Agronomist Dave Goorahoo, left, and database analyst Diganta Adhikari walk through an experimental broccoli field on the Fresno State campus.

This is part of a system in a Fresno State project looking at the injection of air into irrigation systems to allow the air to reach the root zone of plants.

By Dennis Pollock
The Fresno Bee

Just as people need air to breathe, plants rely on air in their roots to thrive.

That principle is at the center of a research project at California State University, Fresno, that looks at the use of air injection during irrigation to increase yields and crop quality.

"Roots of plants need at least a 10% oxygen level," said agronomist Dave Goorahoo. He heads a research project focused on adding air to water that travels through subsurface drip irrigation lines.

The concept is not new. For more than 60 years, researchers have known that plants benefit when air and water are delivered to soil.

But Goorahoo said drip lines and new technology for injecting air now make the prospect easier. His project is aimed at determining just how effective it is.

Diganta Adhikari, a database analyst for the

See AIR, Page C3
Air: Plant roots need oxygen to thrive

Continued from Page C1

project, said the process is similar to aeration of the soil—a result when people don boots with nails on their soles and walk on their lawns. Such boots are sold in hardware stores.

The air injection project at Fresno State is far more precise and the dividends potentially high. For instance, Adhikari uses equipment to calibrate and document the amount of oxygen delivered through irrigation lines.

Adhikari and Goorahoo, an assistant professor at Fresno State, work with other scientists at the Center for Irrigation Technology on campus as well as with Mazzei Injector Corp. in Bakersfield.

Goorahoo began exploring the use of air in irrigation water, now referred to as AirJection Irrigation, several years ago using newly patented technology from Mazzei. The program’s work documenting the potential of the technology may influence farmers to adopt it more widely.

The system uses injectors that mix microscopic bubbles of air with the water inside the drip line. The injectors are configured so that they naturally draw air into the lines. No mechanical devices are needed.

Goorahoo said the increase in yields and potential improvement in soil quality “augurs well for the adoption of the technology.” He said he would like to see future studies focus on the impact of air injection on water-use efficiency, soil respiration, insect and pest resistance and rooting characteristics of various crops.

Chuck Dees, irrigation specialist with Stamoules Produce Co. in Mendota, said the injection system has proved very successful on 1,500 acres of cantaloupes, broccoli, honeydew melons and sweet corn the company grows.

“We put it in about three years ago,” he said. “It’s a lot better if you put it in when you first put in the drip lines. It can be labor intensive otherwise.”

Dees said the 1,500 acres is a test plot. The company farms about 14,000 acres in all.

Goorahoo said the technology has been tested on conventionally grown bell peppers, fresh-market tomatoes, cantaloupes, honeydews, broccoli and sweet corn. Commercial-size plots in Firebaugh and Mendota were among research sites.

More recently, research has begun on organically grown broccoli and bell peppers on Fresno State’s university farm.

In the summer of 2004, a study on a 20-acre cantaloupe plot revealed a 13% increase in the number harvested and an 18% increase in the weight of melons in plots treated with AirJection Irrigation, Goorahoo said. Increased yields also were reported in other crops that included bell peppers.

In the new phase of research, Goorahoo 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.

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 visits the field regularly to measure plant photosynthesis, transpiration rates and soil respiration.

Initial measurements revealed that both AirJection Irrigation and nitrogen rates had a significant effect on plant transpiration rates, Reddy reported.

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 reporter can be reached at dpolelock@fresnobee.com or (559) 441-6364.

For more information about the Mazzei AirJection® Irrigation System, please contact:

Mazzei Injector Company, LLC
500 Rooster Drive
Bakersfield, CA 93307
661-363-6500

www.mazzei.net