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Regenerative Agriculture: A Sustainable Solution to Combat Climate Change and Restore Ecosystems

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ABSTRACT

Regenerative Agriculture (RA) presents a transformative approach to addressing the dual challenges of climate change and ecosystem degradation. By prioritizing soil health, biodiversity, and ecosystem resilience, RA enhances soil carbon sequestration, thereby mitigating climate change. This review explores the potential of RA to improve soil organic carbon (SOC) levels, reduce greenhouse gas emissions, and promote sustainable farming practices. Empirical studies demonstrate the effectiveness of RA in increasing SOC through techniques such as reduced tillage, cover cropping, and diverse crop rotations. However, the extent of carbon sequestration varies regionally, emphasizing the need for further research and long-term monitoring. Despite its ecological benefits, widespread RA adoption is hindered by challenges such as the lack of a standardized definition, socio-economic barriers, and limited empirical evidence supporting its large-scale implementation. Addressing these challenges requires a holistic approach that integrates scientific research, policy support, farmer training, and community involvement. Additionally, adopting circular economy principles and leveraging nature-based solutions are crucial for optimizing RA's benefits. Case studies reviewed highlight the potential of RA to enhance farm profitability while improving ecosystem services. However, its effectiveness is context-dependent, necessitating tailored strategies for different regions. Future research should focus on standardizing RA methodologies, overcoming socio-economic constraints, incorporating diverse knowledge systems, and evaluating urban RA's potential. As RA continues to evolve, fostering collaboration among scientists, policymakers, and farmers will be essential in scaling its impact and ensuring a sustainable agricultural future.

Keywords: *Regenerative agriculture, Carbon sequestration, Climate change, Soil organic carbon, Sustainability, Mitigation*

1. Introduction

Regenerative agriculture (RA) is rapidly emerging as a potential solution to the intertwined challenges of climate change and ecosystem degradation [1], [2], [3]. Unlike conventional agricultural practices, which often rely on intensive chemical inputs and methods that deplete soil health and biodiversity [4], [5], RA emphasizes holistic approaches designed to restore and enhance ecosystem functions [6], [7]. This review delves into the current state of research on RA, analyzing its potential for climate change mitigation and ecosystem restoration, while also addressing existing knowledge gaps and limitations. The review will synthesize findings from various studies, comparing and contrasting methodologies, assessing the strength of evidence, and highlighting areas requiring further investigation.

2. Principles and Practices of Regenerative Agriculture

RA encompasses a wide array of practices unified by a core set of principles (Fig. 1) centered on improving soil health [4], [3], [8]. These practices aim to mimic natural ecological processes, thereby enhancing biodiversity and promoting ecosystem resilience [1], [2]. Key practices include:

2.1. Minimizing Soil Disturbance

Reducing or eliminating tillage is a cornerstone of RA [4], [8], [9]. Minimizing soil disturbance helps maintain soil structure, improves water infiltration, and reduces erosion [4], [3]. No-till farming, in particular, is a widely adopted practice within many RA systems [9]. The reduced compaction and increased porosity of no-till soils enhance root growth, leading to improved water and nutrient uptake by plants [4]. This method also protects soil organic matter from oxidation, contributing to higher carbon sequestration rates [8].

2.2. Maximizing Soil Cover

Maintaining continuous soil cover is another crucial aspect of RA [4], [3], [10]. This is achieved through cover cropping, the retention of crop residues, and other techniques [4], [8]. Continuous soil cover prevents erosion, suppresses weeds, and fosters a thriving soil microbiome [4]. Cover crops, in particular, play a vital role in nutrient cycling, improving soil fertility, and enhancing carbon sequestration [8].

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They also provide habitat for beneficial insects and other organisms, contributing to increased biodiversity [10].

