture and forestry](#)⁶ include targets that are still valid, for instance: integrated landscape-level planning and enhancing the understanding of farmers on how they rely on biodiversity and ecosystems/ecosystems services for production.

More on RfP I: 'habitats'

Benefits to biodiversity and agro-ecosystem services / disservices: The benefits to single species and cropland associated biodiversity, especially pollinators and birds, led to habitat recommendation for implementation on cropland. Their conservation benefits have been well researched and documented. Agro-ecosystem services such as pollination and natural pest regulation have received the highest attention in research and by the public at large. This research, however, often remains unspecific in terms of crops, crop varieties, economics and disservices or crop production needs, thus does not reflect real-world agronomic reality. For instance, pollination serves less than 5% of the cropped area worldwide (IPBES, 2016 Assessment on pollinators) as the major field crops, including those identified in this RfP, are mostly self- or wind-pollinated. Natural pest regulation may increase the threshold level (which is useful) to control pests, but may also increase pest pressure. Mostly direct crop protection

⁶ <https://www.cbd.int/sp/actions.shtml>



intervention can thus not be avoided and what is more the most important disservice in field crops are weeds – not pests. ‘Habitats’ value to abiotic agro-ecosystem services, such as water quality and regulation, soil erosion regulation, carbon sequestration or soil fertility upon which all crops depend, and which are becoming ever more important because of climate change related effects are less focused on in research. They should, however, be the focus of this RfP to reflect real-world agronomic realities.

Economic benefits: effects of habitat creation on crop production economics e.g., the profitability (e.g., costs of labour, extra costs, time, yields) have often been neglected. It may also be valuable to understand if ‘habitats’ / ‘cover crops’ can make a meaningful contribution to carbon trading and if carbon credits could thus be a lever to get farmers to create more ‘habitats’ for instance in addition to applying GAPs such as cover crops and no till. Economic value of dual purpose ‘habitats’ have been established in high value crops (e.g., blueberries⁷, wild flower production⁸). These are good examples for learnings, their area coverage would however contribute less to the establishment of habitats at landscape level.

Trade-offs and synergies: many recommended habitat types (e.g., over 200 in the EU⁹) strive to protect single species or groups of species for their intrinsic value, while using cropland (e.g., seeding of flowers for bees and birds, hanging up bird nests), although such measures are not specific to cropland and could equally be implemented on non-crop land. Overall approaches often seem to favour biodiversity over crop production goals and may even lead to unsustainable practices and disservices, if for instance sown seeds of flower strips become invasive plants or turn into noxious weeds. Therefore, the suitability of ‘habitats’, for crop production, needs careful considerations. When exploring ‘habitats’ trade-offs need to be considered. Ideally, ‘habitats’ should foster synergistic effects for biodiversity conservation and crop production¹⁰.

⁷ Blaauw BR, Isaacs R. 2014. Flower plantings increase wild bee abundance and the pollination services provided to a pollination dependent crop. *Journal of Applied Ecology* 51:890–898.

⁸ Delphia C M, O’Neill K M, Laura A. Burkle L A, 2019. Wildflower Seed Sales as Incentive for Adopting Flower Strips for Native Bee Conservation: A Cost-Benefit Analysis. *Journal of Economic Entomology*, XX(XX), 2019, 1–11. *Apiculture & Social Insects*. Doi: 10.1093/jee/toz191

⁹ Dicks LV, Ashpole JE, Dänhardt J, James K, Jönsson A, Randall N, Showler DA, Smith RK, Turpie S, Williams D, Sutherland WJ. 2014. *Farmland Conservation: Evidence for the effects of interventions in northern and western Europe; Synopses of Conservation Evidence, Volume 3*. Pelagic Publishing, Exeter.

¹⁰ Brandes, E., McNunn, G. S., Schulte, L. A., Bonner, I. J., Muth, D. J., Babcock, B. A., Sharma, B., Heaton, E. A. (2016). Subfield profitability analysis reveals an economic case for cropland diversification. *IOP Publishing Ltd*, <https://doi.org/10.1088/1748-9326/11/1/014009>



