



Consumers prefer citrus juice blended with Sugar Belle®

By Yu Wang, Xixuan Tang, Charles Sims, Zhifeng Gao and Renee Goodrich

Citrus fruit produced from HLB-affected trees are green and taste bitter. They are usually not suitable for either the fresh market or juice market because they have a lower Brix/acid ratio.

Mitigation strategies can cause less fruit drop and help citrus trees survive. However, they triple production costs, which increases the pressure for citrus growers to have a competitive enough citrus price to make a profit.

Decreased quality and quantity caused by HLB, together with the dramatic decline in consumer demand for orange juice (OJ) in recent years, has caused hardship for the Florida citrus industry. Therefore, developing reliable strategies that increase the

production of HLB-affected citrus trees and improve fruit quality and consumer preference to raise the market share is urgent.

The LB8-9 cultivar Sugar Belle® is a mandarin (tangerine) hybrid developed by the breeding team at the University of Florida Institute of Food and Agricultural Sciences (UF/IFAS) Citrus Research and Education Center. It is recognized as the most HLB-tolerant cultivar currently available. Sugar Belle® is being planted more in Florida because of its HLB tolerance, unique flavor and appealing appearance. Fresh Sugar Belle® is seedless and has ideal qualities for the fresh market.

Nevertheless, Florida's fresh fruit business is consistently around 20% of

the entire citrus business. Considering the saturation of the fresh market, citrus growers and juice processors are highly interested in utilizing Sugar Belle® fruits in juice processing. Sugar Belle® has good flavor and fruit quality. It meets consumer preference, driving a potential increase in consumer demand. Therefore, blending Sugar Belle® juice in OJ processing can potentially be a promising solution for both decreased production and consumption of OJ.

TASTE-TEST RESULTS

UF/IFAS researchers recently conducted two consumer studies to examine the potential of using Sugar Belle® in blended citrus juice. Two

Overall Rating

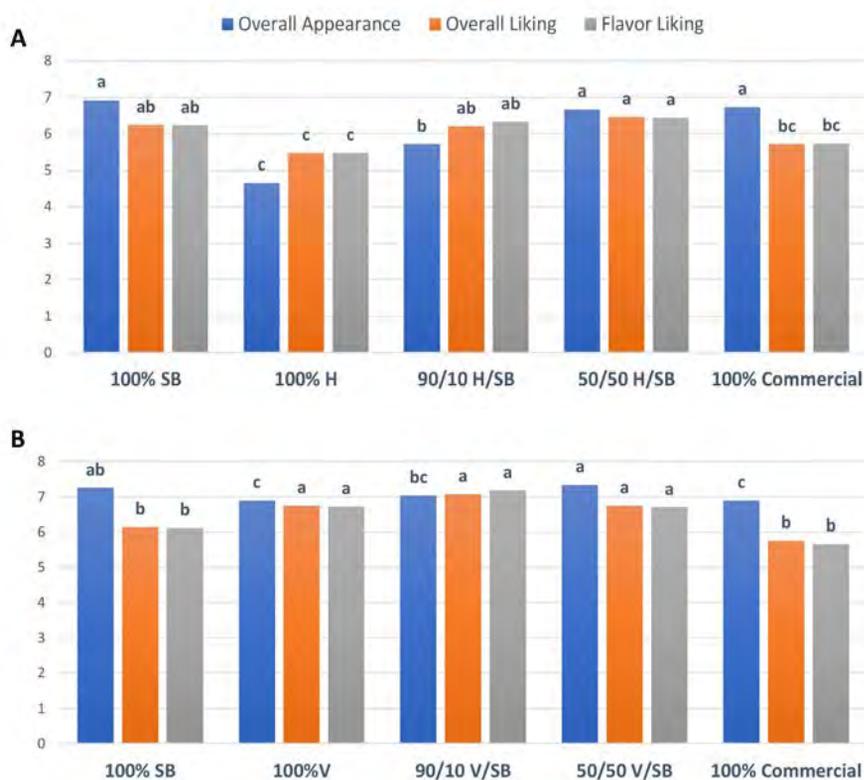


Figure 1. Ratings on overall appearance, overall liking and flavor liking of different blended juice (A: Spring study; B: Summer study).

100% SB = 100 percent Sugar Belle® juice

100% H = 100 percent Hamlin juice

100% V = 100 percent Valencia juice

90/10 H/SB = 90 percent Hamlin juice and 10 percent Sugar Belle® juice

90/10 V/SB = 90 percent Valencia juice and 10 percent Sugar Belle® juice

50/50 H/SB = 50 percent Hamlin juice and 50 percent Sugar Belle® juice

50/50 V/SB = 50 percent Valencia juice and 50 percent Sugar Belle® juice

100% commercial = 100 percent commercial not-from-concentrate (NFC) juice product

Different letters within same groups (same colors) indicate significant differences ($p < 0.05$).

typical sweet orange cultivars were selected for comparison: Hamlin orange and Valencia orange. Five different combinations of juice samples were processed and evaluated in each study.

