

by Donald E. Pszczola

The Flavor of Fruits to Come

Imagine taking a tour through a global “flavor orchard.” There, you would find an exciting array of new fruit flavors ripe for picking. In that direction, for example, you might see such varieties as mango chili, citrus cayenne, and spicy pear. And a little bit up ahead, ginger peach or a berry mint.

Some of these flavors you know of—blueberry, cranberry, strawberry, and peach, just to name a few. Others, however, may have unfamiliar names. Take lacuma and mamey sapote. Based on fruits from Central and South America, these flavors are finding their way into frozen fruit bars. At least that’s what I hear coming down the grapevine. And some varieties...well, they may have names that don’t necessarily mean what you may think. That one over there, prickly pear flavor, doesn’t even come from a pear, but rather from a cactus. (The word “prickly” might have given you a subtle hint.) And blood orange, I’m glad to say, has nothing to do with blood, although it is a cool name and may help create some interesting formulations around Halloween. Blood orange punch perhaps?

And that flavor there—beyond that grove—is from the impressive dragonfruit. Despite its exciting name and the fruit’s appearance (it looks like something out of a science fiction movie), the flavor is actually said to be rather delicate and works well with other more traditional flavors such as strawberry. Of course, from a marketing perspective, the word “dragonfruit” adds a sense of excitement and mystery to the product formulation.

In this flavor orchard, as you might have already guessed, hybrid flavors are playing an important part, as exotic flavors partner with more familiar ones. Acai blueberry might be one example. Or Acai pomegranate. You

This orchard is the result of the imaginative minds of many flavorists using natural fruit formats, extraction methods, and chemical synthesis to capture more authentic, exotic fruit notes ...

know, pomegranate has an interesting history. A few years ago, it would have been considered an emerging flavor, but today it has entered the mainstream, finding its way in a variety of products and flavor combinations, and as a result has gained a certain respectability. I guess marriage will do that to some flavors. Some unions, on the other hand, well, they’re still rather unusual, proving the old adage, I guess, that opposites do attract. Take this odd



Prickly pear cheesecake, anyone? How about a prickly pear smoothie? Varieties of less-familiar fruit, such as prickly pear, are finding their way into the mainstream. Their flavor, blended with other fruits, can create new opportunities for the food and beverage manufacturer, and may even help increase the consumption of fruit. Photo courtesy of SGP Marketing

couple, for example. Because of their sweet and tart flavors, fruits are finding soul mates with savory flavors, creating new taste sensations that probably at one time would have been beyond the imagination, but no longer.

The rise of the so-called “superfruit” has certainly influenced some of the varieties in this orchard, bringing little-known flavors into the mainstream. The Maqui berry may be one such example. Flavors like these are finding their way not only into beverages, but confections, ice

creams, yogurt, desserts, nutraceuticals, and other sectors. One particularly exciting area is smoothies, whose popularity continues to grow. Fruit, of course, is a major ingredient in this thick, creamy beverage, with exotic fruit flavors shaping the smoothies for tomorrow.

And, of course, no tour of this orchard would be complete without the coconut, and specifically coconut water, which has taken the market by tropical storm, if you will. »»

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Coconut water, which is recognized as an isotonic juice, blends easily with flavors ranging from cranberry to yellow curry. And, as we will soon see, it is creating many new opportunities as a low-calorie base for juice blends.

Now you may ask me the directions to this global orchard. Well, to be truthful, this orchard really doesn't exist—not as a place at least. Rather, it is the result of the imaginative minds of many flavorists using natural fruit formats, extraction methods, and chemical synthesis to capture more

authentic, exotic fruit notes that can be combined with mainstream flavors. In that sense, this orchard is meant to be seen as a metaphor for the many exciting developments that are coming into "fruition" today.

Many of these fruit flavor developments will be described in this article as we will look at the role that fruit flavors play in formulating, and which flavors are particularly ripe for picking for use in today's formulating. Some of these flavors may be suitable for masking the tastes of certain

nutraceuticals. Others may help to make a certain food more enticing to meet nutritional needs. Fun fruit flavors can be especially created for children, while others, designed for adults, try to inspire a certain adventure in cuisine.

But as we will soon see, if we continue to take this path through our global orchard, the use of these fruit flavors is adding a new dimension, creating many interesting sweet and savory twists.

So let's begin harvesting!

IngredientTalk:

No matter how many years you write about food and food ingredients, they continue to be full of surprises and unexpected twists. It's even more interesting, when these developments leave your office and enter your personal life. Take this month's article on fruits. It's perfect timing when you consider that recently I had two very personal—and somewhat unusual—encounters with berries. This blog post describes these two experiences, providing insight into their deeper meanings. If you care to share your own insights into the nature of fruits—and you're an IFT member—visit www.ift.org, type in your name and password, click on the IFT Community button, and go to the blog section. Juicy views are always welcome!

Personal Encounters with Berries

"Welcome to 'Personal Encounters of the Food Kind'—the show where everyday people describe their sometimes unusual experiences or encounters with different foods," said the host. "Our first guest this morning has recently had not one, but two out-of-the-ordinary encounters with... I believe, a berry?"

"That is true," I said.

"Well, please, go on. Tell our viewers here and at home about your first encounter."

"I guess it all started over the weekend," I said, clearing my throat. "I bought two gallons of blueberries at the local supermarket. I put them in my freezer because I like to eat them frozen, after washing them, of course. Anyway, that following week, we had a terrible

thunderstorm which knocked out all the electric power in our area for about 24 hours."

"So your refrigerator wasn't working during that time," put in the host, adding some unnecessary clarity to the situation.

