

Professor seeks to extract the most out of his vanilla research

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To Ken Cameron, vanilla is a lot sexier than its name implies. The world's leading expert on the biology of vanilla orchids sees the popular spice, not as plain or ordinary, but as a beautifully complex and valuable commodity produced from the world's largest family of plants.

While bottles of vanilla extract fly off store shelves at this time of year as holiday bakers mix it into cakes, pies and cookies, vanilla is much more than a pastry chef's favorite spice.

Deodorants, household cleaners, popular brands of vodka, pill coatings, the finest perfumes, even Coke and Pepsi count vanilla as an ingredient. And, of course, it's the No. 1 selling ice cream.

"I often tell people, 'I'll challenge you that within 10 minutes of waking, you will encounter vanilla,' " Cameron said in his book- and plant-filled office at the University of Wisconsin-Madison, where he's a botany professor and director of the Wisconsin Herbarium.

"We tend to think of it as a flavor, but it's also a fragrance. There aren't many spices in that category."

Cameron travels around the world to speak about vanilla and conduct research on the valuable crop. This month, he will spend three weeks in vanilla capitals Madagascar and nearby Reunion Island. He's written a well-received book, "Vanilla Orchids: Natural History and Cultivation."

Much of his research has been done in sequencing the DNA of vanilla orchid species around the world, determining, for example, that vanilla orchids found in Mexico are the same species found in Madagascar. He was the first to figure out that the vanilla orchid found in Tahiti, which has different colored flowers than those in Mexico, is a hybrid.

"It was kind of a like a paternity test," Cameron said of his work on the Tahitian vanilla orchids. "There had always been a mystery as to how it got there. We don't have a time machine to see who crossed it and when."

Because vanilla vines pretty much look the same and rarely flower, he is building a DNA bar code database for the 100 species of vanilla orchids, to identify them like a criminal fingerprint book. That way anyone can cut a piece of vanilla orchid vine and determine the species. Working with the University of Wisconsin, Madison botany graduate students, he so far has created bar codes for 45 vanilla orchid species by sequencing small snippets of DNA.

Gourmet cooks and foodies already know this - the flavor and fragrance of vanilla varies widely depending on the species. With more than 400 separate flavor components, selecting vanilla beans can be as difficult as judging fine wines.

"In the same way tobacco and wine have different varieties, or terroir, all those things apply to vanilla, too," said Cameron, opening tubes containing vanilla pods harvested from different countries.

Holding a long, brown vanilla seed pod from Madagascar, Cameron explained the rum-like smell is the most common to vanilla consumers. A vanilla pod from Mexico smells spicier while the species grown in Tahiti has a more flowery, fruity aroma. Cultivation, harvesting and drying affect flavor and odor.

The first vanilla orchids were cultivated for food centuries ago in Mexico. Called "vainilla," or little pods, by Spanish explorers, vanilla beans and orchids were taken back to Europe where the French ended up being much more enthusiastic about the new spice than Spaniards, said Cameron. French explorers, in turn, carried vanilla orchids to colonies like Tahiti, Indonesia, Reunion and Madagascar. That's why it's commonly known as French vanilla.

The Spanish explorers, however, didn't take along the orchid bees that pollinated the vines, so for many years the transplanted orchids didn't flower and produce beans. Eventually, someone figured out how to carefully hand pollinate vanilla orchids, which is still done today on vast vanilla plantations.

Scientists believe the vanilla orchid bee is now extinct. They also suspect vanilla orchids in the wild are close to becoming extinct, a prospect that worries Cameron.

Since most orchids are propagated by cutting pieces of the vine, there are many genetically identical copies in the world, "so if a disease comes through, it could wipe out everything like the Irish potato famine," said Cameron, who wants to explore directive breeding because vanilla is still being grown the same way as a century ago.

Which is to say, very painstakingly.

On plantations in Madagascar, vanilla orchid flowers open once only for a few hours and must be hand pollinated. It can take up to nine months for the fruit to develop. When the green fruit is picked, it has no odor but during a monthlong drying process the aroma develops as the pods are laid in the sun during the day and rolled up in blankets at night while the beans ferment.

Cameron became fascinated with orchids as a boy growing up in Michigan and asked for a tropical lady's slipper orchid for a birthday present when he was 9. His doctoral research was on using DNA to understand the evolution of orchids. He spent a year working at Kew Gardens in London, served a stint in the Smithsonian's botany department and was associate curator at the renowned New York Botanical Garden before coming to UW.

"He has this magnificent reputation for his own work within the biggest plant species in the world," said UW-Madison Botany Department Chairman Donald M. Walter. "What Ken Cameron is doing is understanding very important processes in how one species splits into two or 20."

In addition to giving speeches about [orchids](#) and vanilla in Asia, South America and Europe, Cameron finds time to visit local orchid groups to talk about his latest vanilla research.

"One of the things he's done is by genotyping various cultivars of vanilla, he's been able to identify where the beans come from. That's important because it has a big effect on price," said Jeff Baylis, a member of Madison's Orchid Growers Guild.

Cameron has hundreds of expensive vanilla beans in his freezer, sent to him by researchers and vanilla farmers asking for his expertise. He makes his own [vanilla](#) extract. And he's a good cook.

At last year's UW botany department holiday party, his cookies and baklava won prizes.

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