

Position

Brussels, 12 July 2019

Research priorities for Horizon Europe

The next Framework Programme for Research and Innovation will be implemented with a view towards 2030 – and with it the challenge of ensuring that the European Union is able to effectively contribute to successfully addressing the global challenges for sustainable development, including the Sustainable Development Goals and the Paris COP 21 Agreement.

In order to achieve this challenge, there is a clear need to strengthen strategic research in agriculture and in particular in plant breeding for all crops (Food, Feed, Fuel, Fibre, Flower and Fun).

Innovative solutions such as modern varieties ensure farmers to maintain high stable yield and quality production while at the same time reducing the environmental impact and addressing biodiversity. To successfully meet the challenges ahead, farmers need to rely on high quality seeds and traits. Benefits of those innovations should be accessible to European farmers.

Building on the strengths of its rich community of researchers and innovators, the EU is in a strong position to take the lead in developing and deploying breakthrough solutions for green and inclusive growth that will be applicable in the EU as well as globally¹

Research and innovation outcomes, promoted by the EU, should be properly backed up by other relevant EU policies. This would allow farmers to implement innovation at farm level, which is the real indicator for successful innovation in agriculture. This process has to be accompanied by a

¹ European Commission. Reflection paper: Towards a sustainable Europe by 2030:
https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf

consistent regulatory framework that allows such innovations to reach the farmer field and the market.

Among others, EU policies on the bioeconomy, sustainable agriculture, improved food and nutrition security, renewable energy, climate change, resource efficiency and the circular economy will require more investments in research and development to enable Europe to become a true world leader in “green” innovation.

Further international alignment (Cartagena Protocol on Biosafety, Nagoya Protocol on Access and Benefit-sharing and International Treaty on Plant Genetic Resources in Agriculture) will enable the European seed industry to maximise the results of the EU research policy in very important areas such as plant breeding innovations (e.g. gene editing) and access to genetic resources.

Among others, climate change represents one of the biggest challenges for farmers already today. Mitigation and adaptation measures may come from different sectors. For instance, the seed sector contributes with resilient varieties that are bred to well perform under different soil and climatic conditions. Generally, a multidisciplinary approach is needed to combine all potential solutions and enable Digital Farming practices, one out of *100 Radical Innovations Breakthrough of the Future*² identified by COM. The combined use of Digital Farming and modern data analysis allows to further explore the sustainability of farming by making more targeted use of inputs and at the same time, improving the output of agriculture.

Societal acceptance of new technologies and developments is a key enabling factor. In order to respond to the different sensitivities within the society, the seed industry relies on the principle of freedom of choice. By this mean, a proper toolbox which includes all plant breeding innovations will allow us to develop the products that farmers, consumers and society as a whole demand.

Areas for innovation

● Soil and biodiversity

It is estimated that 275 hectares of agricultural land are destroyed every day in the European Union³, equaling 17 agricultural holdings of EU average size⁴. This loss is higher if we consider that in many other cases, soils are also degrading in Europe. Good quality soil is essential to agriculture and sustainable food production systems, and as such good quality soil is vital to the future of food and farming.

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https://ec.europa.eu/info/sites/info/files/research_and_innovation/knowledge_publications_tools_and_data/documents/ec_rtd_radical-innovation-breakthrough_052019.pdf

³ https://ec.europa.eu/info/news/preserving-our-soil-protect-our-food-2018-dec-05_en

⁴ https://ec.europa.eu/eurostat/statistics-explained/index.php/Farm_structure_statistics

Soil is the support system for nutrients, microorganism communities, water, and organic matter, which are all essential for food production. Furthermore, it plays an important role in making crops and food systems more resilient or mitigating climate change by conserving soil carbon.

Research on well performing crop varieties which provide additional environmental benefits such as better interaction with the soil microbiota or that help to keep organic matter in soil are some of the challenges for the sector on soil and biodiversity. It could also be interesting to study interactions between plant's genome and mycorrhizae for a better use efficiency of soil nutrients and a better plant health.

In addition, improved varieties more resistant to pests and diseases which require less input use (pesticides, fertilisers) also contribute to good health soil conditions and benefit the entire rural ecosystem, while taking into account consumer demands.

Seed protection is a fundamental part of the Integrated Pest Management, which also contributes to promote resource efficiency and keeps/improves biodiversity, while at the same time reduces water contamination by run-off or drift. Research on how to increase sustainability in seed protection, e.g. via treatment methods, biocontrol products or biostimulants, will benefit the seed sector, farmers and the environment.