I nodded. "The blueberries I bought over the weekend defrosted, and then refroze again after the power came back on."

"Ooohhh," said some of the members of the audience.

"With the fruit, I wasn't worried about any food safety issues," I continued. "Other products such as dairy or meat, if they're defrosted and frozen again, should, of course, be discarded. You don't want to take unnecessary chances with microorganisms and toxins and that sort of thing. But getting back to the blueberries though. I was more concerned about what might happen to their overall eating quality since their structural integrity had been impacted."

"And what were they like?" asked the host.

"I mean they were different," I answered. "Especially their texture. They were much softer and wetter, and kind of reminded me of a slushie-like product. I could even imagine people using them in place of ice in an orange juice or a clear water beverage."

"Sounds like you had a big surprise," said the host.

"But a pleasant one," I added. "I really liked them because they were different. I sometimes think we take texture too much for granted. But this particular experience made me realize not only how important texture is in a food, but how a different texture can really affect the eating experience, and not necessarily in a bad way. I mean, when it comes to texture, there may still be so many opportunities worth discovering. Some of these may even involve the blueberry."

The host smiled. "So I guess the big question now is: As a result of your personal encounter, how are you going to eat your blueberries in the future?"

"I'll probably still eat my blueberries frozen—it's just a preference like some people prefer them fresh out of the carton—but from time to time I wouldn't mind duplicating the conditions that we discussed on this show. That's because they provided a different kind a taste experience, sort of a new adventure. And besides, I bet a frozen, defrosted, frozen blueberry would taste really good as a yogurt topping."

"Now did your second encounter also involve a blueberry?" asked the host.

"No, actually it involved a berry that is normally not eaten by humans. As least as far as I know."

"You intrigue us, sir. Please go on," encouraged the host.

"Well, perhaps, I'm getting ahead of myself. It all started a couple of weeks ago, when my Chihuahua, Princess Bubbles Tiara, a.k.a. Bubs, started behaving strangely. Even by Chihuahua standards. In the middle of the night, she would wake me up, wanting to go out. On other occasions, she would be pawing my leg, jumping on me, and not letting me sleep. I would wake up and then couldn't fall asleep again. After several days of this, I was becoming a zombie. I was so tired that I couldn't fall asleep, and even if I did, I was only getting a couple of hours. Something had to be done before Bubzilla destroyed me."

"Did you try a sleeping tablet?" someone shouted in the audience.

"I don't like taking sedatives," I answered.

"I mean for the dog," someone shouted back.

There was laughter in the audience.

New Alliances with Fruit

According to the *McCormick Grill Mates and Lawry's Flavor Forecast 2011: Grilling Edition*, released by McCormick & Co. Inc., Hunt Valley, Md. (phone 410-527-8753, www.mccormick.com), fruits can play an important role in partnering with other ingredients to create new tart and sweet sensations, especially in grilled foods. For example, when combined with tangy balsamic vinegar, the blueberry can

put an attractive spin on sauces, marinades, and salsas, as demonstrated by *Balsamic Steak Salad with Blueberry Dressing*. In this formulation, the blueberry can add flavor, sweetness, and color to a dressing for a grilled balsamic-marinated skirt steak salad. A combination of blueberries and tangy balsamic vinegar was also used in another recipe, *Grilled Angel Food Cake with Peppered Berries and Vanilla Cream*. In this formulation, a

"Please, people, let's not turn into a mob," said the host. He then asked, "What did you do?"

"Well, about the time she started acting different, my mulberry tree in the backyard was bearing fruit. Mulberries look a lot like blackberries, and birds and squirrels from all over the neighborhood love their taste. And as they picked these berries, they would drop some of them to the ground. I would catch Bubbles eating these berries—she had a big smile and her little bulging eyes were all shiny like she was hallucinating or something. At first, I was afraid that these berries were toxic, but since the birds and squirrels were having a feast, I figured they were safe."

"Berries probably have some nutritional value for dogs, too," the host remarked.

"But she was addicted to them. Even when I didn't see Bubbles eating berries, I knew she was consuming them because her paws were stained purple and so were her stools. Then it hit me. It was the berries, especially those that she was eating in the evening when I came home from work. Those right before bedtime."

The audience laughed. "It's not funny," I said.

Shaking his head, the host tweaked the bridge of his nose and asked, "Are you telling us

that you have a hopped-up Chihuahua?"

"It makes sense though, doesn't it? She's only six pounds. These berries are full of water, which is why she has to go in the middle of the night. Also, they're full of sugar which would stimulate her, and they might even have other components, like antioxidants, that might hype her up even further."

"One of our audience members wants to know, 'Is Bubbles in rehab today?'" asked the host.

"Well, no, although I did consider cutting down my mulberry tree. But in the end, I'm just trying to keep her from eating mulberries in July and August until the fruit season is over. I also have been going to bed earlier, like around eight, and trying to catch up on my zzzzz's over the weekends."

"Well, thank you for sharing your personal encounters with berries," said the host. "Perhaps Bubbles can visit us sometime."

"She's crashing at the moment," I replied.

"Our next guest will describe his encounters with an artichoke. Is it dream or reality? Stay tuned."

If you have any personal encounters of the food kind that you wish to share, and it doesn't necessarily have to include broken refrigerators and hopped-up Chihuahuas, let's IngredientTalk.

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The sweet and sour flavors of stone fruits such as cherries, plums, apricots, nectarines, and peaches can partner with the minty character of thyme. In this alcoholic beverage, for example, peach provides a juiciness and fragrance, while awakening many of the notes associated with thyme. Photo courtesy of McCormick & Co.

sauce, made from a mixture of berry and vinegar with a touch of heat from black pepper, topped grilled angel food cake with cool creamy mascarpone vanilla cream.

