Humans have used irrigation to increase crop yields since the start of cultivation. Today, about 39 percent of all the fresh water used in the U.S. goes to irrigate crops (Perlman, 2015). The majority of irrigated acres, nearly 75 percent, are concentrated in the arid states in the western portion of the U.S., from North Dakota and Washington in the north to Texas and California in the south (Maupin et al., 2014).

Water use in the West is critical to maintaining the nation’s food supply. Geographically broad and diverse, the Western Region produces many of our major agricultural commodities. California alone produces almost 100 percent of our artichokes, walnuts, kiwis, plums, and garlic (Palmer, 2013). In total, the West accounts for 23.3 percent of the total U.S. farm gate value, which amounts to $87.7 billion (WAAESD and WEDA, 2015). With many western states facing yet another year of drought conditions, it is no surprise that water conservation continues to be a pressing topic of research throughout the country. In order to maintain our economic vitality and agricultural livelihood, growers must find sustainable ways to use water more efficiently to meet current and future agricultural needs.
MICROIRRIGATION: MORE THAN CONVENTIONAL IRRIGATION

Conventional crop irrigation techniques involving flooding fields or imitating rainfall with sprinkler systems can be inefficient. These systems may over- or under-water plants and can result in extreme water loss through runoff, wind, or evaporation, especially when the water is applied over wide areas of land.

Microirrigation (MI), also referred to as “drip irrigation,” is often viewed as a more sustainable approach to irrigation. Unlike conventional irrigation, MI uses special sensors, timers, and emitters to deliver the right amount of water to crops at the right time. Multistate research project W-2128, titled Microirrigation for Sustainable Water Use (Delheimer, 2012), uses research and Extension to help improve MI systems and encourage growers to adopt them.

W-2128 was formed in 1972 to coordinate MI research across the U.S. and help growers irrigate their land more efficiently. Currently, W-2128 consists of at least 20 participating land-grant institutions across 19 states and territories. W-2128 also works closely with USDA Natural Resources Conservation Service and the Agricultural Resource Service.

“Leveraging the expertise at several institutions and federal agencies gives much greater impact to the results of the research and education efforts,” said Steve Loring, Associate Director of the Agricultural Experiment Station at New Mexico State University and administrative adviser for the project (Agriculture is America, November 2014).

In November 2014, W-2128 received the national Experiment Station Section Excellence in Multistate Research Award, honoring the group’s innovative work and wide variety of national and regional impacts. W-2128’s efforts are supported, in part, by USDA-NIFA through the Multistate Research Fund.

“To many, the Multistate Research Program is one of the best kept secrets of the land-grant university system. This award recognizes the interdependent efforts of researchers and Extension specialists from universities in several states that have come together to tackle a priority issue that no one institution can address on their own,” said H. Michael Harrington, Executive Director of the Western Association of Agricultural Experiment Station Directors (Agriculture is America, July 2014).

A SUSTAINABLE APPROACH

W-2128 engages with growers through strategic outreach, such as inviting growers to demonstration sites and conducting training sessions. The group has also made irrigation databases, models, and decision-making tools available online. With better technology, data, and training available, more growers, including small-acreage growers and low-input producers, have readily taken advantage of MI.

The group also regularly conducts field experiments, examining soil health and plant physiology to fine-tune MI system development and implementation. Soil science and plant physiology data help researchers better pinpoint optimal irrigation times and identify the right amount of water and agrochemical applications for crop yield and quality.

For example, in Oregon, where demand for sweet potatoes is growing due to commercial interest in the production of sweet potato fries, W-2128 scientists at Oregon State University tested different MI configurations to optimize sweet potato yields and crop quality that would meet grower and industry needs. In Puerto Rico, scientists helped farmers grow taro on a commercial scale despite a dry growing season and poor soil conditions.

W-2128 researchers are dedicated to ensuring MI systems are a sustainable solution for the irrigation challenges that growers face. The group conducts surveys to determine barriers to use and then uses this data to develop and test new MI equipment that is more reliable, cheaper, and easier for growers to install and maintain. In Idaho, growers saved more than 10 percent on labor and water-pumping costs after adopting recommended MI practices.

By delivering water more precisely, MI systems help growers reduce runoff. MI systems can also be used to deliver agrochemicals more precisely.
so that they stay on fields, further helping to reduce contamination of nearby land and bodies of water. For example, growers in Oregon who used irrigation systems and practices recommended by W-2128 increased onion yields while simultaneously decreasing groundwater nitrate contamination.

MI systems also help restore land. W-2128 researchers have shown that MI is a viable strategy for establishing and maintaining vegetation on disturbed lands sites, including uranium mill sites in Navajo Nation and former petroleum refineries. Replanting these sites reduces erosion and airborne dust, limiting threats to environmental and human health.

IMPACT BEYOND MICROIRRIGATION

According to the University of Nebraska-Lincoln Drought Monitor, 58.7 million people are affected by drought (National Drought Mitigation Center, 2015). Large parts of California and Nevada are classified as D4, meaning these areas are experiencing exceptionally intense drought with short-term and long-term impacts. As demand and dependence on the Western agriculture industry for the nation’s food supply increases and water supplies decrease, it is critical to rethink traditional irrigation methods and find more sustainable methods.

“A safe, reliable supply of water is inextricably linked to food security. The five-fold increase in irrigated acres that took place during the 20th century cannot be repeated in the 21st century—there isn’t the space. Instead, we must increase efficiency of the irrigated farmland we have, and that is what this project is doing,” said Dr. Ramaswamy, Director of USDA-NIFA (Agriculture is America, November 2014).

Growers need the right tools to improve water security and food security, and W-2128 is working across state lines to bring those tools directly to the people who grow our food, from commercial operations to family farms. Land-grant universities have a three-fold mission that includes research and Extension, and W-2128 scientists have demonstrated a commitment to fulfilling and exceeding this mission to address drought and food security one drop at a time.

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