

*Counting and Accounting for
Changes in
Agricultural Practices that Reduce
Greenhouse Gas Emissions -
**Capturing the Potential of Organic
Farming Practices***

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1990 "Farm Bill" [Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA), Public Law 101-624, Title XVI, Subtitle A, Section 1603 (Government Printing Office, Washington, DC, 1990) NAL Call # KF1692.A31 1990].

“Sustainable agriculture is an integrated system of plant and animal production practices having a site-specific application that will, over the long term:

- satisfy human food and fiber needs;
- enhance environmental quality and the natural resource base upon which the agricultural economy depends;
- make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- sustain the economic viability of farm operations; and
- enhance the quality of life for farmers and society as a whole."

Production Methods

- Sustainable – generally no specific production methods
- Conservation – cover crop regimen associated with explicit cover crop and dates for seeding to prevent soil erosion and gain biomass
- Typical – annual nitrogen fertilizers used, residues taken off
- Precision – using GIS for fertilizer application to prevent overlap...
- Improved – fertilizer use estimated based on pre-application soil tests (Cornell Univ) & virtually always means less fertilizer for same yields as the higher, general application recommendations
- Organic – increases soil organic matter, no synthetic nitrogen
- Other

What is out there now for ag regs?

- Organic producers are audited annually, field by field.
- NRCS pays farmers by the field for cover crops and other carbon-saving programs.
- Where participation occurs, NYS Soil & Water counties track participation in cover crop use, some nutrient mgt practices.

USDA National Organic Program

The program has identified specific soil improvement goals and production practices or prohibitions, some of which relate to GHG emissions.

Definitions in USDA National Organic Program

- *Organic matter.* The remains, residues, or waste products of any organism.
- *Organic production.* A production system that is managed in accordance with the Act and regulations in this part to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.
- *Organic system plan.* A plan of management of an organic production or handling operation that has been agreed to by the producer or handler and the certifying agent and that includes written plans concerning all aspects of agricultural production or handling described in the Act and the regulations in subpart C of this part.

USDA National Organic Program

- **§ 205.203 Soil fertility and crop nutrient management practice standard.**
- (a) The producer must select and implement tillage and cultivation practices that maintain or improve the physical, chemical, and biological condition of soil and minimize soil erosion.
- (b) The producer must manage crop nutrients and soil fertility through rotations, cover crops, and the application of plant and animal materials.
- (c) The producer must manage plant and animal materials to **maintain or improve soil organic matter content** in a manner that does not contribute to contamination of crops, soil, or water by plant nutrients, pathogenic organisms, heavy metals, or residues of prohibited substances.

Is it worth trying to engage New York State growers?

Total Acres in Farmland 7 million

comprised of

Acres cropped/harvested 4.8 million

- Acres of corn 1.1 million
- Acres cropland pasture .6 million

Acres of permanent pasture .65 million

Woodland 1.53 million

(Organic Farmland 200,000+ acres)