This forecast also describes how citrusy orange can form an interesting partnership with sweet paprika in the creation of *Paprika Spiced Shrimp with Citrus Cilantro Quinoa Salad*. A classic Spanish combination, paprika and orange brightens grilled shrimp, combining the color and sweetness of the herb with the “citrusy pop” of the fruit. The seafood is then served with quinoa, an ancient seed from South America that has a nutty crunch.

When McCormick released its *2011 Flavor Forecast* earlier this year, one of the top 10 flavor pairings it focused on was stone fruits and thyme. This alliance partners the minty character of thyme with the sweet and sour flavors of stone fruits such as cherries, plums, apricots, nectarines, and peaches. These fruits provide qualities such as juiciness and fragrance to the formulation, while awakening many of thyme’s nuanced notes. Recipes might include *Peach and Prosciutto Panini with Thyme Aioli*, *Plum & Brie*

Dessert Panini, and *Peach-Gin Cocktail with Thyme Syrup*.

Tracking Exotic Fruits

At its 2011 Innovation Roadshow, David Michael & Co., Philadelphia, Pa. (phone 215-632-3100, www.dmflavors.com), demonstrated a number of ways that exotic fruit flavors can be used to create more novel, flavorful, and better-for-you products. Highlighted prototypes that served as vehicles for these flavors included beverages, frozen treats, bakery products such as cookies, and even savory products.

Let’s begin our tracking of these exotic fruit flavors, starting with borojo. Native to Columbia, Ecuador, and Panama, this fruit is rich in B-vitamins, polyphenols, and amino acids. It is also known to be a natural aphrodisiac, as well as an adaptogen—aiding the body against stress and fatigue. In the creation of an aloe beverage prototype, the company combined a borojo extract (0.80%) with pulp-less aloe juice and an antioxidant-rich natural rooibos tea extract. The healthy and flavorful drink, *Borojo Flavored Rooibos Tea Aloe Beverage*, was sweetened with a blend of stevia, erythritol, and a natural sweetness enhancer. Other aloe beverage prototypes showcased included *Spiced Peach* (made with peach, cinnamon, vanilla, and mastic flavors, along with a full-pulp aloe juice sweetened with sugar) and *Old-Fashioned Lemonade* (a blend of lemonade flavor, slightly pulpy aloe juice, and sugar).

Fruit flavors, such as pomegranate, acai, pineapple, berry, guava, and passionfruit, are popular offerings in existing coconut water products. Inspired by this, the company used a line of tropical flavors (maqui berry, “Island Punch,” and tequila lime) to create flavored coconut water ices. These frozen concoctions, using coconut water as its base, are hydrating, providing consumers a refreshing and healthy alternative.

Maqui berry flavor was featured

in *Agua Leche Hydration Recovery Beverage*—a water-chocolate milk drink designed for hydration and muscle recovery after exercise. Grown in the Patagonia region of Chile, the maqui berry is said to be high in antioxidants and provides tastes reminiscent of blackberry and blueberry. It was incorporated into a formulation that combines evaporated fat-free milk and coconut water concentrate. Coconut water also serves as a natural isotonic.

The cuisine of the Maghreb refers to the flavors of North Africa—specifically Morocco, Tunisia, Algeria, Libya, and Mauritania. Maghreb fruit combined with almond milk were used in the development of two smoothie prototypes, *Fig & Honey* and *Oasis Mix* (a combination of fig, honey, orange blossom, and cumin). Each smoothie contains a half serving of fig per 11 oz. The *Oasis Mix* can also be used to create a *Maghreb Fruit & Almond Milk Sauce* for chicken, as was demonstrated at the show.

In Brazil, alua is a centuries-old “moonshine” beverage. David Michael developed an alua flavor based on a recipe of fermented pineapple with brown sugar, ginger, and clove. This flavor was featured in an *Alfajores Cookie*—a shortbread sandwich cookie with dulce de leche filling, rolled in coconut.

Fruit flavors can also be used in more unconventional applications. Consider, for example, *Apple Pie a la Mode Fortified Chicken Nuggets* or *Cherry Lime Fortified Nuggets*. These fun (some might call them crazy) flavors are designed to appeal to children. Eating these fruity chicken nuggets for lunch, dinner, breakfast, or even as a snack can deliver a serving of fruit.

Scoping out the Cranberry

Cranberry has been a popular beverage since 1930, but over the decades manufacturers have discovered the berry’s versatility and the range of applications have blossomed, according to Ocean Spray’s

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Cranberry juice and cranberry sauce are not the only uses for this popular berry. Today, cranberry can be found in salad toppings (shown in photo), yogurt, confections, baked goods, cereals, savory applications, and a range of other products. Imagine, for example, a cranberry jalapeno dipping sauce.

Photo courtesy of Ocean Spray's Ingredient Technology Group

Ingredient Technology Group, Lakeville-Middleboro, Mass. (phone 508-946-1000, www.oceanspray.com). Cranberries work well in confections, baked goods, cereals, bars, dairy products, and savory applications. They can be found across the globe in combinations such as cashew and cranberry cookies, vanilla shortcake and cranberry chocolate, cranberry yogurt, and salad toppings.

Ocean Spray's Ultimate Cranberry Recipe Challenge has demonstrated the scope for

innovation, with creations including Italian-inspired cranberry paninis and panna cotta, and Asian-styled cranberry wontons with cranberry jalapeno dipping sauce.

