



An updated, more precise version of the USDA's 1990 plant hardiness zone map, shown at left, is nearing completion.

We're Not in Zone 6 Anymore

Climate change is bringing milder winters—plus other, less-welcome changes.

Most gardeners would find it difficult to complain about early springs or tomatoes before July. And for many of us, this is how our climate-change revelations will come—in the form of earlier flowers and harvests. As the planet warms, our plants awaken a little earlier. In one study, researchers at the Smithsonian's National Museum of Natural History discovered that Washington, D.C.'s beloved cherry trees bloomed about a week earlier in 2000 than in 1970. At the Chicago Botanic Garden, forsythia bloomed on April 1 last year, nearly a month earlier than in the 1950s. "Two years ago, we had snowdrops blooming in January," says Kayri Havens, Ph.D., director of plant science and conservation at the Chicago Botanic Garden. "That's unheard-of."

Unseasonably warm temperatures actually increase the risk of frost damage: One cold night can decimate an entire tree's worth of too-early blossoms. The same processes that push temperatures

higher also play havoc with precipitation patterns, producing wetter winters and drier summers. The precipitation we receive is more likely to be extreme: heavy rain coupled with strong winds. Weather in a climate-changing world will become increasingly unfriendly.

The impacts of climate change extend far beyond the weather report. Take allergies, for example. Many plants respond to rising temperatures and higher levels of carbon dioxide by blooming earlier and producing more pollen. Ragweed is becoming even more allergenic; not only does increased CO₂ result in more ragweed pollen, but the pollen contains higher levels of an allergy-causing protein, potentially leading to more severe hay-fever attacks. Ticks, mosquitoes, aphids, and other pests prosper due to longer growing seasons. And poison ivy? "The chemical that makes you itch is increasing with higher carbon-dioxide levels," explains Havens. "Poison ivy is becoming more toxic."

Ultimately, climate change is expected to alter every aspect of our gardening experience, from the length of our seasons to the ferocity of our summer storms. In a 2009 report titled *Global Climate Change Impacts in the United States*, the U.S. Global Change Research Program documents changes that have already occurred and provides predictions for the future. Average temperatures in the United States have risen more than 2°F in the past 50 years, for example, and are expected to increase an additional 4° to 11°F by 2100. Some changes will affect the entire country—extreme weather events, accelerated weed growth, higher pollen counts—but many impacts will vary by region or season. Hotter and drier conditions could decrease productivity in the Southeast, and severe storms coupled with longer droughts may increase the possibility of crop destruction in the Great Plains. In New England, warmer and wetter conditions will allow growers to experiment with new crops, but will also reduce harvests of cool-season favorites

Prepare for Changes in Your Garden

Drier summers:

Collect excess rain-water in rain barrels and use mulch to keep soil moist.

Extreme storms: Spare plants from water-logged soil by growing them in raised beds.

Frost damage: Protect plants from an unwelcome frost with a sheet or row cover.

Pests and weeds: Control weeds and pests with beneficial insects, row covers, and mulch.

Chronicle Changes in Your Garden

A garden journal may be your best ally. Careful notes will help you learn the climatic quirks of your garden and track changes to weather patterns or plant-growth habits in your region.

Put your observations to work by sharing your notes with Kayri Havens, Ph.D., and her partners at Project BudBurst. This project collects data on phenological events—the timing of leafing, flowering, and fruiting—from volunteers across the country. Visit budburst.org to get involved.

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such as cranberries, broccoli, and maple syrup. It's hard to believe, but by the end of this century, New Hampshire is predicted to have summers similar to what we currently see in Virginia or North Carolina.

Soon, America's gardeners will have a new map to help navigate these changes. The USDA's Agricultural Research Service (ARS) is in the final stages of a comprehensive revision to its plant hardiness zone map, according to Kim Kaplan,

ARS spokesperson. The new map will be more precise than the 1990 map, partially because it considers variables beyond temperature, including slope, elevation, and prevailing winds. The internet-friendly map will feature a zip-code finder to help gardeners determine their zone. "I don't know that you'll be able to see your own back yard, but it will probably be close," Kaplan says.

But the map is no more than a guide. "Don't go ripping out what's been thriving in your yard just because some zone on a map has changed," warns Kaplan, who stresses that no one can know their gardens better than the gardeners. "Gardeners should be aware of the mini microclimates in their yards—the cool spot where frost pools, the warm sheltered spot against a south-facing wall."

As for climate change, Kaplan points out that "most perennials don't experience climate; they experience weather." The difference is a matter of scale and influence. Climate can be measured only at the level of decades and centuries—it affects weather patterns but does not control individual weather events. Put another way, a region may have a hot and dry *climate*, but it will still have rainy *weather* from time to time.

And this is the challenge. Our climate is changing, but weather is the real boss. Climate change may increase the likelihood of summer droughts or leaf-shredding hailstorms, but individual weather events will determine our tomato harvests. The best solution for a gardener? Stay alert to long-term changes, but always check the weather report. —Cristina Santiestevan