Annatto and Turmeric: Naturally Golden

By Renee Gan, Contributing Editor

Aside from being a bit tricky to spell, annatto and turmeric have a few things in common. Both are spices, both are generally accepted as “natural" and both lend golden hues to foods.

Product developers are increasingly looking to color foods with natural ingredients. For the yellow-to-orange spectrum, annatto and turmeric fit the bill nicely. “Turmeric and annatto are both derived from natural sources and, as a result, have been perceived as natural by the food industry and consumers," says Timothy Effertz, senior product manager, Chr. Hansen, Milwaukee, WI.

However, one cannot simply call a color “natural," even if it is naturally derived. “As far as U.S. labeling is concerned, colors are treated very differently from flavors," says Jeff Greaves, president, Food Ingredient Solutions, LLC, Teterboro, NJ. “Unlike natural flavors, FDA’s view is that any added color is artificial because it is not the native color of the product."

Origins and derivation

The annatto shrub is an evergreen native to Latin America. “Annatto is derived from the thin, resinous coating of the seeds of the annatto, or achiote, shrub (*Bixa orellana L*.). It can be processed several different ways, depending on the intended application," says Effertz.

The seeds are dried, or made into a powder or paste, before being sold. An important measure is the bixin content of the paste, which should be 2.7% or greater, according to “Market Brief on Annatto Seeds: Overview of the World Market," a 1993 report from the International Trade Centre and World Trade Organization, Geneva. Peru is the main exporter of annatto, with Guatemala, Ecuador and Kenya being other notable annatto-producing countries.

The main color constituents in annatto belong to the carotenoid group. “There are two basic forms of annatto: water-soluble (norbixin) and oil-soluble (bixin)," says Greaves. “The water-soluble color, which is generally available in both liquid and dry forms, is typically extracted from bixa seeds with water, though it can be made from solvent-extracted material. The oil-soluble form is usually solvent-extracted, though it may also be oil-extracted. Bixin is only soluble in oil to 0.2%, but this can be increased with co-solvents or by making suspensions, the latter of which is quite common."

Turmeric is a rhizome in the ginger family. In its raw form, it bears a close resemblance to regular ginger—until it is cut open to reveal bright-orange flesh. It comes from the plant Curcuma longa L. “The main coloring component is called curcumin," says Effertz. “It is usually extracted and purified by the use of organic solvents. Turmeric can be suspended in vegetable oil or emulsified in different carriers, such as polysorbate 80 or propylene glycol."

Less-processed forms of turmeric are also available. “Ground turmeric is sometimes sold for color, but usually has too much flavor," Greaves says. “There is also some supercritically extracted material on the market."

Mellow yellows

The shades imparted by annatto cover a fairly wide range. “Annatto is pale-yellow (butter color) to yellow to orange—think Cheddar cheese—depending on the use level," Greaves says. “It can be used with turmeric to replace FD&C Yellow #5 at low levels, or to replace FD&C Yellow #6 at higher usage levels, which is more common."

Turmeric’s color array is more limited. “Turmeric is yellow to greenish-yellow. It usually replaces FD&C Yellow #5 (tartrazine), though it is sometimes too greenish," says Greaves.

Both annatto and turmeric are fairly heat-stable. Annatto is reasonably light-stable, but falters in acidic conditions. “Norbixin-based annatto colors will pink at lower pHs, but there are bixin-based emulsion colors that are more stable at lower pH ranges," Effertz says.

Turmeric is somewhat acid-stable, but tends to have poor light stability. “Turmeric performs well in the majority of pHs normally found within food products, but will turn red and degrade at high pHs," Effertz notes.

When selecting which color and type to use, several factors must be taken into account, such as solubility in water or oil; stability with respect to heat, light or acid; liquid or powdered form; and, of course, the desired final product color.

Effertz offers cheese, ice cream, cereal, snacks and baked goods as examples of applications where water-soluble annatto and water-dispersible turmeric can be used. “Oil-soluble annatto can be used in oils, salad dressings, margarine, butter and gelatin capsules," he says. “Annatto emulsion colors can be used in cheese, processed cheese and spreads, ice cream, confectionery products, yogurt and beverages. Oil-soluble turmeric can be used in margarines, butter and salad dressings."

To your health

A healthy halo is associated with turmeric. It has long been used in traditional Indian medicine to treat cuts, rheumatic disorders, digestive issues and even worms. Both turmeric and curcumin have been found to increase detoxifying enzymes, prevent DNA damage, improve DNA repair, and decrease mutations and tumor formation. They also exhibit antioxidative potential in animals (*Asia Pacific Journal of Clinical Nutrition*, 2008; 17(S1):265-268).

A 2010 study describes protective effects of curcuminoids (of which curcumin is one) with respect to bone loss (*Journal of Agricultural and Food Chemistry*; 58(17):9,498–9,504). Two other studies report that curcumin appears to counteract the chemical processes involved with Alzheimer’s disease (*Journal of Neuroscience*, 2009; 29(28):9,078-9,089), and that curcuminoids isolated from other

compounds in turmeric demonstrate effectiveness in preventing rheumatoid arthritis symptoms (*Journal of Natural Products*, 2006; 69(3):351-355).

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