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Potential for commercial vanilla production in southern Florida

By Alan Chambers

Think about your favorite desserts like ice cream, cookies, cream-filled pastries and chocolate. These indulgences are the perfect end to an otherwise healthy meal, or a guilty snack when no one's looking. Many of our favorite desserts include a common, yet irresistible, vanillin flavor extract from the "bean" of the vanilla orchid. Vanillin has enhanced the sensory experience of many foods and beverages for hundreds of years, and it's hard to imagine a contemporary diet without it.

Now imagine your favorite dessert

created with premium, natural vanillin from southern Florida growers committed to quality, sustainability and the economic viability of local agriculture. Growing vanilla in southern Florida may be a new industry for ambitious entrepreneurs, but there are many factors suggesting that this might be a successful venture.

VANILLA SPECIES

There are approximately 110 species of vanilla orchids, but only a few produce the aroma associated with vanilla extract. *Vanilla planifolia*

(commercial vanilla) is an emerald green, shade-loving vine native to the Americas. It was most likely domesticated in southeastern Mexico by Totonac or Mayan people, and was used by Aztec noble families to flavor their chocolate drink. *V. planifolia* requires warm temperatures, a rainy season and plenty of filtered sunshine to produce an annual crop of seed pods commonly called "beans."

Vanilla species other than *V. planifolia* could also be relevant to an industry in southern Florida. *V. x tahitensis* is a chance hybrid between

V. planifolia and *V. odorata*, and is also commercially important on a limited scale. *V. pompona* is grown on a very limited scale for pharmaceutical and perfume applications.

There are also four native vanilla species growing in southern Florida's state parks and nature preserves. These include *V. barbellata*, *V. phaeantha*, *V. dilloniana* and *V. mexicana*. These native species are certainly not an immediate solution for commercial production, but their conservation and characterization could provide useful genetics for a unique vanilla industry in southern Florida. Native species can help uncover useful genetic traits including adaptability to local environmental conditions, disease resistance, and perhaps unique or enhanced fruit quality. Unfortunately, each native Florida orchid is currently endangered and at risk of being lost before their true value is understood.

VANILLIN

Vanillin is the world's most popular spice, and one of the most expensive. Natural vanillin extract is a premium flavoring and perfuming ingredient with a presumably insatiable global demand. Approximately 15 million kilograms of vanillin were produced in 2010, worth around \$1,200 to \$4,000 per kilogram, with less than 1 percent coming from vanilla orchids.

A vanilla bean contains about 2 percent vanillin, though the natural extract contains other components that also contribute to its quality. Madagascar is regularly the highest producer of orchid-based vanillin, followed by Indonesia, China and Mexico. Indonesia, Papua New Guinea, China and Madagascar have the highest gross production of seed pods (Figure 1).

The United States is one of the biggest importers of cured beans and exporters of the finished product (vanillin extract), worth \$26 million in 2004, according to the Food and Agriculture Organization of the United Nations. Supply is heavily influenced by environmental and biotic factors leading to volatility in production and market prices, as shown for global production from 2004 to 2014 (Figure 2). Production

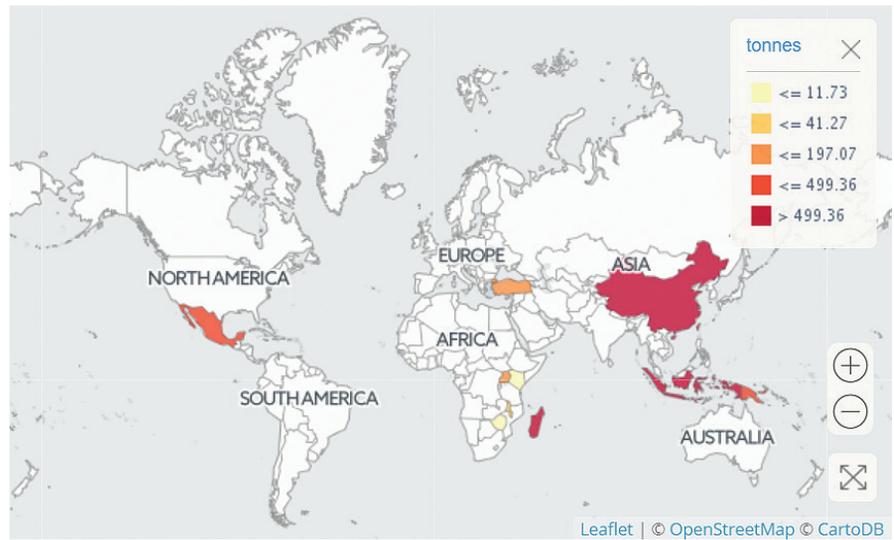


Figure 1. World production of vanilla, 2004–2014

Production/Yield Quantities of Vanilla in World + (Total)

