



Contributions from plant research and innovation on the past, present and future of the European Research and Innovation Framework Programmes 2014-2027

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EPSO welcomes the European Commission consultation and provides input on the achievements and suggests where improve Horizon Europe and the next Framework Programme (FP) to have a higher impact.

The European Research and Innovation FPs are crucial to enable scientists and innovators across Europe to collaborate to generate knowledge, to apply this knowledge to address today's and future challenges and to help building a strong, competitive and resilient, inclusive and democratic European society and improving life on earth.

Plant scientists took an active role in the EU FPs from the start and want to contribute in the future.

They are active in pillar 1, mainly in the European Research Council and the Marie Skłodowska-Curie Actions, both working very well.

They could contribute more to pillar 2, particularly in cluster 6 on Food, bioeconomy, natural resources, agriculture and environment. To this end, we suggest the following improvements:

- Further implement the following concepts:
 - ❖ Address **Food and Nutritional Security, environmental sustainability, biodiversity** (natural and cultivated) **and human health in parallel** as much as possible.
 - ❖ **Improve / adapt crops** towards '**Diverse crops for diverse diets and human health and resilient production**'.
 - ❖ '**Combine approaches on crop improvement, crop management and crop processing**'.
 - ❖ Policy makers should **define the goals but leave the pathways** how to achieve these **open** to the stakeholders
- **Create a new heading 'Enabling sustainable crop improvement' in the Work Programme and / or partnership 'CropBooster-Quest':**

- ❖ CropBooster-Quest - Plant (systems) biology, crop improvement and plant breeding to achieve a critical mass investment enabling the community to substantially help addressing the challenges mentioned above and interacting with partnerships on biodiversity, agroecology, food systems.
- ❖ To bridge the gap until a new partnership can be active, add the heading 'Enabling sustainable crop improvement' in the Work Programme.
- **Better link the health cluster (1) with the food, agriculture, biotechnology cluster (6)** to truly enable plant biologists, breeders, processors, nutritional scientist and health experts to interdisciplinary research and innovation to improve nutritional compounds in plants for the human diet, which are then further protected during crop processing and human digestion. In addition, plant made pharmaceuticals can be co-developed for medical purposes.

All scientists would benefit from more general improvements in pillar 2 across all disciplines and sectors:

- Types of action: Add Research Actions (RAs) in pillar 2 to overcome the gap of **collaborative basic research** and complete the research and innovation cycle.
- Identify funding priorities: Consult **European academic associations**. Define the goals, but not the pathways how to reach these to truly enable innovation.
- Implementation procedures: Increase **trust in and flexibility for beneficiaries**.

On the following pages we will shortly explain each of these recommendations.

1 - Further implement the following concepts:

- ❖ Address **Food and Nutritional Security, environmental sustainability, biodiversity** (natural and cultivated) **and human health in parallel** as much as possible.
- ❖ **Improve / adapt crops** towards '**Diverse crops for diverse diets and human health and resilient production**'.
- ❖ '**Combine approaches on crop improvement, crop management and crop processing**'.
- ❖ Policy makers should **define the goals but leave the pathways** how to achieve these **open** to the stakeholders

To date, still most calls focus on one or maximum two of these components, while a comprehensive approach from the start will gain a higher impact. For instance, many underutilised crops (fruits, vegetables, cereals) have a high nutritional value and were traditionally cultivated and consumed locally but have virtually disappeared due to modern cropping systems and the requirements of globalized markets. Rediscovering those highly nutritive traditional crops can greatly help to diversify our diet and make it more nutritious with their micronutrients (ions, (pro)vitamins, phytochemicals - including anti-oxidants ..) and lead to more agricultural biodiversity. As they were neglected in breeding programmes due to low return on investment, public efforts are needed to improve their resilience to abiotic stress (e.g., drought and extreme temperatures due to climate change), pests and diseases and thus generate an income for farmers who will then cultivate them, switching from mainly staple crops to include in their portfolio as well high-quality niche crops.

More diverse crops will be less prone to pests and diseases than a few staple crops and thereby increase resilience of agriculture in the longer term. Furthermore, intercropping or mixed cropping / strip cropping can become management practices enhancing environmental benefits.

Further along the value chain, crop processing has to be adapted to these niche crops on the field and postharvest as to protect and possibly enhance the share of highly nutritious compounds. In addition, plant compounds which increase the bioavailability of the nutrients during human digestion can be achieved either from the original crop or added from another crop during processing to further improve the nutritional value of the diet.