In the study conducted in spring 2021, 100% Sugar Belle® juice, 100% Hamlin juice, 90% Hamlin and 10% Sugar Belle® blended juice, 50% Hamlin and 50% Sugar Belle® blended juice, and 100% commercially available not-from-concentrate (NFC) juice were consumed and evaluated by 78 sensory panelists.

A study conducted in summer 2021 examined Valencia orange instead of Hamlin in juice blending. Similarly, 100% Sugar Belle® juice, 100% Valencia juice, 90% Valencia and 10% Sugar Belle® blended juice, 50% Valencia and 50% Sugar Belle® blended juice, and

the same 100% commercial NFC OJ were prepared and consumed by 61 sensory panelists.

Panelists were prescreened based on their sweet OJ consumption frequency to ensure they are familiar with OJ. Compared to 100% commercial NFC OJ, 50% Hamlin and 50% Sugar Belle® blended juice received a higher rating in both overall liking and overall flavor liking in the spring study. Similarly, in the summer study, 50% Valencia and 50% Sugar Belle® blended juice was rated significantly higher in overall appearance as well (Figure 1).

The 50/50 and 90/10 blended juices in both studies received higher ratings on sweetness and lower ratings on sourness and bitterness in the subsequent evaluation on sensory attributes related to fruit quality. This indicates that OJ blended with Sugar

Remove Citrus Trees Efficiently & Affordably

Tree Terminator Citrus Shear



- Cut a 20-inch tree in one bite
- Shear & grapple operate in tandem to cut and hold tree
- Minimal ground disturbance, easily avoid drip lines
- Mounts on a variety of power units
- Two year warranty

GRACE
MANUFACTURING
Plato, Missouri

Click or Call for Info
treeterminator.com
417-458-4350

Tropicana®

1001 13th Avenue East, Bradenton, FL 34208

Robert "Eddie" Wertz
Sr. Procurement Manager
Office: (941) 742-2646 or (863) 494-5658
Mobile: (863) 990-1852

Sean McCoy
Manager - Northern Area
Mobile: (863) 632-1141
Office: (941) 742-2406



Steve Riffle
Assoc. Manager -
Central/South Area
Mobile: (863) 214-3222
Office: (863) 402-0487

Agreement Statement



Figure 2. Agreement from consumers on different statements (A: Spring study; B: Summer study).

Belle® increased consumer preference. The sensory aspect of 50/50 Hamlin/Sugar Belle® blended juice and 90/10 Valencia/Sugar Belle® blended juice was preferred by more consumers.

PURCHASE AND PRICE

The purchase intent and the price of willingness-to-pay (WTP) were also estimated. This helped researchers understand not only which sample is preferred but the degree to which it is preferred.

The investigation on purchase intent was based on the price of a 52 fluid ounce carton of citrus juice in the market. Panelists were asked how much they would like to pay for the juices they tasted. Most panelists were willing to pay about 50 cents more for 50/50 Hamlin/Sugar Belle® blended juice,

50/50 Valencia/Sugar Belle® blended juice and 90/10 Valencia/Sugar Belle® blended juice, compared to the commercial OJ. This feedback reflected the positive correlation between consumer preference and purchase intent of the blended Sugar Belle®.

However, panelists surprisingly expected to pay a higher price for juice containing a higher ratio of OJ when asked their general opinion on their willingness-to-pay for 100% sweet OJ and tangerine and sweet orange blended juice without tasting any specific samples. For example, the 100% OJ with the most votes was \$3.49 per 52 fluid ounces. More information was gathered to explain the mismatch between WTP expectation for the known ratio of OJ in blended juices and the results obtained from the real

tasting environment (Figure 2). For example, panelists were asked if they would consider OJ with more nutrients healthier.

Consumers were found to frequently consume OJ but rarely consume tangerine juice, which is partially due to the lack of tangerine juice products in the current market. This consumption habit somehow led to less consumer acceptance of the nutritional and healthy tangerine juice, as well as the taste expectation and WTP for tangerine juice compared to OJ. Even though the acceptance of tangerine juice is currently limited, it was noteworthy that the OJ and Sugar Belle® juice blends performed better in sensory evaluation than pure OJ.

In addition, there were a considerable number of consumers with a neutral opinion on juice quality and WTP of blended orange and tangerine juice, indicating potential improvement with acceptance and consumption of tangerine juice in the future. More importantly, consumer acceptance of the OJ label agreement revealed that adding up to 30% tangerine juice to OJ might still be considered OJ by most consumers, providing an initial guide for citrus legislation to loosen the regulation on the content of tangerine juice blended with OJ.

In conclusion, using HLB-tolerant Sugar Belle® not only could relieve the pressure of Florida's decreased citrus production but also presents the potential to increase consumer demand for citrus juice in the market. Studies have repeatedly shown consumer preference for citrus juice blended with Sugar Belle®. Hence, opportunities for increasing the mandarin content in OJ blending may be further exploited to improve sensory quality and positive economic value. 🍊

Acknowledgments: This research was supported by funding from the Citrus Research and Development Foundation (Project # 19-024). The authors thank Fred Gmitter and Jude Grosser for providing fruit for the study.

Yu Wang is an assistant professor, Xixuan Tang is a graduate student, and Charles Sims, Zhifeng Gao and Renee Goodrich are professors — all with UF/IFAS.