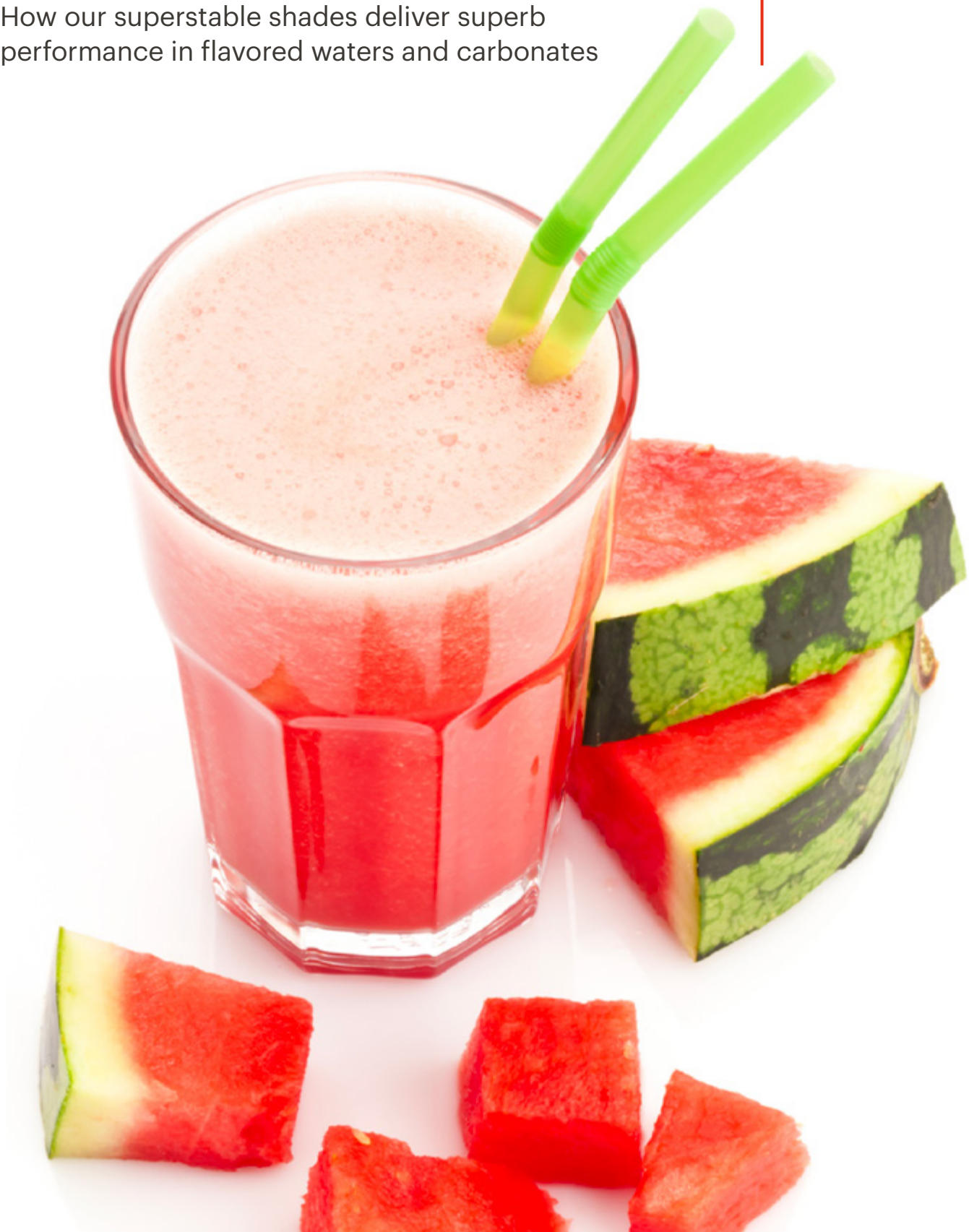
Lycored

True colors shining through your beverages

How our superstable shades deliver superb performance in flavored waters and carbonates



How superstable pink, yellow, orange and red shades from Lycopene and Beta-Carotene deliver superb performance in flavored waters and carbonates.

