Periodic Graphics

A collaboration between C&EN and Andy Brunning, author of the popular graphics blog *Compound Interest*

More online

To see more of Brunning's work, go to **compoundchem.com.** To see all of C&EN's Periodic Graphics, visit **cenm.ag/periodicgraphics.**

THE CHEMISTRY OF PLANT FLOWERING

What causes many plants to flower in the springtime, and what is responsible for the range of colors and aromas their blooms produce? Here we look at the chemicals at play.

WHAT TRIGGERS FLOWERING?

Plants flower when they detect environmental signals, such as changes in day length and temperature.

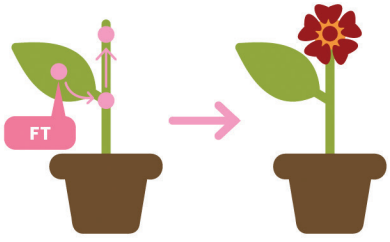
SHORT-DAY PLANTS

Flower when nighttime exceeds a certain length
e.g., chrysanthemum

LONG-DAY PLANTS

Flower when nighttime falls below a certain length
e.g., rose

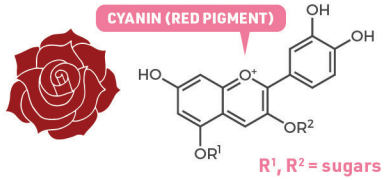
Recent research has identified a molecule that might play a role in triggering blooms. The protein flowering locus T (FT) travels from leaves to a plant's shoots and helps initiate flowering.



FLOWER PIGMENTS

A range of pigments gives flowers their diverse colors, but they all come from three pigment families.

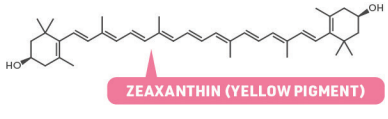
ANTHOCYANINS



R^1, R^2 = sugars

Most red, blue, and purple flowers get their color from anthocyanins.

CAROTENOIDS



Carotenoids are responsible for red to yellow hues in some flowers.

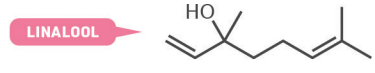
BETALAINS

Some flowers in the Caryophyllales order get their red and yellow colors from betalains.

FLOWER AROMA

Flower petals emit volatile organic compounds (VOCs) to deter herbivores and attract pollinators. These aroma compounds come from three key chemical classes.

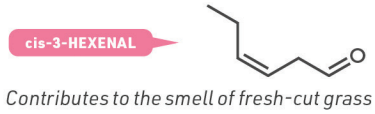
TERPENOIDS



Contributes to the aroma of lavender

Terpenoids are derived from isoprene and are often the most abundant VOCs.

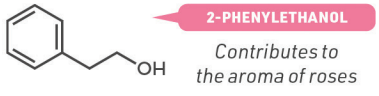
GREEN LEAF VOLATILES



Contributes to the smell of fresh-cut grass

These compounds are derived from fatty acids and are also emitted by leaves.

PHENYLPROPANOIDS



Contributes to the aroma of roses

These are a range of aromatic compounds synthesized from phenylalanine.

PERIODIC GRAPHICS