Going in the other direction, crops need to be improved as well to meet new crop management and new crop processing practices.

Combining all approaches and actors from the very beginning, ranging from knowledge generation to technology, management and processing, will ultimately gain the highest impact for humans and the environment.

2 - Create a new heading 'Enabling sustainable crop improvement' in the Work Programme and / or partnership 'CropBooster-Quest':

CropBooster-Quest - Plant (systems) biology, crop improvement and plant breeding to achieve a critical mass investment enabling the community to substantially help addressing Food and Nutritional Security, environmental sustainability, biodiversity (natural and cultivated) and human health and interacting with partnerships on biodiversity, agroecology, food systems.

Over the past decade, R&I investment in the European programmes have focused on crop management and processing, while those in crop improvement were marginal. This gap should be filled with a critical mass R&I investment generating knowledge on basic biological processes (e.g. host-pathogen interaction, gene regulation including gene silencing ..) while combining existing knowledge to reach an optimal combination of tolerance to abiotic stress (drought, heat, frost, partly due to climate change), with tolerance to pests and diseases (reducing pesticides and fungicides), improving nutrient use efficiency (reducing fertiliser needs), harnessing plant-microbe interactions to further strengthen plants and reduce inputs, and last but not least aiming to protect or enhance the nutritional value of the crop. By including niche crops in the effort in addition to staple crops, this will increase cultivated biodiversity and resilience. Such a partnership is urgently needed to make the agricultural sector fit for the rapidly changing climate and additional volatilities due to global crises.

In addition, crop improvement is needed to support the anticipated diet shift towards more plant-based diets and for example plant based proteins.

A strong partnership on crop improvement – currently the major missing link in EU programming - can interact from the beginning with existing / evolving partnerships on biodiversity (focusing on natural diversity), on agroecology (focusing on crop management) and on food systems (focusing on crop processing and the way we supply food) and the soil mission.

To bridge the gap in time until a new partnership or a dedicated intersectoral programme can be set up and active, the urgently needed boost of these R&I areas needs to be initiated by substantially strengthening these as headings under the existing destinations in pillar 2 cluster 6 as follows:

- The biodiversity destination – triple the effort under heading ‘Biodiversity friendly practices in agriculture, forestry and aquaculture’
- The food systems destination – add the heading ‘Enabling sustainable crop improvement’ – comprehensive approaches from plant (systems) biology to deliver specific species or varieties of crops (crop improvement and plant breeding) adapted to and contributing to Food and Nutritional Security, environmental sustainability, biodiversity (natural and cultivated) and human health. This will enable the shift from ‘elite varieties under optimal conditions’ to ‘nutritious and resilient varieties under a range of constraints’ (environment, climate, process, consumer demands ..).

3 - Better link between the health cluster (1) and the food, agriculture, biotechnology cluster (6)

to truly enable plant biologists, breeders, processors, nutritional scientist and health experts and social scientists to interdisciplinary research and innovation to improve nutritional compounds in plants for the human diet, which are then further protected in crop processing and human digestion. In addition, plant made pharmaceuticals can be co-developed for medical purposes.

To date joint calls enabling this R&I are non-existent and could be implemented by an ‘alternating call’ system under which the call is published and financed in one year under cluster 1 and the next year under cluster 6.

4 - Types of action: Add Research Actions (RAs) in pillar 2 to overcome the gap of collaborative basic research and complete the research and innovation cycle.

We consider that the Research and Innovation cycle in pillar 2 of the HE programme should be designed to achieve a balanced representation of basic and applied research in addition to demonstration and innovation actions.

This will strengthen the effectiveness of the European innovation ecosystem by allowing a continuous flow between advancement of knowledge and technologies at different technology readiness levels (TRLs), thus as well addressing the needs of the industrial sector and private companies. To this end, we strongly recommend including collaborative basic research as an intrinsic component of R&I actions and occasional focus as Research actions, particularly for funding that addresses Global Challenges.

While we see a high potential in bottom-up basic research in pillar 1, e.g., in the ERC and MSCA, we also believe that basic research contributions should be included in pillar 2 of HE to maximally benefit innovation within the R&I cycle. We acknowledge that there are dedicated Innovation Actions (IA) in pillar 2, complementing the innovation focus of pillar 3. The partnerships undoubtedly promote collaborative applied research in pillar 2. We therefore call for dedicated basic (and applied) research actions (RA) in pillar 2, complementing the research focus on pillar 1. The unique position of pillar 2 to cover and thereby complete and strengthen the R&I cycle in a balanced way has the potential to

become one of the strengths of the Horizon Europe programme – a step change compared to H20 and HE to date.