Consumers looking to extend their fruit intake beyond orange and apple, for example, are trying unusual fruit and vegetable combinations. Carrot, cucumber, and beetroot are becoming more common in ingredient statements with sweeter fruits such as strawberry or tart berries such as cranberry to enhance the flavor.

A major factor in the popularity of smoothies is their all-natural appeal and no-added sugar. Ocean Spray's 100% fruit cranberry puree was developed to satisfy the demands of this growing market. With a rich texture and intense red color, it blends well with other fruits to create attractive products that consumers will choose again and again.

All in the Family

At its 2011 Flavorology event, Bell Flavors & Fragrances, Northbrook, Ill. (phone 847-291-8300, www.bellff.com), traced the evolutionary tree of today's fruit flavors. As described by presenter Sheila Hart, the company's Beverage Application Manager, over thousands of years nature has been busy developing the fruit flavors that we have come to know, or in the case of the more exotic versions, may yet experience.

"The flavors these fruits have are all very unique, but through studying the species and

genealogy of these fruits we can see how these flavor profiles are derived," explained Hart. "For this concept we have researched the evolution of species for citrus and berries. In this research we specifically looked at unique flavor profiles and where these fruits' flavors evolved from."

In the Berry Flavor Tree, for example, loganberry is a hybrid produced from crossing a blackberry and a raspberry, with the result offering the combined flavor of both berries. The youngberry is a hybrid between a blackberry and a dewberry, and its sweet flavor makes it especially suitable for use in juices or jams. When loganberry and youngberry are crossed, they produce the olallieberry, which has a more intense, tart flavor. The marionberry—the result of the union between the olallieberry and the Chehalem blackberry (a cross between the Himalayan blackberry and the Santiam berry, with a strong flavor especially suitable for frozen products)—has a somewhat tart flavor, fairly earthy with traces of sweetness. The company showcased a number of prototypes made with flavor profiles based on these berries. These included a *Loganberry Lemonade Beverage*, *Marionberry Carbonated Beverage*, *Dewberry Carbonated Beverage*, *Youngberry Beverage*, and *Olallieberry Beverage*.

In the Citrus Flavor Tree, Calamansi Lime—a cross between the kumquat and mandarin orange groups—can provide a

sweet and sour taste when the fruit and skin is eaten whole. Tangelo—a hybrid of mandarin orange and grapefruit, is known for its juiciness and mild sweet flavor. Prototypes that featured flavors based on these citrus profiles included *Kumquat Smoothie*, *Calamansi Lime Carbonated Beverage*, and *Tangelo Carbonated Beverage*.

The company also highlighted a number of fruit flavors for use in spirited drinks from around the world. Prototype formulations included *Mango Peppadew Cooler* from Africa, *Purple Passionfruit Vodka* from Australia, *Golden Delicious Apple Vodka* from North America, *Hypoxotic Liqueur* from Latin America (which uses a tropical fruit type flavor), *Fuji Apple Vodka* from Asia, and *Citron Vodka* from Southeast Asia.

Several fruit flavor profiles made Bell's 2011 top 10 flavors for beverage, sweet, and savory applications. Prototypes reflecting these flavors included *Calamansi Lime with Black Garlic Dipping Sauce*, *Crispy Wonton Wrapped Shrimp with Citrus and Sriacha Dipping Sauce*, *Blood Orange with a Hint of Ginger Soda*, *Yellow Curry Coconut Water*, *Rambutan Cooler*, and *Yumberry Cheesecake Balls*.

Discovering New Tropical Tastes

"With Latino flavors having gone truly mainstream, more 'fringe' tastes in the tropical fruit flavor category are gaining acceptance, paving the way for less familiar subtropical flavors such as those found in the Caribbean and South and Southeast Asia," declared Emmanuel Laroche, Vice President of Marketing & Consumer Insights, North America, for Symrise, Teterboro, N.J. (phone 201-288-3200, www.symrise.com).

The company recently launched its new line of tropical fruit flavors—*go tropicals!*—which features mango, guava, pineapple, lychee, passionfruit, pomegranate, coconut water, and prickly pear. Laroche explained that Symrise conducted consumer market research to decide which tropical fruit flavors would comprise the line. Consumers across the country, representative of key life stages, participated in the online study. Generally, these consumers indicated a preference for the more familiar tropical fruit flavors, but they also demonstrated an enthusiastic willingness to try the newer varieties that were cited in the study. Among ethnic groups, Asians expressed interest in all of the tropical fruit flavors.

The new line of flavors from Symrise uses proprietary technology to replicate authentic tropical fruit aroma and taste. These products can be used in a wide range of formulations, including confections, bakery products, savory toppings, desserts, still drinks, teas, carbonated

beverages, and cocktail mixes.

"We have also found another advantage in formulations that feature tropical flavors," said Deborah Kennison, Vice President of Research and Development for the company. "When they are used in fortified beverages and food formulations, there is substantial evidence that some of these

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tropical fruit flavors effectively mask the off-tastes of some vitamins and minerals.”

Coming Out of the Desert

Mostly growing in the wild, drier regions of the southwest United States and Central Mexico, the prickly pear (*Opuntia*) is a member of the cactus

family. Beneath a husk covered in small, hair-like thorns lies a fruit pulp that comes in a variety of colors including ruby red, golden yellow, and emerald green. The flavor is described as having a delicate, mildly sweet, melon and berry profile that blends well with other foods.