2.3. Diversifying Cropping Systems

Integrating diverse plant species into cropping rotations is a key element of RA [4], [3], [11]. The incorporation of legumes, for example, improves soil fertility through nitrogen fixation [8], [12]. Crop diversification also reduces pest and disease pressure, improves soil health, and enhances biodiversity [11]. This diversification enhances ecosystem resilience, making agricultural systems less vulnerable to environmental shocks and stresses [11]. Rotational grazing and intercropping are further examples of diversification strategies that can significantly enhance the overall health and productivity of agricultural systems [13].

2.4. Integrating Livestock

Integrating livestock grazing into agricultural systems is another important practice within RA [4], [14]. Managed grazing systems, such as rotational grazing, can improve soil health through increased nutrient cycling, improved soil structure, and reduced weed pressure [14]. The manure produced by livestock provides a natural source of fertilizer, reducing the need for synthetic inputs. Furthermore, integrating livestock can increase farm profitability and enhance the resilience of farming systems to climate change [14]. However, the effectiveness of these systems depends on factors such as stocking density, grazing duration, and rest periods [13]. SilvipastureSilvopasture, a system that integrates trees, shrubs, and livestock, offers additional benefits in terms of biodiversity, carbon sequestration, and climate resilience [15].

2.5. Minimizing Synthetic Inputs

Reducing or eliminating the use of synthetic fertilizers, pesticides, and herbicides is a fundamental principle of RA [4], [3], [10]. These synthetic inputs can have detrimental effects on soil health, water quality, and biodiversity [4], [16]. RA emphasizes the use of natural alternatives, such as cover crops, compost, and biopesticides, to manage nutrients, pests, and weeds [10], [8]. This approach promotes ecological balance and reduces the environmental footprint of agriculture [17]. However, transitioning away from synthetic inputs may require adjustments in management practices and could initially pose challenges for some farmers [18]. The specific practices employed in RA are highly context-specific [1], [2], [4]. Local climate, soil type, and socioeconomic conditions significantly influence the choice and effectiveness of RA practices [2], [14]. The integration of indigenous knowledge and traditional farming practices can enhance the adaptability and effectiveness of RA systems [6], [11].

Figure 1: Key principles of regenerative agriculture

3. Regenerative Agriculture and Climate Change Mitigation

A primary statement supporting the adoption of RA is its potential to mitigate climate change [1], [2], [3]. This potential stems largely from its ability to enhance soil carbon sequestration [8], [19], [20]. Soil serves as a significant carbon sink, and RA practices aim to increase the amount of carbon stored in the soil [21], [22]. This increased carbon storage helps remove atmospheric carbon dioxide, a major greenhouse gas, thereby mitigating climate change [10], [23].

Numerous studies have demonstrated the potential for RA to increase soil organic carbon (SOC) stocks [19], [21], [24]. For example, a study on regenerative almond production revealed significantly higher total soil carbon (TSC) and soil organic matter (SOM) in regenerative systems compared to conventional methods [24]. Similarly, simulations using the RothC model indicated that cover cropping could lead to substantial SOC increases in Great Britain [19]. However, the extent of SOC increases varied considerably across studies and regions [23], [20], highlighting the need for further research to refine estimates of carbon sequestration potential and to better understand the factors influencing this variability. The transient nature of soil carbon accumulation is also crucial [20], as a new equilibrium might be reached at a lower level than under natural vegetative cover.

Beyond carbon sequestration, RA contributes to climate change mitigation through other mechanisms. For instance, reduced tillage minimizes the release of carbon from the soil during cultivation [22]. The use of cover crops and diverse cropping systems improves soil structure, enhancing water infiltration and reducing runoff [23]. Improved water management reduces the need for irrigation, an energy-intensive process, further contributing to lower greenhouse gas emissions [25]. The integration of legumes into cropping systems can also reduce the need for synthetic nitrogen fertilizers, minimizing the emissions associated with their production and use [17].

