

Sustainable Nutrient Management Systems

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<https://soils.ifas.ufl.edu/sustainable-nutrient-management-systems/>

Setting the stage

Current issues

- High yields are needed to meet demand and address the loss of farmland via urbanization
- Fertilization needs to be optimized to increase yields, maintain nutritional quality, and reduce nutrient losses
- Other ecosystem services and related benefits (e.g., soil C) can help make agroecosystems more sustainable

How to address these issues

- Individual practices and systems shifts (e.g., to organic) can both be useful
- Adapted methods are needed to evaluate sustainability in the SE US

Ultimate goals of our research program

- Maximize crop productivity & quality
- Maintain soil fertility and soil health
- Minimize environmental impacts

Our current research focus

Effects of individual practices

- Hybrid fertilization with nitrogen fixers, amendments and fertilizers
- Cover crops (legumes, grasses, others) and alternative crops (winter legumes)
- Reduced tillage in vegetable systems



Systems research

- Optimization of organic systems, such as different management strategies during the transition to organic & practices that reduce plastic use
- Regenerative agriculture
- Livestock integration in vegetable systems

Methods optimization

- Indicators for soil health and methods to quantify changes in soil C in the SE US
- Approaches to quantify nutrient benefits of legumes to subsequent vegetable crops



Selected key outcomes

Cover crops and nutrient cycling

- Cover crops increase soil nitrogen during the vegetable growing season
- Limited nitrogen transfer to vegetables and limited yield benefits
- Promising contribution to soil health and soil C but long-term effects are uncertain

Organic management

- Trade-offs between phosphorus and carbon benefits among fertilization approaches
- Vegetable quality and nutritional properties possibly affected by fertilization
- Important trade-offs with vegetable yields for reduced tillage (but varies among crops)

Soil health indicators

- Indicators selected for other areas of the US don't necessarily work in SE US