2011

**Agricultural activity 5% of all
greenhouse gases in US**

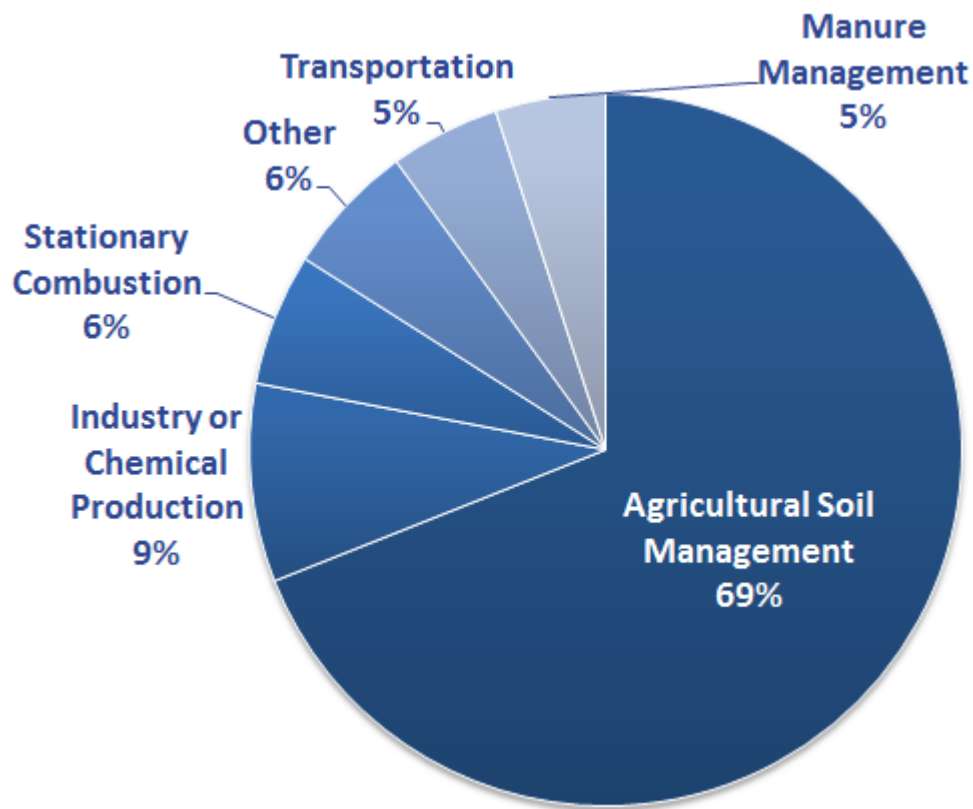
Source: US EPA Inventory (2013)

Greenhouse Gas Emissions NYS

2% from agriculture

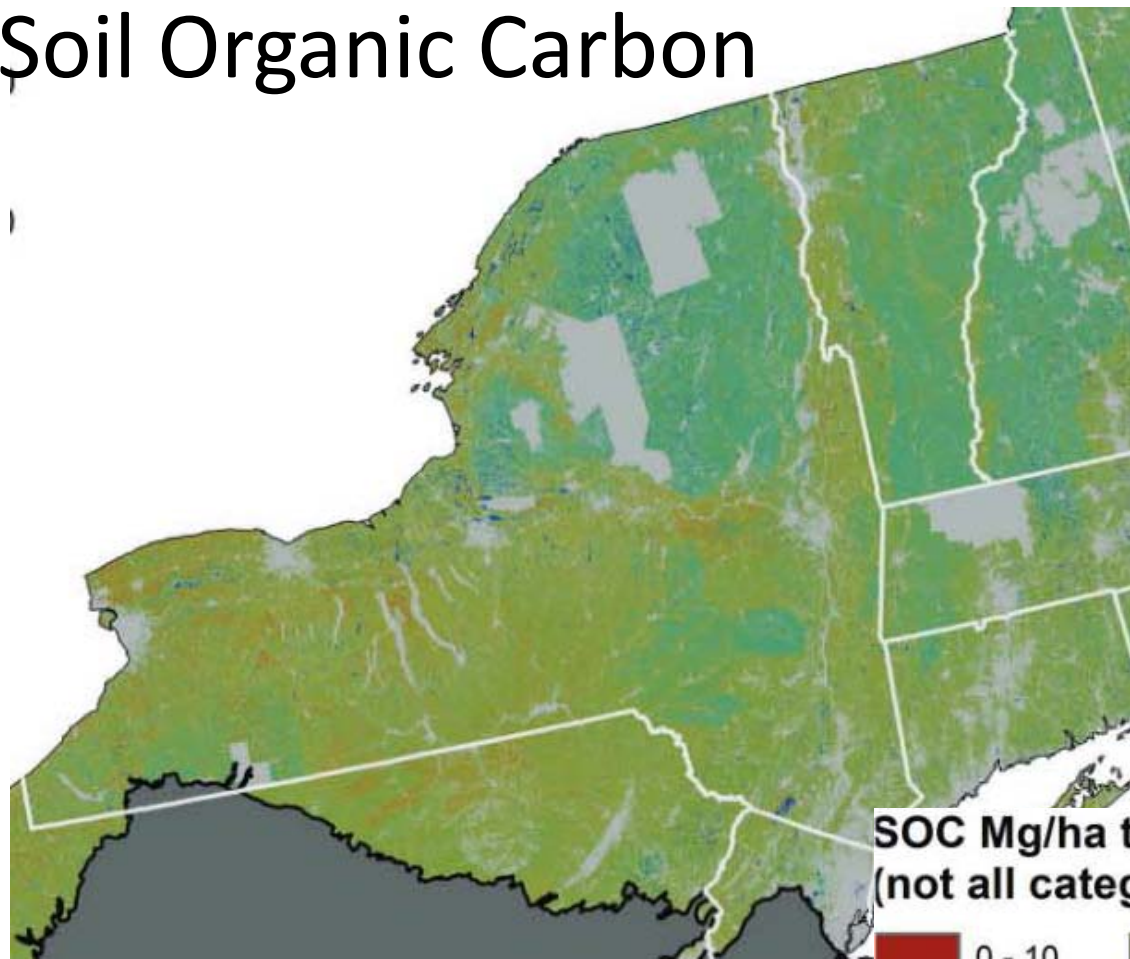
- Carbon – no program for maximizing carbon sequestration in soils
- NO_x - no program for reducing, replacing synthetic fertilizer use or minimizing N releases in manure management
- CH₄ - NYSERDA has a program for anerobic digesters for manure-based methane management

