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ECONOMIC MODEL OF REGENERATIVE AGRICULTURE AND FACTORS OF AGRI-FOOD SYSTEM CHANGE

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Abstract: *The basis of regenerative agriculture is represented by its main element, namely the soil. Ensuring good soil health will lead to many beneficial effects on agricultural ecosystems. Among the main beneficial effects of soil health we can list the management of groundwater resources and irrigation systems at large agro-zootechnical farms, recycling of nutrients from and to the soil surface with the help of green, environmentally friendly fertilizers and agroecosystems, maximizing crop yields, sustainability of crops, soil and productivity per hectare, sustainability of agri-food and livestock farms. The fact that through regenerative agriculture, organic carbon in the soil structure can be exploited in order to maximize agricultural productivity and restore soil structure, regenerative agriculture focuses mainly on restoring soils that have suffered great degradation due to their acidification by using large amounts of pesticides and chemical fertilizer products. This article aims to present the economic principles and methods of regenerative agriculture so that these processes combined into a unitary whole lead to the restoration of soil organic matter naturally, the principles of regenerative agriculture practitioners being that nature can regulate automatically the imbalances identified in nature. The less minimal the interventions on the soil, the less the residues from agriculture (reductions resulting from the activity of fertilization and plant protection) will be minimal, the products used will present a minimum invasiveness, which will lead to the acceleration of the recovery processes. soil, to balance the electrolyte balance of the soil and, implicitly, to develop the root system of plants so as to ensure a sufficient amount of mineral elements in the soil, in order to maximize agricultural production.*

Keywords: *organic farming, regenerative agriculture, farm profitability, food system, policy makers.*

JEL classification: Q01, Q34, Q57,

INTRODUCTION

In the current context, at global, regional and implicitly state level, there are certain socio-cultural, economic, political, technological factors that have the role of determining, modeling and transforming agricultural land use, crop models and agricultural processes. Agriculture is one of the most pressing challenges facing the world today: climate change, food security and nutrition, water quality, biodiversity and livelihoods. Agricultural systems emit about 10% of greenhouse gas emissions into the environment, which will affect the yield and value of proteins in basic crops. The Sars-Cov-2 pandemic created great pressure on the development of agricultural production systems, on production systems causing profound disruptions and revealing the fragility of the food system. Key food producers, essential in the food system, have been recalibrated and rearranged on the basic societal values of health and nutrition (Boedeker, *et.all.*, 2020). Beyond this immediate crisis, there is a need to reformulate the way we produce and consume food and ensure that it can restore resilience and productivity while protecting our natural assets. A transition to regenerative practices could bring

huge gains for farmers, food companies and the environment and a basis for a truly fit farming system for the future (Ceballos *et.all.*, 2020).

MATERIAL AND METHOD

Our agricultural system is very successful in achieving its current objectives, maximizing profit and driving efficiency on short-term productive crops. However, this is detrimental to soil health, food quality, high carbon emissions and declining farmers' livelihoods. The Romanian agricultural system is a strong force in addressing the most pressing challenges worldwide, restoring ecosystem services, including soil health, water quality, biodiversity, diversification of production systems for all these aspects focusing on the quality of crops, agricultural products and from agri-food chains. Building a better agricultural system is an essential fact, even if monumental (Gava *et.all.*, 2019).. The system can be feasible based on the collective effort of farmers, producers and distributors and stakeholders from all corners of our agricultural system, all these aspects being based on cooperation, in order to achieve and achieve important points such as: combating climate change, stopping health crises , especially on the support of farmers (Fava *et.all.*, 2021). The figure below (Figure 1) shows the diagram of the selection criteria that led to the first changes in the agri-food system at European level, each state being responsible for aligning with it. In order to develop these classification criteria, a series of research was conducted in 2012-2020 on agri-food systems (Kirchherr *et.all.*, 2017). In order to implement the principles developed by the European Commission on the support and evolution of agri-food systems, some specialists have proposed methods of recovery and management of residues from the agri-food production industry (biomass) and its conversion into active-functional ingredients which, by hot air drying or by freeze-drying, were converted to soil fertilizers. These powders from vegetable waste can also be used in the food industry as coloring and flavoring ingredients or natural preservatives or can be used to reformulate processed foods to improve their nutritional properties (Francis, *et.all.*, 1986)

