



European Plant Science Organisation

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Statement

Draft Strategic Research and Innovation Strategy by the Biodiversity Partnership Consortium

Brussels, 29.1.2021

EPSO welcomes the Biodiversity draft SRIA and offers to collaborate with the Member States, the European Commission and stakeholders to implement it. We particularly support the ambition that ‘R&I in the biodiversity domain will recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.’

EPSO appreciates that the draft SRIA links environmental sustainability, food and nutritional security, and human health. EPSO urges application of this approach across the SRIA as a whole.

Concepts EPSO suggests including, such as ‘diverse crops for diverse diets and human health and resilient production’, as well as ‘combined approaches on crop improvement, crop management and crop processing’, will enable interdisciplinary approaches with co-benefits in Europe and beyond.

The partnership rightly defines the goals and should lead the process to achieve these, leaving the pathways to reach these open – based on open and transparent approaches ranging from research to innovation, public procurement to legislation.

We provide further insight on how these concepts can benefit the evolving SRIA and its implementation and how plant scientists can contribute to this in the Annex.

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Useful links

- [R1 NS] EPSO www.epsoweb.org
EPSO: [Contributions from plant science towards Nutritional Security and human health](#),
Draft Statement, 11.5.2020
- [R2 HE] EPSO [Statement on the Horizon Europe Strategic Plan](#), 18.2.2020
- [R3 Diverse crops] EPSO [Submission to the EC consultation on EU research and innovation missions \(FP9\)](#),
30.3.2018, incl. 1001 Crops – diverse crops for diverse diets and human health and
sustainable production.
- [R4 F2FEpsos] EPSO: [Statement on the Farm to Fork Strategy by the European Commission](#), 2.6.2020
- [R5 NGT] EPSO [Statement on the EC study on New Genomic Techniques \(NGTs\)](#), 27.5.2020
- [R6 MiBi] EPSO [Implementing a Plants and Microbiomes Strategy in Europe –
Recommendations](#), 18.10.2019

[R7 Forest]	EPSO: Reversing the trend of deforestation and forest degradation , news, 16.9.2020
[R8 GE]	EPSO Genome editing – improving legislation and starting flagships to better address climate, environmental, food and health challenges , 4.11.2019
[R9 3TPs]	3 TPs: Translating the Green Deal into practice – Research and innovation opportunities for sustainable food systems, joint policy brief by Plants for the Future ETP, Food for Life ETP and TP Organics, 2.7.2020 [3 ETPs PR 13.7.2020; EPSO news 9.7.2020]
[R10 Feed]	Plant ETP and ATF: Policy Brief Research and Innovation towards a more sustainable and circular European agriculture: Exploring synergies between livestock and crop sectors , 18.5.2020
[R11 DevCo]	EPSO: Meeting report: ' Towards longer term partnerships of scientists from Europe and Developing Countries ', 16.10.2014
[R12 FAO]	EPSO: Summary FAO EPSO joint workshop , 24.4.2013
[R13 FoPD]	EPSO: Fascination of Plants Day 2019 success stories , 10.12.2019
[R14 Biodiv SRIA]	Biodiversity partnership DRAFT SRIA , January 2021
[R15 F2F]	EC: Farm to Fork Strategy , 20.5.2020
[R16 Biodiv]	EC: Biodiversity Strategy for 2030 , 20.5.2020
[R17 Green Deal]	EC: A European Green Deal , 11.12.2019

Leclere D. et al. (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature 585, 551-556.

About EPSO

EPSO, the European Plant Science Organisation, is an independent academic organisation that represents more than 200 research institutes, departments and universities from 32 countries, mainly from Europe, and 2.700 individuals Personal Members, representing over 26 000 people working in plant science. EPSO's mission is to improve the impact and visibility of plant science in Europe, to provide authoritative source of independent information on plant science including science advice to policy, and to promote training of plant scientists to meet the 21st century challenges in breeding, agriculture, horticulture, forestry, plant ecology and sectors related to plant science. <https://epsoweb.org> | EU Transparency Register Number 38511867304-09

Annex: EPSO suggestions for the evolving Biodiversity partnership SRIA and its implementation

The Biodiversity partnership draft SRIA – hereafter you find an extract of the content *to which EPSO makes ► suggestions for the further improvement and implementation and offers to get involved, referring to page numbers in the [draft SRIA](#) and to previous publications [R1-17 listed above]:*