Several case studies demonstrate the positive impacts of RA on soil health. A study in Gotland, Sweden, assessed the effects of RA practices on various soil health indicators over 0-30 years across 17 farm fields and six gardens [38]. The researchers measured parameters such as bulk density, infiltration rate, and penetration resistance, providing valuable insights into the long-term effects of specific RA practices on soil physical properties. The regenerative approach resulted in lower environmental burdens, particularly regarding global warming and ecotoxicity, it also yielded significantly lower crop yields, highlighting the trade-off between environmental sustainability and productivity. This trade-off is further explored by [36], who found that regenerative fields in the Northern Plains of the U.S. had lower grain production but higher profits due to improved soil health and reduced pest management costs. The study emphasizes the need for a systems-level shift rather than simply adopting individual practices. The importance of soil organic carbon (SOC) levels is consistently highlighted by [23], with studies demonstrating that the increasing SOC can enhance crop yields, although the benefits plateau at a certain threshold. However, achieving and maintaining higher SOC levels requires long-term commitment and monitoring [23], [2].

4. Regenerative Agriculture and Ecosystem Restoration

RA's contribution to ecosystem restoration extends beyond its role in climate change mitigation [2], [3], [8]. The practices employed in RA directly improve soil health, a fundamental component of healthy ecosystems [25], [26].

Improved soil health leads to increased biodiversity, both aboveground and belowground [16], [24]. Healthy soils support a diverse array of soil organisms, which play essential roles in nutrient cycling, decomposition, and other vital ecosystem functions [7]. The increased biodiversity in RA systems enhances ecosystem resilience, making them more capable of withstanding environmental stresses such as drought, floods, and pest outbreaks [27], [28].

Integrating trees and shrubs into agricultural landscapes, through practices like agroforestry [21], [29], further enhances biodiversity and ecosystem services. Trees provide habitat for wildlife, improve soil structure, and contribute to carbon sequestration [21]. The use of diverse cover crops also supports a broader range of pollinators and beneficial insects, enhancing pollination services and natural pest control [16].

Restoring degraded lands is a central objective of RA [2], [26]. Conventional agricultural practices often result in soil erosion, nutrient depletion, and biodiversity loss [9], [29]. RA practices aim to reverse these trends, restoring soil fertility, improving water cycles, and enhancing overall ecosystem health [1]. The success of these restoration efforts depends on numerous factors, including the initial severity of degradation, the specific practices employed, and the local environmental conditions [30]. Long-term studies are necessary to fully assess the effectiveness of RA in restoring degraded ecosystems [2], [30].

The positive influence of RA on biodiversity and ecosystem services is also supported by several case studies. [2] highlights the symbiotic relationship between regenerative practices, community engagement, and policy frameworks in India, emphasizing the vital role of biodiversity in bolstering farm resilience. A study in Australia developed a conceptual framework for evaluating the bioeconomic outcomes of RA in mixed farming settings [39], highlighting the need for transdisciplinary assessments that consider both biophysical and economic aspects. [37] discusses the principles of regenerative agriculture, emphasizing the importance of maximizing diversity and integrating livestock, which are key strategies for enhancing biodiversity and ecosystem resilience. The benefits of plant diversification are also explored by researchers; however, these benefits are often context-specific, and the effectiveness of specific practices may vary depending on local environmental conditions and farming systems [40].

5. Economic and Social Dimensions of Regenerative Agriculture

The transition to RA presents both opportunities and challenges in the economic and social realms [1], [2], [11]. While RA can enhance farm profitability in the long run by improving soil health, reducing input costs, and producing higher-quality products [24], [14], the initial investment in transitioning to RA can be substantial [18]. Farmers may face difficulties in accessing information, training, and financial resources [31], and there may be a lack of supportive policies and markets for the goods produced with RA [18], [9].

Consumer demand for sustainably produced food is a major driver for the adoption of RA [11]. However, the premium prices often associated with regeneratively produced goods may limit market access for some farmers [18], [31]. The development of transparent certification programs and effective carbon credit schemes can help address these market challenges [1], [21], promoting wider adoption of RA practices. The integration of digital technologies can also play a significant role in improving market access and facilitating information sharing [11].