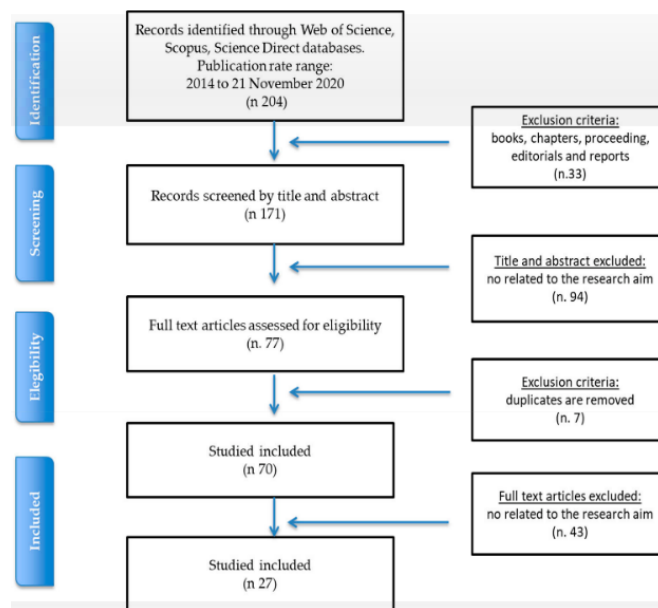


Figure 1. Diagram and literature search

flow of the procedure

RESULTS AND DISCUSSIONS

A series of challenges have been identified that are interconnected to agri-food systems, more precisely environmental degradation, economic crises, social problems, extreme weather phenomena, all of which are determined, forecasted and identified possible solutions in specialized agri-food studies. After a (partial) restoration of agri-food systems and the development of the concept of regenerative agriculture, the term was quickly removed from specialized terminology (Francis *et al.*, 1986) Regenerative agriculture has been set aside in favor of green, ecological agriculture, a more profitable, sustainable and environmentally friendly agriculture. However, farmers' interest in the regenerative agriculture system has grown significantly since 2015. It is important to note that between 1972 and 2018, regenerative agriculture appears in books much less frequently than other terms such as sustainable agriculture, organic farming, organic farming. and agroecology (Figure 2).

