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**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL**

on the European Innovation Partnership 'Agricultural Productivity and Sustainability'

1. INTRODUCTION

In its Europe 2020 Strategy¹, the Commission underlines the role of research and innovation as key elements in preparing the European Union for future challenges. The orientations for “the CAP towards 2020”² highlight innovation as being indispensable to preparing Union agriculture for the future. The “Budget for Europe 2020”³ includes € 4.5 billion for research and innovation on food security, the bio-economy, and sustainable agriculture.

This central role of research and innovation is developed further in the EU 2020 flagship initiative “Innovation Union”⁴ which introduces the concept of European Innovation Partnerships (EIP) as a new way to foster innovation. A pilot EIP on ‘Active and Healthy Ageing’ has been launched. Furthermore, preparatory work has been carried out to develop EIPs on ‘Raw Materials’, ‘Water efficient Europe’, and ‘Agriculture’. EIPs pursue the mission of building a bridge between science and the application of innovative approaches in practice. The Council underlined the need for EIPs to have a clear focus, as well as the importance of Member State involvement and effective streamlining of existing instruments.

This Communication presents the conception of the EIP ‘Agricultural Productivity and Sustainability’ referred to in the “Innovation Union”. The EIP follows the strategic orientations of “Europe 2020” and “The CAP towards 2020”. It builds on consultations of stakeholders, and it shall take up lessons learned from the pilot EIP on ‘Active and Healthy Aging’, including the development of its ‘Strategic Implementation Plan’, as well as the discussions in the Council and needs and ideas expressed by stakeholders.

2. THE SOCIETAL CHALLENGES

World food demand is expected to increase by 70% by 2050 (FAO). The dramatic increase in global food demand will be accompanied by a steep increase in the demand for feed, fibre, biomass, and biomaterial. This will inevitably trigger a supply reaction from Union’s agriculture which is one of the biggest suppliers to global agricultural markets. Union agriculture accounts for 18% of world food exports, worth € 76 billion. In production values, Union agriculture provides more than 40% of total food production in the OECD. Naturally, contributions to Union food production vary between Member States and regions, given the major differences in the economic and technological development of farming sectors.

During recent decades, agriculture has experienced major productivity gains; however, this trend slowed down in developed countries in recent years. These gains were achieved partly by putting serious strains on natural resources and the environment. 45% of European soils face problems of soil quality, evidenced by low levels of organic matter, and almost one quarter suffer from moderate to high erosion. Valuable ecosystems, and with them, valuable eco-system services have been damaged or have even disappeared. Over the last 20 years farmland birds have declined by 20-25%, and grassland butterflies by 70%, alongside with serious threats to pollinators such as bees. Around 40% of agricultural land is vulnerable to

¹ COM (2010)2020.

² COM (2010)672

³ COM(2011) 500

⁴ COM(2010) 546

nitrate pollution, threatening water resources. Furthermore, agriculture accounts for 9% of the Union's greenhouse gas emissions.

Agriculture and forestry have made major strides in terms of reconciling production with the need to manage natural resources sustainably and to preserve the environment. However, these positive developments may be undermined by the expected increase in agricultural output, as a result of rising global demand. If this increase is delivered as per current approaches, this will in turn further damage natural resources and the environment.

These phenomena are not confined to the technologically most advanced parts of Union's agriculture. Europe also has a huge potential in areas characterised by small and traditional farms. However, if those farms follow the established pattern of development, major environmental damage will be inflicted on existing, often rich habitats and biodiversity, and on soil functionality and water resources.

A shift towards a different growth path is needed in order to establish a competitive and sustainable production of food, feed, fibre, biomass and biomaterial. To achieve this, efficiency in supply must be complemented by a reduction in the dramatic post-harvest losses. It must likewise include adaptation to climate change and the wise use of biodiversity and restoration of ecosystems and ecosystem services; it must build upon the particularities of each territory and the potential offered by genetic diversity so that we combine our rich genetic base with diverse agricultural practices, new and old, and ensure better allocation and use of our limited resources. Food chains are diverse and their specificities must be integrated: "Long" supply chains involve aspects such as conservation and storage, while "short" supply chains place the emphasis on the local provision of food and particular quality attributes. Consumers must be at the heart of all this, so as to steer production towards safe, high quality and sustainably produced food.

