INHIBITORY EFFECTS OF THE EXTRACT FROM GALLNUT OF DAIMYO OAK, *Quercus dentata* AGAINST PLANT VIRUS INFECTION, KOREA

Kwon, SB. , Shin, JE., Ahn, SY., Yoon, CS & Kim, BS.

SCIENCE PRIZE WINNER 2011

INNOVATION

Pepper Mild Mosaic Virus (PMMoV) and Cucumber Mosaic Virus (CMV) are important pathogens in various vegetable crops worldwide. Methanol extracts of gallnut on Daimyo Oak, *Quercus dentata* strongly inhibit PMMoV and CMV infection. Based on the result, the compound KN0912 was tested for its inhibitory effects on PMMoV or CMV infection on host plants.

It was found that KN0912 strongly inhibited the infection of PMMoV and CMV. Its effects were found to be notably superior compared to the effects of the known viral inhibitors such as skim-milk or Lentemin.

An environmentally friendly antiviral agent of plant origin has been developed and has been commercially launched under the name Qbyrus-1.

The Innovator: Dr. Soon Bae Kwon is a Scientist at the Gangwon Agricultural Research and Extension Services, Gangwon, Chunchon in South Korea.

Contact: Dr. Soon Bae Kwon, Gangwon Agricultural Research and Extension Services, Gangwon, Chunchon, Korea
E-mail: snbkwon@korea.kr
Web: www.ares.gangwon.kr/hb/en

DESCRIPTION

The fresh gallnut of Daimyo Oak were collected in Gangnung in Korea. 1kg dried sample was ground using a blender, and extracted twice with 7 liter ethanol at room temperature, and filtered. The filtrate was then concentrated in vacuum at 40^{0}C, freeze-dried and the compound KN0912 was formulated.

Daimyo oak twig with a raw gallnut

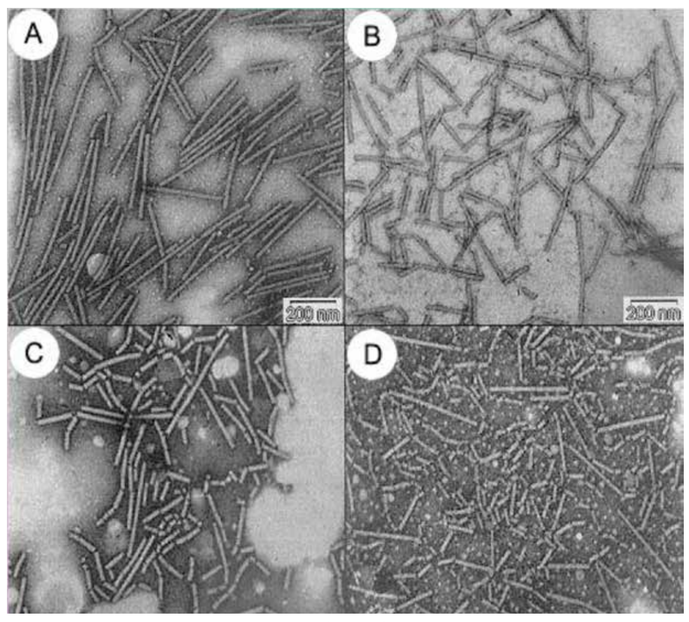
The antiviral and inhibitory effects of KN0912, persistence of the treatment and systemic inhibitory effects on the host were studied in detail. Electron microscopy revealed that the virus particles were almost destroyed or segmented by mixing KN0912, but not affected in its absence in the control.

Dried gallnuts of Daimyo oak

RELEVANCE

Many plant resources have been reported to have potent antiviral activity. Some of them have already been used to treat animals and people who suffer from viral infection because they are a rich bioactive source. However, little work has been done to control plant viruses by using these natural products, in spite of their excellent pharmacological significance.

This is the first evaluation of antiviral activities of Daimyo Oak gallnut on plant viruses. The gallnut is a plant excretion produced when irritants are released by the larvae of gall insects. It contains high amounts of tannic acids such as gallic acid and ellagic acid. As the gallnut extract is widely used in pharmaceuticals, food and feed additives and dyes, it is a safe natural material for use in organic agriculture. The gallnut extract used in this report proved harmless to tobacco seedlings. The results indicate that it is a potent virus inhibitor that can be used to prevent the spread of plant virus infections in the field. It is now available commercially in the name Qbyrus-1.



Electron micrographs of PMMoV particles in the absence(A) or presence of KN0912 (B,C,D)

OFIA Organic Farming Innovation Award

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