

September 26, 2005

A Project to Remodel Grape Genes Yields Mostly Outrage

By **CRAIG S. SMITH**

COLMAR, [France](#), Sept. 21 - Behind six-foot fencing, watched by unblinking video eyes, and guarded by motion detectors that set off bright halogen lights and a silent police alarm in the event of nocturnal intruders, there lurks what some people in this gentle wine-making region consider an unholy alliance between the noble grape and "Frankenstem": 70 grapevines grafted onto genetically modified rootstocks.

The operation here by the National Institute for Agronomic Research is meant to demonstrate that transgenic plants can cure one of grape growing's most nettlesome ills: the fan-leaf virus, which turns leaves yellow and kills the flowers before they can form fruit, reducing vineyard yields. The virus is present in as many as a third of French vineyards.

But in a land where winemaking is a sacred art and genetic modification is blasphemy to many people, selling the idea to the public has been slow.

"We feel that we don't have the right to alter nature," said René Muré, glaring behind large tortoise-shell-rimmed eyeglasses, at a nearby winery that his family has run since 1648. He contends that wine should be an expression of the land and that the tiny worms that carry the virus and even the virus itself are part of the complex and wondrous biology that makes for great wine.

Mr. Muré's dismay is part of a growing concern in Europe about the gradual spread of genetically modified plants despite popular opposition. Transgenic corn is growing in more than 2,500 acres in

France, up from just over 40 in 2004.

Nowhere is the genetic tinkering more contentious than in the vineyards, whose richly varied produce, together with the country's cheese, as much as anything else define French culture.

The effort to modify grapevines genetically started in the 1990's with Moët & Chandon, the venerable Champagne maker, which was trying to combat the virus.

Gene splicers argue that a transgenic answer is the only effective way to stop the virus, short of saturating the soil with pesticides to kill the worms that carry it, or tearing out infected vineyards and leaving the land fallow for 10 years.

Moët & Chandon's scientists, working with a hybrid of the *Vitis vinifera* and *Vitis berlandieri* vines known as 41B, developed a transgenic fanleaf-resistant plant onto which grapevines could be grafted. The rootstock is used primarily for growing white grapes.

The company eventually won approval for a field test from the Ministry of Agriculture and quietly planted dozens of the gene-altered grapevines in 1996, only to rip them out three years later when the French press learned of the project.

Worried about tarnishing its image, the company turned over the genetic material to the National Institute for Agronomic Research, which has been working ever since to win over skeptical winemakers.

Winemakers worry that someone could steal the genetically modified grapevines and transplant them in the neighboring vineyards, "as a kind of bioterrorism," said Olivier Lemaire, lead scientist on the project.

French grapevines are already growing on borrowed roots. The country's vineyards were nearly wiped out in the late 1800's when an

aggressive ground-borne aphid, the grape phylloxera, arrived from the [United States](#) and spread quickly. Only American vines were resistant to the sap-sucking insect, so French vineyards were replanted with American plants that had European grapevines grafted onto them. The practice has continued ever since.

The National Institute is using five transgenic strains of 41B, each with a gene that produces virus-killing material implanted in a different place in the rootstock's DNA, the substance in the cell nucleus that contains the genetic code. Mr. Lemaire watches over the young plants on the institute's grounds.

But local vintners worry that any confusion in the public's mind could taint their wine.

"We asked that they not use an Alsatian grape," said Jean-Paul Goulby, president of the Alsatian Winemakers Association, adding that any link between Alsatian wines and genetically modified grapevines "would be catastrophic for us."

To ease those fears, the institute chose Pinot Meunier, a variety used in Champagne, to graft onto the transgenic rootstocks. The vine has fuzzy leaves that are easily differentiated from Alsatian varieties.

Mr. Lemaire said the institute has also agreed to cut off all buds before they can develop into flowers. Thus, the plants will not be used to produce wine. He emphasized that there was no exchange of DNA between the rootstock and the grapevine grafted onto it. There may, however, be an exchange of RNA, a nucleic acid present in all cells, and one of the things the scientists want to discover is whether the genetically modified rootstock will send virus-killing RNA into the grapevine, making the entire plant immune.

The scientists also created a test area to see if the transgenic rootstock caused the virus itself to mutate or if the worms migrated toward

unprotected rootstocks planted in clean soil.

It will take at least two years before they have any results, and the test is scheduled to run through 2009, when the results will be evaluated and the plants destroyed.

The careful planning has not assuaged everyone. Earlier this month, about 40 protesters gathered outside the institute's gates.

Mr. Muré, looking at a verdant hillside combed by rows of grape-heavy vines, worries that the introduction of genetically modified plants would only create disease-resistant, climate-adapted vines and increase the volume of mass-produced wine with a standardized flavor.

"There needs to be a multitude of organisms in the soil for the land to express itself in the vine," he said, adding that wine quality eroded after World War II as more and more chemicals were applied to the land. His vineyard stopped using pesticides and herbicides a decade ago, part of a growing trend in France to produce organic wines.

He said a carefully tended vineyard could survive without pesticides, herbicides or transgenic plants. "The more diversity, the greater the character of the wine," he said, "but there will be no diversity if you use a clone."