

WHAT IS REGENERATIVE AGRICULTURE?



FACT SHEET

Produced by
Dr. Kater Hake with contributions from the ICAC Expert Panel on Social,
Environmental and Economic Performance of Cotton Production (SEEP)

Definition

Regenerative Agriculture (RA) is a holistic system of farming practices that restore and enhance soil health, strengthen ecosystem services, and build resilience to climate change. Unlike prescriptive approaches, RA is outcome-based: it adapts to local soils, climates, and farm conditions to achieve sustainable productivity. RA is continuous improvement as farm resources and opportunities expand.



Key Farm Practices

Minimize Soil Disturbance:

Reducing or eliminating tillage preserves soil structure, prevents erosion, and lowers fuel and equipment costs.

Maintain Soil Cover:

Using cover crops, crop residues, or multi-cropping shields soil from heat, wind, and water loss.

Grow Diverse Crops:

Rotations and intercropping break pest and disease cycles, improve nutrient cycling, and support stable farm income.

Why it Matters

Healthy soils

- store more water, and organic matter, building climate mitigation and resilience from droughts and floods.

Resilient crops

- develop stronger root systems that enhance soil water and nutrient access.

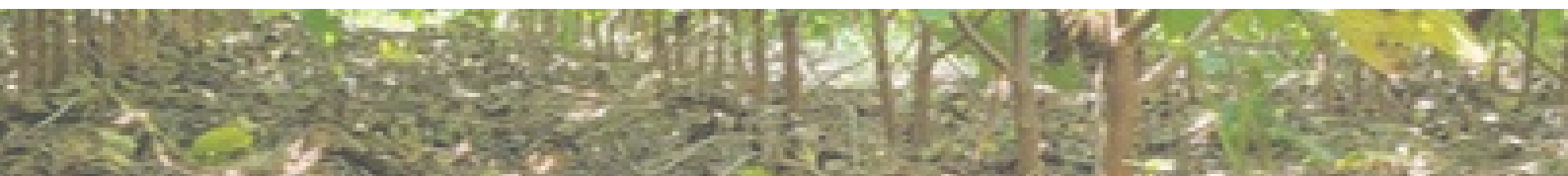
Biodiversity in the soil and crops

- supports natural pest control, nutrient efficiency and multiple harvests.

Economic sustainability

- follows from lower purchased inputs and productivity that is more diverse and stable

Regenerative Agriculture in cotton builds soil health to ensure profitable, resilient, and environmentally beneficial cotton production for generations to come.





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WHAT SUPPORT HELPS MOST

Most farmers will adopt what works well on their fields; they need help to de-risk the first steps. The biggest gains come from locally relevant advice and demos, dependable access to inputs and equipment, and basic markets for rotation crops. Short, targeted finance, tied to sound agronomy and simple RA practice tracking, can catalyze changes for farms of all resource levels that then sustain themselves.

CAN COTTON FARMERS EXPAND REGENERATIVE AGRICULTURE?

Expansion is already happening where farmers have access to knowledge, inputs, and basic infrastructure. The biggest opportunity is supporting less-resourced farm communities with the right tools and markets.

WHERE ADOPTION GROWS FASTEST

- Crop rotation: Scales when there are buyers, storage, and processing for rotation crops, plus agronomic support and reliable seed.
- Reduced tillage and no-till: Accelerates with disc-opener planters, vigorous planting seed, and herbicide programs that control weeds without cultivation.

COST AND RISK PRIORITIES

- Start with the lowest-cost, highest-benefit step for the farm context, often rotation or reduced tillage.
- Prioritize practices that compound benefits over time. No-till often delivers larger gains in years 2–4 as soil structure and biology recover.
- Continuous soil cover requires local experience with surface residue for planting, diseases, insects, weeds, moisture and termination along with low-cost seed if using cover crops.
- Use simple cover crop mixes first and scale up after local learning.



Practical extension and farmer-to-farmer demos focused on local pests, soils, and weather.



Access to planters, quality seed, crop protection, and small-scale processing for rotation crops.



Provide small, time-limited funding to help farmers start practices that will pay for themselves once the funding stops.



Outcome-based incentives from brands and potential carbon finance where measurement is credible

BOTTOM LINE

Scaled Regenerative Agriculture adoption depends on pairing farmer know-how with basic market and input access. Start where benefits are immediate, prove success locally, and reinvest gains to widen the practice set.



How Do Organic & Traditional Cotton Systems Compare with Regenerative Agriculture?



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TRADITIONAL COTTON PRODUCTION:

- Practices have been refined across generations for specific fields and previous climates
- Some RA practices already used (reduced tillage, crop rotations) to lower costs and stabilize income.

ORGANIC COTTON: PRODUCTION

- Some RA frameworks include organic requirements, but these are tangential to soil health.
- Organic emphasizes prohibiting synthetic inputs, not necessarily soil outcomes.

REGENERATIVE COTTON PRODUCTION

- Elevates soil health and off-farm environmental benefits (reduced nutrient runoff, less erosion, carbon sequestration).
- Outcome-based: focuses on soil regeneration, biodiversity, and long-term productivity rather than fixed input rules
- Yield and quality effects can vary: reduced drought stress may improve fiber quality, while delayed stand establishment may hinder maturity.
- Recognizes and helps prepare cotton farming for climate change.

