



Keeping Corn Farmers Seeing Green

As recently as 100 years ago, farmers plowed their fields with horses and predicted the weather and climate conditions by gazing into the sky. Today's farmers are much more sophisticated and advanced, yet their success still depends largely on meeting the challenges posed by forces beyond their control — weather and climate.

Having access to trusted, timely and accurate information about our nation's highly variable and extreme weather and climate is essential, as corn is a key commodity in the U.S. agricultural economy, with a value nearing \$66 billion in 2010¹. The success of the corn industry is not only vital to farmers and the agricultural industry, but also to the U.S. economy. That's why farmers, agriculture extension agents, businesses, commodities traders, and agencies such as U.S. Department of Agriculture have long relied on NOAA's weather and climate information to inform and improve their planning, management and financial decision-making.

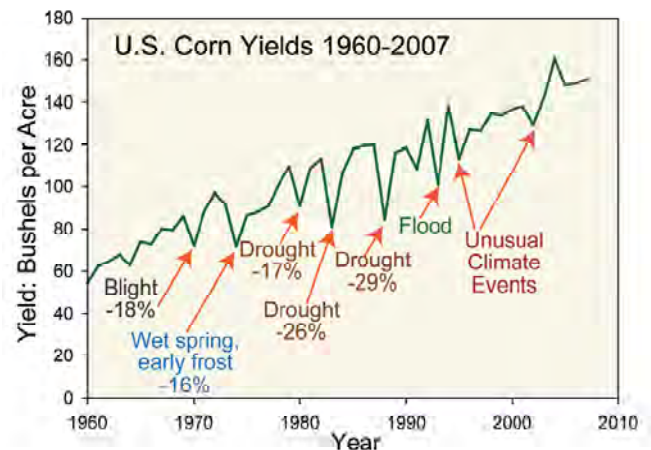
NOAA's weather forecasts provide critical short-term information to the agriculture sector about temperatures, rainfall and severe weather that is factored into day-to-day agricultural operations such as when to irrigate or fertilize. NOAA's climate forecasts, on the order of two weeks and longer, provides information such as the length of growing seasons, growing degree days, seasonal temperature and precipitation, drought and flood, and El Niño/La Niña conditions that help inform longer-term decisions such as what and when to plant, when to harvest and sell their crops or what supplies to purchase before the planning season begins. The economic ties between climate information and agriculture are considerable. For example, it is estimated that NOAA's El Niño/La Niña forecasts allow agricultural producers to make adjustments in their decisions, which in turn generates an increase in the agricultural sector welfare that is valued between \$507-\$959 million/year.²

As the relationship between NOAA and the agriculture community strengthens, NOAA will strive to continually improve its services through enhanced technology and products. Enhancements in future NOAA satellites, including JPSS and GOES-R, will improve weather and water forecasting, so farmers can more efficiently irrigate their crops, saving water and energy. For example, a study of GOES-R suggested they could even see revenue gains from selling excess water, a service valued at \$61 million in 2015 and \$1.09 billion for 2015-2027.³

In late July 2011 — as flooding persisted in the Missouri and Red River valleys, and a particularly brutal heat wave gripped much of the United States — corn farmers, agricultural extension agents and climatologists turned to NOAA's data for insight into the extent of potential crop



In 2010, U.S. farmers harvested more than 12.4 billion bushels of corn valued at about \$66 billion dollars. (Source: USDA)



U.S. corn yield variation from 1960-2008 showing the impact of extreme events such as floods, drought and other climate events such as El Niño. (Source: Global Climate Change Impacts in the U.S., 2009)

"As climate continues to change in the region – a continued trend toward more frost-free days, possible continued increase in annual precipitation and heavy rainfall events, and continued humidity increases – growers will face new challenges with existing crops."

-Eugene Takle
Director, Climate Science Program
Iowa State University

impacts. Corn is particularly susceptible to heat and moisture during crucial stages of its development. Farmers used NOAA's temperature, precipitation, humidity and soil moisture data to assess their crop's well-being and adjust their management practices to lessen their crop's vulnerability to expected conditions.

