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The link between long-term food security and sustainability in Europe: Reform of the Common Agricultural Policy 2014-2020

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1.The need for a more sustainable agricultural produc on

Agriculture is, one side, the major source of food, considering that a sustainable human nutrition is the plant-based one, but on the other side it is held responsible for an increase of nearly 13.5% of greenhouse gas emissions (GHG)[1]. This statement draws the attention towards the economic impact of an unsustainable food system. To encounter the destination set out by the Farm 2 Fork strategy, it becomes of u er importance to balance the needs of sustainable food production but keeping an eye on the social dimension of agricultural ac vi es, as well as on the health of the environment. Modern agriculture is still heavily based on fossil fuels. A transition towards renewable sources of energy, which do not impact on climate change, allows farmers to move towards a more sustainable agricultural system. The concept of "*turning electricity into food*"[2], which combines the adoption of Precision Farming techniques in combination with traditional

[1] Balafou s, Athanasios & Beck, Bert & Fountas, Spyros & Vangeyte, Jürgen & van der Wal, Tamme & Soto, Iria & GómezBarbero, Manuel & Barnes, Andrew & Eory, Vera. (2017). Precision Agriculture Technologies Posi vely Contribu ng to GHG Emissions Mi ga on, Farm Produc vity and Economics. Sustainability. 9. 1339. 10.3390/su9081339.

[2] Bardi, Ugo & El Asmar, Toufic & Lavacchi, Alessandro. (2013). Turning electricity into food: The role of renewable energy in the future of agriculture. Journal of Cleaner Produc on. 10.1016/j.jclepro.2013.04.014.

farming methods, paves the way to an effective modernization of the whole agricultural sector. Embracing PF-driven methods does not mean to completely automatize the process, but it is acceptable to par ally rely on them, so a combination of innovative and traditional farming represents a rewarding solution.

Precision farming: advantages and state of the art

Precision Farming creates "*the possibility to do the right thing, in the right place, in the right me and in the right way*"[3] providing an essential contribution to the creation of a sustainable output of agricultural ac vi es in terms of quality and quantity and it illustrates a modern farming management that requires digital techniques for the optimization of agricultural production processes. Its aim is to create a balance between the mass production in response to a growing market with a sensitive reduction of the energy consumption and costs. Precision Farming nowadays offers a wide range of effective solutions, star ng from the most common ones like smartphone to AI - driven monitoring systems, autonomous electricity-driven tractors able to reduce the fuel consumption, mapping sensors. The introduction of low- cost, low-power and multifunctional wireless sensor networks (WSN) for the data collection on soil which permit to study the environmental impact of the agricultural activity, leading to a decrease of energy consumption. To explore the potential of Precision Farming to reach the goal of a more sustainable farming management, a specific so ware architecture aimed at the improvement of the sustainability of agricultural production has been investigated[4]. By means of a network of cheap, low-power and multifunctional sensors it will be possible to benefit of a real me monitoring system able to speed up the development of a sustainable agricultural production. The high level of precision of such network, tailored on the specific need of the soil, permits to drive the environmental parameters in the most efficient way to decrease the costs. The data collection carried out by means of such devices allow to target the distribution of pesticides on the soil without spraying the whole cultivated area with a consequent minor impact on the environment and a reduction of the production cost.

3.Obstacles and possible solutions

Despite the advantages of innovation, some critical points that do not consent to fully appreciate its potential have been underlined. Nowadays the number of farmers in Europe is slowly decreasing, especially in rural areas, their traditional role is rapidly changing as they are not only in charge of keeping the soil health and productive, but they are called to face environmental and economic issues (climate crisis, price rises), so they need to act as "company managers" to be er respond to the needs of a fast growing and highly demanding market. A first obstacle to the adoption of technological solutions is represented by the rather high cost of PF equipment. Machine guidance, for example,

[3] Francis J. Pierce, Peter Nowak, Aspects of Precision Agriculture, Advances in Agronomy, 67, 1999;

