

What genes help blossoms last longer?

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Some cut flowers and potted plants are better than others at fending off the aging process, known as senescence. To help tomorrow's blooms stay fresh longer, Agricultural Research Service (ARS) plant physiologist Cai-Zhong Jiang is investigating the gene-controlled mechanisms of plants' aging.

Such probing may eventually reveal how to modify flowers' aging-linked [genes](#), or the proteins that are products of those genes.

Jiang is with the ARS Crops Pathology and Genetics Research Unit at Davis, Calif.

One approach, known as "virus-induced gene silencing" or VIGS, is allowing Jiang and colleagues to determine the function of genes in aging plants. In the laboratory, the scientists work with a naturally occurring microbe known as the tobacco rattle virus, modifying it by inserting plant genes of interest into it. In any given experiment, some [flowering plants](#) will not be exposed to the virus, while others will be exposed to either the unmodified or the modified virus.

Exposure triggers the plants' natural [defense mechanism](#), including attempts to quash, or silence, the virus. When that happens, the genes that were inserted into the modified virus are also silenced. By comparing all of the plants, the researchers may be able to determine the newly-silenced genes' functions

In early, proof-of-concept experiments, Jiang and University of

California-Davis professor Michael S. Reid used petunia as their model plant. They showed that inserting a piece of a color-imparting gene into the virus resulted in white sectors or splotches on a normally purple-flowering petunia. The plant's defense system had silenced the gene's normal function, which was to create color, according to Jiang.

A second gene fragment that the team also inserted into the virus was similarly silenced in the oddly white splotches. That silenced gene would normally have been involved in producing ethylene, an aging compound. But the white splotches on the plants exposed to the modified virus produced less ethylene than unexposed plants, or plants exposed to the unmodified [virus](#).

Though VIGS has been used elsewhere to study the functions of genes in tomato and tobacco, the experiments by Reid and Jiang were the first to use VIGS to explore senescence mechanisms in commercially grown cut flowers and potted [plants](#).

Provided by United States Department of Agriculture

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