Prickly pear can be enjoyed fresh or prepared in a variety of products, such as alcoholic drinks (daiquiris or martinis), fruit juices, smoothies, gelatos, jellies, syrups, baked goods, and dairy products. Its nutritional value—high in fiber and soluble fiber, rich in antioxidants (vitamin C, betalains, and quercetin), and an excellent source of magnesium and taurine—makes this cactus fruit especially suitable for nutraceutical products as well. In fact, a number of studies have looked at its potential to affect blood-sugar levels, cholesterol levels, and cell growth. These properties may have implications for maintaining health or improving conditions such as diabetes, cardiovascular disease, and cancer.

A line of prickly pear products is available from S&P Marketing Inc., Maple Grove, Minn. (phone 763-559-0436, www.snpmarketing.com), in a variety of formats—puree and puree concentrate, pulpy juice and juice concentrate, fruit powder, essences and aroma, fiber, and oil. According to the company, in a prickly pear powder, for example, the process can retain the brilliant color of the fruit and its nutritional value.

At the 2011 IFT Food Expo, the company showcased a ruby variety with a magenta color that has potential as a natural coloring agent or food ingredient. Two beverages prototypes highlighted the fruit: *Prickly Pear Quencher*, a tart and refreshing prickly pear/lime juice, and *Prickly Pear Smoothie*, combining several fruits for a sweet and delicious way to boost fruit consumption. Representatives were on hand to describe future opportunities for the use of this fruit. Imagine a *Prickly Pear Cheesecake* where the fruit works well with baked and dairy-type products. Or a *Prickly Pear Yogurt* taking advantage of red and magenta hues that are pH stable.

Like other desert plants, such as aloe vera, prickly pear may offer new opportunities in food and beverage formulating, and may be particularly useful in formulations designed to increase the consumption of fruit.

Blueberry Bonding

According to a recent trendologist article, “An ongoing trend is pairing an exotic or new flavor with a familiar one...to appeal to consumers’ sense of adventure or curiosity while still offering something familiar enough so as not to be too intimidating. It helps ease consumers into the flavor profile. Generic flavor pairings, such as blueberry citrus



Blueberries can be used as part of a dressing for a savory meat dish. Because it can add flavor, sweetness, and color, this berry is able to put a novel spin on sauces, marinades, and salsas.
Photo courtesy of McCormick & Co.

remains popular, but more specific ones, like blueberry pomegranate...are now mainstream.”

And there seems to be no end in sight to the pairings of the blueberry with other flavors. The U.S. Highbush Blueberry Council, Folsom, Calif. (phone 650-824-6395, www.blueberry.org), notes “that a virtual plethora of products combine blueberries with acai, dragon berries, camu camu, guava, pomegranate, and others. Blueberries are synergistic with these tropical fruits in juice blends, teas, vinaigrettes, yogurts, and many other products. Consumers equate blueberries with antioxidant power and readily accept them as an ingredient in almost any formulation. In a sense, their inclusion validates a product which contains exotic ingredients, making it less scary and giving the product curb appeal.”

Fruity flavors paired with mint or floral, as demonstrated by a blueberry mojito flavor, is a current trend, as are teas which provide a base for fruit flavors

such as blueberry with lemon. Blueberry and lemon has become a particularly significant fruit pairing. Bakers and pastry chefs pair the two throughout the day, beginning with popular quick breads and ending with tarts and frozen desserts. Bar chefs are equally adept at blending them into smoothies, quenchers, and cocktails. And in the main kitchen, savory dishes such as duck have become fair game for the two.

Blueberries work well in flavor combinations with spices, botanicals, floral, citrus, and herbs, with blueberries able to complement, enhance, or balance a wide range of flavors. Their sweetness can add an exciting dimension to the smoky qualities of sauces, salsas, and other savory products.

From the Incas and Aztecs to European confectionery traditions, the cacao bean has had an affinity for fruit. Consequently, the fruitiness of blueberries shine in chocolate-based desserts, candies, and confections of all kinds. And because evoking

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nostalgia can be trendy, blueberries also figure prominently in comfort foods, holiday fare, and foods popular at family gatherings.

New Compositions in Fruit Major

Several new flavor lines from Wild Flavors, Erlanger, Ky. (phone 859-342-3600, www.wildflavors.com), highlight several varieties of fruit. For example, take note of this line of music-themed flavors, which includes *Natural Jazz Berry Flavor WONF* (a fruity mix of blackberry, raspberry, and slight hints of strawberry); *Natural Raspberry Rumba Flavor WONF* (fruity top notes, honey flavor in the middle, and a splash of rum for a finish); *Natural Dark Berry Blues Type Flavor* (intense blend of blackberry and black currant with a touch of cream and subtle cognac notes); *Natural Moonlight Serenade Type Flavor* (with notes of juicy peach and a hint of fresh mango); *Natural Berry Beet Type Flavor* (containing both berries and beet for a new beat in formulating); and several others involving apple, banana, pear, and yuzu citrus oil.

A second line, *Farmstand Favorites™*, combines fruits, herbs, and vegetables for use in marinades, dressings/dips, sauces, soups, side

dishes, appetizers, frozen novelties, confections, and snacks. *Blended Favorites* include *Honey Pear & Thyme*, *Peppery Peach*, *Blackberry Barbecue*, *Nectarine Salsa*, *Autumn Apple Rosemary*, *Dark Cherry & Cola*, and *Harvest Cider & Molasses*. *Single Favorites* are also offered such as *Harvest Apple*, *Wild Strawberry*, *Juicy Pear*, and *Heirloom Tomato*.