Glossary for the RfPs

- **Associated Biodiversity:** see cropland associated biodiversity
- **Agro-Ecosystem Services and Disservices:** soil fertility (determined by e.g., nutrient cycling, soil formation, organic matter decomposition, soil structure, carbon sequestration), soil erosion prevention, including through wind erosion; water regulation, retention quality and flow control; pollination and natural pest (weed and disease) regulation/control. Most of these services depend on abiotic factors such as local climate conditions, physico-chemical properties of soils such as pH, mineral content, natural organic matter content, or soil structure etc.. Others are delivered by biotic factors i.e., species: soil organisms (e.g., microorganism, earthworms, collembolan), insect pollinators and beneficial insects such as predators. These services together with disservices such as weed, pest and disease outbreaks, climate change related effects, or water scarcity crucially influence crop production. This RfP should target the relevant agro-ecosystem services for field crops. See: more under RfP I: 'Habitats'.
- **Biodiversity:** encompasses species, biotic and abiotic agro-ecosystem services delivery and natural resources conservation.
- **'Cover Crops':** marked with 'backquotes' refer to those that provide temporary 'habitats' for some species and agronomic benefits in terms of agro-ecosystem services (e.g., nutrient, soil structure enhancement) or which may benefit cropping systems financially (probably in the longer term). The advantage of cover crops is their ease of integration into common crop management practices.
- **Cropping Systems:** all types of systems including, but not limited to: smallholder farms, large farm enterprises, mainstream agriculture, organic, agro-ecology, agro-forestry etc..
- **Good Agricultural Practices (GAP):** crop rotation, crop diversification (including cover crops such as leguminous crops high in nitrogen), mixed- and inter-cropping, conservation (reduced- or no-) tillage systems, integrated crop protection (weeds, pests and diseases) often referred to as Integrated Pest Management (IPM) and integrated plant nutrient management (IPNM). All GAPs are adapted to the diversity of cropping systems, crops/crop varieties grown, farm sizes, farming contexts such as ecological and socio-economic variations across the world.
- **'Habitats:** are marked in this RfP with 'backquotes' to differentiate them from other habitats. 'Habitats' refer to a subset/shortlist of a broader variety of habitats recommended by government policies, authorities, scientists or other stakeholders for use on crop production areas to conserve biodiversity. The 'habitats' addressed here should be beneficial for both biodiversity conservation and crop production and serve dual purposes: e.g., the provision of financial benefits, abiotic and biotic agro-ecosystem services on the one hand and the provision of space for multiple species while increasing the habitat connectivity at landscape level on the other hand. Identifying 'habitats' represents a challenge due to the diversity of cropping systems and even more so due to the lack of key words attributed to them in publications. Habitats are an unspecific term; they may also be referred to as one example of a series of varying conservation measures (e.g., GAPs) to enhance biodiversity. Finding a one-size fits all solution may not be possible, however developing a generic framework could already be a helpful step.
- **Mainstreaming biodiversity:** the integration of the conservation and sustainable use of biodiversity in both cross-sectoral plans such as sustainable development, poverty reduction, climate change adaptation/mitigation, trade and international cooperation, and in sector-specific plans such as agriculture, fisheries, forestry, mining, energy, tourism, transport and others. It



implies changes in development models, strategies and paradigms. Mainstreaming is not about creating parallel and artificial processes and systems, but about integrating biodiversity into existing and / or new sectoral and cross-sectoral structures, processes and systems.

- **Resilience:** “the ability of a system to recover from, or adjust to, change over scale (landscape) and time ... generated by multiple factors such as habitat loss and fragmentation, and changing weather patterns (climate change), land abandonment and other drivers of change.” (Folke et al, 2010). The ‘habitats’ RfP focuses on practical, on the ground resilience building in agricultural production.
- **Cropland Associated Biodiversity:** “the vast range of beneficial organisms that live in and around crop production systems”¹¹.
- **More definitions:** BESS Resource Paper / Glossary: Clarifying general biodiversity & ecosystem services-related terminologies and those relevant to agriculture and pesticides.

