



Maryland Healthy Soils Program: How Maryland is promoting farming practices that increase soil carbon and farm productivity

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National Agriculture Reform Is Needed, and Maryland is Leading

Our nation's agriculture is important because it:

- Occupies 60% of land on the continental U.S.
- Uses 80% of water and is a major water polluter
- Causes soil erosion; e.g., 1 pound of soil lost per 1 pound of corn grown in the Midwest
- Is threatened by increasing extreme weather events
- Is responsible for ~ 10% of U.S. GHG emissions
- Overall, the food system is responsible for ~ 30% GHG emissions

Why Support Healthy Soils?

- Protect water quality, reduce flooding, and enhance flood, drought, and heat resilience
- Increase soil carbon, reduce greenhouse gas emissions, and help fight climate change
- Improve soil structure, heighten water and nutrient holding capacity, and increase farm productivity
- Currently, many practices deplete and degrade healthy soil, and much farmland soil is now degraded or lost



Benefits of Healthy Soil Practices (1)

- **Greenhouse gases:** 1/3 to 1/2 ton of CO₂e removed per acre
- **Water retention:** 20-30% more water retention capacity
- **Nutrient pollution:** 10-30% less nutrient pollution
- **Soil erosion:** Greater than 33% less soil erosion



Benefits of Healthy Soil Practices (2)

- **Farmer Profits:** e.g., \$40/acre in increased profit on corn acres with healthy soil practices—roughly double the current average
- **Carbon Markets:** Healthy soil practices, if cost-effectively measured and verified, can perhaps be sold as carbon offsets in carbon trading programs
- **Climate Change:** Helps achieve carbon-neutral agriculture



Four Key Principles to Improve Soil Health

1. Minimize soil disturbance;
2. Maximize the diversity of plants in the rotation;
3. Keep living roots in the soil as much as possible;
4. Keep the soil covered with plants and plant residues at all times.



Practices That Build Healthy Soils

- Use no-till or reduced till
- Plant cover crops during offseason
- Diversify crop rotations
- Integrate crop-livestock
- Reduce synthetic fertilizer use
- Substitute compost and manure
- Shift to perennial crops
- Add trees to farms or pastures
- Plant prairie strips
- Switch to prescribed grazing
- Conserve wetland and preserve stream buffers



Maryland's Healthy Soils Program

Created by legislation in 2017
(HB 1063)

Purpose:

- Improve health, yield, and profitability of soils
- Increase biological activity and carbon sequestration in agricultural soils
- Promote further education and adoption of healthy soils practices

MD Healthy Soil Champion



Source: <https://www.nacdnet.org/get-involved/soil-health-champions-network/>

❑ Maryland's Bay Restoration Program



As part of the state's requirement to reduce nitrogen and phosphorous from entering the Chesapeake Bay, Maryland provides grants through the Maryland Department of Agriculture (MDA) to farmers to implement best management practices that not only reduce runoff into the bay but have the co-benefit of sequestering carbon in the soil.

❑ **Maryland Water Quality Cost-Share Program (MACS)**

In Fiscal Year 2018

- Maryland farmers received \$25.2 million in cost-share grants
- installed 2,008 conservation projects on their farms to protect water quality
- Grants cover up to 87.5 percent of the cost of installation
- Farmers receiving these grants invested about \$730,000 of their own money
- Projects projected to prevent an estimated 2.5 million pounds of nitrogen, 100,107 pounds of phosphorus, and 5,225 tons of soil from entering Maryland waterways.

❑ Cover Crops

- Largest and most popular cost-share program offered
- Nearly 50% of Maryland's farmland is protected by cover crops that protect soil from erosion, suppress weeds, improve soil health, and add to carbon sequestration
- During the 2017-2018 planting season, farmers planted 395,862 acres of traditional cover crops statewide using \$18.8 million in MACS cost-share grants.
- During the same year, an additional 161,332 acres of cover crops planted for harvest, which were not eligible for MACS cost-share
- MACS grants help farmers offset seed, labor, and equipment costs associated with planting cover crops

❑ **Additional Farmer Incentive**

For the 2019-2020 cover crop season underway, MDA added a \$15/acre extra incentive for farmers willing to delay killdown until May 1, 2020. This incentive is especially designed for the soil health benefits provided by an extended cover crop season.



□ No-Till Farming

Maryland farmers are among the first in the nation to practice no-till farming—reducing the amount of carbon released from their fields.

- Conservation tillage involves planting and growing crops with minimal disturbance of the surface soil.
- No-till farming, a form of conservation tillage, is used to seed the crop directly into vegetative cover or crop residue with no disturbance of the surface soil.
- Minimum tillage farming involves some disturbance of the soil, but uses tillage equipment that leaves much of the vegetative cover or crop residue on the surface.
- Farmers receive an income tax subtraction modification to help offset costs associated with buying certain types of conservation tillage equipment.

