Bluebells may fail to flourish as warmer days speed start of spring

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Carpets of bluebells have long been a feature of spring woodlands - but the flowers may not be at their best in years to come as climates get warmer, research suggests.

Bluebells and some other spring flowers appear to be slipping out of sync with spring, as changes in seasonal temperatures alter the optimum time for them to come into leaf or flower.

A study of spring plants - based on hundreds of thousands of observations by amateur enthusiasts submitted to the Woodland Trust's Nature's Calendar project - has highlighted that some are liable to adapt less well than others to rising temperatures, which can impact on their chances to grow and reproduce.

The study will help scientists improve their estimates of which spring plants, whose flowering and leafing is triggered by warmer days, will respond well to increasing temperatures, and which will not.

All 22 species of plants included in the study were found to be sensitive to warming temperatures in spring, by changing when their leaves or flowers emerged.

Researchers found that the plants would come into leaf or flower an average of three to eight days sooner for each 1C increase in temperature. Some species may lack the immediate flexibility to keep up with changes to their optimum timing, and may need to adapt over

several generations in order to cope.

Seven of the 22 species tracked are likely to keep up with future changes in climate, such as silver birch, beech, ash and wood anemone. Four were identified which may struggle to keep up, including bluebell and garlic mustard. The other 11 species studied did not show a consistent pattern.

The study is published in *Global Change Biology*.

Christine Tansey, Research and Evidence Coordinator at the Woodland Trust, who led the study at the University of Edinburgh's School of Biological Sciences, said: "Plants have an optimum time for developing leaves and flowers - if they get it right, this will maximise their chances for growth and reproduction. As long-term temperatures change, it may alter the optimum timing for plants to develop."

Dr Kate Lewthwaite, Woodland Trust Citizen Science Manager, said: "Christine's findings are really valuable. They also show just how important the records people submit to Nature's Calendar are in helping to predict the effects of our changing climate over time. The English bluebell is an iconic woodland species so this prediction is a wake-up call for the possible effects of climate change on much loved parts of our natural world.

"It's important that this data collection continues and now is a great time to start recording this year's spring activity. It's really easy - just go to naturescalendar.org.uk, record what you have seen."

Provided by University of Edinburgh