NbS = Nature-based solutions

0. Foreword:

- P. 3 (par 3): NbS... offer holistic approach to address major challenges such as climate and water regulation, food and nutritional quality and security, and sustainable urbanization, ...
 - EPSO: ► *Point out 'food and nutritional security' as major challenge, closely interlinked with biodiversity [R1 NS, R2 HE, R3 Diverse crops, R4 F2FEpsO]*

1. Introduction:

- P. 10 'Biodiversity: a fundamental asset for NbS to societal challenges': .. a fundamental asset for Nature-based Solutions tackling numerous societal challenges (such as water and food and nutritional security, energy supply, health and well-being, climate change and equity).
 - EPSO: ► *Point out 'food and nutritional security' as major challenge, closely interlinked with biodiversity [R1 NS, R2 HE, R3 Diverse crops, R4 F2FEpsO]*

- P. 12 'Need for transformative change': Reversal of biodiversity loss is only possible with urgent transformative change that tackles the root causes of biodiversity and linked challenges including climate change, urbanization, food and fibre production, and health ... For example, ambitious conservation efforts (protected nature reserves, restore degraded land, landscape-level conservation planning) combined with food-system transformations (boosting agricultural yields, globalize food trade, reducing food waste, globally adopt healthy diets by halving meat consumption) are central to an effective post-2020 biodiversity strategy and could avoid 2/3 of biodiversity loss as well as adverse outcomes for food affordability. (Add reference: Leclere D. et al. (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature 585, 551-556.)
 - *EPSO: ► Link with food systems transformation will increase the impact on biodiversity and other global challenges [R1 NS, R2 HE, R3 Diverse crops, R4 F2FEpso]*
- P. 13 'Figure 3: Enabling transformative change to tackle the biodiversity crisis.:
Lever: Environmental and Food and Nutritional Security law and implementation.
Nexus: ...Increasing cultivated diversity in agriculture and contribute thereby to food and nutritional security.
 - *EPSO: ► Point out 'food and nutritional security' as major lever and nexus, closely interlinked with environmental goals [R1 NS, R2 HE, R3 Diverse crops, R5 NGT]*
- P. 13: 'R&I in the biodiversity domain will thus recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.'
 - *EPSO: most welcome and highly supported, offer to contribute. ► see concepts of diverse crops [R3 Diverse crops] addressing FNS and environmental sustainability and human health; of diverse crops with diverse microbiomes [R6 MiBi]; reversing the trend of deforestation and forest degradation [R7 Forest]*
- P.15 'New needs in terms of biodiversity research': ...to efficiently tackle the interdependent biodiversity and climate crisis and food and nutritional security, all three issues need to be tackled in an integrated manner, mobilizing research communities from across disciplines ...
 - *EPSO:► Integrate 'food and nutritional security' as major challenge, closely interlinked with biodiversity [R1 NS, R2 HE, R3 Diverse crops, R5 NGT]*

2. Ambition and expected impacts of the BD PS

- P.17 'Building on previous partnerships and results', last paragraph: .. build on already successful joint programming and cooperation, further widening the scope of members and reinforcing the link with policy makers and stakeholders...
 - *EPSO: ► Offer to become a member of this partnership contributing its expertise in plant sciences and interlinkages to biodiversity, food and nutritional security, plants and microbiomes, tree biology and biotechnology, non-food products etc. and its official observer status in the ERA-Nets SusCrop and ERA-CAPS. [R4 F2FEpso, R1 NS, R2 Diverse crops, R6 MiBi, R7 Forest, R8 GE]*
- P.19 'five Overarching Objectives':
 - (2) tackle the drivers of biodiversity loss:
 - *EPSO: ► Consider increasing crop diversity in agriculture: Diverse crops for diverse diets and human health and resilient production. [R3 Diverse crops, R1 NS, R4 F2FEpso, R6 MiBi]*
 - (3) Evidence base for development and deployment of Nature-based Solutions to societal challenges whilst addressing ...fighting the climate crisis and also enhancing food and nutritional security and human health and water security, ...deployment of Type2 and Type3 Nature-based Solutions (based on higher levels of intervention on ecosystems) and including new technologies in breeding and management ...
 - *EPSO: ► Integrate 'food and nutritional security and human health' as major challenges, closely interlinked with biodiversity [R1 NS, R4 F2FEpso, R3 Diverse crops]*

Paragraph 2: 'Valuation will ... assess and monitor the cost-effectiveness and economic viability of NbS to meet multiple benefits (environmental, food and nutritional security, social and economic) ...