Key Distinction:

Traditional = efficiency and profitability.

Organic = compliance with input restrictions.

Regenerative = outcomes for soil, climate, environment and profitability

Unlike traditional or organic systems, **Regenerative Agriculture** includes soil health and resilience rather than primarily profitability or input rules

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DOES REGENERATIVE AGRICULTURE INCLUDE CARBON SEQUESTRATION?

REGENERATIVE AGRICULTURE PRACTICES USUALLY IMPROVE SOIL CARBON BUT DO NOT SUBSTITUTE FOR CARBON CERTIFICATION MRV (Monitoring, Reporting, Verification)



Cotton is often grown on soils low in organic carbon, offering high sequestration potential.



Improving nitrogen fertilizer efficiency lowers nitrous oxide emissions, a major greenhouse gas.



Cotton textiles store ~1.5 kg of CO₂ per kg of fiber grown

Permanence of Carbon Sequestration:

- Agricultural sequestration from no-till is less vulnerable to reversal than forest carbon credits.
- No-till adoption is usually permanent because benefits increase over years, tillage equipment is sold, and cost savings allow higher farm income

Additionality of Carbon Sequestration:

- Every new cotton garments is additional carbon pulled from the air and many kilograms of carbon avoided from petroleum-based garments.

BOTTOM LINE

COTTON grown under Regenerative Agriculture can lock carbon in soils and textiles, helping mitigate climate change while strengthening farm productivity and resilience.



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MINIMIZE SOIL DISTURBANCE

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Key Farm Practice

Minimizing soil disturbance is one of the most common Regenerative Agriculture objectives for farmers. Farms are independent businesses where harvest value must exceed costs over the long term, and cost savings have been the main incentive for this practice.

Key Points

- Every tillage pass exposes soil to oxygen, accelerating the decomposition of organic matter.
- Each pass disrupts macropores from dead roots and earthworms where water can infiltrate.
- Mixing leaves and stems with deeper soil leaves the surface vulnerable to erosion and baking.
- The soil microbiome, especially the delicate mycorrhizal fungi networks, is disrupted by tillage.

Benefits

- Reduces fuel, labor, and equipment costs.
- Improves soil structure and organic matter retention.
- Enhances water infiltration and drought resistance.
- Reduces erosion and maintains soil microbiome health.



Adoption in Cotton

Cotton is ideally suited to minimizing soil disturbance because the large cotton seed can germinate without fine seedbeds and weeds can be controlled without cultivation. Many growers begin by reducing weed cultivation and then transition to no-till (zero-till) as cost savings and soil health improve annually.



Minimizing tillage protects soil structure, cuts costs, and builds resilience, making cotton farming more sustainable year after year.



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GROW DIVERSE CROPS

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Key Farm Practice

Growing diverse crops is the foundation of resilience in Regenerative Agriculture. It emulates the success of natural plant diversity, where mixed species stands are more resistant to stress and better use available resources.

Benefits of Crop Diversity

- Disrupts pest and disease cycles.
- Adds fibrous roots and organic matter.
- Enhances soil fertility and nutrient cycling.
- Provides economic stability when weather or markets fluctuate.
- Improves environmental quality by reducing excess nitrogen in water or air.

Additional Diversity Tools

- Cover crops introduce more plant species (grasses, legumes, mustards).
- Interseeding before cotton harvest accelerates both the next crop and cotton harvest with boll opening and firmer soils.

Diverse cropping builds healthier soils, stabilizes farm income, and strengthens cotton's role in resilient, climate-smart agricultural systems.



In Cotton Systems

- Diversity is most easily achieved through crop rotation.
- Cotton is ideally suited for rotation because it enhances weed control and suppresses diseases in rotational crops.
- Cotton benefits from prior crops that add residue or nitrogen and uses leftover soil nitrogen efficiently, reducing pollution risks.





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MAINTAIN SOIL COVER

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Key Farm Practice

Maintaining soil cover is another key Regenerative Agriculture objective. It protects the soil from rain and wind erosion, adds organic matter, and nourishes soil microorganisms.

Practices and Benefits

- **Cover crops are the most common solution outside tropical regions.**
 - Protect soil from erosion.
 - Fix nitrogen and add organic matter.
 - Loosen compaction, suppress weeds, improve infiltration, and retain nutrients.
- **Double cropping is feasible in tropical areas where rain or irrigation allows multiple crops per year.**
 - Provides similar soil health benefits as cover crops.
 - Adds additional farm income.

Examples

Small grains after cotton can maintain soil cover while generating income from grazing or grain. In the tropics, no-till planting of a new crop right after cotton harvest provides continuous soil protection.



Challenges in Cotton

Cotton requires more heat units to mature than most crops and has no value if fiber development is halted by lack of heat or early frost. Because the growing season is long (5–7 months), there is limited time for a second crop after harvest outside the tropics.



Keeping soil covered through residues, cover crops, or double cropping helps protect the land, improves fertility, and sustains soil life essential for future cotton yields.