

WHAT'S GREEN ABOUT IRRIGATION

2009 IAEF Essay Contest

When most people think about the word “Green” today, they think about environmentalism, conserving our resources, and creating ways to solve environmental problems. Even though irrigation is just that, irrigation is also “green” in other ways. This summer I was able to start my own small sprinkler business. I called it Greener Landscaping. The catchphrase on my business cards said “Greener lawns in Greener ways with Greener pockets”. Irrigation is “green” in these three ways. In the most literal term, irrigation is green because it makes plants green, or beautifies landscapes. It is green because it helps save our most valuable resource and helps solve environmental problems. It is also green because it saves people “green”, or money. The reason why irrigation has become so green is because of new irrigation products and techniques.

The primary objective of irrigation in its creation was to grow crops. Many regions would be uninhabitable and desolate without irrigation. Utah is a good example of this. When the Mormon pioneers, who founded Utah, arrived in the Salt Lake Valley in 1847, they found nothing but desert. Fertile land was limited and water was sparse. Some of them must have thought it to be crazy to try to settle such a dry and desolate place. Irrigation techniques such as reservoirs, canals, and flood irrigation made it possible to sustain life, grow crops, and make things green. By the 1900's over 400 farm communities were formed, 30,000 farms were formed, and 4.1 million acres were being farmedⁱ. Today, Utah is still an agriculturally productive state and is home to some of the nations' more renowned landscaped and maintained grounds such as Temple Square and Brigham Young Universityⁱⁱ.

Irrigation helps us conserve our most valuable resource. For many urban regions, especially western states such as California, Arizona, Nevada, New Mexico, and Utah, water reserves are decreasing. Cities such as San Francisco limit how much grass and what type of irrigation components companies and residents can use in their landscapesⁱⁱⁱ. More efficient irrigation products and techniques allow residents and businesses to keep more lawn and still conserve water.

Agriculturally, 80% of all fresh water consumed in the US goes toward producing food. Farmers are often given a certain number of water shares they can use each year. This number decreases over time as water storage decreases. Many farmers face the problem of growing productive crops with less water. One option has been to grow crops that require less water. But more water efficient techniques such as sprinkler irrigation rather than flood irrigation make it possible to use less water and have healthier crops^{iv}.

Irrigation also helps solve environmental problems. Mexico's water supply from the Rio Grande and the Colorado River is being reduced and polluted with sedimentation. This is occurring because of flood irrigation practices by farmers in Texas and other upstream states. The US government has contracted with Mexico to keep the river clean from sediment and to keep sufficient water levels but have had problems keeping regulations. Recent drought has further depleted available water. Sprinkler irrigation is helping solve this problem by reducing sediment runoff and water usage. Water sources are also being recycled in forms called reclaimed or effluent water to supplement the lack of water^v. The government has even

started programs to pay farmers to install sprinkler systems on their farms to subsidize costs and encourage better irrigation practices.

Irrigation is also green because it saves people money. Many municipalities are charging more and more money for water use. As a result, many citizens, especially in the dryer regions of the United States, are paying high prices for their water bill. One example of this is Spanish Fork, UT. A few years ago, Spanish Fork City installed a pressurized irrigation system using secondary water. The goals were to lower costs and reduce the use of culinary water. They charge residents 94 cents per 1000 gallons. I recently conducted a survey in Spanish Fork to see what people were paying monthly for their PI water bill depending on their lot size. I found that residents with one quarter acre lots were paying over \$100 a month for irrigation water. Residents with one half acre lots were paying up to \$200 per month and one resident with an acre lot paid \$600 dollars for one month of irrigation water. Efficient irrigation products can cut water usage and therefore water bills by over 50%. One Spanish Fork City resident I surveyed, who had just installed efficient irrigation products in his yard, paid just \$40 dollars for water during the hottest month of the year.

What are these highly efficient irrigation products and smarter techniques people are using to make their lawns greener, more water-wise, and save money? Products include nozzles, heads, pressure regulators, drip irrigation, and smart controllers.

The most widely used nozzle in the world for small turf applications is the spray nozzle. Spray nozzles have an efficiency rating of 2.00. This means that 200% of the water needed to satisfy plants needs is applied. Where is all the extra water going? Some may be evaporated

due to misting, blown away, run off because of high application rates, or overwatering areas due to uneven watering. This has created a great need for a more efficient nozzle and led to the creation of the multi-stream nozzle. The multi-stream nozzle has an efficiency rating of 1.35, which is 30% more efficient than spray nozzles. It achieves this by watering more evenly, spraying in a tight wind resistant stream, and watering at a low precipitation rate which lets water soak deep into the roots and reduces runoff. This means deeper roots, less weeds, fewer diseases, healthier grass, and a lower water bill. Another great thing about them is that they are the same size as most industry spray nozzles. They can be replaced by simply screwing off the spray nozzle and screwing on the new one without any digging.