¹¹ <http://www.fao.org/3/CA3129EN/ca3129en.pdf>

Annex I

Enhancing Biodiversity & Resilience in Cropping Systems	
<p>Background: Habitat availability further declines, land is degrading, biodiversity targets for 2020 were not achieved. Primary reasons include:</p> <ul style="list-style-type: none"> - Lack of implementation of valid recommendations - Loss of habitats at landscape level (not just through land use change in agriculture) 	
Questions/Opportunities	Challenges
<ul style="list-style-type: none"> • What are the key ‘habitats’ / ‘cover crops’ that are dually beneficial for conservation (connectivity) and crop production (in terms of agro-ecosystem services / avoiding disservices) that can be created as an integral part of crop management and landscape planning for use within and beyond cropped fields? • What are the key financial benefits ‘habitats’ / ‘cover crops’ creation can generate in priority agricultural landscape areas (e.g. intensive, ecologically sensitive) as part of an integrated crop management and landscape planning approach? • What are the criteria ‘habitats’ have to meet e.g., in terms of landscape context and local ecological / landscape complexity (where?), connectivity (how much?), duration of (annual / multiple years?) etc. • Are there differences in quality (what?) of habitats? • Are the ‘habitats’ fit for purpose, suitable in view of agronomical (crop / crop rotation) conditions? 	<ul style="list-style-type: none"> • Reasons for past poor implementation include: <ul style="list-style-type: none"> ○ Perceived conflicts between economic / agro-ecosystem service and biodiversity goals ○ Benefits of habitats for agro-ecosystem services are not clear and hardly addressed (focus is given on pollination and natural pest control, which in many cases are theoretical benefits for some crops or even crop varieties, whereas weed control is the key disservices of crop production and is rarely addressed) ○ Benefits in terms of economics / Return on Investment of ‘habitat’ creation for farmers seem to be lacking ○ Cross-sectorial trade-off & synergy discussions in the provisioning of different public goods (nature conservation & food provision) are often missing and part of a prevailing dichotomous approach ○ Land ownership: if farmers are leasing the land, they may be restricted to implement long-term changes ○ Incoherent policies & regulations are the result of separate, silo approaches that do not consider trade-offs or synergies (intrinsic value of species vs crop production needs) ○ Poor enforcement of integrated landscape plans into practice by governments ○ Farmers are burdened to carry the costs to enhance biodiversity for society at large



	<ul style="list-style-type: none"> ○ Changing policies (e.g., EU Common Agricultural Policy, here set aside) make implementation more difficult ○ Inconsistency of recommendations e.g., certification systems / labels reflect marketing or image purposes, yet may not necessarily provide real biodiversity outcomes. They often even distort understanding of what real biodiversity benefits / outcomes are ○ General attitude to work against agriculture rather than with it, although it would provide great opportunities and solutions
<ul style="list-style-type: none"> ● Which incentives are needed for farmers to create dual purpose ‘habitats’? Good examples exist. They could serve as role models for later implementation in larger projects / crop production areas ● Is there value in incentivizing different types of ‘habitats’ / ‘cover crops’ differently? ● How important are stable policies / incentives / financial mechanisms over years? 	<ul style="list-style-type: none"> ● Reasons why biodiversity enhancing incentives may not properly work: <ul style="list-style-type: none"> ○ Farmers needs are disregarded and do not highlight the potential agronomic and economic benefits of habitat creation ○ High administrative burdens, penalty systems ○ Developed to pay subsidies to farmers for production loss, while disregarding real biodiversity outcomes (quantity vs quality, e.g., implementing aesthetically pleasing flower areas, as opposed to areas with high biodiversity value – i.e., pleasing societal needs vs real biodiversity outcomes) ○ Some opportunities, such as knowledge increase on what benefits biodiversity and/or crop production are not yet supported by eco-centric policies (policies lacking behind scientific knowledge increase, remaining in old paradigms) ○ Short-term incentives, being discontinued after a couple of years (e.g., fallow land in EU) hinder long term farm management planning ○ Subsidies focus on farmers and are not connected to society at large (incentives reform needed)



Annex II

Suggested Pre-proposal template for RfP application

Please do not exceed 5 pages, follow the Requirement Parameters and note the use of terms under Glossary. Sign and return to baerbel.hundt1@bayer.com to express your interest.

1. Key RfP-applicant / coordinator contact details:

2. Type of RfP applied for: both RfPs, RfP I or RfP II or parts of one of the RfPs

3. Key experts/consortium involved names, affiliation, expertise, role & responsibility:
Especially indicate the expertise of particular interest for the RfPs

4. Summary of the scope of the work:

Includes: project description/overview; description of methodology applied; work plan and deliverables; description of the internationality of the scope.

General comments on the RfP, missing elements, suggestions?

5. Timeline/milestones, and budget estimation (funding partners / matching contributions if applicable) ideally illustrated in chart format:

Broken down by phases/milestones

6. Potential type of pre-study / scoping study or evidence synthesis provision:

7. Indicate if you could convene stakeholders for subsequent implementation and indicate who (sector/groups) this could entail:

8. Indicate if a synthesis report could be provided:

9. Date

Signature