The increase in output must go hand in hand with improved economic viability for primary producers who have suffered a declining share of value-added in the food chain over the past decade. Without greater farm profitability, ecological sustainability will become even more challenging.

Increased and sustainable agricultural output will be achievable only with major research and innovation efforts at all levels. Repeatedly, researchers and stakeholders have highlighted the gap between the provision of research results and the application of innovative approaches to farming practice. New approaches take too long to arrive on the ground, and the needs of practical farming are not communicated sufficiently to the scientific community. Thus, important innovations are not implemented on the necessary scale, and relevant research fields do not always receive the attention they require.

Increased productivity and competitiveness of agriculture calls, first of all, for improved resource efficiency in order to produce with less water, energy, fertilisers (especially phosphorus and nitrogen), and pesticides. It requires also the increased use of renewable energy sources and a reduction of waste, in line with the orientations given by the 'Roadmap to a Resource efficient Europe'⁵. Sustainability requires pollution reduction, to protect water quality and soil functionality, the preservation of biodiversity and ecosystem services, as well as a reduction in greenhouse gas emissions. Solutions need to go beyond the individual farm and also integrate the broader geographical context, including forestry and nature reserves.

⁵ COM(2011) 571final

Appropriate technology, ICT and satellite navigation support, as well as new management tools, provide important development potential. Education and training are essential for developing the skills needed. Strengthening the farmers' position in the supply chain requires innovative approaches that enhance transparency, information, and management capacity and deliver new quality products.

Sustainable production must integrate input and output substitution by the smart use and recycling of bio-mass and bio-refinery; and it needs to reduce post-harvest losses. The challenge exists for the whole supply chain from primary production up to the consumer. Consumers can alleviate pressures for more primary production by changing consumption patterns. Education and training offer a huge potential for enhancing nutrition, healthy lifestyles, and reducing food wastage. Sustainability criteria, established at pivotal points throughout the supply chain, would contribute to increasing transparency, trust, and knowledge.

3. FOSTERING A COMPETITIVE AND SUSTAINABLE UNION AGRICULTURE

The EIP aims to foster a competitive and sustainable agriculture and forestry that 'achieves more from less' and works in harmony with the environment. The EIP will help building a competitive primary sector that secures global food availability, diversified products and production, long-term supply of various raw-materials for food and non-food uses, as well as a better allocation of added value across the food chain.

In order to make the increase in agricultural productivity and output sustainable, natural resources must be well managed, in line with environmental requirements. Land will be particularly important, as this is the medium where the success or failure in moving towards more sustainable patterns of production will be observed. Land is the essential resource for agricultural production. Land use interacts in multiple ways with water quality and quantity, biodiversity, and the provision of eco-system services.

Climate change places emphasis on soil as a particularly vulnerable resource. Soil functions including the stability of soils, the soil water cycle, the nutrient buffering capacity, and the soil biotic integrity are essential parameters of land productivity. Its function as a carbon sink gives soil a key role in climate change mitigation. Appropriate land management must prevent soil degradation and erosion, stabilise soil functions, and address climate change mitigation and adaptation.

Given these objectives, two headline targets have been identified for the EIP:

- As an indicator for **promoting productivity and efficiency** of the agricultural sector, the EIP aims to reverse the recent trend of diminishing productivity gains by 2020⁶.
- As an indicator for the **sustainability of agriculture**, the EIP aims to secure **soil functionality**⁷ in Europe at a satisfactory level by 2020. Soil functionality

⁶ Measured as 'total factor productivity'

⁷ Including: Reversing the trend of losing soil organic matter; appropriate farming practices on agricultural land susceptible to erosion.

encompasses the productive capacity of soils and its key roles in climate change mitigation and adaptation and eco-system stability.

