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Air injection explored in organic crop trials

Scientists with the Center for Irrigation Technology (CIT) at California State University, Fresno are expanding their research in the use of air injection as a means of enhancing soil properties for crops.

Agronomist Dave Goorahoo began exploring the technique, now referred to as AirJection® Irrigation, several years ago using newly-patented technology to inject air into subsurface drip irrigation lines.

The system uses high-efficiency venturi injectors to mix microscopic bubbles of air with the water inside the drip line. The air permeates the soil along with the water during irrigation and helps to aerate the soil.

“Recent and ongoing research has shown that AirJection® Irrigation can increase root zone aeration and add value to grower investments in subsurface drip irrigation systems,” Goorahoo said. “So far we have tested the technology on conventionally grown bell peppers, fresh market tomatoes, cantaloupes, honeydews, broccoli and sweet corn.”

In the summer of 2004, for example, a study on a 20-acre cantaloupe plot revealed a 13-percent increase in the number harvested and an 18-percent increase in the weight of melons in plots treated with AirJection® Irrigation, Goorahoo noted.

The work conducted to date has been aimed at evaluating AirJection® Irrigation using conventional farming methods, Goorahoo reported. In a new phase of research, he is overseeing a graduate student project assessing the impact of nitrogen on the yield and quality of bell peppers grown organically using the AirJection® irrigation.

The study is being conducted on Fresno State’s university farm. The experiment features a split plot design of eight beds – each five feet wide and 50 feet long – representing four replications of air injected treatments and no-air (control) treatments. Nitrogen is being applied at rates of 30, 60, 90 and 120 pounds per acre as commercially available organic fertilizer (12-0-0) derived from feather meal.

Handling the technical aspects of the project is Namratha Reddy, a master’s degree candidate in the Department of Plant Science. As part of her work, Reddy has overseen the fertilizer and irrigation applications. She also attends the field regularly to measure plant photosynthesis, transpiration rates and soil respiration

Initial measurements revealed that both AirJection® Irrigation and N rate had a significant effect on plant transpiration rate, Reddy reported. Nitrogen application rates also had a

significant effect on stomatal conductance and water use efficiency.

Soil samples taken before and after the cropping season will be used to assess the impact of AirJection® Irrigation on soil fertility. Yield data, tissue analysis, and plant biomass data also will be determined.

“The increase in yield and improvement in soil quality associated with the root zone aeration augers well for the adoption of AirJection® Irrigation, primarily as tool for increasing crop productivity,” Goorahoo noted.

Results of yield analyses and other aspects of the project will be presented at upcoming seminars and in special publications.

For more information, Goorahoo may be contacted via email at dgooraho@csufresno.edu.