

# AGRICULTURE

## In a dry spell



# Is there relief in sight for the ongoing drought?

**T**he United States is currently engulfed in a significant period of drought. As of September, more than 30% of the country is experiencing moderate to extreme drought. More than half of the land area in seven states has been declared to be in severe drought conditions—five of those states sit within American AgCredit's territory: California, Nevada, Kansas, Oklahoma and New Mexico.

For agriculture, after years of steady prices and strong market values, 2014 may be the year of redress. As of May 2014, Gov. Brownback declared half of Kansas to be in a drought emergency. By June ten governors met in Colorado Springs to discuss drought and the environment. And by August, Bloomberg News was reporting that the drought in California would "transform the global food market." As of September 2014, an estimated 82 percent of California is experiencing extreme drought, according to the U.S. Drought Monitor.

Despite this, reservoir stores, groundwater, and improved irrigation, harvesting and distribution techniques have buttressed many agricultural operations. Oklahoma's 2014 cotton crop was estimated to be 320,000 bales, more than twice as many bales as was ginned in 2013. The same growth can be seen in the grain sorghum and cattle markets, which have helped to buoy prices for pasture land. Yet these gains illustrate a mixed blessing.

Drought has had a major impact on important crops such as winter wheat, which is typically grown across the southern half of the Great Plains, including

Oklahoma and Kansas, two of the hardest-hit states. In the Southwest, concerns are focused more on reservoir levels, where New Mexico reservoir stores were only slightly more than half of their normal levels. Nevada storage is one-third of what it should be at this time of year.

While mild winters have provided some stability for a swath of territory from Kansas westward into California, the prolonged lack of significant moisture will doubtless have significant consequences on all types of farming and ranching operations throughout the driest regions as we move into 2015.

The situation in California may be a marker for other ag markets as the lack of rain continues. In August 2014, the state reported the warmest 48-month period ever recorded and reservoirs are rapidly diminishing. As a result, the state has put severe restrictions on agricultural water use, forcing many California farmers to leave fields fallow. Estimates report that at the current usage rate, California has less than two years of water remaining.

Despite the bleak circumstances, ag businesses are working through it, and farmers are coming up with inventive and resourceful strategies to do more with less.

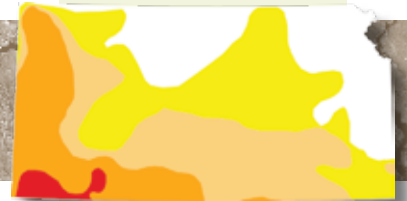
## Solutions

Propelled by the ongoing drought and technological advances, farmers and ranchers are rapidly adopting new systems—employing both existing and emerging technology. Farmers are making changes in irrigation equipment, data collection and computer systems

Relief rests on success of previous years, combined with new technologies and a changing marketplace

# DROUGHT STATE BY STATE

KS



■ Abnormally Dry   
 ■ Moderate Drought   
 ■ Severe Drought   
 ■ Extreme Drought   
 ■ Exceptional Drought

SEVERE DROUGHT	44.76%
EXTREME DROUGHT	19.5%
EXCEPTIONAL DROUGHT	2.25%
ACRES OF LAND USED FOR AGRICULTURE	46.1 MILLION
MARKET VALUE OF AG PRODUCTS SOLD	\$18,460,564,000

This graphic illustrates the severity of drought impact, measured by five levels identified by the U.S. Drought Monitor.

Severe drought is characterized by crop loss, frequent water shortages, and mandatory water use restrictions.

California (58%) and Nevada (12%) suffer from exceptional drought, the highest severity classification. Under exceptional drought, crop and pasture loss is widespread, and shortages of well and reservoir water can lead to water emergencies.

*Data courtesy of the U.S. Drought Monitor and the USDA 2012 Ag Census. The U.S. Drought Monitor is produced by the U.S. Department of Agriculture, the National Oceanic Atmospheric Administration (NOAA), and the National Drought Mitigation Center at the University of Nebraska-Lincoln.*

used for analyzing information generated on the farm. Other drought-related irrigation trends include:

- Rapid irrigation system conversions to pressurized, above- and below-ground drip systems.
- Increased field instrumentation to measure soil moisture.
- Added use of water meters at individual field turnouts and of remote flow-sensor reporting.
- More frequent irrigation system evaluations to ensure efficiency and uniformity.
- Increased use of irrigation management consulting services.



