Subsurface Drip Irrigation; Good For Water Quality

The Situation
The benefits of using subsurface drip irrigation to water potato and sugar beet fields are becoming apparent in the Magic Valley. Increased pumping costs and concerns about the loss of expensive nutrients and pesticides through the root zone are some of the driving forces behind this interest. These lost chemicals have been found in our water sources. Drip irrigation systems leach less water through the root zone and thus carry less agricultural chemicals to the ground water. The Snake River Plain Water Quality Demonstration Project, located in Burley, Idaho, has been working to assist area producers reduce these costs and losses. In previous years the project has demonstrated the use of drip irrigation on small plots. These plots showed that potatoes could be grown using buried drip tape.

Our Response
In an effort to better understand how a subsurface drip irrigation system will work under a rotation of potatoes, sugar beets, and small grains, the demonstration project entered into an agreement with Galen Myers, a farmer in Murtaugh, Idaho, to help him place the corners of his center pivot irrigated fields under drip irrigation.

Drip tape was laid above a hard pan 18 inches below the soil surface. The installation was unique in that the drip tape lines were laid at right angles to the field rows. Tape lines were placed 3 feet apart with emitters every 2 feet.

This year Myers grew sugar beets and several differences became apparent between drip irrigation and other types of systems. The drip system was able to maintain soil moisture at acceptable levels throughout the season. The hand line system let the soil dry but was able to increase soil moisture latter in the season. The center pivot let the soil dry out and was not able to "catch up" with peak evapotranspiration rates during mid-season. In the field there was a visible difference. Under the pivot the sugar beets experienced episodes of moisture stress. This was not the case with the drip system.

Yield test plots were harvested from center pivot, drip, and wheel line areas. The beet yields were slightly higher under drip irrigation. Total sugar grown was not significantly different between irrigation type, although % sugar was lower for the drip system. There was also no significant difference between the % conductivity and the nitrates in the beets.

Disease control differs dramatically under subsurface drip irrigation. For instance, any fungal disease that is adapted to wet conditions can be reduced with subsurface drip irrigation. This includes late blight of potatoes. However, diseases like powdery mildew infect and spread more effectively when conditions are dry. Powdery mildew was present in the drip irrigated beets this year.

Past studies have shown that drip irrigation can save 10-30% of the water used by sprinkler systems and
can allow nitrogen application to be reduced by at least 20%. It can also reduce the hazard of chemicals entering ground water. Less chemicals are lost under drip because they can be injected into the drip tape and are thus applied directly to the root zone. Drip irrigation systems are somewhat more costly than sprinkler alternatives, but do have definite benefits in disease control, chemical management and irrigation efficiency. Drip systems can be used to improve water management and water quality without reducing sugar yield.

**The Future**

The Demonstration Project will continue to assist with this drip system. In future years the project will be involved in more closely monitoring the water and energy use of the system. Modified nitrogen and fertilizer management will be required for drip irrigation to produce the sugar content required in the beets at harvest time.

**For More Information**

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