The beverage market

The global non-alcoholic beverage market is evolving. Expected to grow to $190 billion by 2020, it shows no sign of slowing. Whatever direction consumers take the market next, the use of effective beverage colorants remains central to developing appealing and innovative drinks that stand out across the segment. Currently, the non-alcoholic beverage industry's product development is driven by several key demographic and consumer choice trends.

Changing taste and consumption habits

Consumer tastes are changing. The non-alcoholic beverage category is expanding every day as consumers choose to drink fewer alcoholic beverages and select alternatives. The beverage industry is responding by introducing a broad, new range of drinks across several key categories including fruit, carbonated and non-carbonated waters, vegetable and vegetarian choices and more.

Clean label

Still high on the agenda, clean label has transcended trend status to become a standard consumer expectation. Around 80% of consumers want to know more about a product's ingredients before making purchase decisions[1] as part of their quest for healthier products and greater ingredient transparency. In response, manufacturers across the industry are producing and reformulating products with simpler, more natural ingredients. Between 2012 and 2016, clean label product launches in Europe grew by 19,974 products to 30,774.

Plant based flavors

Flavor remains a key differentiator for beverages and the increasing popularity of plant based diets and ingredients is introducing bolder flavor notes to the category with earthy flavors and botanical based beverages taking off. A product that exemplifies this trend is coconut water, which is set to have a market value of $2.5bn by 2024.

A recent Mintel[2] report also shows that the appeal of fruit flavors is as strong as ever, with growing consumer interest in drinks with berry and other red or pink hued fruit flavors as well as citrus based flavors, highlighting an opportunity for ingredients that are naturally red, orange or yellow in color.

Health & wellness

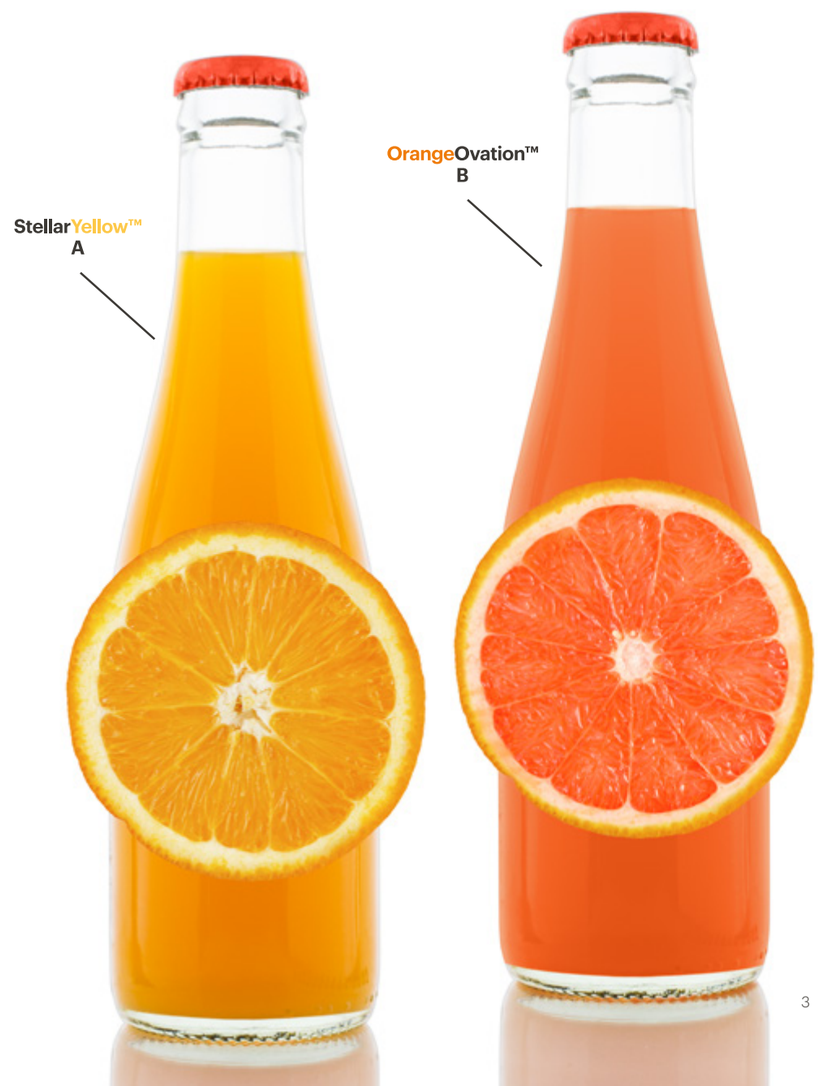
Closely linked to clean label is the health and wellness drive that continues to impact the beverage industry. Greater focus on health and wellness leads to replacement of unhealthy products for healthier choices and opens up new opportunities for functional products. The market for energy and sports drinks continue to rise in line with this, as consumers seek out healthier beverages to consume on the go or rehydrate after physical activity. Many of these consumers are health-conscious and want their products to be part of their healthy lifestyle.

