

Save water on irrigated alfalfa

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A THREE-year study of irrigation strategies on 12 south central Utah alfalfa fields compared ways farmers could save on water yet maintain alfalfa production. One result suggests a 10% reduction in irrigation won't hurt alfalfa production, particularly in wet years, said Matt Yost, Utah State University Extension agroclimate specialist.

"The impetus for this project was to find inexpensive ways farmers could use less water or become more efficient with water and provide more resiliency to drought," Yost said. He also wanted to see if updating irrigation equipment would improve alfalfa production.



MATT YOST
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Using Alfalfa Checkoff research funds, Yost and his colleagues also compared three tools that potentially could help schedule irrigation more efficiently. One is a free, university-developed tool called

Irrigation Scheduler, which estimates and tracks evapotranspiration. The other tools: an in-field soil moisture sensor program developed by Meter-GROUP and a commercial program from Lindsay Corp., called FieldNET Advisor. The commercial program uses satellite imagery and data to estimate water need and can automatically adjust pivots to irrigate.

"We've had sensors and weather stations to help guide irrigation for a long time. But very few studies compare them side-by-side and see how they



Alfalfa yield and quality sampling at a farm in Sevier County, Utah.

Jody Gale, USU Extension

perform," Yost said.

The study was established in 2019 on 12 alfalfa fields owned by 11 farmers. On each pivot, researchers divided one span into three sections. One section included new sprinkler equipment, such as nozzles, regulators, and sprinklers. Another section had the same new equipment but smaller nozzles to apply 10% less water. The third section used farmers' existing equipment and rates.

Four irrigation schedules tested on the pivots included:

1. The grower's conventional irrigation rate and timing.
2. A rate based on a soil moisture sensor installed in each field.
3. A rate set by the irrigation scheduler using weather data collected on site.
4. A rate set by FieldNET Advisor.

Each schedule was replicated four times. Pivot panel and logistic issues resulted in schedule treatments on

nine fields in 2019 and six fields each in 2020 and 2021.

"Sometimes we saw pretty significant water savings, like 15%, but sometimes it was pretty small, like 5%, to get the same alfalfa production," Yost said. Reducing irrigation by 10% did not impact production in 2019, which was a wet year. But yield losses from the irrigation reduction were apparent in 2020, a drought year. "There's definitely more opportunity to cut back in wet years than in dry years," he added.

Yost was surprised to see little impact on alfalfa production from changing out older equipment for new, although not all of the equipment was highly worn. The irrigation industry recommends replacing sprinklers every six to eight years, but some are used 15 years or more, he said. He continues to recommend changing out worn equipment because it impacts performance and

Average water use across farms for four irrigation schedules

Irrigation Schedule	2019	2020	2021
Conventional	45.9	34.5	31.3
FieldNET Advisor	43.3	49.3	34.9
Irrigation Scheduler	46.0	43.1	27.7
Soil Moisture Sensor	40.6	36.7	28.4

PROJECT RESULTS

Growers can likely cut irrigation rates by 10% without hurting alfalfa yields. Worn irrigation equipment may not cause as much yield loss and nonuniformity issues as expected. Advanced irrigation scheduling tools may have more potential to reduce irrigation rates than improve alfalfa yield.

can cause crop losses.

“Among the tools, the soil moisture sensor most frequently had the largest water savings, which wasn’t too surprising because it had the most direct measurement,” Yost said. The commercial product often recommended more irrigation than the other methods during dry years.

“When we talk about that program, we mention the automatic nature and

ease of it,” he noted. But it requires the most investment and technical expertise in setting it up. The irrigation scheduler tool recommended near to or slightly more irrigation than did the soil moisture sensor, but the tool is free and a good place for farmers to start, Yost said.

The research showed that irrigation scheduling in general is more likely to save water than improve yield. In dry

years, the scheduling tools “were really useful” because they helped farmers figure how to partition irrigation water, he noted.

“One of the most important points is that farmers are already doing a really good job,” Yost said. “They are irrigating close to what the advanced tools would suggest. But, there is still quite a bit of opportunity to save water with the advanced tools.” ●



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