[4] Mare Srbinovska, Cvetan Gavrovski, Vladimir Dimcev, Aleksandra Krkoleva, Vesna Borozan, Environmental parameters monitoring in precision agriculture using wireless sensor networks, Journal of Cleaner Produc on, 88, 2015, Pages 297-307;

impacts on the reduction of working hours and fuel consumption, but the cost of a fully automated tractor driving system could range from 5284 to 44,040 euros[5]. An investigation about the motivations that lie behind such reluctancy has been carried out in an Italian case study[6] that puts into evidence how the fear of a long-term investment, combined with a lack of specific IT knowledge and the perceived frustra on in using new devices slow down their appropriation. A comparison with another study carried out in Italy[7] collected similar results. To overcome this second obstacle, basic technical education becomes essential. Additionally, small farmers may have to cope with more financial difficulties than larger ones, as they will need to invest more capital: in this sense, joint investments represent a good solution: the ISOBUS technology, a standard for implementing the compatibility of agricultural machineries, represents a brilliant example of jointed investment among small farmers.[8]

Conclusions

In response to these challenges, the EU created the Common Agricultural Policy (CAP) in 1962. Intended to be a 'partnership between agriculture and society and between Europe and its farmers'[9]it is focused on the improvement of the environmental performance of agriculture. The reformed CAP 2014-2020 introduced some compulsory measures for Member States, such as the 'Young Farmer Scheme', where young farmers receive a 25% supplement to the direct aid allocated to their farm for a period of five years. In this sense, the provisions of the CAP become essential as more than 200 million for Research and Innova on (R&I) were allocated to the deployment of digital technologies for the agricultural sector. On the same side, the Farm2 Fork Strategy, published in May 2020, puts a major emphasis on the importance of an environmentally friendly food system. Direct communication amongst farmers, stakeholders, machinery manufacturers, social parts and politicians becomes essential to reach the goal of a more sustainability management of agriculture.

Bibliography:

- Basso, B., Antle, J. Digital agriculture to design sustainable agricultural systems. *Nat Sustain* 3;
- Balafoutis, Athanasios & Beck, Bert & Fountas, Spyros & Vangeyte, Jürgen & van der Wal, Tamme & Soto, Iria & Gómez-Barbero, Manuel & Barnes, Andrew & Eory,

[5] Balafou s, Athanasios & Beck, Bert & Fountas, Spyros & Vangeyte, Jürgen & van der Wal, Tamme & Soto, Iria & GómezBarbero, Manuel & Barnes, Andrew & Eory, Vera. (2017). Precision Agriculture Technologies Posi vely Contribu ng to GHG Emissions Mi ga on, Farm Produc vity and Economics. Sustainability. 9. 1339. 10.3390/su9081339.

[6] J Blasch and others, Farmer preferences for adop ng precision farming technologies: a case study from Italy, *European Review of Agricultural Economics*, Volume 49, Issue 1, January 2022, Pages 33–81,

[7] Yari Vecchio, Marcello De Rosa, Felice Adinolfi, Luca Bartoli, Margherita Masi, Adop on of precision farming tools: A contextrelated analysis, Land Use Policy, Volume 94, 2020

[8] Ku er, Thomas & Tiemann, S. & Siebert, R. & Fountas, Spyros. (2011). The role of communica on and co-opera on in the adop on of precision farming. Precision Agriculture. 12. 2-17. 10.1007/s11119-009-9150-0. [9] European Commission, The European Union Explained, 2014

Vera. (2017). Precision Agriculture Technologies Positively Contributing to GHG Emissions Mitigation, Farm Productivity and Economics. Sustainability. 9;

- Mare Srbinovska, Cvetan Gavrovski, Vladimir Dimcev, Aleksandra Krkoleva, Vesna Borozan, Environmental parameters monitoring in precision agriculture using wireless sensor networks, Journal of Cleaner Production, 88, 2015, Pages 297-307;
- Bardi, Ugo & El Asmar, Toufic & Lavacchi, Alessandro. (2013). Turning electricity into food: The role of renewable energy in the future of agriculture. Journal of Cleaner Production. 10.1016/j.jclepro.2013.04.014.
- Yari Vecchio, Marcello De Rosa, Felice Adinolfi, Luca Bartoli, Margherita Masi, Adoption of precision farming tools: A context-related analysis, Land Use Policy, Volume 94, 2020
- Organic Agriculture, Food Security and the Environment, Eva-Marie

  Meemken and Matin Qaim, Annual Review of Resource Economics, 2018, vol. 10, issue 1, 39-63