Regenerative Agriculture

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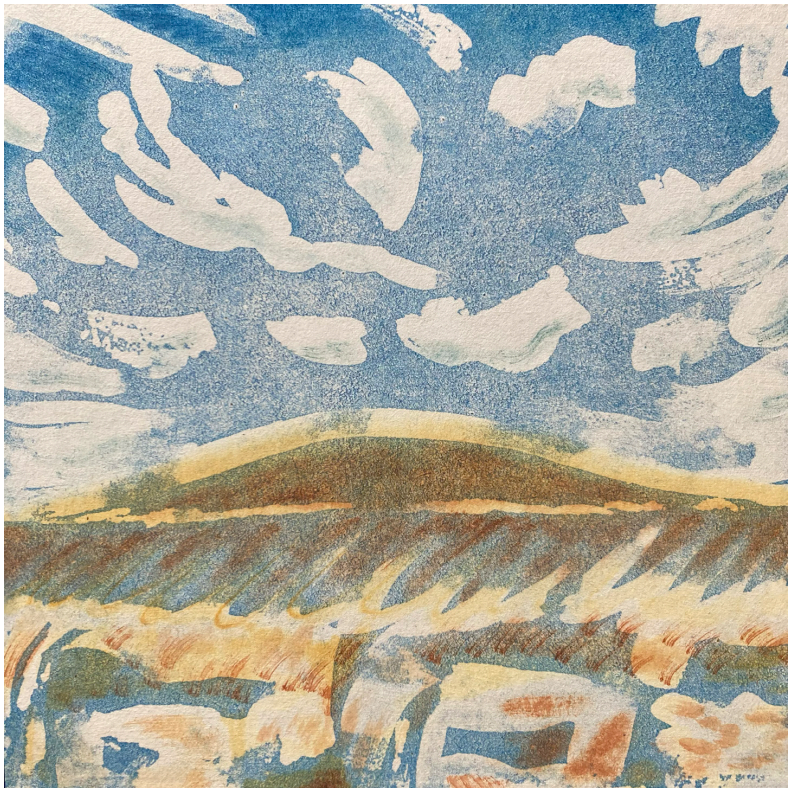

Rejuvenation
Ian Huebert

REGENERATIVE AGRICULTURE

It is estimated that agriculture will need to produce more food in the next 30 years than what has been produced in the past 400 years.

However, the expansion and intensification of agriculture are considered the main drivers of soil degradation, and conventional agriculture is one of the main causes of this environmental impact. Regenerative agriculture is an approach to farming and land management that focuses on restoring and enhancing the health of ecosystems. Regenerative agriculture aims to create a more sustainable and resilient food production system by working with natural processes rather than against them. It is seen by many to address environmental issues, improve food quality and enhance the long-term viability of agricultural systems. The goal is not just to sustain the land but to actively improve its condition over time. Regenerative agriculture shares several key concepts with the native prairies.

Resilience: The tallgrass prairie is a climate-resilient ecosystem. Regenerative agriculture seeks to build resilience by diversifying crops, using cover crops and implementing other practices that enhance the ability of the system to withstand environmental stresses.

Soil Health: The tallgrass prairie often is seen as the epitome of soil health. The tallgrass prairie is made up of organic material rich in nutrients, good soil structure and an active soil microbial community. Regenerative agriculture implements practices that improve soil structure, increase organic matter and enhance microbial activity.

Water efficiency: The tallgrass prairie is adapted to its precipitation pattern and uses water efficiently. Regenerative

agriculture aims to manage water more efficiently through no-till, residue management and good soil structure to capture intense rainfall events and store the water for dry periods between rain events.

Biodiversity: Both regenerative agriculture and native prairies emphasize the importance of biodiversity. The tallgrass prairie is characterized by a diverse mix of grasses, forbs and other plant species. Regenerative agriculture promotes biodiversity through practices such as cover cropping, crop rotation and integrated livestock.

Carbon sequestration: The tallgrass prairie stores high amounts of carbon in the soil. In fact, the tallgrass prairie stores more carbon than many forests. Regenerative agriculture promotes practices that enhance carbon sequestration, such as no-till or minimal tillage, cover crops and crop rotation, including perennials in the rotation.

