Agroforestry and Organic: Opportunities and Challenges for GHG Mitigation

Both organic agriculture and agroforestry practices provide opportunities for greenhouse gas mitigation in the northeast. They are both broad, flexible concepts that may be adapted to a variety of farming systems, locations, and contexts. They present potential components of the changes the agricultural system needs to make to mitigate and adapt to climate change. This session will explore the opportunities and challenges for organic and agroforestry systems, as well as the role of government in maximizing public benefits from these systems.

1. **Framing the discussion**
    a. Agroforestry and organic are broad, flexible concepts that may be adapted differently depending on the location – and therefore may not work in all ecosystems
    b. Both have a range of climate and other benefits. Producers can choose which benefits are most important to them and design their systems accordingly.
    c. The systems are site-specific, and so are there variable outcomes – stay away from better/worse, all/none generalizations
    d. Both have long time horizons – organic requires soil building, agroforestry requires tree/shrub growth
    e. Overarching question: what is the role of government in maximizing the public benefits from these systems, and can we incentivize their adoption where market forces fail?

2. **Defining systems**
    a. <u>Organic</u> – defined in law
        i. Labeling term for food/ag products produced using cultural, biological, and mechanical practices that support the cycling of on-farm resources, promote ecological balance, and conserve biodiversity
        ii. Requires maintenance or improvement of soil and water quality, and conservation of woodlands, wetlands, and wildlife
        iii. Synthetic fertilizers, sewage sludge/biosolids, irradiation, and genetic engineering may be used
        iv. All producers and handlers using the USDA organic label are inspected at least yearly to ensure compliance
        v. Market: $37 billion in food sales in 2015, growing at 11-12% per year, major domestic supply shortages resulting in import increases
    b. <u>Agroforestry</u> – generally defined as the intentional combination of agriculture and forestry to create integrated and sustainable land-use systems. It is not defined in law.
        i. Intentional, interactive, integrated all are important– not just trees and crops near each other but instead trees and shrubs that benefit crops or livestock
        ii. In temperate areas, this usually encompasses five main practices: riparian forest buffers, forest farming, alley cropping, silvopasture, and riparian forest buffers
            1. Some of these are used more in the northeast than others, which are more prevalent in other regions
            2. Each have different potential for mitigation and adaptation
        iii. Agroforestry is just one possible component of a broader sustainable ag system. Different farms and forests may add different practices that suit a producer's goals, resource concerns, and local ecosystem.
        iv. We don't know how many people are practicing agroforestry in the US but can get some sense by people who use government cost share to install practices, Census of Agriculture, remote sensing, and other methods.

3. **Organic practices: opportunities**

a. Soil health – dependent on natural fertility inputs, like compost and manure
    i. Adaptable to drought conditions
    ii. Retains water & reduces runoff
    iii. Not dependent on synthetic fertilizer manufacture or transport
b. Crop rotation required, cover crops common
c. Buffer zones may improve biodiversity, wildlife habitat
d. Preventative weed management – rotation, mating disruption, tillage
e. Pasture-based livestock systems – requires grazing
f. Excluded methods – briefly acknowledge that biotech not allowed, limits seeds approved for use

4. Organic practices: challenges

a. Tillage – necessary for weed management, controversial; net impact on soil health and GHG emissions still unclear
b. Transition – 3-year minimum conversion time without price premiums
c. Yield drag – what is the yield gap? Inconsistent across crops, not as great in drought
d. Research needs daunting – multi-cropping systems, variable ecosystems, animal husbandry
e. Certification system
    i. Focus on materials (pesticides, food additives, biotech) rather than environmental benefits
    ii. USDA has increased emphasis on natural resource aspects
    iii. How do we either train certification staff to verify conservation practices OR increase partnership with USDA conservation practitioners?

5. Agroforestry – Opportunities

a. Income opportunities: Improved yields, diversified income, improved pollinator habitat
b. Conservation opportunities: Improved water quality, reduced soil erosion, additional wildlife habitat, carbon sequestration, and others
c. Climate context: mitigation and adaptation opportunities
    i. Plant now to receive benefits later
    ii. "Productive conservation" – getting carbon (and other conservation) benefits while still producing income

6. Agroforestry – Challenges

a. Making a producer's system more complex– takes time, different skills, potentially different markets, etc.
    i. Opportunities for leasing to allow specialization
b. Time lag – plant now, income and other benefits later
c. Some program support, but how do we ensure retention after payment is gone (especially for riparian forest buffers)
d. Training needs among technical service providers- landowners ask for agroforestry assistance but don't find the expertise
    i. Efforts to address this