

Want Vivid Pink Sakura Indoors? Hirosaki University Researchers Might Just Make That Possible

Cherry blossoms beautifully color the landscape of Japan at this time every year. Now, a research team at Hirosaki University in Japan's northern Aomori prefecture has deciphered the mechanism by which the ubiquitous Somei Yoshino variety blooms into clouds of softly-tinted pink blossoms every spring.

The researchers found that blue and red LED lights used to illuminate the buds were the key to understanding this coloring mechanism. It may be possible, they said, to use this research to make cherry trees bloom into vividly-colored blossoms at will.

Hanami? You're Probably Thinking of Somei Yoshino Trees

The Somei Yoshino variety originated in Japan by crossbreeding two native cherry trees, the edo higanzakura and oshima-zakura. At the end of the Edo Period (1603-1867), a gardener in the town of Somei in Edo (present-day Komagome in Tokyo's Toshima ward) began selling Somei Yoshino trees nationwide. He named the variety "Yoshino-sakura," after Mt. Yoshino in Nara Prefecture, which had long been known as a famous cherry blossom viewing spot.

Afterward, the name is said to have been changed to Somei Yoshino, bearing the name of the town where it was propagated and differentiating it from the cherry trees on Mt. Yoshino.

Somei Yoshino were planted nationwide during the high-growth period of the Showa Era (1926-1989). The variety has become so familiar to Japanese people today that it is Somei Yoshino that comes to mind at the mention of cherry blossom viewing.

Somei Yoshino are very fast-growing cherry trees with a canopy that can exceed 20 meters wide in only 20 years. It is particularly well-suited to hanami, or cherry blossom viewing, with dense blossoms engulfing the branches before its leaves emerge in the spring. For this reason, there are many famous hanami spots featuring Somei Yoshino throughout Japan.

Hirosaki Park in the city of Hirosaki, Aomori Prefecture, is one of them. The Hirosaki Cherry Blossom Festival, held over Japan's annual Golden Week holiday from late April to early May, typically attracts more than two million tourists each year.

Illuminated by LEDs

About 1,700 Somei Yoshino trees are planted in the park, their branches pruned throughout the year as part of regular maintenance. The pruned branches with little buds don't go to waste, however. Residents who so request can take them home and care for them in flower vases, and enjoy an early hint of spring when they come into bloom. Yet, the color of these blossoms is quite white, compared to blossoms outside in the park.

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Why are the colors different between those raised indoors and outdoors? Professor Osamu Arakawa of Hirosaki University's Department of International Agriculture and Horticulture, a specialist in pomology (fruit trees) was inspired by the effect of ultraviolet light on apples. He speculated that the color differences could have something to do with light. He started an experiment using budded branches pruned in winter from Hirosaki Park.

Using light-emitting diodes (LEDs), he illuminated the swelling buds as they were about to open. Blue light LEDs were found to tinge the petals with a pink color. When red LEDs were applied with the blue, the pink color became darker. However, there was almost no change in color when the buds were irradiated only with red LEDs.

Altering the Coloring of Flower Petals

It was learned that Somei Yoshino petals have receptor molecules that are activated when exposed to blue and red lights. In experiments, blue LED receptor molecules were activated to produce pigments called anthocyanin. This function was bolstered by red light receptors to color the petals pink.

Blue and red lights are found in sunlight in abundance, but very little is found in fluorescent indoor lighting. For this reason, Professor Arakawa concluded that blue and red lights are both needed for the coloring of Somei Yoshino blossoms. If the branches are brought indoors, where such light is scarce, the petals will be whitish when they bloom.

The team aims to use genetic research to further analyze the mechanism by which blue and red light affects the coloring of Somei Yoshino petals. Professor Arakawa said: "It may be possible to adjust the hues of other sakura varieties, too, and grow beautiful pink sakura indoors at will."

An official of Hirosaki municipal government's Parks and Green Spaces Division explained the high hopes placed on the team's research, saying, "It will help pioneer new methods of exhibiting Somei Yoshino, not only outdoors but also indoors."

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桜が色づく仕組み解明 青と赤の光でピンクに

日本の春を美しく彩る桜。その代表的な品種である「ソメイヨシノ」の花がピンクに色づく仕組みを、弘前大などの研究チームが解明した。鍵を握っていたのは、つぼみを照らす青と赤の光だ。この成果を活用することで、色づきのいい花を自在に咲かせられる可能性が出てきたという。

お花見といえばソメイヨシノ

ソメイヨシノは、エドヒガンとオオシマザクラの仲間の交配で生まれた日本産の品種だ。江戸時代の末期、江戸の染井（現在の東京都豊島区駒込）の植木屋が、昔から桜の名所として知られていた奈良県の吉野山にちなんで「吉野桜」の名で全国に売り出した。

その後、吉野山の桜と区別するため、産地名を冠したソメイヨシノに名が改められたといわれる。昭和の高度経済成長期に全国で植樹が進み、今ではお花見といえばソメイヨシノがすぐに思い浮かぶほど、日本人に親しまれている。

ソメイヨシノは成長が非常に早く、20年程度で木の横の広がりや20メートルを超える。また、葉が出る前に花が密集して木を埋め尽くすように咲き花見に適している。そのため、各地に数多くの名所がある。青森県弘前市の弘前公園もその一つで、毎年ゴールデンウィークごろに「弘前さくらまつり」が開かれ、200万人以上の観光客が訪れる。

LEDでさまざまな光を照射

園内にはソメイヨシノが約1700本植えられ、手入れのために通年、枝の剪定（せんてい）が行われている。同市では、冬場に切った枝のうち、小さなつぼみがついているものを希望者に配布。もらった人は室内で花瓶に入れるなどして育て、花を咲かせて楽しんでいる。ただ、屋外の公園でピンク色に美しく染まって咲いた花に比べると、色はかなり白っぽいという。

野外と室内で花の色が変わるのは、いったいどうしてなのか。弘前大の荒川修教授（果樹園芸学）は、リンゴの実が紫外線の効果で赤くなることをヒントに、ソメイヨシノの色づきも光と関係があるのではないかと推測。弘前公園で冬場に剪定された小さなつぼみのある枝を利用して、実験を開始した。

発光ダイオード（LED）を使い、開き始めのつぼみにさまざまな色の光を照射。すると、青い光を当てた花びらはうっすらとピンクに色づいた。さらに赤い光を同時に当てると、色はさらに濃くなった。ただし、赤い光を当てただけではほとんど変化がなかった。

花びらの色づきを自在に調節

ソメイヨシノの花びらには、青や赤の光を受けると活性化する受容体という分子があり、実験では、青い光の受容体が働いてアントシアニンという色素を生成していた。その働きを赤い光の受容体が強め、花びらをピンク色に染めていた。

青や赤の光は、太陽光には豊富に含まれるが、室内の照明に使われている蛍光灯には少ない。そのため荒川教授は、ソメイヨシノの色づきには青と赤両方の光が必要で、これらが少ない室内で育てると、花びらが色づかず白くなると結論づけた。

今後は、ソメイヨシノの遺伝子を解析し、青や赤の光が花の色に影響を与える仕組みについての詳細な解明を目指す。荒川教授は「室内でもきれいなピンクの桜を自在に育てられる方法を確認できそうだ。他の桜品種の色づきも調節できるかもしれない」と話す。

弘前公園を管理する同市公園緑地課でも「屋外だけでなく、ソメイヨシノの新たな展示方法が開拓できるのではないかと期待を寄せている。

出典:桜が色づく仕組み解明 青と赤の光でピンクに
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