Assessment of Carbon and Climate Smart Practices Through Field Data, Sensors, and AI Modeling in Specialty Crops

Sabine Grunwald and R&D team of the USDA-funded project "*A vibrant future: Pilot projects for climate-smart fruit and vegetable production, marketing, and valuation of ecosystem services*".

SOIL, WATER, AND ECOSYSTEM SCIENCES

UF UNIVERSITY of FLORIDA

Significance

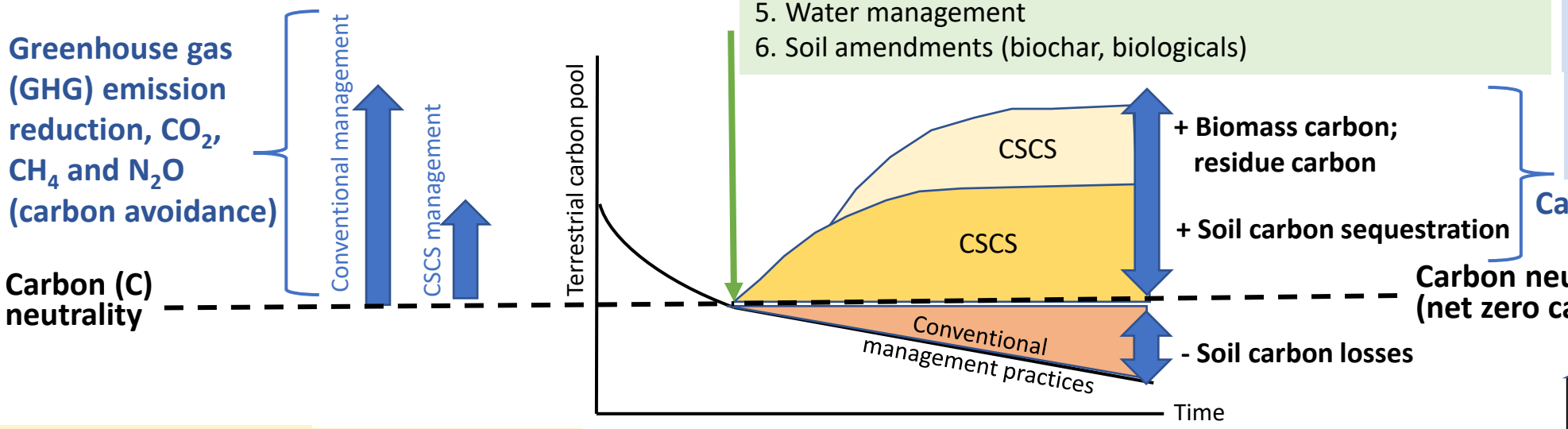
Adopting carbon-sequestering and climate-smart practices (CSCS) by fruit and vegetable growers represents a significant opportunity for establishing consumer-driven markets, enhancing land-based carbon sequestration and ecosystem services, improving soil and crop health, and enabling growers to participate in carbon markets.

Carbon-sequestering and climate-smart (CSCS) practices

1. Nutrient management
2. Residue and tillage management (reduced tillage; no-tillage)
3. Alley cropping
4. Short season cover crops
5. Water management
6. Soil amendments (biochar, biologicals)

Carbon sequestration rates in global croplands vary between 0.90 – 1.85 Pg C yr^{-1}, i.e. 26–53% of the target of the global "4p1000 Initiative: Soils for Food Security and Climate" (Zomer et al., 2017)

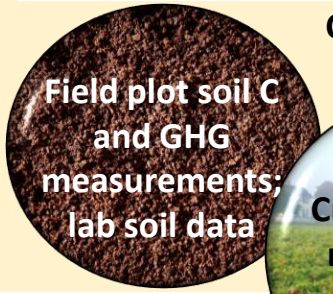
Carbon sequestration in specialty crops? More data and models are needed.



COMET

Modeling Output

Quantification methods of carbon additionality and avoidance of CSCS practices in specialty crops (in CA, FL, GA, LA, and AL)



Climate data and other env. geodata (Google Earth Engine)

Remote sensing of vegetation indices and CO_2 emissions

Cost-effective proximal soil sensing (portable visible-near-infrared spectral scanners) to build soil C/soil health spectral library for specialty crops

Soil C, soil & crop health indices, GHG emissions (Artificial intelligence, AI, modeling—machine and deep learning)

Ecosystem services (ARIES assessment tool)

C and GHG (DayCent simulation modeling)

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