



—Scientific Note—

Establishing a Domestic Vanilla Industry

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Vanilla has potential to be among the highest grossing agricultural commodities in Florida. Spices like vanilla comprise a small portion of our diet, but have major impacts on the sensory quality of our food. Vanilla extract comes from the cured beans of either *Vanilla planifolia* or *V. x tahitensis* as legally defined by the FDA. *V. planifolia* is native to North and Central America, but Madagascar is today's leading vanilla grower. Domestic vanilla production is becoming increasingly attractive as international supplies are perennially strained and demand for vanilla extract increases as global food companies pledge to remove artificial ingredients from their products. Most vanillin, the primary flavor component of vanilla extract, is chemically synthesized, but vanilla extract has the potential to support growers in Florida, Hawaii, and Puerto Rico striving to meet an evolving consumer base favoring local, organic, and natural products. Vanilla is somewhat unique in that the species not been domesticated through plant improvement, and today's industry relies on cultivated, wild clones. Since 2016, we have collected around 300 vanilla accessions for trialing in Florida. The primary objective of the vanilla collection was to identify adapted types that are virus-free and that grow well in Florida. This presentation will describe our 1) preliminary results from characterizing the vanilla collection, 2) efforts to connect with growers, and 3) genomics and breeding work to develop superior vanilla cultivars.

Materials and Methods

The living vanilla collection of almost 300 accessions has been characterized using genotyping-by-sequencing with ~5,000 single nucleotide polymorphism DNA markers. Additionally, hundreds of vanilla samples from other countries were also analyzed. Vanillin content was analyzed using high performance liquid chromatography. Grower communication through public talks and a symposium were used to disseminate information. The full genome of *V. planifolia* 'Daphna' was generated and is now being used to identify gene candidates for priority traits.

Results and Discussion

Genomics has greatly improved our understanding of vanilla diversity, resolved species assignments, and identified hybrids. Our recent work has divided *V. planifolia*, the commercial species, into three distinct types based on heterozygosity levels and SNP patterns. Future work will include deep phenotypic characterization of these types. Vanillin content of Florida-grown vanilla

beans averaged 3.5% vanillin (dry weight) for the 2021 harvest. This exceeds current industry standards and shows promise for domestic vanilla production of exceptional quality vanilla beans.

We continue our efforts to provide scientifically-validated information for vanilla growers in southern Florida and beyond (Fig. 1). Our Vanilla Orchid Symposium in 2021 attracted ~100 participants. We are currently supporting mass propagation efforts to generate commercial quantities of vanilla planting material as we design best practices for vanilla bean curing that will exceed domestic food safety requirements.

The publication of the complete vanilla genome supported discovery research that could lead to increased vanillin content in improved vanilla cultivars. This is a critical tool that will make all breeding activities more efficient. We anticipate continuing our research to develop vanilla cultivars with improved traits to support domestic production.

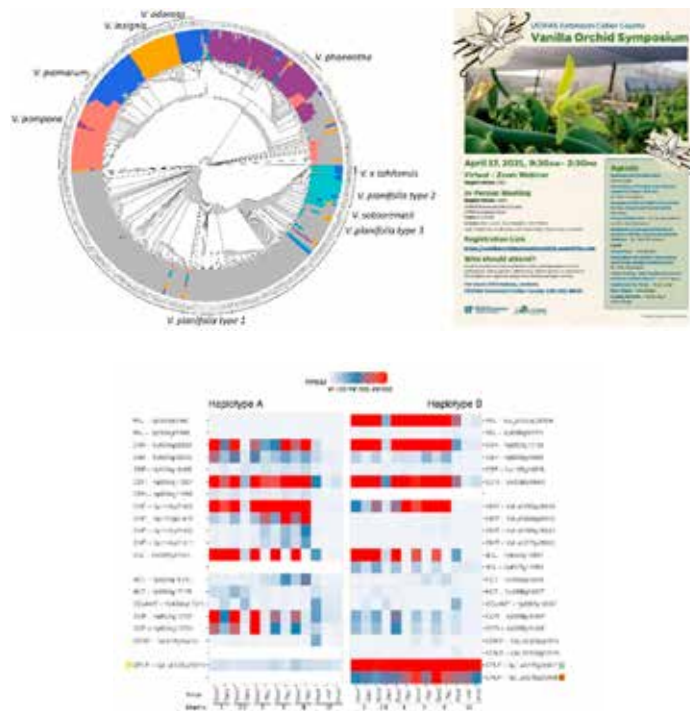


Fig. 1. Vanilla diversity (top left), Vanilla Orchid Symposium flier (top right), and vanillin biosynthetic pathway (bottom).

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