

# Plants are new weapon in fight against dengue

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Credit: University of Nottingham

Scientists have discovered a way to create disease fighting proteins from tobacco plants which could lead to the development of a vaccine for Dengue Fever.

Currently, there is no promising treatment for Dengue Fever, a disease that infects almost 400 million people worldwide every year and is Malaysia's most prevalent infectious disease. Carried by Aedes mosquitos, the [virus](#) causes severe headaches, muscle and joint pains, swollen lymph nodes, vomiting, fever and rash and in some cases can be serious or life threatening.

A team of scientists from the University of Nottingham Malaysia are working on a project to create a plant-based [vaccine](#), which if successful would provide a safe and cost effective way to prevent this disease.

## Moving closer to an oral vaccine

Professor Sandy Loh is leading the research and says: "Vaccines are created from proteins that can be produced in many different systems and research usually focuses on mammalian cell, bacterial cell or fungus. Using [plants](#) for this process is a new platform to emerge that has the potential to provide an edible based vaccine that can be used in orally taken medicine. Other than [tobacco plants](#), we are also working on edible plant species such as lettuce which we hope will eventually lead to an [oral vaccine](#) in the future."

"Using plants to develop a vaccine in this way offers many advantages like higher expression, lower production cost, easier distribution as there is no need for trained nurses to provide injections and better safety as there are no animal or human pathogens which increases the biosafety aspect."

## Neutralising the Dengue virus

The project has produced a vaccine antigen (protein) within the plant that neutralises the Dengue virus. The uniqueness of the project is the use of a transient expression process called Agroinfiltration. During this process, a defective plant virus is combined with Agrobacterium in making an expression vector that delivers the Dengue vaccine antigen into the leaf of the tobacco plant. It is then incubated and harvested after a few days that the vaccine antigen can be extracted and purified for use as a vaccine.

The findings of the project have verified that an immune response is created using the plant-based vaccine in an animal model and the antibodies produced can neutralize the Dengue virus. The next stage of the research will involve virus challenge studies to determine the

protection efficacy of the plant-based vaccine.

## Quick and safe development

As well as Dengue Fever, this technique has also been used to investigate plant based vaccine for Avian Flu and has had similar success. Professor Loh continues; "For developing countries, the development of a cost effective vaccine from plants would have a significant impact as it would mean they can develop their own local vaccines to combat endemic diseases. Providing vaccines in this way would undoubtedly save many lives."

One of the unique aspects of this research is the speediness at which the vaccines can be created using the agroinfiltration method. Professor Loh explains: "For diseases like flu which can mutate quickly, the speed at which we could potentially develop a vaccine is as rapid as one month, this means specific vaccines can be produced to be ready for any potential pandemic outbreaks."

Provided by University of Nottingham

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