D.C. cherry trees: Blooms won't wait in warming world, research finds

March 20 2012, By Sandra Hines

Mary Levin/U of Washington

Cherry trees in full bloom in our nation's capital – as well as the festival surrounding that event – could be as much as four weeks earlier by 2080 depending on how much warming occurs.

So says an analysis conducted at the University of Washington that relied on the UW's own cherry trees as one test of a computer model used in the project.

Plant phenology models that consider when plants bloom and bear fruit in response to temperature are used for agricultural crops such as apples and grapes as well as ornamental and forest trees. This appears to be the first time such a calculation has been made for the cherries in the Tidal Basin of Washington, D.C., according to Soo-Hyung Kim, UW assistant

professor of environmental and forest sciences. Kim is co-author on a paper about the findings published in the Public Library of Sciences' online journal *PLoS One*.

Every spring tens of thousands of visitors flock to see the cherry trees in Washington, D.C. This year's celebration has been extended from two to five weeks to mark the 100th anniversary of the first planting of 3,020 trees that were a gift from Japan.

To make the estimates, researchers at the UW used an existing computer model and adapted it using the last two decades of National Park Service peak bloom records – peak bloom being when 70 percent of the blossoms are open – and temperature records from Reagan National Airport.
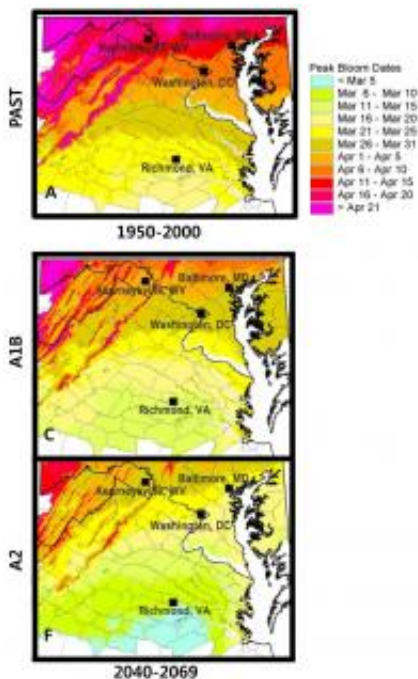
Early-March bloom times in pale blue range to late-April times depicted in hot pink are used to contrast the historical record of peak blooms 1950 to 2000 (top) with predictions for the 2050s under moderate temperature increases (middle)

and more drastic temperature increases (bottom).

Before using the model for future predictions, they tested it using data from additional locations including the UW campus and older peak-bloom records in the Tidal Basin. The UW has the same varieties that are most common in the Tidal Basins: Yoshino, in the UW Quad, and Kwanzan, along Rainier Vista. The scientists gathered general information about when the UW trees bloomed based on news reports.

Projections were then made based on two of the various climate change scenarios developed by the Intergovernmental Panel on Climate Change.

A scenario with moderate warming suggests that by the 2050s the peak bloom could be five days earlier and by the 2080s about 10 days earlier. Researchers have already established that cherry trees and other plants in Washington, D.C. have been blooming earlier during the last 60 years because temperatures warm earlier. The trajectory of warming that's already been detected essentially mirror the UW's findings using the moderate scenario.

If the other – more drastic – scenario of warming should occur, then peak bloom could be about two weeks earlier by the 2050s and four weeks earlier by the 2080s.

The researchers did not attempt to make predictions for the UW trees because they couldn't find long-term, historical records of "peak" blooms for these trees to test the model before applying it to the future, Kim said.

One day Kim hopes to organize students, staff, faculty and visitors as citizen scientists to record peak blooms on campus. Scientists like Kim

who study plant phenology – when plants bud, flower, bear fruit and lose their leaves – already rely on citizens to document what they see where they live through Project Budburst and other organized efforts.

The models like the one used at the UW for the capital's flowering cherry trees can also be used, "perhaps more importantly, for assessing the agricultural and ecological impacts of climate change," wrote the co-authors. Co-authors with Kim are Uran Chung, who was a visiting scientist in Kim's lab and is now with the United Nations in Mexico doing research on maize and wheat, UW graduate student Liz Mack and Jin Yun of Kyung Hee University, Korea. Kim's lab is part of the UW's Center for Urban Horticulture and the School of Environmental and Forest Sciences.

The work was done as part of a grant to Kim from Korea's Cooperative Research Program for Agricultural Science and Technology, which is interested in models that can be applied to specialty crops such as vegetables, ornamental crops and fruit trees.

"This type of predictive model will become increasingly useful when it is capable of making real-time forecasts," the authors wrote. For fruit crop production, for example, plant-growth models might someday help predict flowering dates so farmers know when to arrange with bee handlers to have their apple, pear, peach trees and other deciduous fruit trees pollinated as well as optimize the use of resources with minimal environmental impacts, Kim said.

  More information: www.plosone.org/article/info %3Adoi%2F10.1371%2Fjournal.pone.0027439

Provided by University of Washington