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Natural and Bright

To create a new generation of natural color additives, processors enlist new sources and new technologies.

by Laurie Gorton, Baking & Snack

Does the color of food products seem a bit more dazzling lately? A new generation of natural color additives has made vivid hues possible where paler versions were once the norm. Bright raspberry red, deep indigo blue, glowing sunflower yellow — new sources and preparation methods are opening the door to a much brighter future.

"When natural colors were confined to the narrowest natural segment of the food industry, this lack of natural pigments was not much of an issue," said Jeff Greaves, president, Food Ingredient Solutions, LLC, Teterboro, NJ. Rising demand for natural and organic foods changed the playing field. And he particularly noted the concerns about artificial colors, especially the lake form with its aluminum component, as supporting today's interest in effective natural pigments.

Also, many consumers consider the colors naturally present in many fruits and vegetables to have antioxidant properties, a belief that suggests a potential nutraceutical approach to product development.

For the record, these ingredients — including naturalsource materials — are properly referred to as "color additives." Although it may be commonplace to refer to colors as colorants, the US Food and Drug Administration (FDA) reserves that term for colorings added to packaging materials, not foods.

Formulators can also follow a practice gaining popularity in Europe, where consumers closely watch ingredient listings. In Europe, colors added to food, no matter whether they are naturally sourced or synthetically manufactured, are given an E-number that has to be used on packaging. E-numbers can be red flags to some consumers who assume all such ingredients are artificial; however, E-numbers can be avoided by choosing a "coloring foodstuff," an ingredient used in its natural form to lend color to the formulation.

BREAKTHROUGH PERFORMANCE. Purple corn and black carrots may sound exotic, but such fruits and vegetables represent new sources for high-potency natural colors. Processors have developed a number of proprietary methods for extracting the colors in forms suitable for food use.

"Proprietary emulsion technology yields microemulsions in our Fusion Precise Natural Colors line," said Penny Martin, applications manager, Sensient Food Colors, Indianapolis, IN. The carotenoid emulsions produce butter yellow to egg yolk orange shades, and their high intensity means "more for the bottom line" when coloring foods. The company's naturally stabilized fruit and vegetable juices in this line offer attractive red shades for baked foods, cakes, fillings, crackers, snacks and RTE cereals. "Additionally, we developed plating-grade natural colors for seasonings that are perfect for converting formulations from synthetic to natural colors," she noted.

Kalsec, Inc., Kalamazoo, MI, uses a patented stabilizing system to produce its Durabrite color line, based on paprika, annatto and carrot. This method addresses the problem of carotenoid pigment oxidation, associated with loss of color and production of rancid or off-flavors and aromas. Results, according to the company, are exceptional color and flavor stability.

Turning to purple corn, Suntava, Afton, MN, created a new line of natural color additives. The fact that these are sourced from corn makes them compatible with grainbased foods, contributing no off-tastes or smells, according to Bill Petrich, the company's c.e.o. "Not surprisingly, the color smells very faintly just like the corn from which it is derived," he said.

Like other natural-source colors, these ingredients rely on pH to control their color effects. Mr. Petrich explained, "For example, at pH levels of 3 (lemony or citrus), the colors are strawberry, cherry, raspberry red in color. At higher pH of 4 to 5, the colors become more grape in color. Above pH 6, the colors become the richly dark to black colors now associated with the healthy trend in dark vegetables and grains that contain high levels of anthocyanin nutrients."

ALTERED STATES. The form of the color makes a difference, too. Color additives usually take the form of liquid dyes or powdered lakes. The lakes are made by combining dyes with mineral salts to yield insoluble compounds that tint by dispersion. Lakes are not oil-

soluble but are oil-dispersible and are more stable than dies. "Traditionally, the vast majority of natural colors have been dyes, which are fine for coloring solutions but not very effective for coloring where coverage or coating is required," Mr. Greaves said.

He observed that the main exception has been carmine lake. He described this as "a very effective" pigment, but it has become increasingly unacceptable to some customers because it is not vegan, kosher or halal and has been identified as an allergen.

Carmine is a bright red color derived from the ground bodies of cochineal insects that feed on South American cactus. Although an exempt color additive, this material must be labeled in ingredient listings on food packaging as "carmine" or "cochineal" under FDA regulations that go into effect Jan. 5, 2011.

Mr. Greaves described the process for manufacturing his company's VIVAPIGMENTS line. "Natural vegetable dyes are encapsulated by coextrusion into an insoluble rice protein matrix and then ground to approximately 10 microns by a fluid-bed air-jet mill," he explained. "The resulting colors are dispersible in water and oil, and like synthetic lakes, they color by pigmentation." In this form, they are well suited to coloring panned candies, compound and yogurt coatings, seasoning blends or wherever a dye color is required, and they greatly reduce the usage rate, he added.

Natural blue colors have been difficult to use, being highly sensitive to acidic environments. WILD Flavors, Erlanger, KY, recently introduced a natural, acid-stable radiant blue color derived from fresh fruit by a proprietary method. It not only delivers various shades of blue but can also provide the foundation for other colors, ranging from light blue to forest green, as well as blue-to-purple shades. This color is exempt from certification and can be listed as "fruit juice concentrate (color)" in ingredient legends on packaged foods. It is stable in pH ranging from 2.5 to 8.0. Previously, such blue color additives were stable only when applied in neutral pH products (pH 5.5 to 7.0).

"Unlike previous attempts to achieve blue colors for applications by leveraging the stabilization of red cabbage or other anthocyanin-based colors at a neutral pH, WILD's new blue color additive is unique in that it is truly acid-stable," said Kevin Gavin, c.o.o. of WILD.

"Seasoning and dry mix items present a challenge because natural lakes are not permitted by FDA," Ms. Martin stated. Describing new developments in Sensient natural colors for such applications, she observed that these come in natural, kosher, orange-to-red shades for topical application.

Baking applications were cited by Kelly Newsome of GNT USA, Inc., Tarrytown, NY, as applications for the company's yellow and orange products as an alternative to artificial dyes as well as formulated dyes like annatto, paprika and turmeric. Specifically, "our EXBERRY Shades Mango Yellow and Mandarin not only offer the addedvalue of being made exclusively from fruits and vegetables, but they deliver a remarkably wide range of yellow and orange shades in baking applications," she said.

REAL WORLD USES. As natural colors evolve, they earn innovative uses, and some even solve vexing problems. Consider what happens when a standard fruit or vegetable use is added to color white chocolate or compound coatings. "The color will migrate, giving an uneven result best described as mottling," Mr. Greaves said. VIVAPIGMENTS technology produces the same depth of shade without mottling, he stated.

Good brown colors present another problem: Many are not oil miscible. According to Mr. Greaves, with Colarome's patented natural pigment technology, his company can offer a range of oil-dispersible tans and browns suitable for powdered seasonings and similar applications.

The popularity of extruded snacks and RTE breakfast cereals, as well as the development of tiny flavor bits and colored extruded particulates, can challenge the performance of color additives. "In this equipment, the pH and color can be set at the time of extrusion, with the color generally uniformly dispersed throughout the product," Mr. Petrich observed.

Also, the use of coating and panning technologies lend themselves to placing thin, highly coated coatings and/ or glazes just on the surface. "This can be an economical way of providing very bright colors," Mr. Petrich said. "Combining extrusion processes with coating technology opens up many new opportunities for both color and flavoring within the snack market."