- *EPSO: ► Integrate 'food and nutritional security' in the evaluation as major co-benefit, closely interlinked with biodiversity and environmental impacts. [R4 F2FEpso, R1 NS, R3 Diverse crops, R2 HE, R8 GE]*

Paragraph 3: Accounting for ecological, economic and societal considerations in a global (particularly climate and food and nutritional security) change context.' start investing in biodiversity assets, by making the economic case and linking biodiversity to agendas that matter (e.g. poverty reduction, social justice, security, food and nutritional security and human health, and climate change).

- *EPSO: ► Integrate 'food and nutritional security and human health' in the evaluation as major co-benefit, closely interlinked with biodiversity and part of the agendas that matter. [R3 Diverse crops, R4 F2FEpso] (see as well: Leclere D. et al. (2020) Bending the curve of terrestrial biodiversity needs an integrated strategy. Nature 585, 551-556.)*

o P.31: 'Major knowledge needs include'

1st bullet point: 'development of science-based targets providing a framework and a process for business to align their individual sustainability actions with globally agreed environmental goals and co-benefits, such as food and nutritional security.

- *EPSO: integrate 'food and nutritional security' in the science-based targets for a comprehensive approach on biodiversity [R3 Diverse crops, R4 F2FEpso]*

5th bullet point: ... meet multiple benefits (environmental, food and nutritional security, social and economic).....and help science-based choices by policy-makers for adapted and contextualised legislation and regulation. It will be crucial to define the goals and leave the pathways to achieve these open recognizing that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.'

- *EPSO: ► Crucial here to implement the SRIA recommendation from p. 13: 'R&I in the biodiversity domain with thus recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.'*

o P.32: 'Major knowledge needs include'

4th bullet point:... governance strategies across sectors and policies... (Environmental sustainability, food and nutritional security, human health ..).

- *EPSO: ► Integrate 'food and nutritional security and human health' as major challenges, closely interlinked with biodiversity and environmental sustainability. [R3 Diverse crops, R1 NS, R4 F2FEpso, R2 HE]*

6th bullet point: ... policies and governance systems aiming at particular balances between nature protection and socio-economic development and food and nutritional security and human health.

- *EPSO: ► Integrate 'food and nutritional security and human health' as major challenges, closely interlinked with biodiversity and environmental sustainability. [R3 Diverse crops, R1 NS, R4 F2FEpso, R2 HE]*

Theme 3

o P.35: – Rationale: last paragraph p.34 / top paragraph p.35: '... biodiversity finance must be increased ..to improve ...protected area networks, to restore degraded ecosystems, and to mainstream biodiversity across sectors, e.g. by increasing diversity, performance and productivity of agricultural crops.

- *EPSO: ► Crop improvement of more diverse crops can increase resilience / tolerance of crops to abiotic and biotic stress and reduce input from chemical plant protection and fertilisation products, while at the same time increasing cultivated diversity in agriculture. This is not only important in developed, but as well developing countries, rich in biodiversity, from which underutilised species / crops (mainly fruits and vegetables) should be improved and their cultivation thereby become more widespread. [R4 F2FEpso, R1 NS, R6 MiBi, R7 Forest, R11 DevCo, R12 FAO]*

Expected impacts:

1st paragraph: ...help scale up ..policy instruments for biodiversity and get the economic incentives right to ensure biodiversity is better reflected in producer and consumer decision making. It will be crucial to define the goals and leave the pathways to achieve these open recognizing that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.'

- *EPSO: ► Crucial here to implement the recommendation from p. 13: 'R&I in the biodiversity domain with thus recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.'*

2nd paragraph: ... delivering many other goals...related to poverty alleviation, food and nutritional security, sustainable agriculture and fisheries, health

- *EPSO: ► Point out 'food and nutritional security' as major challenge, closely interlinked with biodiversity [R1 NS, R2 HE, R3 Diverse crops, R5 NGT]*

- P.36: Major knowledge needs include'

3rd bullet point: study how certification in key agricultural commodities can be used to obtain effective biodiversity outcomes and increasing crop diversity and productivity.

- *EPSO: ► Crop improvement of more diverse crops can increase resilience / tolerance of crops to abiotic and biotic stress and reduce input from chemical plant protection and fertilisation products, while at the same time increasing cultivated diversity in agriculture. [R4 F2FEpso, R1 NS, R6 MiBi, R11 DevCo, R12 FAO]*

7th bullet point: assessment of the role of EU food consumption in the current biodiversity decline and recommendations on improvements, including e.g. the concept of more diverse and improved crops for diverse diets and human health and resilient production.