The rotor nozzle has also been redefined. Standard rotor nozzles tend to apply more water toward the outer edge of its throw rather than up close distances. This creates dry spots around heads when spacing is not exactly 50%. New nozzles with up close watering capabilities water more evenly and improve water efficiency.

High pressure is another factor that creates inefficiency in sprinkler systems. High pressure causes misting to occur. Misting leads to evaporation and wind loss. Pressure reducers can be used on main lines, valves, or at the heads to fix this problem. Pressure reducing heads are the most efficient way to obtain the best possible pressure. Pressure reducing heads have pressure regulators built right into the head so that no matter what the pressure is coming in, it will be optimal pressure going out. Lowering pressure by just 20 psi can increase water efficiency by 10-20%. Different nozzles require different pressure for optimal performance. Different heads are made for each nozzle type according to its need.

Just like the multi-stream nozzles, pressure reducing heads can be easily installed into existing head bodies. Another water saving feature that pressure reducing heads may include is a check valve. Normally when a valve is shut off all the remaining water in that lateral line drains out the lowest head on that zone. This wastes water and makes a muddy mess. Check valves in heads prevent water from escaping from the head when the valve is shut off.

One of the most recent advances in the residential irrigation world is the ability to use smart controllers or weather stations. Plants water needs vary day to day depending on temperature, solar radiation, and rain fall. There are many types of controllers and weather stations that can be used to calculate how much water plants need and when. Studies done by the Irrigation Association and Texas A&M show that onsite weather stations can increase water efficiency by up to 20%^{vi}. Onsite weather stations may include sensors that measure rainfall, temperature, wind speed, and/or soil moisture. These controllers use onsite data to automatically calculate ET loss and readjust run times accordingly.

Drip irrigation is another way that cuts water usage by up to 70% over sprinkler irrigation in planting bed areas^{vii}. Drip irrigation delivers water straight to the roots of plants instead of watering unnecessary areas. Tec-Line, a type of drip line, is even being used in turf applications as sub-surface irrigation. This eliminates evaporation and emits water right at the turfs root zone.

Rebate programs in many municipalities are being offered to those that use these products in their landscapes. Having the right products are not the only important thing to having a green irrigation system. Knowing when to water, how much to water, and the

watering needs of each plant is also crucial in making plants healthier, saving water, and saving money. We see that irrigation is “green” in these three ways. It beautifies, it is eco-friendly, and it is cost efficient. It accomplishes this through new irrigation products and techniques that make the world a better, more beautiful place and allow us to be better stewards over the earth.

References

ⁱ Peterson, Charles S. "History of Agriculture in Utah." *Online Utah*. Web. <www.onlineutah.com>.

ⁱⁱ "Landscaped Areas." *America in Bloom*. 2005. Web. <<http://www.americainbloom.org/Articles/?categoryid=12&articleid=230>>.

ⁱⁱⁱ "CHAPTER 63: LIMITATIONS ON WATER USE FOR LANDSCAPING IN NEW DEVELOPMENTS AND LANDSCAPING RENOVATIONS." *SFGOV*. Web. <<http://www.municode.com/library/HTML/14131/ch063.html>>.

^{iv} Stebbins, Christine. "FEATURE - Drought, Water Worries Cloud Skies for US Farmers." *Planet Arc*. 23 Aug. 2006. Web. <<http://www.planetark.com/dailynewsstory.cfm/newsid/37792/story.htm>>.

^v "International Cooperation (Mexico and Canada)." *Mission 2012 Clean Water*. Web. <<http://web.mit.edu/12.000/www/m2012/finalwebsite/problem/international.shtml>>.

^{vi} *EVALUATION OF SMART IRRIGATION CONTROLLERS*. Charles Swanson and Guy Fipps, P.E2, 4 June 2009. Web. <<http://itc.tamu.edu/documents/Inital%20Results-Smart%20Controller%20Report%207-16.pdf>>.

^{vii} *Smart Watering*. 5th ed. Fresno, CA: Agrifim Irrigation Products, 2002. Print.