

Citrus Innovation: Another Look

Ongoing advances in technology and evolving customer and consumer demands add a modern twist to citrus ingredients and applications

“There’s nothing new in orange oil that wasn’t there 100 years ago,” says Daemmon Reeve, senior purchasing and business manager at Treatt plc. “An essential oil is an essential oil.” Except when it’s not. Today, technology and R&D advances are allowing ingredient producers to discover and extract key and/or unwanted molecules from oils at increasingly lower levels—at economically viable levels.

As Reeve puts it, “We’re constantly looking to innovate, looking in the oils again to see if we can bring out some unique ingredients for our customers.”

Ingredient Evolution

While the world boasts hundreds of varieties of citrus, few are processed for their essential oil. “Unless you’re producing fruit for the oil *and* the juice, it’s often not economically viable,” says Reeve. “It takes three or four years for any citrus tree to establish commercial volumes of fruit. There’s a persuasion factor as well in terms of getting farmers to commit to unusual varieties. Often, by the time they do it, the demand may have subsided. Certainly there’s interest [in new and novel citrus varieties], but mostly they’re from marketers.”

Yet, he says, “Our customers are looking for something new. [Consumer] product lifecycles have gotten much shorter these days, and flavor houses are looking for true innovation—different exotic fruits and things like that. Citrus would come into that.” Unfortunately, he concludes, “The lifecycle of citrus doesn’t lend itself to the development of some kind of new Japanese or African citrus fruit.”

Instead, he explains, innovation in citrus focuses on putting new twists on classic ingredients.

Low agricultural residue: “There’s a trend toward customers seeking innovation in citrus,” says Reeve, “particularly focusing on low agricultural residue products. It’s not new, but it’s becoming a stronger signal from the marketplace. There’s greater awareness of the issues surrounding agricultural residues, leading to greater demand.” As detection technology improves, he adds, ever more minute levels of unwanted elements—agricultural residues and industrial contaminants, for example—are being located in essential oils. Things that were undetectable even just 10 years ago are no longer hidden. This



necessitates significant R&D and technology investments by suppliers. “I think advancements in analytical science have driven a trend in demand toward more discerning levels in some of these products,” Reeve says.

Removing furanocoumarins, allergens and more: “More and more customers are demanding some innovation in citrus,” says Reeve. And so, he adds, “Generally, further-processed citrus is very much still a key focus.” These materials include specialty products such as reduced furanocoumarin oils—particularly bergamot, lemon, lime and grapefruit—for use in fragrance and cosmetic applications. The challenge of such products is to allow formulators to adhere to allergen-related guidelines and regulations without sacrificing characteristic odor.

For example, Treatt has pursued the citrus materials featuring cold-pressed oil characteristics with low coumarin levels. The goal, according to the company, is to ensure that, for example, low-furocoumarin lemon oil retains “some herbal, green characteristics alongside the distinctive odor of fresh lemon peel,” or that lime oil remains tangy.

Organic: That the company is preparing to launch organic versions of its reduced-furanocoumarin citrus oils, says Reeve, reflects that “there’s an increasing demand for organic citrus oils coupled with low-furanocoumarin requirements. We’re seeing a strong demand for that, which is relatively new. There are few providers of those oils in the marketplace.” Any such provider must of course combine technical and certification capabilities.

Reduced color: Meanwhile, the marketing of flavored waters and similar beverages has driven the demand for low-color solutions from an ingredient supplier standpoint. Symrise, seeking to boost flavor intensity and authenticity, recently launched a line of molecularly distilled citrus oils primarily for clear

beverage applications. According to the company, the materials “are manufactured at low temperatures with short contact times through the use of short-path, high-vacuum distillation technologies,” which allows for wax-free, low-terpene lime, lemon, mandarin, tangerine and grapefruit oils. The manufacture of such oils requires low temperatures and short contact times via short-path, high-vacuum distillation. Limiting exposure to high temperatures helps avoid burned and oxidized notes. In addition, the process increases stability and cuts bitterness. Ingredient technologies such as these come as researchers at the University of Massachusetts and IFF have reported evidence that “micelle or reverse-micelle structures may be used to improve the chemical stability of citral in beverage emulsions.”¹ This could potentially limit the degradation of citral in aqueous solutions and thus the formation of off flavors and loss of desirable flavors (see Page 14).

Market and Supply: A Look Ahead

“Global weather remains a big factor in the citrus market,” says Reeve. “We’ve had some unusual weather events in the last year, if you talk about citrus. At the beginning of this year there was a significant freeze in Florida, with probably 7% of the orange crop lost. It was the biggest freeze in many years.” This is significant, particularly as Florida supplies ~75% of the US orange crop. Elsewhere, says Reeve, “Last year in Argentina there was a freeze and then a drought that led to a short Argentinean lemon crop this year. “One is always remaining vigilant against these kinds of climatic conditions around the market,” he adds, “which is why sourcing from multiple origins is very important in helping mitigate some of these issues.” While some customers may engage in just-in-time sourcing, Reeve notes, “For natural products, it’s a risky strategy. We see some short-term panics in the market, where suddenly an origin cannot supply. That can often be the result of a climatic issue. Sometimes you find a customer has left themselves short of a particular product. Through supply chain management and sensible sourcing strategies, you can avoid many of these issues.”

Orange oil: According to the latest available market report from Treatt (at press time), the Brazilian crop is likely to be below average for 2010–2011. Meanwhile, customer destocking throughout 2009 has resulted in low inventories and thus resurgent high demand and prices, reflecting wider recovery in the industry and economy. The report warns that while the 2010–2011 Florida orange crop could grow 25% above 2009–2010, an above-average hurricane season is expected this year, with as many as eight hurricanes and 15 named storms. Longer term, the report notes that US and Brazilian industry stakeholders recently gathered at the Citrus Research & Education Center in Lake Alfred, Florida to discuss the future of the orange juice industry—the fate of which directly affects the production of orange oil—in the wake of declining consumption.

Grapefruit: The report notes that overall grapefruit oil demand has fallen, and so have supplies of better

qualities. The situation appears to be ongoing as grapefruit acreage in Florida continues to shrink. The US crop accounts for about 50% of total world production, according to the US Department of Agriculture. That production continues to drop year-over-year as juice popularity continues to fall and crops face competition for land from real estate and other interests.

Lemon: As Reeve mentioned, the 2009 freeze in Argentina’s Tucuman region, coupled with a drought, may lead to a short crop. Lemon oil availability is good, while lemon terpene supplies are strained.

Lime: Treatt’s market report shows relatively steady supplies for both expressed and distilled lime from Mexico, Brazil and Peru.

Tangerine: The market for tangerine oil is predicted to be tight as Mexican output was weak, while Chinese supplies are being bought out as an alternative.

References

1. SJ Choi, EA Decker, L Henson, LM Popplewell and DJ McClements, Inhibition of citral degradation in model beverage emulsions using micelles and reverse micelles, *Food Chemistry*, 122(1), 111–116 (2010)

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