## INTEGRATING DATA TO GET THE WHOLE PICTURE

Farmer Dino Giacomazzi of Hanford, CA, is in the process of establishing a new almond orchard, and is installing a variety of systems and developing methods to gather data in a way that allows him to make good decisions about irrigation and a host of other farming activities.

"Farmers are thinking in terms of systems these days," said Giacomazzi, who often speaks to farm groups about incorporating technology into farming operations. "It's very difficult to put things together piecemeal. Even to get advice about these more advanced systems is difficult."

As a new almond farmer, he said, he can't find just one person who can tell him what to do with his almonds.

"Instead, I've had to consult with six different experts to get the information I need on the whole process," Giacomazzi said, listing tree experts, soil and irrigation specialists, researchers, regulators, equipment manufacturers and technology advisors. "This is where farmers have to become the experts in terms of putting systems together."

He has used sonar imaging in his new orchard to see below ground, in order to better deploy his high-tech irrigation system.

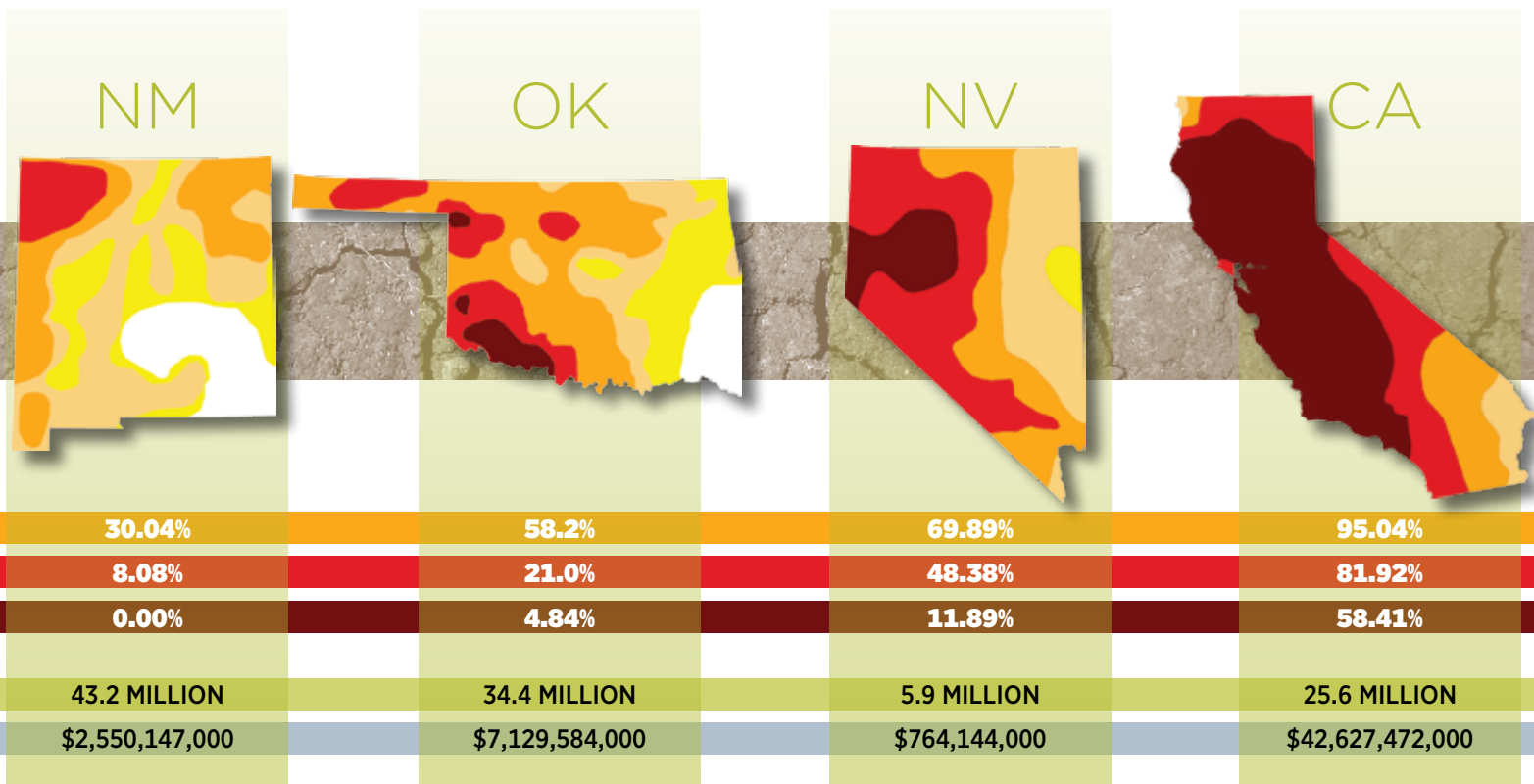
"There is so much going on right now that systems integration is essential," Giacomazzi said, "but it's hard to find workers prepared to help us with this technical work."