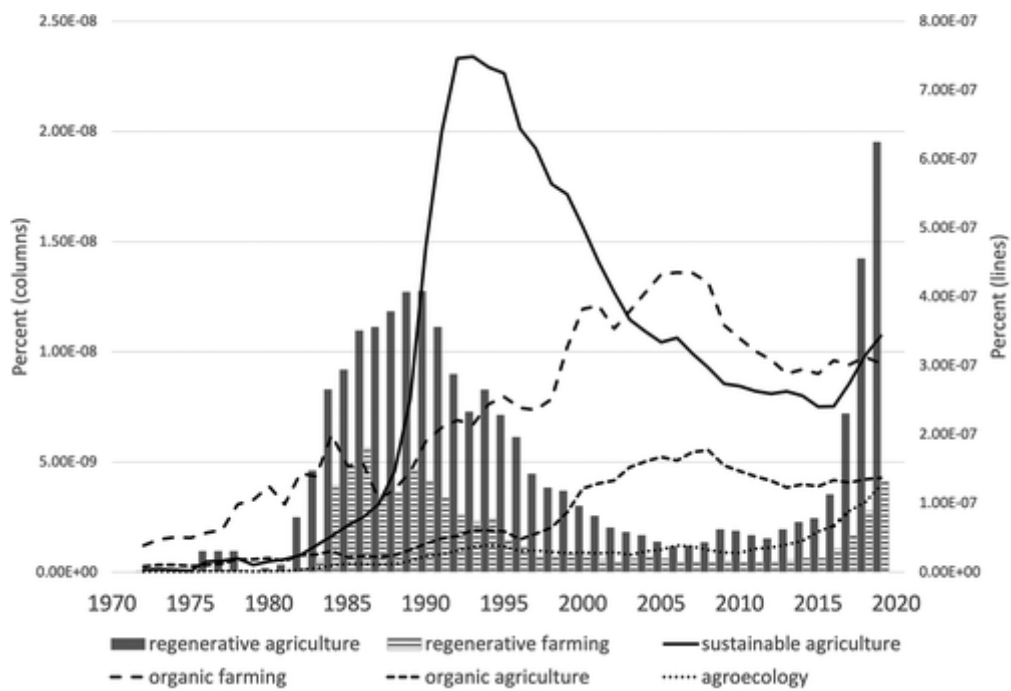


Figure 2. Terminology search results Regenerative agriculture

Thus, while the terms Regenerative Agriculture and Regenerative Agriculture have been used since the early 1980s, they have not been used as widely as other related terms to date, such as sustainable agriculture or organic farming. Since 2016 their appearance in books, news and on the internet has increased dramatically, reflecting the fact that they have now been adopted by a wide range of NGOs (e.g. The Nature Conservancy, World Wildlife Fund, GreenPeace, Friends of the Earth), multinational companies (e.g. Danone, General Mills, Kellogg’s, Patagonia, World Council for Sustainable Business Development) and charitable foundations (e.g. IKEA Foundation). In connection with this new popularity, Diana Martin, communications director of the Rodale Institute, warned: “It is [Regenerative Agriculture] the new fashion word (Rodale Institute, 2014).

The most common themes associated with Regenerative Agriculture are improvements in soil health, the wider environment, human health and economic prosperity (Schreefel *et al.*, 2020). The authors continue to define regenerative agriculture as “an approach to agriculture that uses soil conservation as an entry point to regenerate and contribute to the multiple supply, regulation and support of ecosystem services, with the aim that it will increase not only the environment but also its size. social and economic aspects of sustainable food production ”.

Figure 4 shows what we understand to be the most common current articulation of the theory of change in Regenerative Agriculture. In the sense of this agronomically oriented work, the critical question is: How far and in what contexts do the proposed regenerative practices restore soil health and / or reverse biodiversity loss? Given the diversity of understandings about regenerative agriculture and the different contexts in which it is promoted, it should come as no surprise that a section on regenerative agriculture promotes a wide variety of agronomic practices. We return to these practices later, but first we take a closer look at the two crises that Regenerative Agriculture aims to address.

