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Showing off

IRRIGATION EXTRA

CIT Director David Zoldoske is looking into the benefits of elephant grass as an alfalfa substitute.

High water marks

Center for Irrigation Technology leads the way in developing on-farm water use efficiency and conservation. ■ *By Don Wright*

California may be better known for its Silicon Valley than its Central Valley, but you can't eat a computer chip. The Central Valley is the most agriculturally productive of the five Mediterranean climates on earth. The food and fiber it produces feeds and clothes Americans at a per capita cost among the lowest in the world. That takes water and lots of it.

Located on the California State University, Fresno, campus, the Center for Irrigation Technology (CIT) has been looking into stretching water supplies by studying ways to improve irrigation technology and management. CIT was founded in 1982 and David Zoldoske, its executive director, has been there from the start.

"I began here as a grad student and worked my way up," Zoldoske says. "In those days the center only dealt with a fraction of the issues it does now."

CIT employs 42 staff members and 70 students, with a $10 million annual budget. The research has expanded to take in agronomics, water and air quality, as well as water policy. The goal is to become the worldwide, recognized leader in all things irrigation.

The importance of improved irrigation technology and management in relation to higher efficiency cannot be overemphasized. Comprising only 20% of the state's population, ag producing areas use 75 to 80% of the developed water in California.

"Why do farmers use so much water?" Zoldoske asks. "Because consumers want to eat." Farmers also want to stay in business and with pressures such as unlevel trade practices, government regulation and urban encroachment, turning a profit in agriculture has become increasingly difficult.

LEARNING ABOUT WATER

In view of the high input costs for energy in California, it's not surprising that conservation has become a major area of interest to CIT. The Agricultural Pumping Efficiency Program (APEP) is one of two CIT administered projects designed to help farmers save water, energy and money.

Peter Canessa is the program manager. He brings 20 years experience as a water and energy consultant to the task of managing a beneficial pro-

gram during an era of budget cuts. However, Canessa doesn't let fears of future revenue uncertainties sway him from his task. "Our goal is to make these programs as user friendly as possible," Canessa says. "We have the funding and we're looking for a reason to say yes."

APEP is a statewide education and incentive rebate program designed to increase pump efficiency and promote energy conservation. It's funded by the California Public Utilities Commission by way of the Public Goods Charge fee that appears on consumers' bills. Last year the CPUC put $100 million of the fund out to bid for third parties to fund their programs. Out of 65 recipients, APEP is one of only four ag-related programs to receive this money.

Student technicians such as Robert Blevins gain practical experience testing irrigation technology at the CIT laboratory in Fresno.

Educational outreach is a large component of APEP. "Research conducted by CIT and others has identified many aspects of specifying and maintaining an efficient pumping plant," Canessa says. "Sharing this information can make a difference for farmers' bottom lines."

Canessa isn't referring to just improved pump maintenance and high-tech design, although CIT also plays a hand in researching those issues. A big part of pumping economics is knowing when and how much water to pump. Understanding the optimum time crops need water takes into consideration plant and soil science. "Why spend the money on energy running pumps if the water isn't applied at the right time or at the right amount," Canessa says.

APEP also offers technical assistance. Program personnel can help find pump efficiency testers, lend a hand in guiding participants through the process of filling out applications for retrofit/repair rebates and answer general questions about pumping plant design and use.

REBATES AVAILABLE

Included in the program is pump efficiency testing for working electric or natural gas powered agricultural water pumps. Rebates are paid directly to participating pump test companies, easing the cost to the farmer. Once the pump's been tested, repairs and retrofits may be the answer to improved energy savings. Rebates are available to individuals as incentives to upgrade equipment.

Canessa says this program is available to production ag, where the pump is located on the farm or field. Secondary facilities such as canneries and processing plants won't qualify.

But, as Canessa says, the goal is to make things user friendly. The eligibility list isn't all that exclusive.

> 'Our goal is to make these programs as user friendly as possible.'
>
> — Peter Canessa

APEP is open to all owners or users of an agricultural electric or natural gas utility account who are paying the Public Goods Charge on their bills (usually PG&E, SCE, SCG and SDG&E customers). There are certain other qualifications and those interested should contact CIT.

The APEP program is funded until the end of this year, and the consensus is there's a good chance it will be renewed for an additional two years. Applications for the retrofit/repair rebates are on a first-come, first-served basis.

The second project administered by Canessa under the umbrella of CIT is the Agricultural Peak Load Reduction Program (APLR). This program is the result of the 2001 energy crisis, and the senate-enacted legislation SB 5X that was aided by Central Valley Assemblywoman Sarah Reyes.

APLR is a bit more inclusive; any agricultural electric account — i.e. farms, dairies, warehouses, food processors, breweries and wineries — may be eligible. As the name implies, APLR's goal is to reduce the amount of energy used during the peak hours of noon to 6 p.m.

Once again pump efficiency testing comes into play and CIT has negotiated standardized rates and professional service agreements with independent pump testing companies.

Under APLR, CIT representatives will assist clients with the procedures necessary to successfully utilize the program for maximum returns.