Climate-neutral agriculture

One of the challenges worldwide is to develop new production methods that ensure that food production leaves a smaller climate footprint. In order to achieve a climate-neutral agriculture that no longer emits more greenhouse gases than absorbs, more applied research is needed. However, in order to make these efforts sustainable, we need to build an economically sustainable path to climate-neutral food production.

Plant breeding can contribute to this goal by developing better adapted varieties to different environmental conditions, which require less input. More resilient varieties with higher tolerance to biotic and abiotic stresses are the starting point to reduce food losses in the field and along the food chain. In that purpose, the characterisation of a large scale of genetic resources and related species will contribute to increase knowledge and enable the use of genetic resources in plant breeding programs aimed at a climate neutral agriculture.

Agronomy practices and genetic crop improvement need to evolve in a coordinated layout to improve global climatic impact of cropping. More generally multidisciplinary research programs are needed to adapt plant breeding target to farming practices (organic, agro-ecology or conventional).

Moreover, the European Union needs to clearly support research on protein crops for food and feed (not only pests and diseases but also yield). Due to different policy disruptions, this kind of crops are often not perceived as attractive by farmers and do not play a major role in the crop

rotations despite their environmental services (e.g. nitrogen fixation). This would help to reduce the overall greenhouse gas emissions and carbon footprint of agriculture and EU consumers would also benefit from a higher variety of nutritious choices to complement their diets with protein crops.

● **Bioeconomy**

In order to achieve the EU goals on bioeconomy, sufficient European biomass needs to be available for all types of productions (Food, Feed, Fuel, Fibre, Flower and Fun). The offer of biomass needs to respond to both, industry expectations (quality and quantity) and citizens demands (production methods and environmental footprint, among others). In this context, plant breeding and breeding innovations are the starting point for sustainable (not only to increase) yields but also to obtain targeted plant varieties with new or improved traits that fit to the specific industrial application. More research is needed aiming at a better plant photosynthesis efficiency and better knowledge of biosynthetic pathways. New and improved crops may also be investigated for new industrial applications.

Moreover, seed innovation will provide the base for the continued development, production and use of more bio-based products and processes for a greener European economy. The future bioeconomy can provide a major socioeconomic contribution and its benefits will improve public health environmental sustainability and the productivity of industrial processes.

The bioeconomy's success will, however, strongly depend on continued and targeted plant science research together with partners from the value chain to deliver biomass from European sources and the development of new seed innovations that provide the genetic foundation for new business models.

In this respect, more than 42,000 different varieties are available to European farmers today, and more than 3,500 new varieties are registered in the catalogue every year. There is a large-scale output of products targeting different markets and research on bioeconomy should also focus on bringing value to this biodiversity.

The transformation towards sustainable, healthy, nutrition-sensitive, resource-efficient, resilient, circular and inclusive food and farming systems needs to accelerate. This objective can only be achieved by a proper multistakeholder approach, which includes all chain partners, including the seed sector.

In order to achieve circularity, the EU needs to increase the efficiency on the primary production including better cooperation between branches and at the same time, be able to provide solutions locally adapted to the needs of the specific circular economy solutions.

● Digitalisation and big data

Due to the recent advances in technology and its application in breeding and agriculture, we see an increased amount of generated data. When processed and analysed, these data may provide very relevant information to accelerate the adoption of climate-smart technologies and practices for sustainable agriculture. In order to do so, pre-competitive research collaboration for scaling up is needed.

For instance, genotyping and phenotyping are producing huge amounts of data which could be used to develop varieties better adapted to local conditions. This is especially important if we can combine this information with other types of information (i.e. weather) to better predict in which environmental conditions a variety can perform at its potential yield. Moreover, the use of new technologies (i.e. drones and sensors) may provide very valuable information and from a broader variety of different environmental conditions, if we manage to integrate them in the breeding process.

However, due to the amount and diversity of data, the number of potential sources, etc. it is difficult to integrate all this information and to process it. Therefore, research on standardisation and harmonisation of data produced in gene banks, breeding facilities, farm level... will also benefit the different chain partners and will allow companies to respond quicker to societal demands and consumer expectations.



Avenue des Arts 52
1000 Brussels

www.euroseeds.eu

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