Whilst these headline targets refer to primary production, the EIP will also tackle the many interactions across the whole supply chain up to the consumer. The specific objectives of the EIP will be elaborated upon during its concrete implementation, reflecting the strategic orientations of the policies it is relying on.

Operational objectives of the EIP include successful bridge-building between cutting-edge research and technology and stakeholders, including farmers, businesses, industry, advisory services and NGOs. This should help translating research results into actual innovation, faster transferring innovation into practice, giving a systematic feedback from practice to science concerning research needs, enhancing knowledge exchange, and raising awareness on the need for joint efforts to invest in sustainable innovation.

The EIP strives to achieve synergies through fostering exchange among partners from different policy fields, sectors, initiatives and projects, thereby contributing to higher effectiveness of existing policy instruments and complementing them with new actions where necessary.

4. BENEFITS AND OPPORTUNITIES

The combined agricultural and food sector accounts today for 17 million jobs (7,6% of total employment) and for 3,5% of total Gross Value Added in the EU-27. The EIP will reinforce the position of Union agriculture as a competitive and resource efficient sector and contribute to more sustainable forestry and land use practices. Up-stream and down-stream sectors that provide "green" technologies to primary producers must be integrated in the EIP and will also benefit.

To develop their full potential, the role of farmers in the supply chain must be strengthened. Changes in consumer demand towards safe, healthy, and high quality food point to an increasing importance for local markets. The constantly growing market for food, feed, fibre, biomaterial, and bioenergy provides economic development, employment, and possibilities for social innovation. Making use of European genetic diversity unlocks a vast potential for development. Thus, new product and market opportunities are opening up for primary producers, and the EIP will help to seize them.

Absent an innovation driver such as the EIP, Union agriculture will face difficulties in increasing outputs while avoiding further deterioration of productive capacities and natural resources, in particular soil, water, and ecosystem services. The TEEB study on the "Economics of Ecosystems and Biodiversity" suggests that the value of preserving biodiversity from terrestrial systems will be in the order of 7% of estimated GDP in 2050. As an example, the study refers to insect pollination, worth € 15 billion per year. Beyond this, the EIP will help securing carbon sequestration and mitigating GHG emissions as well as reducing energy needs. Better knowledge of nutrition aspects will change consumer behaviour and provide benefits for a greater diversity and higher quality of products.

5. MOBILISING THE POTENTIAL

Member States and stakeholders have repeatedly expressed a strong interest in promoting innovation in agriculture through a Union-wide approach. The European Council of 20 June 2008 pointed to the "*need to pursue innovation, research and development of agricultural production, notably to enhance its energy efficiency, productivity growth and ability to adapt to climate change*". Similar conclusions have been drawn by farm organisations and Chambers of Agriculture, and the G20 declaration from Cannes underlines the primordial need to invest in agricultural research and innovation.

The concept and content of the EIP 'Agricultural Productivity and Sustainability' have been discussed with a wide range of stakeholders. Stakeholders underlined the need for an agricultural EIP and emphasised the need to bridge the gap between farming practice and science through smart networking.

The EIP will encourage partners at different institutional and geographical levels and in different sectors to collaborate and take advantage of the immense potential for synergies. Particular emphasis will be placed on making use of the opportunities provided by different policy fields, in particular the Common Agricultural Policy (CAP), Union Research and Innovation Policy, Cohesion Policy, Environmental and Climate Change Policy, Consumer and Health Policy, Education and Training policy, Industrial Policy, and Information Policy. Close cooperation and exchange on lessons learned will be ensured with other European Innovation Partnerships, including the EIP on 'Raw Materials' and the EIP on 'Water efficient Europe'. The latter is interlinked with the agricultural EIP, as it will cover water infrastructure and water allocation in rural areas, while the agricultural EIP will address water management and pollution reduction at farm level.

6. TRANSPOSING INNOVATION INTO AGRICULTURAL PRACTICE

The EIP will cover multiple stages: from the core research process and the dissemination of research results to the development of products and techniques and their integration in the production process. An important role will be assumed also by certification processes that confirm the increased added value of the research products.

