

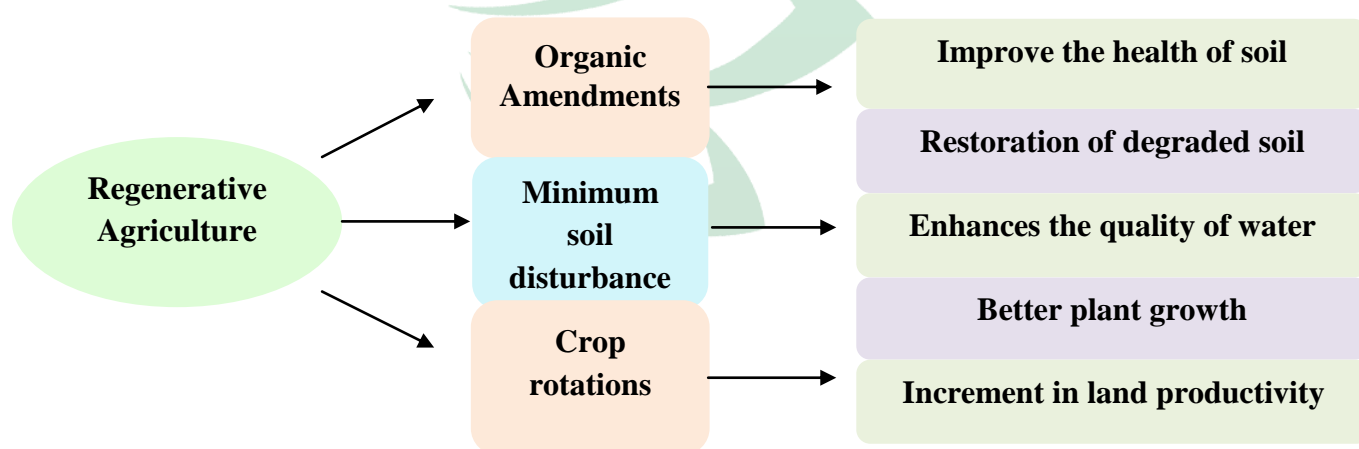
Regenerative Agriculture: Principles and Practices

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ARTICLE ID: 33

Introduction

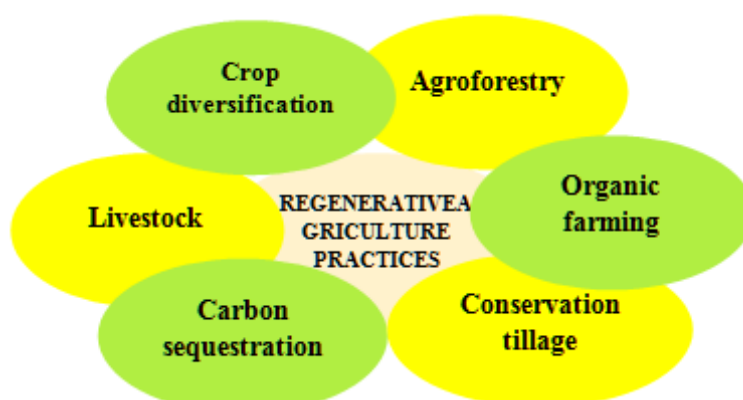
Regenerative agriculture is a holistic, integrative approach evolving set of practices that encompass several soil health supportive techniques, targeting to improve productivity, environmental quality, and soil carbon sequestration. Rodale (1983) defined regenerative agriculture as an integrative system of producing more food using as few resources as possible at the same time revitalizing the productive capacity of the soil and sequestering carbon. Regenerative Agriculture is quite simple: it is any form of farming, i.e. the production of food or fibre, which at the same time improves the environment. This primarily means regenerating the soil. The Regenerative agriculture systems have their origins in organic farming systems. The narrative found in sustainable agriculture, organic farming, and ecosystem-based agriculture systems does not address the full extent of the challenges the world is facing with food, carbon emissions and resilience of production systems. Higher resilience of agricultural systems supported by requisite soil amendments reduces dependence on external synthetic inputs over time and ensures increase in production capacity. The increase in production does not lead to negative externalities on the farmland and biocides accumulation in agricultural produce.