The tallgrass prairie is a complex ecosystem. Regenerative agriculture recognizes the interconnectedness of soil, plants, animals and the environment. While there are similarities to the tallgrass prairie, it is important to note that the goal of agriculture is to produce food, feed, fuel and other materials for the human populations and the circular bioeconomy. The circular bioeconomy is a model that aims to create a closed-loop system where biological resources are sustainably produced, used and then recycled back into the system. Regenerative agriculture and the circular bioeconomy are complementary approaches that contribute to more sustainable and resilient agricultural systems, fostering environmental health and economic sustainability. The interest in regenerative agriculture is driven by a desire to address the environmental challenges associated with conventional agriculture, promote sustainable and resilient farming systems and meet the demands of consumers who prioritize environmentally friendly and socially responsible food production.

Consumers are increasingly interested in where their food comes from and how it is produced. There is a growing demand for environmentally friendly and sustainably produced food. While transitioning to regenerative practices may involve initial investments and changes in management, improving soil health, reducing input costs and building resilience contribute to the economic sustainability of regenerative agriculture. Some governments and organizations are recognizing the benefits of regenerative agriculture and offering incentives, grants and certification programs.

Regenerative agriculture is based on a systems approach rather than specific practices. Those principles include minimal soil disturbance, such as no-till; continuous soil cover (living plants and crop residue);

Rex and His Herd of Goats, Butler County, Kansas, 2024
Jeremiah Ariaz

maintaining living roots; increasing biodiversity through crop rotation and intensity; integration of livestock; and considerations in the context of social, economic and environmental conditions. In production agriculture, we now have the tools needed to plant crops with minimal disturbance with no-till as the ultimate goal. In the United States, less than 20% of agriculture is in continuous no-tillage. Thus, we have a great opportunity to increase acreage in no-till systems.

The second principle of regenerative agriculture is maintaining cover on the soil year-round. No-till maintains plant residue on the soil surface, protecting the soil from wind and water erosion. Cover crops keep the soil covered year-round. After summer grain crops (corn, sorghum or soybeans), fall-planted cover crops protect the soil over the winter and early spring. For winter crops such as wheat, a summer cover crop will protect the soil after wheat harvest.

A key component of regenerative agriculture is adding diversity to the crop rotation. The diversity of cropping systems has decreased globally in favor of monoculture systems that rely on synthetic inputs to manage fertility and pests. Diversifying crop rotations can decrease the reliance on inputs, improving the financial resilience of the production system and increasing soil health. For example, in eastern Kansas, a wheat-soybeans-corn rotation would provide three grain crops in two years, thus intensifying and diversifying the crop rotation.

The presence of living roots from perennial plants is critical to improving soil health, fertility and resilience and is an important component of regenerative agriculture. Increasing perennials in the rotation of agricultural systems is an effective strategy for increasing soil health and decreasing weeds and pests. Integrating livestock in cropping systems may improve soil health and provide an additional revenue stream. The sixth principle of regenerative agriculture is that these systems must be flexible in regard to soil types, climate and farmers' acceptance of risks.

Regenerative agriculture also applies to grazing systems. Regenerative grazing, or adaptive grazing, manages livestock in a way that aims to mimic natural grazing patterns. Regenerative grazing involves dividing the pasture into smaller grazing units. Livestock are rotated through these units in a controlled and planned manner. After livestock graze a specific unit, that unit is allowed time to rest and recover. This allows the vegetation to regrow, enhances root development and improves overall plant health.

Regenerative agriculture has the potential to create markets through

Burned Field With Road
Larry Schwarm

several avenues, driven by the increased interest for sustainable and environmentally friendly products. There is a growing demand by consumers for products that use sustainable and regenerative practices. Farms and ranches and products meeting regenerative criteria may be able to differentiate themselves in the market, attracting consumers willing to pay a premium for sustainable and regenerative products. In addition, a growing carbon market may create opportunities for producers to participate in these markets and receive additional income. By aligning with consumer preferences for sustainable products, regenerative agriculture not only addresses environmental concerns but also opens new markets for producers who adopt regenerative practices. The market for regenerative agriculture is likely to expand further.

Charles (Chuck) Rice is a University Distinguished Professor and holds the Vanier University Professorship at Kansas State University. He is a professor of soil microbiology and conducts research on soil carbon and nitrogen, soil health, microbial ecology and climate change impacts on agricultural and grassland ecosystems. Chuck served on the United Nations Intergovernmental Panel on Climate Change in 2007, which received the Nobel Peace Prize.