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Improving alfalfa yields one drip at a time

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For the Maddox family, early innovation has been something of a trademark for their farming operation. Whether it has been the innovations in the dairy breeding program for Holstein cows to those which support the dairy, new programs and efficiencies remain a vital part of the business.

So when a new use for a commonly employed technology presented itself, Steve Maddox Jr. was interested.

Alfalfa is an important feed component at Maddox Dairy in Riverdale, Calif. With 3,300 hungry dairy cows milked three times a day, growing enough alfalfa to keep the cows healthy and producing plenty of milk is vital to a profitable business model.

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Typically, Maddox floods his alfalfa fields once or twice a month. In Central California where Maddox grows alfalfa, eight to 10 cuttings a year is typical. All 14,000 tons of Maddox Farms' alfalfa produced annually is consumed by the dairy.

Last October Maddox began the move away from the typical and into a practice of utilizing subsurface drip irrigation (SSDI) in the alfalfa and Maddox is happy. The yields speak for themselves.

"In typical alfalfa production, first-year fields produce eight tons per acre," Maddox said. "This subsurface drip irrigated field should produce nearly 11 tons per acre."

Maddox credits this with keeping water in the field constantly, versus a flood system which inundates the plants with water in a feast or famine mode. He believes alfalfa becomes stressed when the soil dries out, leading to lesser yields.

Maddox is using Netafim SSDI on 66 of his 2,000 acres of alfalfa. He plans to install another 280 acres in 2014. Of his total alfalfa acreage, 25 percent is Round Up Ready. This includes the 66 acres on SSDI.

Drip lines are buried 15 inches deep and spaced every 38 inches. This spacing was chosen in part since Maddox will later convert the field to corn. The drip system can be used with the corn spacing as well.

Maddox relies on advisers from the irrigation system supplier to help with issues related to spacing and water efficiencies.

The system is set to keep water on the crop six days a week. He dries down the alfalfa four days prior to cutting. The SSDI starts again after baled hay is removed from the fields.

Soil cracking problem

Another issue Maddox deals with in fields is soil cracking common in the heavy clay soil where the alfalfa is grown. Some of these two-inch cracks, which can reach a five-foot depth, pull apart the root systems in the alfalfa. Not only does this affect the alfalfa stand, but the next irrigation has to fill in the cracks, leading to an inefficient use of water.

Overall, the SSDI system places the water where the plants need it the most.

“This is important since it reduces water evaporation,” Maddox said.

The heavy soil cracking has not been completely eliminated with the SSDI system. Soil cracking is still enough to pull apart drip lines at the connections, causing leaks and the need for repairs.

“When you dry down before harvest, it has a tendency to pull the couplers apart,” he said. “Every time we start back up we find four-to-five leaks.”

To work around the problem, Maddox keeps some water in the SSDI system to maintain soil moisture around the tape and prevent soil cracking.

“We feel pretty confident that this will solve our problem,” he said. “It’s still a learning process for us.”

Water use during the spring months did not seem to change from the flood system to irrigating by SSDI, Maddox said. He suspects the summer months where the soil tends to crack more will result in an appreciable savings of water.

“They say we ought to save 20 percent (on our water use),” Maddox said. “I don’t think that is out of the realm.”

Maddox uses water sensors in the two fields where the SSDI system is located. The sensors link to a computer program to provide real-time water-use information. Attached to one sensor is a weather station assessable with a smart phone app.

The app and weather station have proven useful as workers can monitor the wind speed prior to baling. Too much wind can dry the hay during baling.

One water sensor reads every foot down to five feet. The other sensor reads every four inches down to 20 inches. The later sensor is not as useful as visually checking the field for soil moisture, he said.

Irrigations in the system are timed to run two hours on one set, and then switch to another set for two hours. Maddox says this pulsing system of irrigation allows for total coverage quicker and more efficiently.

“We are consistently feeding the plant all the way through and not stressing the plant.”

The results are increased tonnage and an improved stand.

Other benefits with SSDI include reduced weeds. Soil amendment treatments are more efficient.

Business efficiencies

Maddox strongly supports more efficient ways to do business. For example, the dairy is powered almost exclusively by solar. Net metering has reduced power costs to run the dairy to nearly zero.

Irrigation water for the farm is pumped into ponds at night to take advantage of the lower power costs. From the ponds water is moved to the fields through a system of irrigation ditches. Pumping water at night is yet another efficient method Maddox uses to irrigate his crops.

Making the capital investment was not cheap. At about \$1,500 per acre, installing Maddox's SSDI system in his two alfalfa fields cost \$99,000.

Maddox hopes to recover about 40 percent of his capital investment in the first year. The system could pay for itself within three years through improved yields and water savings.

Not factored into that calculation is the likelihood of his alfalfa stand lasting longer than the typical four to five years before rotating out to corn or wheat for silage, all of which work together to support the dairy.

Hay quality has not changed with SSDI. Maddox planted a number nine dormancy alfalfa seed. He may switch to a number seven or eight dormancy seed to improve hay quality for the dairy

With the increased alfalfa yield, Maddox may be able to sell some hay, and purchase higher quality dairy hay as necessary for the lactating cows.

Maddox currently uses surface drip irrigation in his almond orchards and wine grape vineyards.

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