- *EPSO: ► Crop improvement of more diverse crops can revert biodiversity decline [R1 NS, R4 F2FEpso, R3 Diverse crops]*

- P.37: Major knowledge needs include'

- 3rd bullet point: 'research into how the EU can support ecosystem protection and restoration globally – what metrics should be used and how should areas be prioritized for support? e.g. by increasing crop diversity, performance and productivity in agriculture.

- *EPSO: ► Crop improvement of more diverse crops can increase resilience / tolerance of crops to abiotic and biotic stress and reduce input from chemical plant protection and fertilisation products, while at the same time increasing cultivated diversity in agriculture. This is not only important in developed, but as well developing countries, rich in biodiversity, from which underutilised species / crops (mainly fruits and vegetables) should be improved and their cultivation thereby become more widespread. [R4 F2FEpso, R1 NS, R6 MiBi, R11 DevCo, R12 FAO]*

Cross-cutting Theme 1

- P.40:– Expected impacts:

2nd paragraph: 'Genotyping and phenotyping wild species can be of interest for a range of sectors linked to cultivated plants, livestock, aquaculture and cultivated microorganisms. For instance, for many aquacultural and agricultural species, we need characterization of wild individuals for important traits (abiotic and biotic stress, nutritional quality), since the wild relatives act as a valuable reservoir to be introgressed and/or introduced by New Breeding Technologies into existing breeding/selection programs/conservation schemes to improve not only staple crops, but as well underutilised crops. Similarly, seed production for native plant species and ecotypes is needed, e.g. in the context of deployment of urban Nature-based Solutions and new forestry schemes.

- *EPSO: ► Wild relatives are a valuable source to better tolerate / resist abiotic and biotic stresses as well as containing compounds (e.g. plant secondary metabolites) beneficial for human nutrition and health. These can be introgressed in species with well established introgression systems (e.g. tomato), whereas for other species NBTs can be used. This will improve staple crops and it can be used to improve the performance and nutritional quality of underutilised species, increasing cultivated diversity. [R3 Diverse crops, R4 F2FEpso, R2 NS, R6 MiBi, R11 DevCo, R12 FAO]*

P.40-41: 'Major knowledge needs include' 1st bullet point: 'better characterization of all biodiversity dimensions and their trends in Europe ... different organisation levels (functional,

genetic and taxonomic) ...less known organisms (like microbial ...) ...dimensions (such as functional diversity and food webs) ... [p.41] ... bio-prospecting of new genes, functions and natural substances (e.g. abiotic and biotic stress tolerance for crops, nutritional quality for human health, medical uses) harboured by aquatic and terrestrial organisms...

- *EPSO: ► Working Groups on Plants and Microbiomes and on Molecular Farming offer to contribute. In addition, EPSO members with expertise in landscape genomics (discussed first time at the landscape genomics workshop back in 2009). [R2 HE, R4 F2FEpso, R1 NS, R3 Diverse crops, R6 MiBi]*
- P.42: 2nd bullet point: ... This includes analysing the importance of species/breed//variety selection and the utility of locally-adapted genetic resources and species and improving these in terms of abiotic and biotic stress tolerance and food and nutritional quality, for delivery of multiple services in agricultural areas and adaptation capacity to climate change, invasive alien species and pathogens;
 - *EPSO: ► Crop improvement of more diverse crops can increase resilience / tolerance of crops to abiotic and biotic stress and reduce input from chemical plant protection and fertilisation products, while at the same time increasing cultivated diversity in agriculture. [R4 F2FEpso, R1 NS, R6 MiBi, R11 DevCo, R12 FAO]*
- 3rd bullet point: 'knowledge on the impacts of pesticides/fertilizers on biodiversity...and guiding criteria and thresholds for the authorization and use of pesticides/fertilizers; complemented by crop improvement and management implementing the concept of diverse crops with diverse microbiomes for resilient production.
 - *EPSO: ► Crop improvement of more diverse crops and their management with diverse microbiomes, tailored to the crop and the environment, can increase resilience / tolerance of crops to abiotic and biotic stress and reduce input from chemical plant protection and fertilisation products, while at the same time increasing cultivated diversity in agriculture. [R4 F2FEpso, R1 NS, R6 MiBi, R9 3TPs, R11 DevCo, R12 FAO]*
- 4th bullet point: 'indicators on the global extent and consequences of biotic homogenization, including genetic homogenization; incentivise crop diversification and improvement;
 - *EPSO: ► Crop improvement of more diverse crops and their management with diverse microbiomes, will increase the cultivated diversity in agriculture and at the same time robustness of the system by increasing resilience / tolerance of crops to abiotic and biotic stress. [R4 F2FEpso, R6 MiBi, R3 Diverse crops, R9 3TPs, R11 DevCo, R12 FAO]*
- P.44: 'Major knowledge needs include' 1st bullet point: ... Possible perspectives are to monitor all species-level biodiversity (by DNA barcoding and metagenomics) and genetic diversity within a broad selection of species in Europe to link the genotype to resilience to abiotic and biotics tresses and to nutritional quality
 - *EPSO: ► It will be highly beneficial to link genetic to functional diversity to better protect and utilise this in future. [R4 F2FEpso, R3 Diverse crops, R9 3TPs]*

