

## **FARM: Subsurface drip irrigation in alfalfa: Advantages and disadvantages**

**By Ali Montazar and Khaled Bali, Special to this Newspaper | Posted: Thursday, August 3, 2017 12:40 am**

Water management is perhaps the key limiting factor for irrigated alfalfa production worldwide. Alfalfa is the highest agricultural water user in California given its large acreage (over 0.85 million acres) and long growing season. It uses greater than 16 percent of the agricultural water in the state, which is over 4.5 million acre-feet per year. Alfalfa is also the dominant water user in the low desert region.

One strategy to improve the water-use efficiency in alfalfa production is improvement in water system delivery technologies. Subsurface drip irrigation (SDI) is a well-known, feasible alternative in irrigation technology with superior application efficiencies. This irrigation system has been applied primarily to the production of high value crops of fruits, processing tomatoes and other vegetables, nuts and sugarcane. As system reliability and longevity improved, its application has expanded to agronomic crops like alfalfa. In alfalfa, drip lines with a lifetime of 6 to 12 years are typically buried 10 inches to 12 inches below the soil surface on a spacing of 30 inches to 60 inches, depending upon soil type. The most common spacing is 40 inches (note that ideal spacing parameters are dictated by soil type and other factors). A pressurized system (pumps), as well as a filtering and filter maintenance system are necessary for SDI.

### **Where it is most appropriate**

Drip irrigation has likely the best fit for farms with a high level of management, regions with a highly limited water supply, sandy soils where subsurface losses are great, and areas with low gopher pest pressure. It has also been used successfully on clay loams and heavier soils. If yield advantages (evidenced by earlier research and grower experience) can be confirmed, it has wider applications on many soil types.

### **Advantages**

**Yield** — It is quite likely that yields may improve utilizing SDI vs. flood irrigation in alfalfa. Growers in the long-seasoned environment of Central and Southern California and Arizona have



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Leaks and drip-tape damages because of rodent issue. Courtesy Photos

reported increased yields averaging 3 ton/acre over their check-flood fields, at least in the initial years (Montazar et al. 2016 and Putnam 2015).

**Better water distribution uniformity over space** — Check flood systems have built-in problems with uniformity due to longer periods available for water infiltration at different places in the field. Often, water in flooded fields needs to move more than 1,300 feet, which takes 10-14 hours, resulting in different amounts of water available in different sections. One of the key advantages of SDI systems is to apply water more uniformly across a field.

**Better water distribution uniformity over time because of more frequent irrigation** — SDI has the ability to quickly apply uniform irrigation to an entire field. This is not feasible with most surface irrigation systems. Depending upon flow rates, many surface systems require from 3-12 days for irrigating an 80-100 acre-field. Thus, one side of the field may get water much later than the other side. In a well-designed and properly managed SDI, there is less soil evaporation, more crop transpiration, no runoff and no/less-deep percolation. As a result, there is a high potential to enhance water use efficiency. Since irrigation events are able to be scheduled more frequently, crop water requirements (ET) and applied water may significantly match over the growing season.

### **Disadvantages**

The key limitations of SDI include cost of installation and rodent damage.

**Rodent damage** — Rodent damage, particularly the potential for gopher damage, is probably the key practical disadvantage and main barrier of adaptation of SDI (Fig. 1). Some growers have ‘walked away’ from large investments due to rodent infestations. Alfalfa, particularly sprinkler- or SDI-irrigated is an ideal habitat for gophers. High levels of management are required to manage rodents. Gopher fences, setting traps, burrow fumigation, and continual monitoring and removal need to be implemented as effective solutions.

**Costs** — The cost of SDI installations has been a major disadvantage of SDI systems in alfalfa. System installations may cost between \$1,000 per acre to \$2,600 per acre depending upon specifics of the farm. However, these costs can be justified if yields are improved and/or price of the product is sufficient to cover costs. We have estimated the yield required to justify the cost at between 0.5 ton per acre and 1.5 tons per acre depending upon specific costs and the price of hay.

**Last word** — Desirable water and salinity management practices and design considerations are required to prevent salinity build-up at soil profile above the drip tapes, where salts will accumulate throughout the multiple-growing seasons, specifically in low-desert areas with insufficient annual rainfall.

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