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Rootzone pH affects plant growth as well as pathogen proliferation causing root rot diseases. The idea of this series of unique studies being conducted at the Ohio State University is to grow leafy greens in a relatively acidic solution (pH 4.0-4.5) that can mitigate the risk of root rot diseases. The challenge of this effort is to minimize the potential negative impact of low pH on plant nutrient uptake and growth, as hydroponic leafy greens are typically grown in nutrient solutions with pH 5.5 to 6.5.

Using a deep water culture (DWC) hydroponic system, sweet basil 'Dolce Fresca' and 'Nufar' and spinach 'Corvair' plants were grown under a pH of 4.0, 4.5, 5.0, or 5.5 to understand species- and cultivar-specific pH sensitivity. Then, a challenge inoculation of acidic nutrient solution with *Pythium aphanidermatum* zoospores was examined with basil 'Nufar' plants grown at pH 4.0 vs. 5.5. Effects of increasing overall strength of nutrient solution to improve the uptake were also examined for possible recovery of spinach plant growth at pH 4.5.

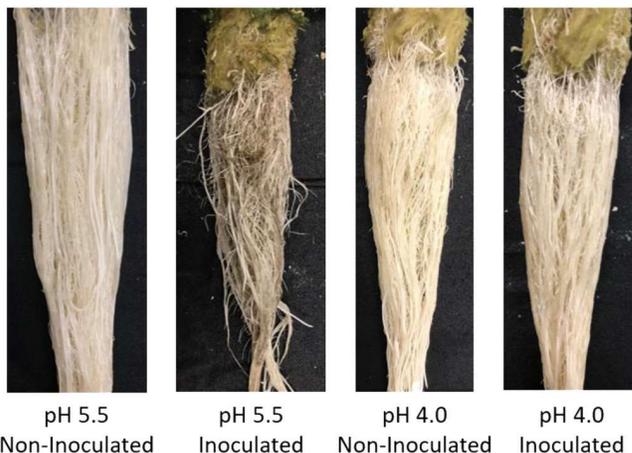


Figure 1. Basil roots after inoculation with *Pythium* zoospores

Summary of Findings

Plant growth under low pH:

- Basil can be grown hydroponically at a pH as low as 4.0 without reducing shoot biomass (yield).
- Spinach shoot and root biomass decreased by lowering pH.

Plant nutrient uptake under low pH:

- All macro and micro nutrients uptake (except Ca and Na) decreased by lowering pH for spinach.

Root rot disease at low pH:

- *Pythium* oospore was confirmed in the inoculated basil at a pH 5.5 but not at a pH 4.0.

Nutrient adjustment:

- Overall increase of nutrient strength improved spinach growth at pH 4.5, although the yield was still lower than at pH 5.5.

Take-Home Message

- Lowering the pH is a potential low-cost mitigation measure for root rot diseases in hydroponics.
- Various leafy greens need to be examined to develop a nutrient solution formula suitable for the use at low pH.

