Best Management Practices for Long Term Soil Health and Fertility

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These best management practices were selected by experienced high tunnel growers and extension staff as a result of a four year project tracking economic, soil and irrigation water data from high tunnels across New York State. They can be used remedially, or implemented in a new high tunnel system. This work was a collaboration between Cornell Cooperative Extension and NOFA-NY, funded by the NY Farm Viability Institute. We thanks the farmers that participated in the development of these BMPs.

Soil test annually and keep track of trends in major nutrients

Nutrient levels can shift quickly in high tunnel soils. Fertilizers are often over applied or contain non-target nutrients, leading to nutrient imbalances that impact yields. Keeping track of these levels is a key practice to maintaining productive tunnel soils. An annual soil test and knowing how to manage fertility in response to changing nutrient levels can help prolong the productivity of high tunnel soils.

- Perform an annual soil test at the same time each year with the same lab.
- Keep records of nutrient levels, especially phosphorus and calcium.
- Avoid fertilizers that contain phosphorus and calcium, especially when soil levels are high.
- Test amendments such as composts for these nutrients prior to application.

Actively address and manage soil pH, and irrigation water pH and alkalinity

Over half of the tunnels we tested have soil pH higher than 7.0, while the optimal pH range for most crops is between 5.5 and 6.5. Outside of this range, micronutrients become less available to the plants and can lead to deficiencies in the crop. Keeping track of soil and water pH levels and managing fertility with these levels in mind is crucial for long term tunnel productivity.

- Test soil pH and irrigation water pH and alkalinity annually and keep track of changes over time.
- If either pH is higher than 6.5 and/or seems to be rising over time, consider mitigation efforts.
- Apply elemental sulfur to soil in the fall or spring.
- Add sulfuric or citric acid to irrigation water with an injector throughout the growing season.
- Leave plastic off for a season to mitigate high pH soils, precipitation is naturally slightly acidic.
- Check the pH of any amendments, weigh the benefits against potential impact on soil pH.

Add Organic Matter

Given the intensive nature of high tunnel growing, incorporating organic matter back into high tunnel soils is essential to maintain soil health and productivity. There are a number of effective methods, and some pitfalls to be avoided when aiming to increase organic matter levels.

- If organic matter levels are decreasing on soil tests, start adding organic materials to the program.
- Mulch aisles between rows with straw, and turn it in at the end of the season to decompose.
- Amend soil with peat moss, which has a low pH level and does not contribute additional nutrients.
- Incorporate cover crops into the tunnel rotation. More research is needed on the benefits to high tunnel soils of growing a cover crop.

- If compost will be used, test for pH, salt level and nutrient content prior to application.

Foliar test the crop and respond to the results

Foliar testing is key for making sure your crop is getting the necessary nutrients from the soil or fertility amendments and avoid overloading high tunnel soils with excessive inputs. Foliar testing your crop will give you an inside look at how your plants are doing before symptoms arise.

- Check with your local Cooperative Extension office for reputable labs in your state.
- Sample two weeks post-transplant and then every 2-3 weeks throughout the growing season.
- Collect 5-10 of the youngest fully mature leaves from one variety and send to a lab for analysis.
- The lab should provide you with macro and micronutrient levels and recommended ranges for each nutrient, and your local extension agent can help with interpretation of the data.