

### **Proposed Definition of Regenerative Agriculture**

Using a systems-based perspective, regenerative agriculture sequesters carbon in the soil and intentionally improves soil health, biodiversity, water quality and air quality while ensuring the viability of farm production.

### **Principles of Regenerative Agriculture**

The principles of a regenerative agriculture system are based in Indigenous ways of land management and are adaptive to local physical conditions and culture. These principles include:

- Minimizing soil disturbance
- Maintaining living roots in soil
- Continuously covering bare soil with crop residue
- Maximizing diversity with emphasis on crops, soil microbes and pollinators
- Integrating livestock where it is feasible

### **Field to Market's Definition of Sustainable Agriculture**

Sustainable agriculture meets the needs of the present while improving the ability of future generations to meet their own needs by:

- Increasing productivity to meet future food, feed, fiber and fuel demands
- Improving the environment
- Improving human health
- Improving the social and economic well-being of agricultural communities

### **Relationship Between Sustainable and Regenerative Agriculture from Field to Market's Perspective**

Regenerative agriculture offers specific mechanisms for achieving the broad goals of sustainable agriculture and improving soil health. For example:

- Minimizing soil disturbance
  - Improves soil conservation, which is important for productivity
  - Improves soil structure and soil water holding capacity
  - Reduces turbidity, and indicator of water quality
  - Reduces pesticide and nutrient losses into waterways, thereby improving water quality and protecting human health
- Maintaining living roots
  - Supports functional microbial populations that may make soil nutrients more available to crop roots and increase productivity

- Improves soil structure and soil water holding capacity
- Continuously covering bare soil
  - Improves soil conservation, which is important for productivity
  - Creates wildlife habitat and supports biodiversity
- Maximizing diversity
  - Contributes to an integrated approach to pest management by disrupting pest cycles and supporting a genetic reservoir for biocontrol
  - Improves the environment by supporting a wider community of organisms occupying different ecological niches
- Integrating livestock
  - Improves soil structure and soil water holding capacity
  - May reduce commercial fertilizer needs and reduce input costs
  - Fosters soil microbial function, thereby improving productivity
  - Supports the economic and social well-being of communities where animal agriculture occurs

### **Background on how this definition was developed**

Interest in regenerative agriculture has increased over the past five years. What was initially thought to be a niche approach to sustainability has taken off with company commitments, marketing campaigns and a proliferation of definitions within the U.S. and globally. It is important for us to help the increasing number of members who are committed to this work understand how Field to Market's programs can help them measure progress against regenerative agriculture principles.

There are three types of definitions that were seen in research. We recommend the outcomes-based definition, as it aligns with Field to Market's mission.

1. Outcomes-based definitions are not bound to specific practices and align with Field to Market's approach to sustainability
2. Process-based definitions are focused on the inclusion of practices and are agnostic of outcomes
3. Combination of outcomes- and process-based principles

**Regenerative Agriculture Principles addressed by the Fieldprint Platform and Field to Market Metrics**

For Field to Market members who want to understand how data collected via the Fieldprint Platform is aligned with the principles of regenerative agriculture, the following table provides a summary:

	Minimize soil disturbance	Maintain living roots in soil	Continuously cover bare soil	Maximize biodiversity	Integrate livestock
Biodiversity		Cover crops Rotation complexity	Rotation complexity Edge of field	Cover crops Edge of field	
Land Use		Rotation complexity	Rotation complexity		
Energy Use	Tillage				
Greenhouse Gases	Tillage	Cover crops Reduced fallow time	Cover crops Reduced fallow time		
Irrigation Water Use					
Water Quality	Tillage	Rotation complexity	Cover crops Rotation complexity	Cover crops	
Soil Carbon	Tillage	Rotation complexity Cover crops	Rotation complexity Cover crops	Rotation complexity Cover crops	
Soil Conservation	Tillage Edge of field	Rotation complexity Cover crops Edge of field	Rotation complexity Cover crops Edge of field	Rotation complexity Cover crops Edge of field	

## Definitions and principles of regenerative agriculture in the literature

Year	Author	Definition	Website
1983	Rodale	“Regenerative agriculture is one that, at increasing levels of productivity, increases our land and soil biological production base. It has a high level of built-in economic and biological stability. It has minimal to no impact on the environment beyond the farm or field boundaries. It produces foodstuffs free from biocides. It provides for the productive contribution of increasingly large numbers of people during a transition to minimal reliance on non-renewable resources”.	<a href="https://rodaleinstitute.org">https://rodaleinstitute.org</a>
2019	Croatian Institute	“Instead of simply avoiding further degradation and depletion, regenerative agriculture aims to work with natural systems to restore, improve, and enhance the biological vitality, carrying capacity, and ecosystem services of farming landscapes. Regenerative farming operations also aim to support the resilience of the rural communities and broader value chains in which they are situated. Regenerative agriculture practitioners use strategies that aim to deepen soil carbon, improve soil health and fertility, infiltrate more water, and increase biodiversity. Practices vary widely but tend to focus on techniques that minimize soil disturbance, maintain four-season soil coverage using cover crops and diversified crop rotation, and enhance soil quality with compost and natural soil amendments rather than synthetic chemical fertilizers, sprays, and inputs.”	<a href="http://www.croatianinstitute.org/soilwealth">http://www.croatianinstitute.org/soilwealth</a>
2020	L. Schreefel, R.P.O. Schulte, et. al.	Regenerative agriculture is “an approach to farming that uses soil conservation as the entry point to regenerate and contribute to multiple provisioning, regulating and supporting ecosystem services, with the objective that this will enhance not only the environmental, but also the social and economic dimensions of sustainable food production.”	L. Schreefel, R.P.O. Schulte, I.J.M. de Boer, A. Pas Schrijver, H.H.E. van Zanten, 2020. Regenerative agriculture – the soil is the base. Global Food Security, Volume 26, September 2020, 100404.

