

What your fruit bowl reveals about climate breakdown

March 25 2024, by Chris Wyver



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Spring arrived in style on March 26 2021 in Kyoto, Japan, as cherry trees reached [the peak of their bloom](#). This marked the earliest recorded date when most flowers have opened in a series of annual records dating back to 812 AD—over 1,200 years.

The culprit is climate change. [Milder, wetter winters](#) and warmer springs coupled with increasingly variable weather have caused blossom dates to advance across growing regions and a variety of fruit trees.

While this might scupper the travel plans of those hoping to catch a glimpse of [the famous cherry blossom in Japan](#), changing blossom dates are causing a much larger headache for those in charge of over 40 million hectares of fruit orchards [worldwide](#).

Fruit trees have a complex relationship with the climate. In winter, trees need a period of cold weather (known as [chill accumulation](#)) to exit their dormant winter state and resume growth. This is followed by a period of [warm weather](#) (known as heat accumulation) which is necessary to produce blossoms in spring.

The amount of cold and warm weather required varies depending on the fruit and variety, but failure to fulfill either can damage fruit yield and quality.

Higher average temperatures and greater swings in temperature across both seasons have caused chaos for fruit trees, with increasingly frequent and severe heat waves and cold snaps disrupting the once stable cycle of seasons.

Despite warming winters, many fruit trees are still comfortably meeting their requirement for chill accumulation in temperate realms like Europe

and North America. But the same trees are fulfilling their heat accumulation requirement earlier because of warmer springs.

As a result, apples, pears, cherries, plums and apricots are all flowering earlier—by as much as [a fortnight](#) in some cases.

You will notice these changes too, most vividly, in the quality and availability of fruit you can buy. Here's how the contents of your fruit bowl will change to reflect the distorted seasons.

How earlier blossoms affect fruit

Changes in blossom dates have major consequences when the time comes to harvest.

In areas where blossom dates are advancing, experts are warning of an increased risk that delicate blossoms will be exposed to damaging frosts. Even relatively short cold snaps when trees are in blossom can devastate fruit production. [A single frosty night](#) in April 2017 caused a 24% drop in the European yield of apples and a 12% drop in pear production.

Many fruit trees are also self-incompatible. This means they need cross pollination from a different variety to set fruit. Much of this pollination is carried out by insects, particularly wild bees, and, during my Ph.D., I have found that the climate is also affecting the timing of [wild bee lifecycles](#).

Some species of bee are emerging at the wrong time to pollinate fruit blossoms, partly because bees and blossom [respond differently to the climate](#). Not enough pollinating insects can be costly. Research from the University of Reading highlighted an estimated £5.7 million (US\$7.3 million) a year in [lost production](#) of Gala apples due to too few insect pollinators.

[Lack of pollination](#) can slash crop yield and change dry matter content (a good indicator of sugar content and eating quality) and reduce the ratio of potassium to calcium in the fruit, which reduces the chance of fruit developing diseases post-harvest.

Earlier blossom dates have even been linked to changes in the [taste of fruit](#). Research into Fuji and Tsugaru apples in Japan uncovered falling acid concentrations and increases in soluble sugars, resulting in sweeter-tasting fruit. Early indications suggest that, in [temperate regions](#), these changes may be [beneficial to fruit quality](#).

But in regions that are already considered warm, such as the [Mediterranean, northern Africa and Brazil](#), growers face different challenges as their orchards [aren't getting enough cold weather](#).

This means trees may not reach their chill accumulation threshold, resulting in slower growth and lower production. The UK is importing [more fruit than ever](#) from such [climate-vulnerable](#) countries, including [18.5% of apple and pears](#) in 2022.

This includes imports from South Africa and Brazil, where winter chill is already limited and predicted to shrink further under [future climate conditions](#). Existing varieties with high chill requirements may need to be replaced by those with lower chill requirements, such as Granny Smith or Pink Lady, which could become more prevalent on UK shelves as a result.

Even in countries not classed as particularly vulnerable to climate change, widespread changes in the varieties and fruits that farmers grow may be necessary if orchards are to persist. By the end of the 21st century it is predicted that the necessary [chill accumulation will be unattainable](#) for many selectively bred varieties of apricot and peach in California, prompting dramatic declines in yield and making large

changes in crop selection necessary.

A bitter harvest

Any changes to orchards will inevitably mean changes on the shelves of supermarkets. In the UK, experts are warning that traditional apple varieties such as Pippin or Nonpareil, grown in the country since at least 1500, are likely to be [replaced](#) by apples more suited to warmer climates, such as Fuji and Gala, bred in different parts of the world but grown in the UK.

In the not too distant future, you may find your favorite varieties of many fruits increase in price, or simply become unavailable, should climate change continue on its current trajectory.

Uncovering changes in blossom dates and their effect on fruit yield and quality requires a lot of data, often painstakingly collected by researchers at universities and horticultural research stations. The advent of smartphones and their ability to share photos has made it possible for members of the public to get involved in this crucial area of research.

[FruitWatch](#) in the UK and [Bloom Watch](#) in the US are appealing to the public to submit records of where and when they see fruit trees blossoming, to help scientists better predict when trees will blossom under climate change and provide growers a vital early-warning system for the risks posed by [climate change](#) to their livelihoods.

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