In addition, a number of prototypes featured at the 2011 IFT Food Expo demonstrated interesting pairings of fruits. *Guava Jalapeno Margarita*, *Green Apple-Jalapeno Frozen Ice Pop*, and *Ginger-Plum Green Tea* were three examples of combining fruitiness with spiciness. *Mixed Berry Fruit & Veggie Juice* provides two servings of fruits and vegetables and includes milk peptides for digestive health.

Achieving Fruition in Market Sectors

The popular tastes of Mexico, Puerto Rico, Cuba, and other Spanish-speaking areas are made more accessible by a line of products offered by Comax Flavors, Melville, N.Y. (phone 631-249-0505, www.comax.com). This product line, inspired by traditional Hispanic cuisine, includes authentic flavors of Latin fruits such as mango, papaya,

passionfruit, and lime, as well as more exotic types—guanabana (comparable to a mixture of strawberry and pineapple with an underlying creaminess of coconut or banana); acerola (also known as the Barbados cherry); and lulo (a citrus flavor sometimes described as a combination of rhubarb and lime). These fruit flavors can be paired with other Hispanic flavors including chipotle pepper, jalapeno, Mexican vanilla, Sangria, avocado, and chamoy (a Mexican delicacy with a combination of salt, sweetness, and heat infused in apricot). These flavors can create new opportunities in the development of mainstream Mexican products, along with authentic Hispanic and Nuevo Latin foods.

Another growing market for fruit flavors is in the area of energy drinks. Comax recently developed a line of natural flavors for use in this sector. These flavors included *Grapefruit*, *Calamansi*, *Green Apple*, *Dalandan*, *Clementine*, *Mango*, *Guava*, *Passionfruit*, *Plum*, *Blueberry*, and *Lavender*. Such flavors can offer a number of benefits. They can help mask off-tastes brought on by the nutrients in the formula, while differentiating the product in the marketplace.

The Coconut Craze

My first exposure to coconuts as an ingredient probably came from watching the television show, "Gilligan's Island," where Mary Ann was always making coconut cream pie without the use of any modern kitchen appliances. (My next encounters came with fruity cocktails and the candy bar *Almond Joy*.) Today, though, coconuts are getting a new lease on life, moving beyond these traditional associations and providing a source for ingredients other than coconut milk.

Coconut water—the translucent, free-flowing liquid obtained from the inside of a young green coconut—has become popular. A natural source of nutrition and hydration, it is low in calories, has no fat or cholesterol, and contains potassium and magnesium. The World Health Organization recognizes coconut water as a natural isotonic juice and a natural source of essential electrolytes. Its similar chemical makeup to human blood plasma provides effective hydration and mineral replenishment for aiding bodily and muscular functions.

According to iTi Tropicals, Lawrenceville, N.J. (phone 609-987-0550, www.ititropicals.com), a

supplier of tropical and exotic fruit purees and concentrates, coconut water presents exciting opportunities as a low-calorie base for 100% juice blends. For example, blending coconut water with cranberry juice can reduce tartness while creating a low-calorie, healthful product. Or coconut water can be combined with other fruit juices such as orange, guava, pomegranate, pineapple, passionfruit, apple, and red concord grape. Coconut water concentrates, available from the company, can provide natural, low-sugar, low-calorie alternatives to existing filler juices. They blend easily because of their gentle flavor and translucent color, and do not adversely impact the formulation.

Other flavor manufacturers are also busy creating flavors for coconut water. A line of coconut water flavors from Virginia Dare, Brooklyn, N.Y. (phone 718-788-1776, www.virginiadare.com), include *Maqui Berry*, *Strawberry White Tea*, *Nectarine Rose*, *Orange Blossom Rooibos*, *Guava*, and *Papaya Passionfruit*. Comax Flavors created a *Natural Coconut Water WONF* flavor, along with black currant, lulo, lychee, yang mei, and many others.

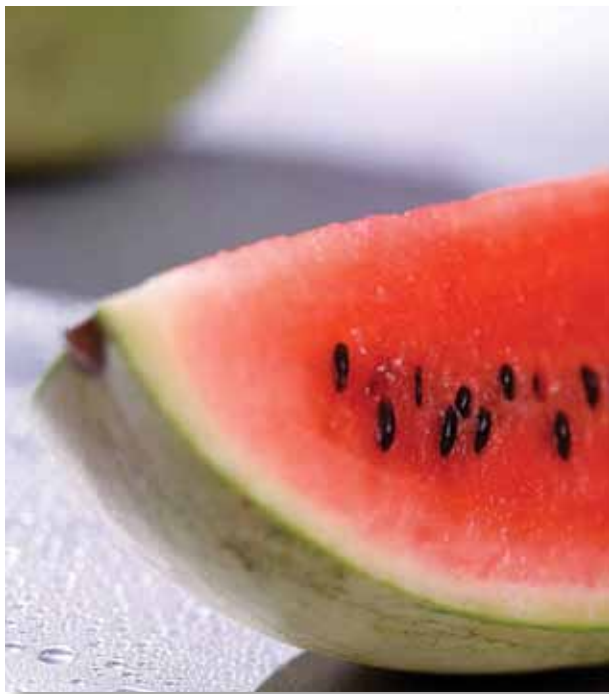
And to put it in a nutshell, the



Coconut water has entered the market with the force of a tropical storm. This translucent, free-flowing liquid has nutrition value and blends easily with other fruit flavors. This spritzer, designed for women, combines coconut water with Anjou pear. Photo courtesy of Wild Flavors

popularity of coconut water was clearly evident at the 2011 IFT Food Expo. Wild Flavors presented such formulations as *Anjou Pear Green Tea Coconut Water Spa Spritzer* and *Antioxidant Coconut Water Beverage*. David Michael used coconut water as base for a frozen treat—coconut water ice—which was offered in a variety of exotic fruit flavors. Coconut water was highlighted in Symrise's new line of tropical flavors. »

The Flavor of Fruits to Come continued...