This recommendation will have two additional positive impacts that we deem worth emphasizing:

- Meets the needs of private companies by embedding programmatic basic research requirements in all clusters of pillar 2. Designing programmes with basic and strategic research will help meet the needs of private companies with limited in-house capacity for applied R&I. It will also help soften the lack of financial motivation for exploratory research that lays the groundwork for further improved innovation activities.
- Indirectly facilitates widening participation. Supporting projects encouraging basic and subsequently applied research that includes participants from EU-15. Enabling research groups across Europe to collaborate within the European Research and Innovation Programmes will advance economies across Europe, increase social stability, and help build a more inclusive and equal Europe.

5 - Identify funding priorities: Consult European academic associations. Define the goals, but not the pathways how to reach these to truly enable innovation.

To date the Commission consults scientists mainly directly or through Member States, whereas other stakeholders, such as NGOs and farmers, are consulted both, directly / through Member States and through their European level organisations. We strongly recommend applying the same practice to scientists and thus consulting scientists in addition through their European associations, which can be reached directly or through the Initiative for Science in Europe (ISE) and the League of European Research Universities (LERU). This will add to individual expertise a broader, well balanced, reflection from the entire science community from the respective discipline (medical, animal, plant science; physics, mathematics, chemistry, social sciences ..).

This is crucial for identifying strategies and funding priorities, but equally important for High-Level Advisory Groups, Stakeholder Groups and governance structures for European Innovation Partnerships (EIPs) and Public-Private Partnerships (PPPs).

Similarly, in Commission consultations, there is a category for company associations and for NGOs, but no category yet for academic associations, this should be added in future to truly reflect their status – currently they have to be ‘academic/research institution’ or ‘other’. In consequence, to state the organisation size, to the choice of ‘number of employees’, a choice in ‘members represented’ should be added, as an association with 1-5 employees could well represent many thousands of people.

Policy makers should define these goals but leave choice of the pathways to them open to the stakeholders to encourage innovation, flexibility, and evidence-based confirmation. In this way pathways can compete as they are neither preferred nor excluded and combining the advantages of different approaches can be encouraged. Through this approach, policy makers will be able to mobilize the European research community and all interested actors in research and innovation to achieve the targets set out in the EU Green Deal and in the UN Sustainable Development Goals.

6 - Implementation procedures: Increase trust in and flexibility for beneficiaries.

The Commission already undertook several measures to ease administrative burden. However, by further increasing trust in beneficiaries, the administrative burden could be substantially reduced, and the impact of the projects increased: give more flexibility to beneficiaries in shifting funds in one project (currently limited to 10%) as long as the goals are achieved or even more could be achieved:

- shifting their own funds without limit
 - between Work Packages
 - between categories (e.g. between 'Personnel cost' and 'Other Direct Cost')
- shifting funds between partners up to 20% based on approval by the project coordinator.

In addition, increasing trust in beneficiaries can ease the reporting burden by replacing monthly signed timesheets by one page per reporting period that is signed by all people that worked on that project in that period. This could be further eased by a flat rate agreement.

7 - Further explanations to the choices ticked in the questionnaire:

Section B – Horizon 2020:

In your opinion, to what extent have public-private and public-public Partnerships supported by Horizon 2020 been more effective, compared to regular collaborative research in achieving impact for science, the economy and/or society?

- To a limited extent
 - as for instance the **ERA-CAPS, an ERA-Net highly successful** from Dec'11 – May'2015 with EC support (generating over 20 M€ research funds from national funds per call) then as self-sustained ERA-Net, **could not receive EC support / funding again**, preventing some interested funders to participate in the self-sustained ERA-Net.

In your view, to what extent did Horizon 2020 produce the following scientific effects?

- Making Europe more attractive for world class researchers from abroad: to a great extent
 - Due to the ERC

In your view, to what extent did Horizon 2020 produce the following economic effects?

- Fostering market uptake of European innovations: a little
 - Due to legal hurdles
- Improved time-to-market for European manufacturers and service providers: a little
 - Due to legal hurdles
- Fostering sustainability across the entire product-service lifecycle: neutral
 - New technologies were excluded, otherwise the impact would be higher
- Creating smart global value chains that enable value capture in Europe: neutral
 - New technologies were excluded, otherwise the impact would be higher

In your view, to what extent did Horizon 2020 produce the following societal effects?

