



Pocket gophers - No. 1 enemy in subsurface drip irrigation in western alfalfa

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No 'silver bullet' to stop rodent damage

The war underway in agriculture continues and its strategic battlefield is located underground.

The continued farming skirmish pits western alfalfa growers – who want to upgrade from traditional surface irrigation systems to more water efficient subsurface drip irrigation (SDI) systems - against vertebrate pests, mainly pocket gophers, which chew up underground SDI drip tape.

While the stakes are high and producers have an upper hand, gophers remain the No. 1 enemy.

“Rodents are undoubtedly the major challenge for SDI in alfalfa in northern California,” said Dan Putnam, University of California Extension alfalfa and forage specialist based at Davis.



Putnam shared the latest information on SDI and gophers with 700-plus western state alfalfa industry members at the 2016 Western Alfalfa & Forage Symposium held in Reno, Nev. in December.

‘Subsurface drip irrigation creates an ideal habitat for gophers,’ Putnam says noting, “Some growers have simply walked away from SDI alfalfa fields due to severe gopher damage.”

SDI is expensive to install and gopher damage makes the day-to-day management of the system even more costly.

Born to chew

An adult pocket gopher (*Thomomys* species) is six-to-eight inches long and constantly burrows through the soil using its strong front legs, says University of California (UC) Assistant Extension Specialist Roger Baldwin.

With SDI's network of buried drip tape in the field, gophers use their sharp incisor teeth to chew everything in their path. The gophers chew through tape due to the rodents' genetic makeup.

Water savings

The benefits of SDI are numerous including the water delivery directly to the plant's root zone. With surface water delivery, Putnam says the distribution is not always ideal, and SDI can 'recharge' fields within a day or two, distributing water more uniformly across the field.

This avoids plant stress, often leading to higher yields. SDI reduces evaporative loss as well as surface water runoff, improving environmental quality and water use efficiency.

Alfalfa Updates

Today, SDI is an important tool in the West where years-long droughts, including the current four-year version in California, have diminished water supplies. Some weather specialists predict more prolonged droughts in the future.

Farmers in many cropping and ranching systems have always worked to reduce water use in crop and livestock operations. Saving water not only helps producers but also the public through overall improved sustainability.

A SDI field trial conducted by UC researcher Bob Hutmacher in Brawley (Imperial County) in heavy clay soil showed a 20-35 percent increased yields and 7 percent water savings. A yield increase may or may not occur in all cases, based on soil types and other factors.

Increased yield

A key caveat of SDI is increased alfalfa tonnage which can provide a much needed financial boost to growers' bottom lines. This is especially important since alfalfa prices have fallen in recent years.

“The number one reason for the interest in SDI in alfalfa is higher yields,” Putnam says. “It’s been the driving force in California for growers looking at SDI.”

According to a UC survey of alfalfa growers with SDI, yields increased 2.5 to 3 tons per acre. Eighty-two percent of the growers were pleased with SDI use. The remaining 18 percent was medium-to-less satisfied with SDI.

Since the survey was conducted, Putnam says several of the ‘highly satisfied growers’ have become less satisfied with SDI, tied to gopher damage.

Specialists from UC, the UA, and New Mexico State University have formed a partnership to further explore SDI and share results with growers.

Putnam says, “All of us are going through a learning curve on this issue – learning from growers and trying to inform them to the best of our knowledge about how to work with this technology.”

Slower SDI adoption

Today, the growth of SDI use in alfalfa has been limited by the gopher issue in some areas.

Putnam estimates that SDI acreage in California has been installed 1 percent to 2 percent of the statewide alfalfa acreage. According to the federal government, statewide alfalfa acreage is about 840,000 acres – down from the 1.1 million acre all-time high – in part tied to the steady increase in trees and vines in the state.

Flood irrigation remains the dominant method in California’s Central Valley and the desert regions in California and Arizona. Putnam says about 80 percent of California alfalfa is grown this way.

Ayman Mostafa, University of Arizona (UA) Cooperative Extension area agent based in Phoenix, estimates that Arizona has 10,000-20,000 acres of alfalfa in SDI. Government figures pegged Arizona alfalfa acreage at about 260,000 acres in 2014. Actual SDI adoption in alfalfa could be higher in Arizona than California.

SDI-seed alfalfa

Shannon Mueller, UC Cooperative Extension agronomy farm advisor in Fresno, Calif., is a SDI proponent.

“I think subsurface drip irrigation has good potential in many California alfalfa fields,” Mueller says. “We have to figure out the ‘bugaboos’ including vertebrate pests.”

Mueller is familiar with the destructive critters. She conducted a Fresno County field trial to determine if SDI could help alfalfa seed growers by slightly water-stressing the crop to encourage pollination and seed set.

“We thought SDI would be ideal and it worked successfully to accomplish these goals.”

Mueller’s trial was later terminated due to severe gopher damage.

Not all the gopher's fault

Perhaps it’s not 100 percent the gophers’ fault for the damage they incur. Converting a field from flood irrigation to SDI involves digging up soil to run underground water lines and drip tape. This can leave looser soil for easier burrowing by rodents.

“The key reason for the infestation is the ideal habitat that alfalfa provides – feed, cover, stability, and the lack of season tillage. It’s simply a preferred habitat,” Putnam says.

The evidence of damaged drip tape is easy to find since pools of water can form on the soil surface. Damaged fields can reduce stand life.

Gopher solutions

Commercially-available pest control products on the market for gophers include traps, baits, repellents, owl boxes in the field to house predators, and others. Research continues on these and other products and services, including protected drip tape plus professional gopher monitoring and control on the farm.

Putnam says, “There is no one single solution to gophers. We recommend an integrated set of solutions – primarily through increased awareness, timeliness, and scouting.”

This means growers likely should allocate extra resources - time, labor, and expense. Growers can install barriers in the field and keep the original flood irrigation in place to help deter the pest.

Putnam adds, “Rodent control is really the key to make this work. We cannot tolerate rodents in these types of fields.”