❑ Chesapeake Bay Stewardship Fund

In October 2019, the Chesapeake Bay Stewardship Fund awarded MDA a \$1 million grant to promote healthy soil practices. The grant will be used for

- financial and technical assistance for farmers; training for conservation staff and crop advisors; collection of regional soil health data;
- education programs, including on-farm events and farmer-to-farmer learning networks.

Greenhouse Gas Reductions From Agriculture: Menu of Recommended Practices (1)

Source: MDE 2019 GGRA DRAFT PLAN, selected practices

GHG estimates from [comet-planner.nrel.colostate.edu/COMET
Planner_Report_Final.pdf](http://comet-planner.nrel.colostate.edu/COMET_Planner_Report_Final.pdf)

NRCS Conservation Practice	Description of Practice	GHG Reduction Mt CO ₂ e/ac/yr		
		CO ₂	N ₂ O	SUM
Conventional Tillage to No Till (CPS 329)		0.42	-0.11	-0.11
Conventional Tillage to Reduced Tillage (CPS 345)	Reduced tillage = strip till	0.13	0.07	0.20
Replace N Fertilizer w/ Soil Amendments (CPS 590)	Soil amendments include compost, manure	1.75	0.00	1.75
Conservation Cover (CPS 327)	Convert to permanent unfertilized grass, legume, pollinator or other mix, ungrazed	0.98	0.28	1.26
Riparian herbaceous cover (CPS 390)	Convert area near water to permanent unfertilized grass	0.98	0.28	1.26
Field border (CPS 386)	Convert strips to permanent unfertilized grass/legume to reduce runoff	0.98	0.28	1.26

Greenhouse Gas Reductions From Agriculture: Menu of Recommended Practices (2)

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NRCS Conservation Practice	Description of Practice	GHG Reduction Mt CO ₂ e/ac/yr		
		CO ₂	N ₂ O	SUM
Grassed Waterway (CPS 412)	Convert strips to permanent unfertilized grass/legume to filter water	0.98	0.28	1.26
Vegetative barrier (CPS 601/342)	Plant stiff vegetative cover on hillsides or by streams to reduce erosion; can be used in critical areas	0.98	0.28	1.26
Convert unproductive cropland or grassland to farm woodlot (CPS 612)	Plant trees and shrubs in marginal cropland to restore diversity, improve water quality	1.98	0.28	2.26
Tree & shrub establishment (CPS 612)	Plant trees and shrubs	1.98	0.28	2.26
Riparian Forest Buffer Establishment (CPS 391)	Replace strip of cropland near water with woody plants	2.19	0.28	2.47
Silvopasture (CPS 381)	Add trees and shrubs to grazed pastures (> 20 plants/acre)	1.34	0.00	1.34

Maryland Soil Health Advisory Committee

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Earlier this month, Secretary Joseph Bartenfelder announced the creation of the Soil Health Advisory Committee to further the mission of promoting health soils. The Committee will support the department in implementing the Maryland Healthy Soils Program by identifying and promoting conservation practices that improve the soil by enhancing soil capacity to hold nutrients and water and store carbon.

The Committee is comprised of members from the following groups: Producers, Agricultural Organizations, Executive Agency Representatives, Academia, Nonprofit Organizations, and two members from the Maryland General Assembly. A full list can be found on the department's [webpage](#).

Supporting Resources (1)

Natural Resources Conservation Service

- “Unlock the Secrets in the Soil”

U.S. Department of Agriculture

- \$15.9 million in funding for microbiome research
- \$72 million in funding for “10 Building Blocks for Climate Smart Agriculture”

Regenerative Agriculture Initiative

- Annie’s Homegrown, Cascadian Farms, Ben & Jerry’s, Dr. Bronner’s, Organic India and Nutiva support the defining of regenerative agriculture as “a holistic land management practice that leverages the power of photosynthesis in plants to close the carbon cycle, and build soil health, crop resilience, and nutrient density.”

Samuel Roberts Noble Foundation and the Farm Foundation

- Soil Health Institute
- \$200 million in funding for agricultural research



Supporting Resources (2)

Soil Health Partnership

- Quantify benefits of improved agricultural practices

U.S. Department of Energy's Advanced Research Projects Agency

- \$30 million in funding for Rhizosphere Observations Optimizing Terrestrial Sequestration Program

National Institute of Food and Agriculture

- \$8 million in funding for understanding various microbiomes and their effects on food-production systems

Legal Pathways to Carbon-Neutral Agriculture

- Lehner & Rosenberg. Environmental Law Reporter 2017 (forthcoming)

Healthy soils laws offer states a big opportunity to protect water, soils, farm productivity, and climate quickly in a cost-effective and politically plausible way. Let us build momentum together.

Thank you,

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