The fruity, juicy character of watermelon is delivered by a new clear distillate. Derived from the natural fruit, the water-soluble product is designed to provide a riper flavor and more authentic mouthfeel than previous watermelon distillates.

Photo courtesy of Treatt USA

And in response to its 2011 Top Flavor Trends, Bell Flavors created a *Yellow Curry Coconut Water*, which it featured at the company's Flavorology event.

Along with coconut water, coconut flavor is also being used to create exciting formulations, demonstrating different ways that coconuts are capturing the imagination of formulators these days. For example, Comax developed a *Natural Young Coconut Flavor* for beverages—it provides the taste of young coconut flesh (described as softer and sweeter than that of the mature counterpart). Wild Flavors created a chewing gum prototype based on a mint mojito with a coconut spin. And among its wide range of recipes, the California Raisin Marketing Board, Fresno, Calif. (phone 559-248-0287, www.calraisins.org), has one for *Coconut-Curry Cookies with California Raisins*.

And coconuts may be providing a source for other ingredients. The Carrageenan Company, Santa Ana, Calif. (phone 714-751-1521, www.carrageenan.com), as part of its alliance with Island Organic Ingredients, is offering new sweeteners, flours, and oils—all derived from the coconut. More information about these ingredients can be found in my post-show article in the August 2011 issue of *Food Technology*.

The craze for coconuts clearly continues.

Watermelon Seeds Not Included

A new clear watermelon distillate from Treatt USA, Lakeland, Fla. (phone 863-668-9500, www.treatt.com), delivers a fruity, juicy character with balanced flowery and fruity backend notes. The distillate, *Watermelon Extra 9728 Treattarome®*, was specially developed to deliver a riper flavor, bringing a more leafy, fruity, pulpy mouthfeel than its complementary flavor *Watermelon 9724*, which carries a more rindy, strong flowery front end.

Using the company's specialized technology, the product is wholly distilled from the watermelon species *Citrullus lanatus*. Volatile collection under high vacuum and the absence of extended heat processing ensures that there are no flavor artifacts introduced during its preparation.

According to the company, the distillate delivers backend flavor characteristics which prolong the well-rounded watermelon aroma. Used at a level of 0.1%, the water-soluble essence brings an intense melon character. At lower levels of 0.01% or less, it is particularly effective in combination with other *Treattaromes* and *Treatt* citrus specialties to deliver delicate watermelon notes.

The extract is stable for more than six months when chilled, making it highly suitable for creating cost-effective clear beverages with exotic, tropical hints.

Extracts Capture Authentic Fruit Flavors

A line of highly concentrated, 100% natural extracts from Sensient Flavors, Indianapolis, Ind. (phone 317-240-1424, www.sensient.com),

captures the true, natural flavor and aroma profiles of original fruit botanicals. The flavor portfolio, *Natural Origins™* consists of several product categories, including citrus (bergamot, grapefruit, lemon, Sicilian lemon, lime, mandarin, and orange) and fruit & floral (chrysanthemum, cucumber, jasmine, juniper berry, and orange flower). The flavors are derived from natural "from the named source" botanical extracts using selective, low temperature extraction processes.

At the 2011 IFT Food Expo, several prototypes highlighted flavors from this portfolio, including *Orange Spice Cookie* (orange flavor), *East African Spiced Beef Tips Over Couscous* (lemon flavor), *Orange Pink Pepper Juice* (a combination of orange flavor and pink pepper flavor), and *Sicilian Lemon Iced Tea* (Sicilian lemon).

Several fruit flavors were also found on the company's 2011 flavor trend predictions. Aguaje, widely grown and consumed in Peru, is a highly nutritious fruit with a bright orange flesh and a sweet taste that has been compared to a carrot. Chemimoya—native to Ecuador, Columbia, and Peru—has a tropical fruit flavor with slight cream and green notes. Yumberry—officially known as the Yang Mei and native to China, provides a pleasantly tart and sweet flavor profile. Borojo, grown in Colombia and Ecuador, is thought to boost energy and has a pleasantly sweet and sour taste. And even though it is technically a Peruvian vegetable, yacon offers a fruity and earthy flavor that is compared commonly with that of the apple.

How Fruit Is Delivered

One popular way of delivering the benefits of fruit is through particulate inclusions, which can add flavor, functionality, texture, mouthfeel, visual appeal, and nutritional properties to a variety of formulations ranging from bakery products to beverages, noted QualiTech Food Ingredients, Chaska, Minn. (phone

The Flavor of Fruits to Come continued...



Fruit ingredients, in a variety of formats, can help enhance visual appeal, add flavor and texture, and provide nutritional value. For example, drum-dried apple, available in a flake or powder form, offers a convenient way to incorporate fruit into a bakery product. Photo courtesy of Van Drunen Farms

952-448-5151, www.qualitechco.com). The company offers standard or customized particulate inclusions for adding value to the formulation and, in its own words, to “get the creative juices flowing.”

“The great thing about inclusions is that we can provide consistency in color, flavor, antioxidant or other nutritional content, performance, and even supply,” said Kye Ploen, the company’s Vice President of Sales, Food Ingredients. “We can start with real fruit and make a powder, boost the nutrition, enhance the color, and make it exactly what the client wants.”

