United States Department of Agriculture
Midwest Climate Hub

Recent Trends in Climate/Weather Impacts on Midwestern Fruit and Vegetable Production

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Midwest's 'Other' Crops

While the Midwest is famous for being the world's leader in corn and soybean production, this region is also home to a variety of high value specialty crops. Specialty crops include fruits and vegetables, tree nuts, dried fruits, and nursery crops including floriculture. Michigan is known for its apples, Minnesota is number one for green peas, and Illinois is the country's leading producer of pumpkins (Fig. 1). Because specialty crops have much higher market values compared to traditional row crops, specialty crop production is an important contributor to the Midwest's rural economy with an estimated value of $1.8 billion dollars in annual revenue. However, these crops are more sensitive to climatic stressors and require more intensive management compared to row crops like corn. Shifting weather patterns and climate change pose a serious threat to specialty crop production in the Midwest.

Figure 1. Illinois pumpkin patch.

Midwestern Climate is Becoming Wetter, Warmer, and More Variable

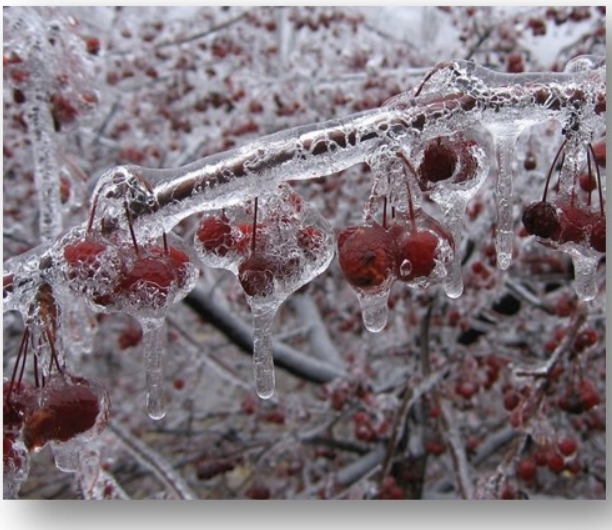

Figure 2. Spring freeze damage to Michigan cherries.

The average Midwest air temperature rose more than 1.5°F from 1900 to 2010. While rising temperatures have resulted in longer growing seasons (increased frost-free periods), crops that break dormancy too early under so-called 'False Spring' conditions are at risk for freeze and frost damage. Tree fruits, including apples, cherries, and peaches are especially vulnerable to these spring freeze events. In 2012, Michigan alone lost 90% of their tart cherry crop due to warm March temperatures and subsequent freezes in April (Fig. 2). Across the Midwest, the timing and severity of rainfall events are rapidly changing. Overall, we are seeing increases in annual precipitation and a rise in the number of heavy rainfall events, especially in the spring. Too much spring rainfall disrupts planting, crop establishment, and can lead to labor issues as field work is delayed. In Illinois, heavy rainfall severely reduced 2015's pumpkin harvest (Fig. 1). In the summer, longer dry periods have severely impacted the production of sweet corn in some years.

An Historical Perspective: Weather Induced Crop Losses From 1989 to 2015

Regional changes in temperature and precipitation are already impacting Midwest specialty crop production via crop quantity and quality, as well as indirectly influencing the timing of crucial farm operations. Using USDA Risk Management Agency's regional data from 1989 to 2015 (i.e. crop insurance claims), trends in Midwestern specialty crop losses due to weather hazards were assessed (Table 1). Too much rainfall in the spring and too little rainfall in the summer have led to increased fruit and vegetable losses across the Midwest region. Excessive moisture was the most commonly reported weather hazard in all Midwestern states except Michigan where spring freeze related insurance claims have risen dramatically. Drought events was the second most reported weather-related hazard.

Table 1. Weather-Related Crop Losses by State (1989 to 2015)

State	Top 3 weather hazards	Top 3 claimed crops	Total crop claims*
IA	excess moisture, drought, heat	popcorn, sweet corn, potatoes	$8,160,600
IL	excess moisture, drought, heat	popcorn, green peas, sweet corn	$19,268,406
IN	excess moisture, drought, heat	popcorn, mint, tomatoes	$35,125,464
MI	Freeze, frost, excess moisture	apples, grapes, peaches	$160,264,695
MN	excess moisture, heat, drought	green peas, sweet corn, potatoes	$173,367,509
MO	excess moisture, drought, hail	popcorn, tomatoes, apples	$16,462,863
OH	excess moisture, drought, freeze	popcorn, tomatoes, apples	$18,286,110
WI	excess moisture, drought, heat	green peas, sweet corn, cranberries	$62,920,725

Total crop claim costs are summed across all claimed specialty crops and weather-related hazards from 1989 to 2015 on a per state basis. Dollars are 2015 US dollar.

The Take-Away

Overall, increasingly variable weather and climate change will continue to negatively impact Midwestern fruit and vegetable production. In collaboration with the Midwest Regional Climate Center (MCRR), the USDA Midwest Climate Hub is currently seeking input from Midwestern fruit and vegetable growers on all weather-related issues. Preliminary grower survey results indicate the need for crop-specific weather, production and financial risk management tools, and more accurate short-term weather forecasts.

If you are a grower, please share with us your biggest weather/climate problems at:

http://mrcc.isws.illinois.edu/events/SpecialtyCrop/

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This is a partial summary of a larger paper titled Vulnerability of Specialty Crops to Short-term Climatic Variability and Adaptation Strategies in the Midwestern USA. For the complete research paper go to:

https://www.climatehubs.oce.usda.gov/sites/default/files/10.1007_s10584-017-2066-1.pdf