Canessa says that when APLR was first proposed, the price of natural gas was very high. Now that prices and reliability have stabilized, part of the program has found itself unfunded. Specifically, equipment conversion from natural gas to an alternative fuel, typically propane or yellow grease. (Yellow grease is the leftover from food preparation. It is possible to take used French fry oil and convert it into fuel.) However, as gas prices dropped, the demand for pump conversion and funding dropped as well.

APLR is funded through the California Energy Commission and is not

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expected to be renewed after this year.

By virtue of its academic surroundings, CIT is a hotbed of applying scholarly methods. With that in mind, it's only natural that engineers would want to test any and every thing to do with irrigation. In fact, CIT is quickly becoming the "Underwriter's Laboratory" of irrigation technology.

Hercules Gonsalves is in charge of testing innovations in irrigation. CIT has a dedicated facility that rigorously proves or disproves claims regarding drip irrigation, backflow valves and pump efficiency.

Gonsalves, with the help of two student assistants, decides if a product is worthy of the American Society of Sanitary Engineers' stamp of approval. CIT and Fresno State University are unique as the only institution of higher learning in the United States certified to give ASSE approval on irrigation devices.

Gonsalves had studied at Fresno State to become an ag mechanics teacher. He decided his true calling wasn't to work with high school students; rather he wanted to fool around with gadgets. Like Zoldoske, Gonsalves found a home at CIT.

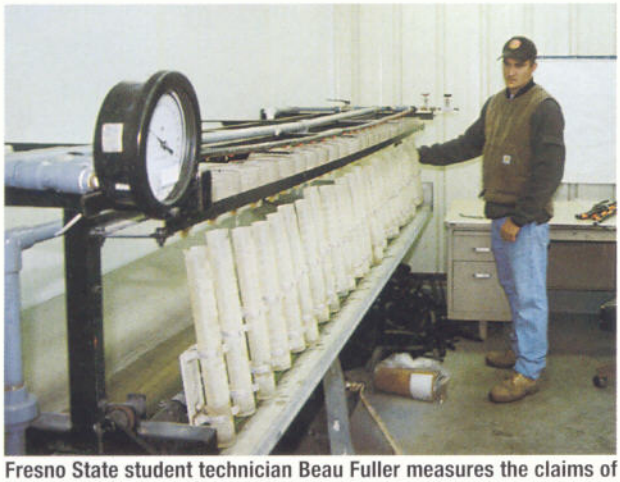
"This week I'll escort a team of observers from China who want to duplicate the success we've found here," Gonsalves said as he assembled a backflow device for testing. "Teaching's important, but for me, this is where I want to be."

Thousands of miles of irrigation ditches crisscross California's fertile heartland supplying water to thirsty crops.

Canal seepage can be a serious water management problem, causing loss and also contamination of surrounding soils with salt. CIT has a special program to help ensure that water reaches its destination.

At an engineering conference in Italy last June, Zoldoske and Florence Cassel of CIT gave a presentation titled "Using Electromagnetic Sensing Technique for Assessing Soil Salinity and Canal Seepage." Furthering Australian research, CIT developed a rapid, noninvasive method to survey canals.

A transmitter is towed behind a truck or tractor emitting an electromagnetic field in the ground that creates a secondary magnetic field that's measured by a receiver coil. The readings of the receiver coil give an indication of the electrical conductivity in the soil.



Fresno State student technician Beau Fuller measures the claims of manufacturers against the reality of performance at the CIT lab.

Since the amount of conductivity in soil is a direct function of water content, the amount and location of seepage can be identified.

Instead of lining an entire canal in cement only, the effected areas need be treated, resulting in a substantial savings in labor, material, time and money.

The technicians at CIT realized that salt water is a better conductor of electricity than fresh water. By combining electromagnetic sensing with a global positioning system (GPS), the salinity content of soil can also be measured.

As the sensor is towed through a field, the GPS records its location. The data from both devices is fed into a laptop computer and a map showing trouble spots is produced.

The farmer benefits by knowing where to sow extra seed where the ground is saltier for an even crop yield by acreage.

Researchers at CIT are also developing a strain of elephant grass with higher cold tolerance and resistance to salt uptake in order to increase its year-round growth and habitat range.

Elephant grass has the potential of competing with alfalfa as a forage crop for livestock. The nutritional content is comparable, and it can be baled and stored as hay.

One of the overarching themes of CIT is to position itself as the world's leader of irrigation technology. California Irrigation and Flow Technology (Calift) is the export branch of CIT.

The two-year-old program helps Central Valley manufacturers and dealers increase their marketing in four Latin American countries: Brazil, Argentina, Chile and Mexico.

Zoldoske and Canessa see a bright future for CIT. "We started CIT to simply measure the efficiency of irrigation technology," Zoldoske says. "But irrigation affects many things. Diesel pumps and air quality, dairy lagoons and groundwater are all linked. We're looking into better ways to recycle and improve the water quality at wineries and food processing facilities. And of course efficient irrigation is part of the overall water policy. What we learn here we can export worldwide."

Canessa agrees that CIT will continue to take on a bigger role in integrating irrigation with the economy and the environment. "If you don't have organizations like CIT in California, we won't be able to keep up in the world market." ◆

—Wright is an agricultural writer living in Fresno.