- Securing sufficient supplies of safe, healthy and high-quality food: neutral
 - Would be much higher if nutritional security would be stronger supported and new technologies too

Section C – Horizon Europe:

To what extent do you agree with the following statements concerning the calls for proposals under Horizon Europe?

- There is an adequate mix of calls for proposals addressing specific topics (top-down) and calls for proposals without a predefined topic (bottom-up): strongly disagree
 - More bottom-up topics are urgently needed

To what extent do you agree with the following statements concerning the project implementation under Horizon Europe?

- The mechanisms for project monitoring and reporting are adequate: disagree
 - Too much effort needed for this, should be much lighter

To what extent do you agree that Horizon Europe is on track to deliver on the following objectives?

- Develop, promote and advance scientific excellence: agree
 - Due to ERC
- Support the creation and diffusion of high quality fundamental or applied knowledge, skills, technologies and innovations: disagree
 - Lack of collaborative basic research
- Strengthen the impact of R&I in developing, supporting and implementing Union policies: neutral
 - Outcome hardly used due to bias to new technologies
- Strengthen deployment and exploitation of innovative solutions: neutral
 - Could be much higher, currently bias to new technologies

How did the following EU programmes work in synergy (complement and reinforce) Horizon Europe?

- Common Agricultural Policy (CAP): few synergies exploited
 - CAP: policy makers should focus on the goals and not the way to get there – equally support and encourage all contributions towards Food and Nutritional Security, sustainable environment, human health. Broaden support for organic farming to all contributions towards sustainable agriculture and encourage combining these (e.g. crop improvement (incl. NBTs) and crop management (incl. organic).

Section D – Horizon Europe Strategic Plan 2025-27

The Strategic Plan 2021-2024 identified specific issues to be considered in the implementation of Horizon Europe. Should any of these cross-cutting themes be further elaborated for the Strategic Plan 2025-2027?

- Key Enabling Technologies: essential
 - New Breeding Technologies should be boosted, they are currently marginalised due to the focus on organic farming which excludes practically NBTs as solution (not sufficient funds per project to realistically develop a conventional and a NBT solution)

This statement was developed by Karin Metzloff with Odd Arne Rognli (President), Angelo Santino (Vice-President), Marie-Theres Hauser (Board), Alan Schulman (former President) with the EPSO members, based on discussions at the 2022 General Meeting and Working Group Meetings. It was finalised by email.

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Useful links

EPSO www.epsoweb.org

- EPSO submission to the European Commission's consultation on the [impact assessment of policy options regarding the legislation for plants produced by certain new genomic techniques \(NGTs\)](#), 2.12.2022
- EPSO: [Fascination of Plants Day 2022 – over 785 events](#) online! You are welcome to organize more events in summer / autumn 2022, 24.6.22
- EPSO: [Healthy Plants for a sustainable production](#) – draft statement by the new EPSO Working Group on 'Plant Health', 5.4.2022
- EPSO: [Genome editing – Improving legislation and starting flagships to better address climate, environmental, food and health challenges](#), report 5th informal science and policy meeting, 25.3.2022
- EPSO: [Repurposing agricultural support to transform food systems' FAO, UNDP and UNEP Report – will be discussed at EPSO concepts workshop 26 October 2021](#), 16.9.2021
- Opinion paper: [Designing the Crops for the Future: The CropBooster Program](#) – mobilize the European plant research community and all interested actors in agri-food research and innovation to face the challenge, 30.7.2021
- EPSO: [Statement on the Draft Strategic Research and Innovation Strategy by the Biodiversity Partnership Consortium](#), 29.1.2021
- EPSO: [Statement on the Farm to Fork Strategy by the European Commission](#), 2.6.2020
- EPSO: [Contributions from plant science towards Nutritional Security and human health](#), Draft Statement, 11.5.2020
- EPSO [Statement on the Horizon Europe Strategic Plan](#), 18.2.2020
- EPSO [submission on orientation towards strategic programming](#), 20.12.2019 (17.11.2019 Contribution ID 666b7610-ddca-4262-b4be-dc125b7ec2cf) to the EC
- EPSO [Genome editing – improving legislation and starting flagships to better address climate, environmental, food and health challenges](#), 4.11.2019
- EPSO [Implementing a Plants and Mircobiomes Strategy in Europe](#) – Recommendations, 18.10.2019
- 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.

About EPSO

EPSO, the European Plant Science Organisation, is an independent academic organisation that represents around 200 research institutes, departments and universities from 31 countries, mainly from Europe, and 2.600 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