

## Truffle genes are much alike in the dark

Are French black truffles better than Italian black truffles?

That's hardly a question to treat lightly, and a team of French scientists has brought the techniques of population genetics to bear on the underpinnings of the controversy.

Their conclusion may only inflame the debate, however. The black truffle, *Tuber melanosporum*, displays remarkably little genetic variation across its European range, report Guillaume Bertault from the University of Montpellier and his colleagues. The variation that does occur follows no geographic pattern. In the August 20 *NATURE*, the researchers say that any regional difference in fragrance and flavor "probably results from environmental, rather than genetic, influences."

Small, earlier surveys had hinted at the low variability but had not explored regional patterns. Bertault's team checked 207 wild truffles from Italy and France for variation in 15 DNA sections. "We found a bit of everything everywhere," Bertault says.

Black truffles can command up to \$900 a pound retail. "Yes, we did eat some," Bertault admits. "That's the advantage of molecular biology: You need only a very small amount of biological material."

The genetic picture suggests that about 10,000 years ago, the truffle endured a population bottleneck, a massive die-off that left only a few survivors to repopulate the range, the researchers say. The disaster that nearly wiped out the black truffle could have been the last glacial period, which ended a little more than 10,000 years ago.

The black truffle ripens in winter and suffers more from the cold than Europe's summer truffle does, Bertault points out. The warm-weather cousin that's dormant through the winter has retained more genetic variety, he says, which supports the notion that it suffered less from the glaciers.

The genetic analysis intrigues Jim Trappe, who studies truffles at Oregon State University in Corvallis. Lots of mysteries remain about basic biology, he notes. Truffles belong to a maddening group of fungi that live only as partners to other plants, and scientists have yet to coax the spores to germinate in laboratory cultures. Even placing bits of the fungus on tree roots outdoors to start a truffle orchard is an uncertain business.

French agricultural advisers emphasize location, location, location as the key to success in commercial orchards, Trappe notes, advice that supports the geneticists' argument for the primacy of environmental influences.

So far only two orchards in the United States have managed to produce commercial black truffles. The owner of one, Franklin Garland of Hillsborough, N.C., thinks the environmental emphasis sounds "very reasonable."

His own trees were inoculated with French cultures, and he has tried to mimic French soil. "My truffles taste just like the ones grown in France," Garland says. Moreover, his Labrador retriever, trained with a French truffle, now sniffs out the home-grown delicacy.

—S. Milius