Despite widespread triple digit temperatures in July, NOAA's climate data indicated that there was higher-than-normal soil moisture in many areas of the nation's corn growing regions. This data helped reassure farmers that this particular heat wave would not be as harmful as it could have been because corn is able to better tolerate heat if there is available moisture in the soil. Water deficits can lower corn's photosynthetic rate, which can reduce yields if these conditions persist over time.

As summer progressed into August, NOAA continued to forecast warmer-than-normal daytime and nighttime temperatures, and regionally variable precipitation patterns, again raising concern among the agriculture industry about the vulnerability of this year's corn crop to long-term heat and water stress. Farmers continued to rely on NOAA short-term weather and drought forecasts, and the crop and soil moisture indices to guide operational decisions, such as when to irrigate. They are also using NOAA's seasonal outlooks and longer-term climate predictions to help them make good decisions on future planting, fertilization, harvest and conservation practices as well as the need to obtain crop insurance as temperatures rise and weather extremes occur more frequently.

Growers have acknowledged that the combination of a changing climate and steadily increasing demand for food and biofuels is a challenge, and that a robust collaboration between NOAA scientists and the agriculture sector is key to making sure they have the reliable information they need to stay ahead.

NOAA's climate and weather products and services keep farmers seeing green both in terms of healthy crops and profits.

The next time you go to the local grocery store, remember that NOAA plays a helping hand in growing the products you purchase and in keeping prices down.

For more information

¹USDA Corn Briefing: <http://www.ers.usda.gov/Briefing/Corn/background.htm>

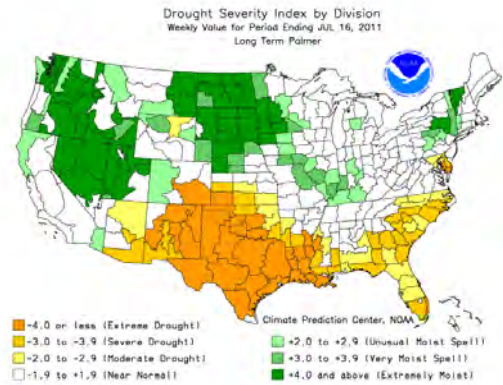
²Chen, C.C., B.A. McCarl, and H. Hill, 2002: Agricultural value of ENSO information under alternative phase definition. [Climatic Change, 54\(3\), 305-325.](#)

³Centrec Consulting Group, LLC., 2007: [An Investigation of the Economic and Social Value of Selected NOAA Data and Products for Geostationary Operational Environmental Satellites \(GOES\)](#). A report submitted to NOAA's National Climatic Data Center.

- NOAA Forecasts: Short-term: www.weather.gov, Long-Range: www.cpc.noaa.gov, Drought: www.drought.gov

- Global Climate Change Impacts in the U.S. (2009): <http://www.globalchange.gov/what-we-do/assessment/previous-assessments/global-climate-change-impacts-in-the-us-2009>

- The Corn and Climate Report: <http://www.gpsid.net>



Soil Moisture Conditions for July 16, 2011
(Source: NOAA Climate Prediction Center)

NOAA's Agricultural Related Products and Services

Long-Range (Seasonal)

- NOAA issues 3-month seasonal temperature, precipitation and drought outlooks and annual hurricane and winter outlooks
- NOAA works with local, state and national partners in the agricultural, water and other sectors on using drought and flood information to reduce impacts.

Monthly

- NOAA issues 30-day temperature and precipitation outlooks
- NOAA provides monthly El Niño/La Niña forecasts
- NOAA issues the State of the Climate report, putting climate events in historic context

One to Two Weeks

- NOAA issues 8-14 day nationwide weather and water forecasts
- NOAA, USDA and the National Drought Mitigation Center issue the U.S. Drought Monitor

Daily to Weekly

- NOAA issues daily to 7-10 day nationwide weather and water forecasts
- NOAA & USDA issue a weekly weather and crop bulletin
- NOAA meteorologists are deployed to fire and flood operation centers to support real-time forecasts

Other Products

- Soil Moisture Index
- Crop Moisture Stress Index
- Climate-Related Planting Zone Maps
- Vegetation Index
- Climate Normals