According to California Farm Water Coalition estimates, during the past decade, farmers and ranchers in California have invested more than \$3 billion in drip irrigation technology alone. Growers have adapted to the record-low rainfall by installing high-technology irrigation systems, watering with treated municipal wastewater and even recycling waste from the processing of pomegranates to feed dairy cows. Some are taking land out of production altogether, bulldozing withered orange trees and leaving hundreds of thousands of acres unplanted.

UC Davis researchers currently are building a Web-based platform to bring a variety of field and crop information together in one database. When completed, the platform will enable users to track such factors as evapotranspiration rates, soil moisture content, irrigation schedules, fertigation programs, nutrient application and water quality.

"We're looking at technology that helps farmers understand their soil types within specific fields or blocks," said Alan Fulton, University of California Cooperative Extension advisor for Glenn, Shasta and Tehama counties, who works with orchard crop growers on irrigation equipment and strategies. "There's spatial variability in the soil and, in the past, we've been irrigating based on best averages for overall coverage. We now have the ability to quickly gather enough data to be more accurate about how water is applied."

Other solutions that the market is seeing include crop switching, drone sensors, and hydroponic domes.



## The water vision in Kansas

In July, Kansas unveiled its first draft of a “water vision” plan that aims to ensure a reliable future supply for the state. The 50 Year Water Vision Plan is being created by the Kansas Water Office, Kansas Department of Agriculture and Kansas Water Authority.

Facing a 70 percent depletion of the Ogallala Aquifer and the potentiality of reservoirs becoming 40 percent sediment have led to the state-wide drive enlisting farmers, ranchers, educators and others in identifying potential long-term solutions.

Kansas Water Office Director Tracy Streeter said the recent drought has been a “game changer” in making Kansas address its water issues.

The ambitious four-pronged approach of the plan includes voluntary and involuntary conservation and more efficient reservoir management. It also draws on technological advancements in irrigation and plant varieties and development of new water sources with the aim to reduce statewide water consumption by 20 percent by 2065.

The 46-page preliminary discussion draft released by the Kansas Water Office outlines more than 170 generalized strategies garnered from the public. But the proposal contains no cost estimates. Officials decided not to get into financial strategies in this initial draft: “Lead with the need, the money will follow,” said Susan Metzger, policy chief at the Kansas Water Office.

Another major thrust of the plan involves the pro-

motion of new technologies for more efficient crop irrigation. Other suggestions include greater adoption of less water-intensive crops such as sorghum and more drought-resistant grasses such as triticale. Mirroring efforts in California, sections of the plan include exploring using lower-quality sources of water—such as treated wastewater effluent and runoff from confined animal feeding operations—for irrigation.

Clearly, farmers are looking into the same future and finding common ground for solutions. In the meantime, however, what does a prolonged drought mean for big ag production states like California, Kansas, Oklahoma and others, and how does it affect the global food supply?

### INTEGRATING TECHNOLOGY TO IMPROVE IRRIGATION

Integrating technology to improve irrigation is what Bob Martin, manager of Rio Farms in the Salinas Valley, said he’s trying to do. “We’re using irrigation technology that’s been around a while, but now we’re using it in different ways—with climate data, soil probes at different levels and ongoing analysis to protect groundwater,” he said. “We’re developing new formulas to set optimum ranges for irrigation.”

Martin said farmers’ attention is more focused underground these days, with soil moisture sensors and subsurface irrigation, as well as new regulatory requirements for an increased variety of reports.

To stretch his farm’s technology investment dollars, Martin said soil moisture sensors have been set in three different soil types on the farm—sandy, loamy and heavy. Remotely transmitted data is analyzed and irrigation decisions for fields with similar soil types are made based on extrapolation and field knowledge.

Salinas Valley farmers also are working with high tech experts in Silicon Valley and with NASA scientists in Mountain View. Growers in Monterey County have created an innovation incubator for startup companies focused on technology that can be used in agriculture.

