



European Plant Science Organisation
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Input to the European Commission

EPSO input towards the EC Horizon 2020, Societal Challenge 2 strategy 2018-20

Brussels, 25.7.2016

Plant science can contribute towards the “vision of an agri-food system which will take up CO₂, produce water, increase biodiversity and provide choices for an exciting nutritious healthy diverse diet for everybody”, articulated at the EC RTD workshop on future food systems, by developing solutions ensuring to take up CO₂, producing high yields with less water and nutrients, reducing the overall environmental footprint, increasing biodiversity (in natural and cultivated systems), and providing consumer choices for a nutritious, healthy and diverse diet. The challenges of food and nutritional security (FNS) are closely interlinked with those of climate change, energy security and sustainability including declining resources, which are impacting food security, as well as biodiversity, which is impacting nutritional security. This is most relevant for instance to “Agricultural research and innovation 2020 and beyond” and to “Food 2030”.

To tackle more quantitative aspect of **food security**, and addressing **climate change, energy security** and **sustainability**, including declining resources, plant research and innovation can make three major contributions:

- Improving resource use efficiency and resource stewardship – such as land, soil, nutrients – implementing the cyclic economy concept
- Improving yield and yield stability combining abiotic stresses with a focus on temperature stress, sustainably increasing marketable yield (as there already was a focus in the WPs 2016/17 on water stress)
- Improving plant health by tackling ongoing diseases with major impact in Europe and strengthening the efforts anticipating emerging diseases (as this has just started in WPs 2016/17)
- Develop plants with improved composition for animal nutrition & lowering environmental footprint (for animal husbandry and farmed fish)

In addition, it becomes increasingly important to achieve **nutritional security** in Europe and globally over the next 15 years – the qualitative aspect of FNS: improved nutritional quality has very positive effects on **human health** by improving wellbeing, reducing the incidence of obesity and the frequency of chronic diseases (steroid-hormone related cancers, cardiovascular diseases, metabolic diseases such as type 2 diabetes) that result from poor ‘Western Style’ diets in both developed and developing countries. This will reduce health and welfare costs, as well as losses in productivity and improve quality of life globally. Plant research and innovation can help to make the healthy choice the easy choice by:

- Developing plants with improved composition for human nutrition and health – Increase understanding of which phytonutrients promote health and protect against chronic diseases; use biofortification to increase micronutrients and / or increase compounds enhancing their bioavailability;
- Improving and promoting diverse crops for diverse diets: Improving the economic performance and value of underutilised fruit and vegetable crops in Europe and globally (WHO has a strong preference to develop fruit and vegetable diets) – these are often nutritious, but need research and breeding efforts for higher yield, transport and storage characteristics

- Outreach activities promoting the health benefits of fruit and vegetables in our diet, generating and providing information on the nutritional benefits of individual components / entire fruits and vegetables - for instance with a mobile phone app

Plant science can also contribute to sustainable utilisation of **renewable resources and to mitigating climate change** through production of plant secondary metabolites for chemicals / materials, as well as production of high value **plant made pharmaceuticals for human health**:

- Green bioactive molecules - secondary metabolites & green proteins (reinforcing and strengthening the support started in WP 2017)

As **horizontal** measures underpinning the themes mentioned above, Europe urgently needs to

- Incentivise outreach activities of scientists across Europe and above: stakeholders should be encouraged to initiate and coordinate snowball-principle bottom up activities at European or even global scale, incentivised by competitive European funding to support the central coordination and core resources provided then through open and free access for anybody across Europe and beyond to utilise and hold an event.
- Drive agricultural research and innovation with / for Developing countries (reinforcing and strengthening the support started in WP 2016)
- Facilitate advancement of and access to state of the art research infrastructure in the plant sector highly relevant to FNS: Perform a gap analysis on research infrastructure in the plant sector (build on the example of phenotyping via the EMPASIS project) and advance the issues of data management and standardisation (as recently initiated by ERA-CAPS).

