Climate Crisis

Botanic gardens' pear tree in full bloom: 'It's completely out of kilter with the seasons'

Stress-induced flowering is becoming more frequent due to global warming, according to National Botanic Gardens director

Maurizio Careddu photographs Matilde Careddu and Susanna Carta from Sardinia at a display of dahlias which would usually have died off due to frost but this year in Nov. are still in full bloom, at the National Botanic Gardens. Photograph: Alan Betson

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Dr Matthew Jebb was disturbed to find the National Botanic Gardens' Callery pear tree in full bloom a couple of weeks ago. The deciduous tree, native to China and Vietnam, normally flowers in early spring. "This is the first time this has been seen in our collection," said Dr Jebb, director of the National Botanic Gardens. "It's completely out of kilter with the seasons."

The botanist and biologist attributed drought stress for tricking the tree into thinking winter had passed and it was time to flower. After realising its mistake, so to speak, the tree quickly shed its buds. “Because the tree used up so much of its energy store blossoming early, it will blossom [as usual] in the early spring, but it will be a shadow of itself.”

Stress-induced flowering such as this is becoming more frequent due to global warming. This year, Europe experienced its worst drought in the past 500 years, with August the driest August on record in Dublin since 2003, according to Met Éireann.

While trees such as the Callery pear can tolerate one drought, Dr Jebb said a few consecutive droughts would kill it. “We will see far more destructive changes because plant species cannot adapt to these extremes of climate and the regularity that they have never encountered before.”

Dr Matthew Jebb, director of the National Botanic Gardens. Photograph: Alan Betson

On a crisp November morning at the gardens in Glasnevin, Dublin, Dr Jebb explained how subtle temperature changes affect flora. He pointed out a small, sage-coloured shrub with a fuzzy appearance, owing to its white hairs. Until about a decade ago, tens of thousands of these shrubs, cottonweed, grew along Ireland’s south and east coast. Since then, their numbers have declined, with only 12 surviving at one location in Co

Wexford. Scientists have been fighting to keep this perennial, classified as critically endangered, from going extinct. Twenty-five critically endangered plant species are on the cusp of extinction in Ireland.

Critically endangered cottonweed growing at the National Botanic Gardens. Photograph: Alan Betson

To save the cottonweed, a clipping of the plant is now growing at the Botanic Gardens, allowing botanists to monitor it. “We’re trying to emulate what happens in the wild and keep it happy,” said Dr Jebb. “This includes piling sand over its roots to mimic the windblown sand that builds up around the plant as it grows.”

Meanwhile, in an another indicator a warming climate, the gardens’ dahlias were in full bloom. Dr Jebb said an early frost should have killed them weeks ago. Increased temperatures such as this can lead to invasive or alien species establishing themselves, so staff quickly remove any plants that don’t belong.

Both the Botanic Gardens and Trinity College Dublin have been working on a sort of Noah’s Ark for plants. Hundreds of seeds from now-extinct plants have been cryogenically frozen at minus 20 degrees, with extracted DNA stored at minus 80 degrees, awaiting a return to their natural habitat.

[Plants flowering earlier due to climate change]

The Paris Agreement, adopted by 196 countries in 2015, aimed to limit global warming to 1.5 degrees. As delegates meet this week for the Cop27 conference in Sharm el-Sheikh, Egypt, the implications of relatively small fluctuations in temperature can be seen in plants.

Dr Jebb said ribes alpinum, a shrubby plant that produces crimson berries, serves as a tool for measuring the arrival of spring. Scientists track when its leaves first unfurl, or when the buds literally burst open. “They will unfurl earlier if it’s a warmer year, and later if it’s a cold year. There is a clear trend that in the last 50 years, it is tending to unfurl its leaves up to three weeks earlier than normal.”

The shrub is part of a European network of clones. Decades ago, cuttings of a German ribes alpinum were sent to countries across Europe, with each growing an identical plant, making it an accurate tool to calculate spring’s arrival across the continent.

Dahlias at the National Botanic Gardens. Photograph: Alan Betson

According to data, Dr Jebb said, spring is moving four kilometres per year northwards. To put that in perspective, oak trees, which appeared in Ireland after the last ice age, move at a pace of about 0.5 km a year. Movement occurs when birds, squirrels and larger animals eat the acorns and disperse the seeds.

“Climate change is moving at four kilometres a year, so you could say that climate change is outpacing the speed at which plants can move by a factor of eight,” said Dr Jebb.

Unlike animals, a plant can’t get up and move when the climate doesn’t suit it, making it difficult for many to survive challenging conditions.

Plants are so attuned to temperature changes that two unrelated plant species near one another will bloom within a day or two of each other, said Dr Jebb.

But stress can disturb this synchronicity and prevent fertilisation.

Without offspring, plants would become extinct. Without plants, humans would become extinct.

While most scientists equate human intelligence with the chimpanzee, Dr Jebb said human beings are more intellectually on par with the pea. If you plant one pea seed in a container, it will produce a bountiful crop. “If you put two pea seedlings together in the same container, within a few days of sprouting, those two peas, although they don’t have brains or nervous systems, are chemically aware of each other’s presence.”

Since both need the same balance of minerals, they become aggressive. This competitive behaviour exerts so much energy, it stunts the plants’ growth and results in a smaller crop of peas.

Dr Jebb compares this to humans, who instead of sharing earth’s resources, which are more than enough for everyone, compete to exploit them, thereby destroying ourselves in the process.

“We’ve got as much intelligence as those peas,” he said. “We’ve got to reduce so many impacts of the human race so the natural world can survive the climatic change that we’ve unleashed upon it.”

Conscious of its own carbon emissions, the Botanic Gardens – which is managed by the Office of Public Works – is transitioning away from fossil fuels. Dr Jebb said neither the building nor the visitor centre will be heated. Their tropical selection of plant species will be reduced, and glasshouses will be used to keep frost off plants. “There is no way we can justify the cost and also the damage these buildings are doing in terms of a carbon footprint.”