In order to transpose innovation into agricultural practice, the EIP will make use of a range of existing policies, in particular CAP Rural Development Policy and Union Research and Innovation Policy, to fund concrete innovative actions. Whilst Rural Development Programmes normally act within the boundaries of programme regions, mostly at local, regional, or national level, innovative actions at cross-regional, cross-border, or Union-level need to be co-funded by Union Research and Innovation Policy. Synergies should be sought with opportunities provided by Cohesion Policy, in particular via regional innovation strategies and transnational and interregional cooperation programmes.

The value-added of the EIP lies, first, in its potential to focus existing policies towards innovation and, second, in its nature as a dynamic platform linking farmers, stakeholders, and researchers. Implementation will be channelled through operational groups as key acting entities, involving actors such as farmers, scientists, advisers, NGOs, and/or enterprises. The operational groups will constitute themselves around topics of interest and will carry out projects aimed at testing and applying innovative practices, processes, products, services, and technologies. At cross-border or Union level, operational groups will act in particular through

cluster initiatives and pilot and demonstration projects. The concrete actions will be fuelled by the knowledge base provided through the EU Research and Innovation Framework

An EIP network facility will be established under the umbrella of the Rural Development Network. The network will animate activities at Union, national, regional, and local level. It will encourage the establishment of operational groups and inform about the opportunities provided by Union policies. In return, operational groups have to report back to the network about their projects. Thus, the network will act as a mediator in enhancing communication and cooperation between science and practice. It will help sharing experience, including failures, lessons learned, and good practice. Moreover, it will foresee a systematic feedback mechanism to incorporate practice needs into the research agenda.

A successful implementation of the EIP will rely on providing and transferring relevant knowledge from a wide range of disciplines forming part of the European research community. Considerable input for discussing and developing consistent and relevant thematic orientations are expected from Joint Programming Initiatives (JPI), the Standing Committee on Agricultural Research (SCAR), ERA-NETs⁸ and European Technology Platforms. These initiatives will feed into the debate on potential innovative actions and discussions on experiences made. They can encourage the setting up of operational groups in view of multiplying innovative action. The EIP network will contribute to a better linking of those initiatives. Related monitoring and evaluation will ensure sound implementation.

7. GOVERNANCE STRUCTURE

A high-level steering board, limited in number and consisting of representatives from Member States and stakeholders from both the supply and the demand side and appointed in their personal capacity, will provide strategic advice and guidance through a strategic implementation plan which identifies priority areas for action and recommendations on how to achieve the EIPs objectives.

Following the experience of the pilot-EIP on 'Active and Healthy Ageing', the work of the steering board will go hand in hand with a full involvement of Member States and stakeholders in the concrete actions and in the follow-up of the agricultural EIP. This will be sought also through focus groups and thematic seminars, to be set-up by the network.

The EIP will rely on existing Union policies. Funding, implementation, and prioritisation of actions will be based on respective mechanisms embedded in those policies. Rural Development Policy asks Member States to define quantified milestones (also for innovation) reflecting Europe 2020 objectives. EU Research and Innovation Policy will support projects in line with the strategic orientations and decision-making mechanisms of "Horizon 2020". The EIP network will use existing mechanisms for reporting to and interacting with Member States and Rural Development Managing Authorities, including the Rural Development Committee and Monitoring Committees.

⁸ ERA-NET schemes support the cooperation and coordination of research activities at national or regional level

8. AREAS OF INNOVATIVE ACTIONS

In line with the experience gained through the pilot-EIP, the content and priorities to be pursued by the EIP should emerge in an open manner and reflect the need for diverse solutions. Translating new technologies, methods, and processes into farming practice and creating a space for practical questions and guidance requires a bottom-up approach, combined with effective networking. In line with conclusions put forward by the OECD⁹, the EIP will not rely on one innovation model. Furthermore, consideration is given to the fact that innovation may be technological, non technological, or social, and may be based on new or traditional practices.

Several indicative priority areas for research and innovation have been selected on the basis of input and exchange with stakeholders and researchers. The list set out below shall not pre-empt the content of innovation actions on the ground. Implementation of the EIP may complement it.