The social dimensions of RA are equally important [6], [31], [32]. The transition to RA requires a paradigm shift in farming practices and mindsets, necessitating farmer buy-in and strong community support [2]. The active involvement of local communities in the design and implementation of RA projects is crucial for ensuring their long-term success [31]. Sharing knowledge and experiences among farmers is essential for accelerating the adoption of RA practices [33], [31]. This knowledge sharing can occur through various channels, including online platforms, farmer networks, and training programs. The figure (Fig. 2.) given below illustrates the interactions between different stakeholders in regenerative agriculture.

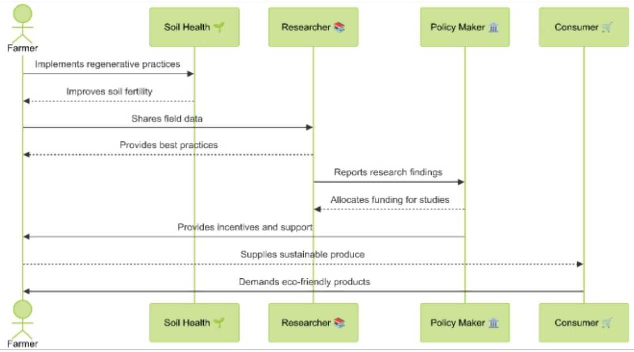

Figure 2: Interaction between different stakeholders in regenerative agriculture

6. Barriers to Adoption

Despite the compelling benefits of Regenerative Agriculture (RA), its widespread adoption is held back by several significant challenges. Farmers hoping to transition to organic and regenerative practices face regulatory hurdles, unpredictable markets, and the high upfront costs of new systems. Social isolation within farming communities adds another layer of difficulty, with many farmers relying on online or international sources for guidance rather than local support networks. A key challenge lies in the emphasis on calculability in RA practices, which can undervalue the experiential knowledge farmers have about soil health. This tension between scientific metrics and traditional knowledge calls for a more integrated approach that blends both quantitative data and hands-on experience. Additionally, existing agricultural policies often overlook the integration of microbial knowledge into farming practices, highlighting a need for alternative forms of expertise that extend beyond traditional assessments.

7. Regional and Context-Specific Approaches

The success of RA is highly dependent on regional factors, and its effectiveness can vary dramatically depending on local conditions. Case studies from various regions, such as a model in the Netherlands [40], demonstrate the importance of tailoring RA strategies to specific agricultural systems. These studies show that focusing on ecosystem services—such as climate regulation and organic matter retention—can reduce greenhouse gas emissions, even if primary productivity slightly declines. Such findings underline the need for further refinement of models that assess sustainability in diverse farming contexts, ensuring RA's adaptability to the unique challenges each region faces.

8. Integrating Agroecology and Regenerative Agriculture

Numerous case studies highlight the strong connection between agroecology and Agroecology and Regenerative Agriculture share a deep connection, particularly in how they approach ecological balance and sustainability. Research identifies multiple approaches to RA, including philosophical, developmental, and corporate strategies, all of which emphasize the role of social dimensions in fostering resilience. Moving forward, the integration of these practices must take into account both ecological and socio-political factors, ensuring that communities—especially marginalized ones—are actively engaged. Agroforestry, for example, stands out as a critical tool in restoring biodiversity and improving soil health, while the application of circular economy principles can further enhance sustainability. Additionally, empowering women farmers and involving local communities is key to fostering resilience, as agroecological practices significantly improve livelihoods and promote environmental stewardship.

9. Challenges and Research Gaps

Despite its substantial potential, several challenges and research gaps persist in the field of RA [2], [23], [24]. One major challenge is the lack of a universally accepted definition of RA [374], [31]. This variability in definitions makes it difficult to compare findings across studies, develop standardized certification programs, and establish effective policies to support RA adoption [34]. The development of a more unified definition, incorporating both process-based and outcome-based criteria [34], is crucial for advancing the field.