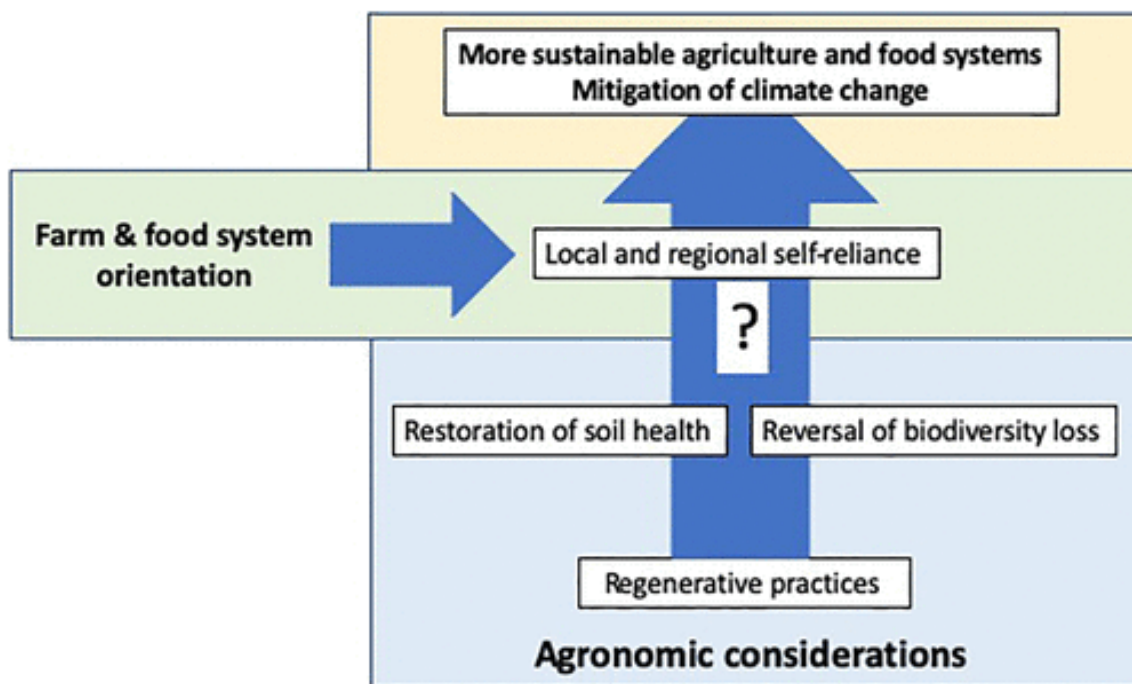


Figure 3. Regenerative Agriculture: Agronomic consideration

The crisis of regenerative agriculture has led to a crisis in soil health. Soil health receives particularly strong attention in the narratives surrounding regenerative agriculture (Schreefel *et al.*, 2020) Indeed, the idea that soil and especially soil life are threatened underpins most, if not all, requires agriculture. regenerative. However, the term soil health is inherently problematic (Powlson, 2020). Like soil quality, soil health is a container concept, which requires disaggregation to be meaningful. Although it can be understood as something to look for, the basic functions of the soil need significant indicators that can be measured and monitored over long periods of time. Moreover, agronomic practices that benefit from an aspect of soil health (such as soil life) often have negative effects on other functions (such as nitrate leaching, primary production, or GHG emissions, (Berges *et al.*, 2019), there is usually not a single direction in soil health, but several trade-offs.

Those who promote regenerative agriculture frame the biodiversity crisis around the widespread use of monocultures, along with a strong dependence on external inputs and a lack of “biological cycle” (Francis *et al.*, 1986). Undoubtedly, large areas of genetically uniform crops can be susceptible to the rapid spread of pests and diseases and add little value to the quality of rural landscapes. Many practices associated with regenerative agriculture, such as crop rotations, cover crops, animal integration, are (or in some contexts have been) generally considered to be "good agricultural practices" and remain an integral part of conventional agriculture. Some are more

problematic: conservation agriculture, for example, can be practiced in an organic environment or as a GMO, intensive in herbicides and fertilizers (Giller *et al.*, 2015). Others, such as permaculture, have a rather limited applicability for the production of many agricultural products. Others, such as holistic grazing, are highly controversial in terms of claims made for their wide applicability and environmental benefits in terms of soil C accumulation and reduction of greenhouse gas emissions (Briske *et al.*, 2014; Garnett *et al.*, 2017). Practicile de agricultură regenerativă, criza solului și schimbările climatice. Majoritatea practicilor de agricultură regenerativă se concentrează pe managementul solului, cu un accent deosebit pe creșterea solului C, sub premisa că va crește randamentul culturilor și va atenua schimbările climatice. SOM este un indicator important al fertilității solului (Reeves, 1997), deoarece îndeplinește multe funcții în sol, de exemplu în furnizarea de substanțe nutritive, structura solului, capacitatea de reținere a apei și susținerea vieții solului (Johnston *et al.*, 2009).

Regenerative agriculture practices and the biodiversity crisis. Although reversing biodiversity loss is a central principle of regenerative agriculture, it receives surprisingly little attention in discussions of best practices. The "encourage plant diversity" principle is, of course, central and is one of the means to address the "pesticide avoidance" principle. However, little attention is paid to approaches such as integrated pest and disease management (IPM). The principles of IPM - to minimize the use of chemicals and maximize efficiency when used - are well established. Genetic resistance is essential, and regular crop research is used to trigger receptive spraying when a certain pest and disease threshold is observed, rather than preventive spraying at certain times in the harvest schedule. Recommended practices, such as rotations and cover crops (multi-species) fall within the IPM, as do approaches such as inter-crop and strip-cutting, which are largely ignored in discussions on regenerative agriculture. IPM is knowledge intensive, requires regular crop monitoring and the ability to identify early signs of outbreaks of multiple pests and diseases.

CONCLUSIONS

From the testimonies of many farmers on the Internet, it is clear that their movements towards regenerative agriculture are supported by a philosophy that aims to protect and improve the environment. The main argument is most often around soil health and, in particular, soil biological health, which is seen as threatened and attributed to somewhat mythical properties. Much of the promotional material available in the public domain makes exaggerated claims about the potency and functioning of soil microorganisms, in particular. Instead, for many NGOs that militate, blocking or sequestering carbon in the soil is paramount, with a vision of agriculture without external inputs or GMOs that mimics nature and contributes to solving the climate crisis. Not surprisingly, the claimed potential of regenerative agriculture has attracted considerable criticism aptly captures in his blog "Regenerative Agriculture: Solid Principles, Extraordinary Claims". It seems unlikely that regenerative agriculture can bring all the positive benefits to the environment, as well as the necessary increase in world food production. The reflective engagement of research agronomists is now extremely important.