U.S. Nitrous Oxide Emissions, By Source



Note: All emission estimates from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2011

Soil Organic Carbon



**SOC Mg/ha to a depth of 100cm
(not all categories occur in this map)**



Potential for Reducing N Emissions in Agriculture

- Use of cover crops to replace or diminish synthetic fertilizers
 - Known to be effective
 - Recommended amounts often available as one type of best management practice
 - Use not only provides atmospheric N, but also reduces carbon burn or loss associated with synthetic N applications.

RGGI Program Presents a High Bar

Offsets must be:

- Real
- Additional
- Verifiable
- Enforceable
- Permanent

Methods of Engagement?

- Private market opportunity? Organic agriculture has shown that there is a market among consumers for the products grown using specific production practices.
- IPM or “eco” labels, with variations on use of pesticides have also been used to market crops (less successfully) to consumers.
- Regulation?

Potential Participants

Individual Farmers

Bio Fuels Plants in NYS

Grain buyers of various stripes

Vegetable processors or buyers

Coops (primarily dairy)

Big distributors

National grocery store chains

Considerations

- Per acre basis to allow overall agricultural production to expand with increased production and contract with decreased production
- Needs to be in blocks of years associated with use of cover crops, “good” rotations and the variability in results that will occur due to influences of weather
- Biological nitrogen fixation using “green manures “ or cover crops
- Carbon levels to amounts associated with soil organic matter potential of specific soils as this relates to nitrogen trapping and preservation for next crop
- Manure management in relation to maximizing soil incorporation/plant uptake of imbedded nitrogen. Could be efficiency of use of on-farm animal nitrogen for crop production needs

Applicable Useful Studies/Data

Current soil stocks and estimates of historic potential

USDA – Rapid Assessment of US Soil Carbon (RaCA) for Climate Change and Conservation Planning – May 24, 2013

Baseline

USDA - Agriculture & Forestry Greenhouse Gas Inventory: 1990-2011 for baseline modeling

Testing Methods

Science-Based Methods for Entity-Scale Quantification of Greenhouse Gas Sources and Sinks from Agriculture and Forestry Practices (draft for comment)

Looking to Organic Fields and Records

- Field crop records have to be kept 10 years. Some growers may have 25 years of records for rotations and soil carbon profile research
- Cover cropping beyond conservation for primary soil fertility needs
- Rotations, which are the key to:
 - Farm profitability
 - Soil Org Matter over time (can't do it in one year)
 - Soil productivity efficiencies

Organic Production and Regulatory System – It is acceptable to farmers

- Record-keeping – It's a lot, but people do it
- There is a market for organic – what about carbon-neutral?
- Farming methods proven – farmers can use them
- Farming methods sync with other things (NRCS or general soil conservation practices, more SOM means soil resilience for crops in both drought and wet conditions)

Conclusion

Organic farming production methods and regulatory framework, including third-party verifiable record trail, have something to offer as food for policy-making thought for an agricultural GHG program