Another significant challenge is the need for more robust empirical evidence demonstrating the long-term benefits of RA across diverse agro-ecological contexts [4], [2], [10]. Many studies have shown positive results in specific cases [24], [19], but more research is needed to assess the scalability and replicability of these findings [2], [13]. Long-term, large-scale studies are essential to evaluate the impacts of RA on soil health, biodiversity, carbon sequestration, and other ecosystem services [4], [29]. These studies should also consider the social and economic dimensions of RA, evaluating its impacts on farmer livelihoods and community well-being [33].

Further research is also needed to understand the trade-offs and potential negative impacts associated with RA practices [10], [35]. For example, some studies have suggested that certain RA practices may increase nitrogen requirements [10], while others have shown potential trade-offs in the application of organic amendments [35]. A thorough understanding of these trade-offs is essential for developing effective and sustainable RA systems. Additionally, research is needed to explore the role of indigenous knowledge and practices in enhancing the effectiveness and adaptability of RA [6], [11]. The political dimensions of agroecology, often overlooked in discussions of regenerative agriculture, also deserve further attention.

10. Future prospects

Regenerative Agriculture (RA) holds immense potential for addressing climate change, restoring ecosystems, and enhancing farm profitability. By improving soil carbon sequestration and reducing greenhouse gas emissions, RA contributes to climate action while fostering biodiversity and ecosystem resilience through agroforestry, cover cropping, and sustainable land management. Economic opportunities in RA are expanding with rising consumer demand for sustainably grown food, carbon credit systems, and digital agriculture innovations optimizing productivity and resource efficiency. Governments worldwide are increasingly supporting RA through subsidies and policy frameworks, promoting regional adaptation based on soil, climate, and socio-economic factors. The integration of agroecology and circular economy principles, including composting and organic waste recycling, will further enhance sustainability. Additionally, advancements in AI, IoT, and remote sensing will enable precise monitoring of soil health and environmental impact, driving data-driven decision-making. The future of RA lies in the synergy of traditional knowledge, scientific research, and technology, ensuring a resilient and sustainable agricultural system for generations to come.

11. Conclusion

Regenerative Agriculture offers a compelling path forward to tackle the intertwined crises of climate change and ecosystem degradation. With its potential to significantly mitigate climate change through improved soil carbon sequestration, RA is an invaluable tool in our environmental toolkit. Moreover, RA's role in restoring ecosystems—by improving soil health, enhancing biodiversity, and boosting ecosystem resilience—cannot be understated. Yet, widespread adoption of RA faces obstacles, from the absence of a standardized definition to socio-economic and policy barriers. Overcoming these challenges requires a concerted effort from researchers, policymakers, farmers, and communities. By embracing circular economy principles, leveraging nature-based solutions, and recognizing the interdependence of human, livestock, and environmental health, we can unlock the full potential of RA. As ongoing research and implementation continue to grow, RA promises to be a cornerstone of a sustainable, resilient agricultural future.

12. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this review article. The views and conclusions expressed are solely those of the authors and do not necessarily reflect those of their affiliated institutions.

References

1. Kumar A, Pandey M, Srivastava A and Ranjan P (2024) Exploring the Potential of Regenerative Agriculture for Climate Mitigation, Resource Efficiency and Sustainability. Am. J. Environ. Sci. & Eng 8(4): 107-119.

2. Vamshi M, Jagadeesan R, Lamani HD, Rout S, VijayKumar R, Jagadesh M et al. (2024) The Revolutionary Impact of Regenerative Agriculture on Ecosystem Restoration and Land Vitality: A Review. J. Geo. Env. Earth Sci 28(4): 1-4.