Much of what is being worked on now is conceptual, Martin said, “but what’s on the ground now is what we’re concerned about. We need to use every unit of water we get efficiently.”

“We need information we can act on,” he said.

California dairy farmers lead the nation in production, churning out 21% of America's milk supply

CA Central Valley farmers are paying on average 10 times more for water for crops and animals than a year ago

California has lost 1% to 2% of its dairy industry in the last three years

## What this means for our food supply

On its own, California would be the world's ninth-largest agricultural economy, according to a University of California at Davis study. Shifts in its production reverberate globally, said Dan Sumner, an agricultural economist at the school.

"It's a really big deal," Sumner said. "Some crops simply grow better here than anyplace else, and our location gives us access to markets you don't have elsewhere."

Significant and ongoing drought conditions will affect everything from the price of milk in China to the source of cherries eaten by Americans. It has already inflamed competition for water between farmers and homeowners.

As the effects of the drought are felt, it may mean less farmland in production as growers abandon corn and cotton because of the high cost of water. Corn acreage in California has dropped 34 percent from last year, and wheat is down 53 percent, according to the USDA.

One Arizona State University study says that the California drought is likely to push items like avocados and lettuce up 28 to 34 percent. And the USDA expects drought and other factors to push domestic food prices for meat and produce up 3 to 6 percent this year.

Business professor Timothy Richards who conducted the Arizona State study noted that the pricier California crops could drive more retailers to source their produce from Mexico and Chile. But others see another development: the reestablishment of more regional food systems.

According to Bob Scaman president of Goodness Greenness, the Midwest's biggest distributor of organic produce, the 2014 cherry crop is a prime example of the success of regional food systems. While the drought forced California cherry farmers to abandon their orchards as the season progressed, the Washington State cherry crop was booming. And Michigan cherries filled other gaps. At the same time, as fall descends and the Midwest crop grows dormant, the lack of fruit from California will be noticed and costs will reflect that.

"This is the ideal storm for the local food network in the Midwest," Scaman said. "It really brings home what people have been talking about for years: the need to grow more local food, stabilize the food supply and build the local market."

Adding to the drought problems this year were high summer gas prices that further argued for more localized food production. "So not only is there less product but we are paying more to transport it from California," he said. "You've got a double whammy

coming at us. So when you look at local food supplies, we've got a little more stability in getting it to the marketplace, lesser freight costs and we are growing our local economies."

While the prolonged dry seasons haven't become significant concerns among local farmers so far, it has revived important questions. Farmers Markets, CSAs and their related infrastructure are to date unable to handle the market changes, pointing to the issue of building infrastructure and putting together policies and funding to make that happen.

"Some kind of controlled environment growing is really the answer," he said, "whether it be greenhouses or hoop houses or inside and vertical gardens. Anything that we can do to push more local product into the non-conventional farming months here in the Midwest I think are things that need to be on top of our list as producers."

Within this, regional farmers can also extend the seasons by planting varieties of vegetables that mature early or late in the season, such as an early broccoli or a late broccoli. Given the growing demand for local produce and the richness of soil throughout the Great Plains and Upper Midwest, drought might drive some corn and soy farmers--whose harvests go primarily to processed food, animal feed and ethanol tanks--to grow crops suitable for local human consumption.

The need for local production may very well increase exponentially. As a result, the economic opportunities for rural communities may likely expand as well.

## SOURCES

Parts of this article were sourced, or taken in whole or in part from the following sources:

- Associated Press, "Kansas water plan aims to ensure reliable supply," by Roxana Hegeman, Tuesday, July 1, 2014. (Published in the *Washington Times*)
- "Drought spurs more investment in new technology," *AgAlert*, Issue October 8, 2014, by Kate Campbell
- "California dairy farmers struggling to survive prolonged drought," *LA Times*, by Brianna Sacks, October 3, 2014
- "California Drought Transforms Global Food Market," *Bloomberg News*, by Alan Bjerga, August 11, 2014
- "California drought renews debate on regional food systems—Agriculture is a major factor in region's water quality and supply," WBEZ Chicago Public Media, by Monica Eng, July 15, 2014
- Kansas Water Plan – [http://www.kwo.org/Kansas\\_Water\\_Plan/KansasWaterPlan2014.html](http://www.kwo.org/Kansas_Water_Plan/KansasWaterPlan2014.html)
- Oklahoma Farm Report*, September 11, 2014
- California Farm Bureau Federation
- 2012 USDA Ag Census
- National Drought Mitigation Center