Traditional fruits such as blueberries are popular inclusions that work well for muffins, bagels, waffles, and many other baked goods. However, the company is also able to serve the trend of working with more exotic fruits such as acai, pomegranate, mango, and guava. In fact, inclusions and particulates provide a cost-effective way to get these exotic fruits not grown in the U.S. into prod-

ucts that consumers want.

According to Ploen, many times the process starts with someone in a marketing capacity wanting a product that can claim a certain percentage of fruit content or nutritional value. “As long as we know what the parameters are and how it will ultimately be used—whether in a dough or topping or blended with something else—together we can create solutions,” explained Ploen. “We can also add omega-3s, fiber, protein, or micronutrients.”

“These customized pieces are now more consistent and easier to introduce into a mass quantity baking process than raw fruit,” he added. “That alone offers more flexibility for the end use.”

Fruits for All Occasions

Fruit ingredients in a variety of formats are available from Van Drunen Farms, Momence, Ill. (phone 815-472-3100, www.vandrunenfarms.com). Made from such sources as raisins, oranges, and apples, they can be used to help enhance visual appeal, add flavor and texture, and provide nutritional value.

For example, freeze-dried raisin powder can be used in formulations that need a subtle sweetness without the piece identity of whole raisins. The free-flowing powder can be added to filling mixes, cakes and muffins, cookie and bar formulas, breads and rolls, cereals and snacks, toppings and frostings, dips, salad dressings, and spreads. Savory dishes such as sauces, glaze, soups, and stews can also benefit from the flavor of raisins. The ingredient retains all the natural goodness of raisins, contributing antioxidants, iron, potassium, and both soluble and insoluble fiber.

For a burst of citrus, freeze-dried orange peel is offered in diced and granule form. The process allows the ingredient to retain the same color, flavor, and nutritional value as the natural fruit. It also maintains its piece identity and is consistent in size. It is lightly sweetened to curb

the naturally bitter taste of the raw orange peel. The ingredient may be used in the creation of such formulations as biscotti, orange chicken, herbal tea, pound cake, marmalade, and sorbet.

Drum-dried apple may be used in applications that require the fresh flavor and nutrition of real apples, but in an easy-to-handle flake or powder form. Apples have a sweet/tart character, complementing other fruit flavors such as cranberry, orange, plum, and peach. They can also work with savory flavors such as pork, cinnamon, and chile. The ingredient may be used in fillings, beverages and smoothie mixes, bakery mixes, cobblers, tarts, and pies. With instant solubility, it is easy to blend and add sweetness and texture to sauces, frozen desserts, and infant foods.

Squeezing More from Citrus

A new range of six natural citrus flavors for beverages were launched by Kerry Ingredients and Flavors, Beloit, Wis. (phone 608-363-1200, www.kerry.com). Known as ‘taste twists,’ the flavors can be used individually or mixed with other flavors to create new formulations with exotic varietal citrus notes.

The company also developed beverage concepts to help manufacturers quickly understand the potential of these new signature flavors. These include flavored still water (*Kusiae Lime Type*), ready-to-drink tea (*Rangpur Lime Type*), flavored carbonated water (*Meyer Lemon Type*), flavored still water (*Pomelo Type*), juice drink (*Blood Orange Type*), and energy drink (*Clementine Type*).

Potential Source for Future Ingredients

As this article has demonstrated, fruits—traditional or exotic—can present an exciting source for flavors—directly, via extraction, or through chemical synthesis. However, fruits can also provide a source for other ingredients. Earlier, this article mentioned how coconuts

The Flavor of Fruits to Come continued...

can be used as a source for new sweeteners, flours, and oils, creating new opportunities for the food formulator.

Much like whey, by-products from fruits have the potential to provide important functionality and nutraceutical properties to a formulation. And as attention turns more and more to the exploration of tropical fruits, this may fuel this potential. Instead of being discarded as waste, these by-products obtained as a result of fruit processing may someday be the source for new antioxidants, antimicrobials, colorants, and texturizers.

While this article has focused primarily on flavors, another article could be easily written about the potential of fruit as a source for a variety of other ingredients. Take, for example, Tate & Lyle, Decatur, Ill. (phone 217-421-2331, www.tateandlyle.com), which recently launched *PureFruit*[™] monk fruit extract as a sweetener. DSM Nutritional Products, Parsippany, N.J. (phone 973-257-8288, www.unlimitednutrition-na.dsm.com), developed *Fruitflow*[®]—a natural,

water-soluble tomato concentrate that reportedly helps maintain a healthy blood flow. California Dried Plum Board, Sacramento, Calif. (phone 916-565-6232, www.californiadriedplums.org), reports that dried plum ingredients can be used as a substitute for alkaline phosphates in standard chicken breast marinades. Olam International Ltd., Summit, N.J. (phone 908-988-1680, www.olamonlinme.com), opened a new Global Tomato Innovation Center, which serves to incubate ideas, generate solutions, and develop new concepts and processes involving tomato ingredients. And in a couple of months, I will be doing an *Ingredients* section on colors, and you know that fruits as a source will play a role in that area.

In the future, I suspect that fruit flavors may be doing a double duty. Imagine, for example, an ingredient that provides a citrus flavor while providing antimicrobial properties. Or a flavor that also provides use as an aromatic or therapeutic.

So, whether we're talking about exotic

pairings with other ingredients, or providing a source for emerging ingredients, fruits continue to add new dimension to food formulating that goes beyond their basic nutritional value. **FT**

Next month's Ingredients section will look at a variety of innovative confectionery concepts (ranging from chocolates to gums) and how ingredients such as sweeteners, flavors, texturizers, nuts and other inclusions, and chocolate innovations are shaping these decadent and yet better-for-you concoctions.



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