3. Gulaiya S, Kumar M, Kumar R, Kumar R, Singh N et al. (2024). Regenerative Agriculture: Integrating Soil Health, Carbon Management and Socio-ecological Outcomes. Int. J. Environ. Clim 14(9): 92-105.

4. Khangura R, Ferris D, Wagg C, Bowyer J (2023). Regenerative agriculture - A literature review on the practices and mechanisms used to improve soil health. Sustain. 15(3): 2338.

5. Rhodes CJ (2017) The imperative for regenerative agriculture. Sci. Prog 100(1):80-129.

6. Hes D & Rose N (2019). Shifting from farming to tending the earth: A discussion paper. J. Org 6(1): 3-22.

7. Aytenew M (2011). Soil Biodiversity as a Key Sponsor of Regenerative Agriculture. In Biodiversity of Ecosystems. IntechOpen.

8. McCauley K & Barlow K (2023). Regenerative agriculture: increasing plant diversity and soil carbon sequestration on agricultural landscapes. SURG Journal 15(1).

9. Koman E, Laurilliard E, Moore A, Ruiz-Uribe N (2021). Restoration through Regeneration: A Scientific and Political Lens into Regenerative Agriculture in the United States. Journal of Science, Policy and Governance 19: 1-28.

10. Sharma S & Bipana KC (2024). Sustainable Agriculture and Its Practices: A Review. Turkish Journal of Agriculture-Food Science and Technology 12(12): 2631-2639.

11. Biradar C, Rizvi J, Dandin S (2022). Diversified farming systems for changing climate and consumerism. J. Hortic. Sci 17(1):19-24.

12. Iannetta PP, Hawes C, Begg GS, Maaß H, Ntatsi G et al. (2021). A multifunctional solution for wicked problems: value-chain wide facilitation of legumes cultivated at bioregional scales is necessary to address the climate-biodiversity-nutrition nexus. Front. sustain. food syst 5: 692137.

13. Jordon MW, Willis KJ, Burkner PC, Petrokofsky G (2022). Rotational grazing and multispecies herbal leys increase productivity in temperate pastoral systems–A meta-analysis. Agric. Ecosystem. Environ 337: 108075.

14. Mooney, Raymond, "Regenerative Grazing and the Benefits of Livestock on Soils in Northern New South Wales" (2019). *Independent Study Project (ISP) Collection*. 3175.

15. Provenza FD, Kronberg SL, Gregorini P (2019). Is grassfed meat and dairy better for human and environmental health? Front Nutr 6: 26.

16. Singh I, Hussain M, Manjunath G, Chandra N, Ravikanth G (2023). Regenerative agriculture augments bacterial community structure for a healthier soil and agriculture. Front. Agron 5: 1134514.

17. Pawan Malik PM &Minkashi Verma MV (2014). Organic agricultural crop nutrient. Res. J. Chem 94-98.

18. Lemke S, Smith N, Thiim C, Stump K (2024). Drivers and barriers to adoption of regenerative agriculture: cases studies on lessons learned from organic. Int. J. Agricult. Sustain 22(1): 2324216.

19. Jordon MW, Smith P, Long PR, Bürkner PC, Petrokofsky G, Willis KJ (2022). Can Regenerative Agriculture increase national soil carbon stocks? Simulated country-scale adoption of reduced tillage, cover cropping, and ley-arable integration using RothC. Sci. Total Environ 825: 153955.

20. Banerjee S, Verma S, Regmi R, Kaushal S (2023). A Vision toward Regenerative Organic Agriculture to Sustain Climate Change and Combat Global Warming. Curr. j. appl. sci. technol 42(14):12-23.

21. Cherubin MR, Junior CR, Alves LA, Bayer C, Cerri CE et al. (2024). Carbon farming initiative: a national-scale public-private partnership to promote regenerative agriculture in Brazil. Exp. Agric 60: e28.

22. Jat ML, Chakraborty D, Ladha JK, Parihar CM, Datta A et al. (2022). Carbon sequestration potential, challenges, and strategies towards climate action in smallholder agricultural systems of South Asia. Crop Environ 1(1): 86-101.