- **Increased agricultural productivity, output, and resource efficiency**

This area of innovation actions aims to increase agricultural output, while ensuring the efficient and sustainable use of resources. Low-input production systems would target the sustainable use of nutrients (including phosphorus and nitrogen) and pesticides, optimised use of energy, water, and genetic resources, and lower dependence on external inputs. Progress is needed in the field of integrated pest management, biological control of plant diseases and pests, improved use of plant protection products, and reducing GHG-emission from animal production and soils. Solutions for recycling and the reduction of post-harvest losses would alleviate pressures on natural resources. The potential of green technologies, such as ICT, precision farming, and pest warning systems, should be explored.

- **Innovation in support of the bio-based economy**

Innovative solutions should be adapted to the whole supply chain as well as the growing bio-based economy. Solutions should be sought for bio-refinery and recycling and the smart use of biomass from crops, forest, and food waste, valorising its cascading potential without reducing soil organic matter. Consideration could also be given to substituting primary protein production by algae or bio-fermentation. Breeding of animals and plants could be explored for achieving higher outputs, reduced emissions and/or better resistance to diseases, as well as higher quality of final products (e.g. better nutritional profiles).

- **Biodiversity, Ecosystem services, and soil functionality**

Innovation that enhances sustainable farm management and forestry practices benefits also eco-system services and soil functionality. Particular emphasis should be placed on integrated agro-ecological systems, including the enhancement of soil biodiversity, carbon sequestration, water retention, ecosystem stability and resilience, and pollination functions. Solutions could focus on improved land management (including low tillage and maintenance of green infrastructure), integrated spatial

⁹ OECD and Eurostat (2005), Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, Paris.

planning and new agro-forestry systems, as well as natural ecosystem conservation methods. Further areas would include optimising the use of genetic resources, low input/organic systems, increasing genetic diversity used in agriculture, and developing bio-remediation for polluted soils, as well as innovative climate change adaptation strategies.

- **Innovative products and services for the integrated supply chain**

The aim is to develop and deploy innovative products, devices and services, alongside with establishing a transparent and sustainable supply chain. The focus would be on better information systems and risk management tools, reflecting the characteristics of products and production processes, such as benchmarking, sustainability standards, foot-printing, lifecycle analysis (with a focus on waste management), and certification systems. Solutions could include managerial innovation for farmers, reinforcing their role in the supply chains, e.g. through producer groups or short food chains. New diagnostic tools would help tracking environmental and social performance of farms. Solutions would include also exploiting the full diversity of our genetic base, creating new and more sustainable opportunities, and establishing institutional innovations (e.g. carbon markets). Effective monitoring systems could be targeted towards residues in food (e.g. pesticides).

- **Food quality, food safety and healthy lifestyles**

Informed consumer choices are essential as steering impulses to the whole supply chain. Areas of action would include food quality and food safety, for instance through developing new food quality schemes and livestock health care schemes. Bio-prospecting and the potential of medical flora as a raw material resource could be explored. Other areas could include natural animal and plant treatment and new methods to analyse the biological qualities of food. Tools for changing consumption patterns and corresponding education, information, and learning tools could help improve public health, accompanied by healthy ingredients in products (e.g. milk or oil with omega-3 fatty acids) achieved by further developing nutrients and through animal breeding. The consumers' role in reducing post-harvest losses could be addressed by intelligent packaging approaches as well as education and information.

9. NEXT STEPS

Given the need to shift development patterns towards sustainable growth in agriculture, these activities should start as soon as possible. This Communication intends to encourage discussion with Member States, European Parliament and stakeholders about the strategic objectives and format of the agricultural EIP.

Taking into account the views of the European Parliament and the Council on this Communication, a strategic implementation plan will be prepared. As a preparatory step, technical assistance provided by Rural Development Policy will be used to establish network facilities. The timely establishment of an EIP network is needed to ensure early information of actors and stakeholders concerning opportunities for innovative action. It will facilitate the process of translating priorities into concrete innovative actions on the ground.