Virus-resistant grapevines

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The plant on the left is unmodified and therefore susceptible to viral infections. The other two were modified -- the one in the center is 59 percent resistant to the virus, while the one on the right is 100 percent resistant. Credit: Fraunhofer IME

Viruses can cost winegrowers an entire harvest. If they infest the grapevines, even pesticides are often no use. What's more, these chemicals are harmful to the environment. Researchers are growing plants that produce antibodies against the viruses and are thus immune.

A good wine needs to ripen. But it's a long way to the barrel. Even before the harvest, the grapevines have to overcome all kinds of obstacles. Extremely hot or rainy periods can destroy entire crops, not to mention the wide variety of pests that can appear on the scene. Bugs such as the vine louse or the rust mite, fungi such as mildew, or viruses such as the "Grapevine fanleaf virus" (GFLV for short) can give the vines a hard time. The GFLV infects the grapevine and causes fanleaf disease, resulting in deformed and very yellowed leaves, smaller grapes and crop loss.

However, there will soon be a cure for GFLV infections: Researchers at the Fraunhofer Institute for Molecular Biology and Applied Ecology IME in Aachen are making certain plants resistant to the GFLV by genetic engineering. "Our modified plants produce antibodies," explains Dr. Stefan Schillberg, head of department at the IME.

"These antibodies 'recognize' the viruses and prevent them from spreading in the plant and causing damage." To enable the plant to produce the antibodies, the scientists have to modify its genotype and channel genetic information for the antibodies into it. This task is performed by tiny helpers called agrobacteria, which genetic engineers have been using for over twenty years. These are soil bacteria that inherently transfer parts of their own genome to that of the plant. Using simple routine processes, the researchers introduce the antibody gene into the bacteria, which then act as a transport vehicle and carry it over to the vine.

The researchers are still testing this process on model plants, and the first results show that their modified versions are up to 100 percent resistant to the virus. "The antibody is produced very effectively inside the plants," says Schillberg. "The next step on the agenda is to test the method on actual grapevines and then to carry out field tests." The scientists' long-term goal is to curb the use of pesticides. "Certain pesticides are necessary to fight GFLV infections," Schillberg explains. But they often only have a limited effect. They are also harmful to the environment and therefore banned in many regions. Countries like Chile, for example, which depend strongly on their winegrowing business, could benefit enormously from the pathogen-resistant grapevines and improve their crop yields.

Source: Fraunhofer-Gesellschaft (news : web)