23. Rehberger E, West PC, Spillane C, McKeown PC (2023). What climate and environmental benefits of regenerative agriculture practices? An evidence review. Environ. Res. Commun 5(5): 052001.

24. Fenster TL, Oikawa PY, Lundgren JG (2021). Regenerative almond production systems improve soil health, biodiversity, and profit. Front. sustain. Food syst 5: 664359.

25. Panda N, Mohapatra KK, Mohanty S, Padhan K, Sahoo SK et al. (2024). Soil Health: Concepts, Principles and Road Maps for Management in Regenerative Agriculture. Journal of Modern Agriculture and Biotechnology 3(10).

26. Prescott CE, Rui Y, Cotrufo MF, Grayston SJ (2021). Managing plant surplus carbon to generate soil organic matter in regenerative agriculture. J. Soil Water Coserv 76(6): 99A-104A.

27. Le QV, Cowal S, Jovanovic G, Le DT (2021). A study of regenerative farming practices and sustainable coffee of ethnic minorities farmers in the central highlands of Vietnam. Front. sustain. food syst 5: 712733.

28. Çakmakçi R, Salık MA, Çakmakçi S (2023). Assessment and principles of environmentally sustainable food and agriculture systems. Agriculture 13(5):1073.

29. Pathirana R & Carimi F (2022). Management and utilization of plant genetic resources for a sustainable agriculture. Plants 11(15):2038.

30. Sah N, Blake J, D'Acunha B, Bell V, Evans J et al. Sponge Scapes (2024): Understanding the role of nature-based solutions in improving sponge functioning of landscapes–the case of regenerative agriculture. InE3S Web of Conferences 2024 (Vol. 599, p. 05004). EDP Sciences.

31. Zuberi, M., Ali, O., and Akhtar, N.. NaN. "Small Farmers and Resource-Conserving Agriculture: The Prospect of Attaining Environmental Sustainability through Zero Tillage Relay Cropping in Bangladesh". https://doi.org/10.23880/oajar-16000171

32. Dipu MA, Jones NA, Aziz AA (2022). Drivers and barriers to uptake of regenerative agriculture in southeast Queensland: a mental model study. Agroecol Sust Food 46(10):1502-26.

33. Alexanderson MS, Luke H, Lloyd DJ (2024). Regenerative agriculture in Australia: the changing face of farming. Front. Sustain. Food Syst 8:1402849.

34. Olsson S, Ameen M, Bajpai S, Gudasalamani G, Gajjar C et al. (2022). Framework for a Collective Definition of Regenerative Agriculture in India. Ecol. economy soc.–the INSEE Journal 5(1):23-30.

35. Burns EA (2021). Regenerative Agriculture: Farmer motivation, environment and climate improvement. Policy Quarterly 17(3).

36. LaCanne CE & Lundgren JG (2018). Regenerative agriculture: merging farming and natural resource conservation profitably. PeerJ. Feb 26;6: e4428.

37. Eckberg JO & Rosenzweig ST (2020). Regenerative agriculture: a farmer-led initiative to build resiliency in food systems. Cereal Foods World 1:65(6).

38. Daverkosen L, Holzknecht A, Friedel JK, Keller T, Strobel BW et al. (2022). The potential of regenerative agriculture to improve soil health on Gotland, Sweden. J Plant Nutr Soil Sci Dec;185(6): 901-914.

39. Jayasinghe SL, Thomas DT, Anderson JP, Chen C, Macdonald BC (2023). Global application of regenerative agriculture: a review of definitions and assessment approaches. Sustain Nov 14;15(22):15941.

40. Schreefel L, Van Zanten HH, Groot JC, Timler CJ, Zwetsloot MJ et al. (2022). Tailor-made solutions for regenerative agriculture in the Netherlands. Agric. Syst Dec 1; 203:103518.