Year	Author	Definition	Website
2020	Peter Newton*, Nicole Civita, Lee Frankel-Goldwater, Katharine Bartel and Colleen Johns	In this meta-analysis, the authors state: “Within the journal articles, the most commonly mentioned outcomes were aspirations to improve soil health (41%), to sequester carbon (17%), and to increase biodiversity (17%). Among the practitioner websites, the most commonly mentioned outcomes were aspirations to improve soil health (86%), to sequester carbon (64%), to increase biodiversity (46%), to improve water resources (46%), and to improve the social and/or economic wellbeing of communities (41%).”	<a href="https://www.frontiersin.org/articles/10.3389/fsufs.2020.577723/full?utm_campaign=later-linkinbio-cubouldermerc&amp;utm_content=later-14061248&amp;utm_medium=social&amp;utm_source=instagram">https://www.frontiersin.org/articles/10.3389/fsufs.2020.577723/full?utm_campaign=later-linkinbio-cubouldermerc&amp;utm_content=later-14061248&amp;utm_medium=social&amp;utm_source=instagram</a>
2020	Tom Green, IPM Institute	6 core principles integrated into a system: <ul style="list-style-type: none"> <li>• Minimize soil disturbance</li> <li>• Living roots in soil year round</li> <li>• Cover on soil year round</li> <li>• Diversity in crop rotation, multiple crops, cover crop mixtures</li> <li>• Careful integration of livestock</li> <li>• Context specific – must fit the farm</li> </ul>	Pulled from a presentation by Dr. Green
2020	Barbara Pia Oberc and Alberto Arroyo Schnell	According to a paper by California State University and The Carbon Underground (2017), regenerative agricultural practices aim to: <ul style="list-style-type: none"> <li>• Contribute to generating/building soils, soil fertility and health</li> <li>• Increase water percolation, water retention, and clean and safe water runoff</li> <li>• Increase biodiversity and ecosystem health and resilience</li> <li>• Invert the GHG emissions associated with conventional agriculture through carbon sequestration</li> </ul>	<a href="https://portals.iucn.org/library/sites/library/files/documents/2020-017-En.pdf">https://portals.iucn.org/library/sites/library/files/documents/2020-017-En.pdf</a>
2021	John Ikerd	A sustainable regenerative agriculture must be socially responsible and economically viable as well as ecologically regenerative.	<a href="https://www.foodsystemsjournal.org/index.php/fsj/article/view/918">https://www.foodsystemsjournal.org/index.php/fsj/article/view/918</a>

Year	Author	Definition	Website
2021	Giller, Hijbeek, Andersson and Sumberg	<p>Principles outlined in this publication:</p> <ul style="list-style-type: none"> <li>• Restoration of soil health, including the capture of carbon to mitigate climate change</li> <li>• Reversal of biodiversity loss</li> </ul>	<p>Regenerative Agriculture: An agronomic perspective  <a href="https://journals.sagepub.com/doi/pdf/10.1177/0030727021998063">https://journals.sagepub.com/doi/pdf/10.1177/0030727021998063</a></p>
2021	SAI Platform	<p>Regenerative Activity</p> <ul style="list-style-type: none"> <li>• Manage pest pressure through IPM to maintain and improve yield while reducing negative impacts to the landscape</li> <li>• Positively impact in-field biodiversity and soil health through keeping soil covered, employing lengthy and diverse crop rotations</li> <li>• Contribute to the harmony of the environment and social systems that surround the farm</li> <li>• Improve native habitat by ensuring ecological connectivity and eliminating land-use conversion</li> <li>• Grow soil through complete nutrient cycling and use of soil amendments</li> <li>• Contribute to the health of watersheds</li> <li>• Improve the farm's energy balance by employing renewable energy and improving efficiency</li> <li>• Contribute to a resilient rural community</li> <li>• Improve the livability of farmers and farm workers</li> </ul>	<p><a href="https://saiplatform.org/our-work/news/sai-platform-introduces-regenerative-agriculture-framework-to-align-agricultural-value-chain/">https://saiplatform.org/our-work/news/sai-platform-introduces-regenerative-agriculture-framework-to-align-agricultural-value-chain/</a></p>