From a broader **strategic** perspective, **five major improvements** to the Horizon 2020 Societal Challenge 2 are strongly recommended:

- Highlighting equal need / balanced support for the three major supply chains and two major uses of biological resources in the Bioeconomy:
 - Farms: agriculture, horticulture
 - Fisheries: open, farmed
 - Forests: wild, cultivated
 - Food, feed, nutrition, health
 - Materials, chemicals, pharmaceuticals, energy/biofuel
- Move from a linear approach to a research and innovation cycle composed of innovative basic research, applied research, (farmers') advice, innovation to ensure balanced support of each component over time and across the collaborative projects. Currently there is the need to strengthen collaborative basic research and translational research in this system. Avoid extremes supporting only parts of the cycle.
- Balance technologies: Innovative research that equally utilises all technologies and cross-disciplinary approaches must be strengthened to develop solutions for societal challenges that we face now and in future. While FP6 fostered high tech research, this changed to increasingly tacit knowledge development in FP7, which is now peaking in H20, thus going from one extreme to the other. This urgently needs to be changed by a truly balanced support of all technologies and practices. The ultimately best benefit for the environment, human health etc. will only come from an open-minded combination of all available solutions. Therefore, goals should be identified, approaches to reach these should be kept open to the applicants as mentioned in the H2020 Regulation of establishment.
- Enable preferred partnerships at European level, such as contractual Public-Private Partnerships (cPPPs) in Bioeconomy as appropriate:
 - Advantage of cPPPs: Involve all stakeholders, led by industry (industry + public research + farmers ..), consider financing SME participation via e.g. semi-equity funds
 - Need / interest in sectors has been expressed by: animal breeding; plant breeding / integrated crop production; food sectors
- Strengthen Europe as a strong contributor to global actions and lead some of these as appropriate, implementing the 'Open to the world' concept of Commissioner Moedas:
 - Achieving nutritional security for Developing countries and Europe (through supplements, biofortification, underutilised fruit and vegetable crops)
 - Capturing the past and present diversity of our crop plants in a global public "Digital

Seed Bank” database populated with state-of-the-art genomic and phenotyping information to facilitate innovative public and private breeding of climate and pest-resilient crops for sustainable agriculture and food security. Europe can be a leader in building such a crop diversity database for truly global impact.

The EPSO input to the European Commission’s strategy towards 2018-20 was discussed at the EPSO General Meeting in 2015 and followed up by several working groups and the EPSO Board.

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Useful links

EPSO: [Submission to EC consultation on PRIMA](#) (Partnership for Research and Innovation in the Mediterranean Area) in Horizon 2020 (summary reply 23.5.2016), [completed online questionnaire](#) 22.4.2016

EPSO: Biorefineries Working Group [Submission to the EC consultation ‘A sustainable bioenergy policy](#) for the period after 2020’, 10.5.2016

EPSO: [Submission to EC consultation on SC5](#) - Potential priorities for research and innovation in the 2018-20 Work Programme of Horizon 2020 Societal Challenge “Climate action, Environment, Resource efficiency and Raw materials”, 8.4.2016

EPSO: [Fact sheets on New Breeding Technologies](#), 21.3.2016. Including: [Site-Directed Nucleases](#) (e.g. genome editing), [Oligonucleotide-Directed Mutagenesis](#), [RNA-directed DNA-Methylation](#), [Cisgenesis](#), [Grafting using GM plants](#), [Reverse breeding](#), and [Agroinfiltration](#).

EPSO: [Fascination of Plants Day Success Stories 2015](#), From Bosnia to Bolivia, from South Africa to South Korea, FoPD 2015 truly united a global research community and engaged the public with plant science on an unprecedented scale. Read Success Stories and social media highlights from just some of the 965 events across 56 countries, 29.2.2016

EPSO: [EPSO Young Plant Scientist Award – winners](#) Ruie LIU (fundamental plant research) and Malaika K EBERT (applied plant research). Ruie and Malaika will present their research at the [Plant Biology Europe EPSO/FESPB congress](#) in Prague 26th-30th June, 18.1.2016

EPSO: [Updated Statement: Crop Genetic Improvement Technologies](#), 18.12.2015;

EPSO: Submission to EC consultation on the [Draft “Strategic approach to agricultural research and innovation”](#), 15.12.2015 [Submission summary](#) and [completed questionnaire](#), calling to urgently strengthen collaborative basic research in the Societal Challenges, supporting all technologies equally, including improvement of yield and yield stability and plant compounds for human nutrition and health

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About EPSO

EPSO, the European Plant Science Organisation, is an independent academic organisation that represents more than 220 research institutes, departments and universities from 28 European countries, Australia, Japan and New Zealand, and 3.200 individuals Personal Members, representing over 28 000 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, 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.
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