Other notable benefits of regenerative agriculture include soil biological stabilization, reduced reliance on non-renewable production resources and positive economic gains from the system. Regenerative agriculture involves systems that aim to improve the health of soil, restoration of degraded soils, enhance the quality of water, plant growth and potential land productivity through the use of organic amendments, minimum soil disturbance and crop rotations (Rhodes, 2017).

Practices of Regenerative agriculture

- Incorporation of crop rotation and cover cropping
- Crop diversification
- Conservation agriculture
- Composting and waste reduction
- Agroforestry
- Agroecology
- Mixed livestock systems



Principles of Regenerative agriculture

- **Soil Cover:** Keeping the soil covered with litter and other residues plays an important role in improving the soil health. It provides habitat for the soil microorganisms that promote the recycling of nutrients and also improve soil structure by enhancing the water holding capacity of soil. Crop residues and mulches not only cover the soil but also maintain the soil temperature. Vegetation covers not only serve as protective layer but also bind the soil through their roots, which reduces the problem of soil erosion.



- **Diversity:** Maintaining crop diversity can pave the way for better soil health. This can be achieved through crop diversification and crop rotation. Plants have the capacity to mineralize nutrients and different plants mineralize different nutrients. Monoculture exhausts the nutrients in soil and also reduces soil fertility. Therefore adoption of cropping system that involves the growth of different crops throughout the year can improve the nutrient status and soil health
- **Continual Live Plant/Root:** The principle of every regenerative farmer is to maximize the amount of time in a year that can have a living root interacting with the rhizosphere, building soil aggregates and mobilizing nutrients for the current and subsequent crops. Main focus is to sustain the beneficial effects of improvisation of soil health
- **Livestock Integration:** Regenerating soil is incomplete without the addition of livestock to soil cover, diversity and growing green plants throughout the year. Apart from providing income through milk and other dairy products, the wastes generated from these animals can be used as a natural manure to maintain soil fertility. Livestock plays a crucial role in supporting sustainable field management, enhancing soil fertility, nutrient cycling and soil moisture retention.
- **Minimizing Soil Disturbance:** To maintain the benefits of regenerative farm through the above mentioned management efforts, it is necessary to minimize soil disturbance through conventional tillage practices.

Practices in Regenerative agriculture

Regenerative agriculture involves the following practices:

- **Agro forestry:** Integrates the land use for agriculture and forestry in such a way to maximise food production and services for diverse requirements of rural communities. It establishes a symbiosis among agriculture crops, tree species and livestock rearing. Tree growth conserves soil moisture, improves soil fertility and protects field crops against the scorching and desiccating effect of winds.
- **Organic farming:** Organic farming systems do not use toxic agrochemical inputs (pesticides, fungicides, herbicides and fertilizers). Instead they are based on development of biological density and the maintenance and replenishment of soil



productivity. Main feature of organic farming is the prohibition of synthetic inputs and health improving agronomic practices are mandated.

- **Conservation tillage:** A tillage designed to maintain roughness of a field surface and leave most of the previous crop residues on the surface providing a suitable seed bed and weed control for the next crop. Benefits associated with conservation tillage include surface crop cover reducing soil erosion, reduced tillage machinery minimizes soil compaction, soil moisture conservation due to higher infiltration and reduced evaporation, soil temperature moderation with surface cover and improvement in soil organic matter content.
- **Crop diversification:** It assists in achieving sustainable productivity by allowing farmers to employ biological cycles to minimize inputs, improve crop yields, conserve resource base and reduce risk from both environment and economic factors. It involves shift from present cropping systems to more productive cropping systems and growing short duration crops and varieties in place of long duration crops.
- **Carbon sequestration:** Carbon sequestration has high potential in improving soil quality besides reducing GHG emissions, environment pollution and enhancing biodiversity. Maintain existing levels of organic matter by reduced tillage or no tillage practices. Restoring carbon degraded soils through appropriate tree farming and soil conservation measures.

Conclusion: Regenerative agriculture is a set of practices with the goal of increasing production of agricultural commodities, protecting the environment and mitigating climate change. It relies on integration of organic based production systems in order to resolve the contemporary challenges of food, environment and climate change.