The way in which a food start-up has improved innovations in the business model has been investigated, given the importance of social and environmental issues. The researchers said that expanding the innovation of the sustainable business model in the agri-food sector is essential, because the business is linked to the social and environmental dimension. A theoretical framework for innovating sustainable business models in the agri-food industry has been suggested to address

the challenges from a sustainable perspective. A combined theoretical vision has been developed to understand the innovations of the business model that lead to improvements in the economic, environmental and social performance of an organization. According to the authors, planning a sustainable business model requires the organization of sustainable value flows between different actors. The authors concluded that taking into account the interests and responsibilities of stakeholders in creating mutual value is imperative to achieve a sustainable business model. Sustainable business models in different sectors were discussed, taking into account the process of building a sustainable business model as an innovative part of a business strategy, in order to provide beneficial solutions to all stakeholders and to meet the requirements of the environment and society.

REFERENCES

1. Briske, DD, Ash, AJ, Derner, JD, et al. (2014) Commentary: a critical assessment of the policy endorsement for holistic management. *Agricultural Systems* 125:50–53,
2. Boedeker, W, Watts, M, Clausing, P, et al. (2020) The global distribution of acute unintentional pesticide poisoning: estimations based on a systematic review. *BMC Public Health* 20:1875.
3. Burgess, PJ, Harris, J, Graves, AR, et al. (2019) *Regenerative Agriculture: Identifying the Impact; Enabling the Potential*. Report for SYSTEMIQ. Cranfield: Cranfield University,
4. Ceballos, G, Ehrlich, PR, Raven, PH (2020) Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. *Proceedings of the National Academy of Sciences* 117:13596–13602.
5. Fava, F.; Gardossi, L.; Brigidi, P.; Morone, P.; Carosi, D.A.; Lenzi, A. The bioeconomy in Italy and the new national strategy for a more competitive and sustainable country. *New Biotechnol.* 2021, 61, 124–136.
6. Francis, CA, Harwood, RR, Parr, JF (1986) The potential for regenerative agriculture in the developing world. *American Journal of Alternative Agriculture* 1:65–74.
7. Garnett, T, Godde, C, Muller, A, et al. (2017) *Grazed and Confused? Ruminating on Cattle, Grazing Systems, Methane, Nitrous Oxide, the Soil Carbon Sequestration Question – and What it all Means for Greenhouse gas Emissions*. Oxford: Food Climate Research Network, University of Oxford, p. 127,
8. Gava, O.; Bartolini, F.; Venturi, F.; Brunori, G.; Zinnai, A.; Pardossi, A. A Reflection of the Use of the Life Cycle Assessment Tool for Agro-food Sustainability. *Sustainability* 2019, 11, 71
9. Giller, KE, Andersson, JA, Corbeels, M, et al. (2015) Beyond conservation agriculture. *Frontiers in Plant Science* 6. Article 870. <https://doi.org/10.3389/fpls.2015.00870>,
10. Johnston, AE, Poulton, PR, Coleman, K (2009) Chapter 1 soil organic matter: its importance in sustainable agriculture and carbon dioxide fluxes. In: Sparks, DL (ed) *Advances in Agronomy*. Cambridge, MA: Academic Press, pp. 1–57,
11. Kirchherr, J.; Piscicelli, L.; Bour, R.; Kostense-Smit, E.; Muller, J.; Huibrechtse-Truijens, A.; Hekkert, M. Barriers to the Circular Economy: Evidence from the European Union (EU). *Ecol. Econ.* 2018, 150, 264–272.
12. Moyer, J, Smith, A, Rui, Y, et al. (2020) *Regenerative Agriculture and the Soil Carbon Solution*. Kutztown, PA: Rodale Institute. Available at: https://rodaleinstitute.org/wp-content/uploads/Rodale-Soil-Carbon-White-Paper_v11-compressed.pdf.(accessed 1 February 2021),
13. Powlson, DS (2020) Soil health - useful terminology for communication or meaningless concept? Or both? *Frontiers of Agricultural Science and Engineering* 7(3):246–250. DOI: 10.15302/J-FASE-2020326,
14. Reeves, D (1997) The role of soil organic matter in maintaining soil quality in continuous cropping systems. *Soil and Tillage Research* 43:131–167,
15. Schreefel, L, Schulte, RPO, de Boer, IJM, et al. (2020) Regenerative agriculture – the soil is the base. *Global Food Security* 26:100404