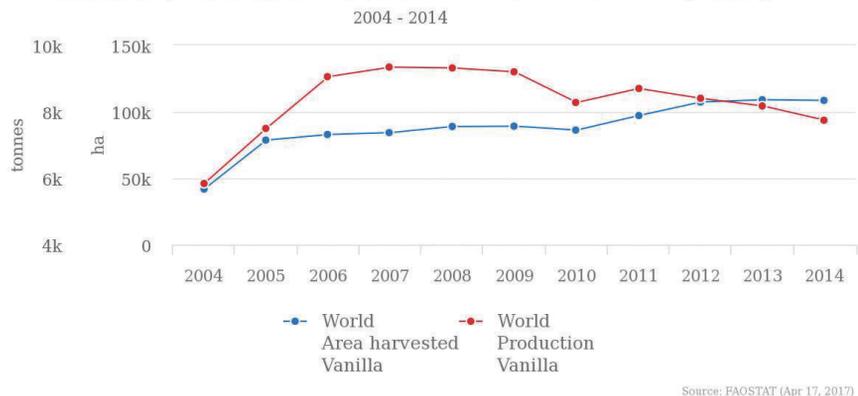


Figure 2. Global vanilla area harvested and world production, 2004–2014

volume, quality and price are not equivalent across producing countries.

Demand for vanillin flavoring from natural sources, including vanilla orchids, is predicted to increase primarily from 1) growing consumption of vanillin products including desserts like ice cream and chocolate, and 2) a trending force from major food companies investing in natural ingredients. This suggests that demand could be increasing specifically for premium vanillin flavoring from vanilla orchids. Vanilla cultivation could be suitable for southern Florida based on a favorable growing environment and high anticipated revenue generation.

CULTIVATION

Vanilla cultivation requires specific infrastructure. First, vanilla orchids require shade. Common nursery shade houses would be suitable. Shade has

also been provided by “tutor” trees, including citrus trees in some countries. In these cases, vanilla cultivation acts as a revenue generator while new tree plantings are getting established. Otherwise, the vines require structural support from some other form of trellising. Vanilla orchids do require an establishment period of a few years prior to flowering, and research will be needed to optimize this process for southern Florida.

The pods require thermal treatments, curing, sweating, drying and extraction to produce the full flavor of natural vanilla extract. Various postharvest practices are employed globally and further optimization could increase production and quality of the finished products. Optimal growth and plant maintenance methods would therefore need to be established for southern Florida.



Images courtesy of the Food and Agriculture Organization of the United Nations

Figure 3. Manual pollination of *Vanilla planifolia*

CURRENT CHALLENGES

V. planifolia currently requires manual pollination in order to set pods (Figure 3). Many homeowners in southern Florida pollinate their own vanilla orchids. The technique is not complicated, but labor is a major expense for commercial production. Pollination is achieved using a small stick to circumvent a physical barrier within the flower (the rostellum) and introduce pollen onto the stigmatic surface. *V. planifolia* flowers must be pollinated the morning they open, before the flowers wither and drop off the vine.

The major pathogens of vanilla are *Fusarium oxysporum*, *Colletotrichum vanillae* and *Puccinia sinamononea*. Poor cultural practices can increase disease severity, and cultural practices are therefore often the first method to reduce disease impacts. Additional control methods might be necessary for high-density production in southern Florida.

GENETICS AND BREEDING

There are few vanilla cultivars available for commercial production. *V. planifolia* is vegetatively propagated and widely distributed, resulting in a lack of genetic diversity in most commercial systems. This generally increases the risk of potentially devastating disease epidemics like growers are currently experiencing in citrus and banana.

Care must also be taken to obtain virus-free stock material for establishing a vanillery. These risks could be reduced through a systematic breeding program focusing on yield, quality and sustainability with regular improvements to

elite cultivars.

Obtaining and increasing stock material for a vanillery would be relatively straightforward. Information for establishing and maintaining vanilla plants is also available from multiple sources. A systematic breeding program could

additionally provide novel and useful cultivars to support a vanilla industry in southern Florida. The availability of closely related species could also provide a route to the creation of superior cultivars, but only sparse information exists for validating this approach.

V. x tahitensis is one example of a chance seedling giving rise to a niche industry. The few native Florida orchids may prove especially interesting, because they can produce seed pods in their natural environments without manual pollination. The mechanisms for this specific trait would be worth study in the future.

CONCLUSION

Vanillin is a timeless ingredient with increasing demand. Market trends

suggest that demand will especially increase for premium, natural vanillin. High prices for natural vanillin extract could justify investment for domestic production. The opportunity for vanilla production in southern Florida might also justify conservation efforts for our native vanilla species that could guide future breeding work. In summary, these challenges and opportunities should resonate with many in our industry, and are worth further consideration especially when enjoying your next bowl of ice cream. 🍦

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