Cross-cutting Theme 2

- P.45:– Rationale: NbS are solutions that are inspired and supported by nature, which are cost-effective, simultaneously provide environmental, social and economic benefits and help build resilience. ... have the potential to transform environmental and societal challenges into innovation opportunities, ... R&I in the biodiversity domain will recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos.
 - *EPSO: ► Add this sentence from page 13 here again to point out its importance in the cross—cutting theme 2.*
- P.46: 1st paragraph: ...NbS .. often remain under-deployed, with the dominant technocratic paradigms and technical solutions mostly being considered as the only options for tackling societal challenges. Scientists, policy makers, practitioners and other stakeholders thus need to join forces in order to support the needed systemic transition to a sustainable future allowed by NbS, in which economic, social and environmental needs are in balance. We have to move from one approach OR the other to one approach WITH the other, truly combining the advantages of all available solutions to the benefit of the environment, food

and nutritional security and human health. This requires a combined effort in crop improvement (traditional and new breeding technologies) with better crop management (traditional and new methods) and with tailored crop processing to achieve the best possible impact.

- *EPSO: ► Implement the sentence from page 13: R&I in the biodiversity domain will recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos. [R4 F2FEpso, R9 3TPs]*
- P.46-47: Expected impacts: ... Finally, R&I will support more robust and integrated NbS for climate-change adaptation, and disaster risk reduction...contributing to ... the new EU Adaptation strategy (2021). It will contribute as well to food and nutritional security and human health by increasing the diversity of crops in agriculture, their performance (abiotic / biotic stress, nutritional quality, yield) for more diverse diets and human health and resilient production.
 - *EPSO: ► Integrate 'food and nutritional security and human health' as major challenges and co-benefits, closely interlinked with biodiversity and environmental sustainability. [R1 NS, R2 HE, R3 Diverse crops, R5 NGT]*
- P.47: Major knowledge needs include' 1st bullet point: 'analysis of how NbS, including new technologies, can offer smart alternatives to purely technical solutions to tackle major challenges ...
 - *EPSO: ► See before - implement the sentence from page 13: R&I in the biodiversity domain will recognize that ecological, social and technological changes go hand in hand and co-evolve, and to focus on this alignment and breakdown of silos. [R4 F2FEpso, R2 HE, R9 3TPs]*

2nd bullet point: ... Here research should focus more than previously on efficiency and resilience properties as well as co-benefits (e.g. food and nutritional security and human health) of systems. Genetic resources and species and community diversity should be explored as a toolbox for NbS, promoting adaptation, sustainability and co-benefits.

- *EPSO: ► Integrate 'food and nutritional security and human health' as major challenges and co-benefits, closely interlinked with biodiversity and environmental sustainability. [R1 NS, R2 HE, R3 Diverse crops, R5 NGT]*
- 4. Enabling approaches:**
- P.53: Communication, outreach and open science: (2) Development of communication material and the organization of communication events.
 - *EPSO: ► Biodiversity partnership should consider becoming partner of and utilising the huge outreach potential of the international Fascination of Plants Day, a global interactive outreach activity, initiated and coordinated by EPSO since 2012. The 2019 FoPD generated over 860 event sin over 51 countries around the world. (<https://plantday18may.org/>), [R13 FoPD]*
 - P.54: Engagement with other initiatives: EPSO, co-ordinator of the international Fascination of Plants Day
 - *EPSO: ► See before [R13 FoPD]*