

## Virus component helps improve gene expression without harming plant

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(PhysOrg.com) -- A virus that normally deforms or kills plants like tomatoes, peppers and eggplants isn't all bad: A gene within the virus has been found useful for allowing foreign genes to be introduced into a plant without harmful effects, according to Texas AgriLife Research scientists.

The technology ultimately could lead the way toward a "cheap, green alternative" for pharmaceutical development, said Dr. Herman Scholthof, AgriLife Research virologist.

Scholthof and colleague Drs. Yi-Cheng Hsieh and Veria Alvarado collaborated with scientists at the John Innes Centre in England on the study which appears in this week's *Plant Biotechnology Journal*.

"Nowadays in the pharmaceutical industry, many protein-based drugs are expressed in and purified from bacteria," Scholthof said. "Plants not only form a cheap and green alternative, but they also have the benefit that they process proteins properly -- something [bacteria](#) can not do."

The team worked with tomato bushy stunt [virus](#), which can attack a multitude of plants worldwide but rarely has economically severe consequences. It is model virus that can be safely contained because it does not have an insect vector which could spread it.

For this study, Scholthof said, only one gene of the virus -- called P19 -- was used because it is the one that suppresses RNA silencing.

"RNA silencing is a fairly recently discovered defense that plants use against viruses," he explained. "During this silencing, short strands of [RNA](#) serve as signals to alert the plant that a virus is attempting to infect so that all of its tissues start mobilizing to defend.

"The elegance is that the P19 protein forms counter-defense units that are each composed of two [protein molecules](#) which form a sort of caliper to measure and capture signal molecules, thereby suppressing the defense to the virus which can infect a plant."

But suppressing the defense might also allow other things, such as allowing desired genes to enter and be expressed. Scholthof said scientists have used other suppressors in plant research in the past to avoid silencing, but "a problem is that these suppressors also cause many developmental defects and severe disease symptoms."

Not so with the P19 variant the group developed, he said.

Scholthof said the process of expressing foreign genes in plants is common in research, but there also is an important practical use.

"It also is used in biotechnology to produce beneficial proteins for medical and veterinary applications," he noted. "By developing this new P19, we have 'tamed' a suppressor because it still works to suppress but does not induce severe disease symptoms in the plant.

"We have provided a proof-of-principle that P19 can be used to protect the silencing of introduced foreign [genes](#) in [plants](#)."

Provided by Texas A&M AgriLife Communications

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