Bringing beverages to life with color

For consumers in the Instagram generation, visual appeal is everything. Adding color to a beverage product is a great way to increase its sensory appeal and ensure it looks true to flavor, particularly with fruit flavored products.

The fruit matching challenge

Among consumer choices, clean-label fruit and fruit-flavored beverages are gaining ground. Many of these drinks possess hues and tones in the red spectrum as well as yellow and deep orange; think cranberries, cherries, strawberries, watermelon, raspberries, pink grapefruit, blood orange and orange, papaya, lemons and more. Beverage industry processors and formulators' main challenge in fruit beverage coloring is ensuring a new, all-natural, fruit based product has an appealing color to match its flavor.

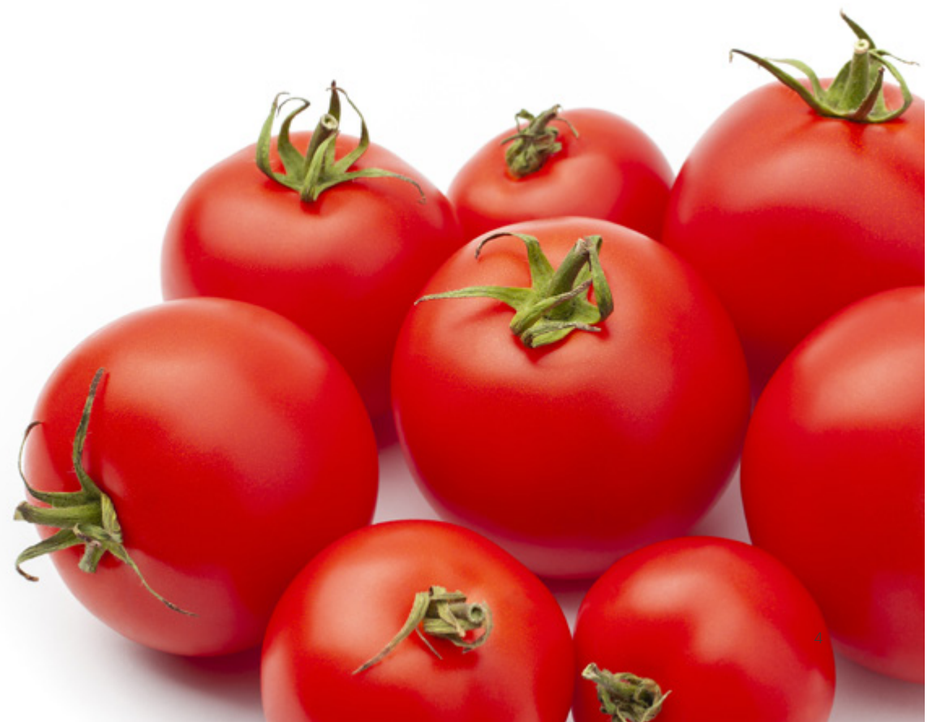


Keeping it real, red and natural with Lycopene based color solutions

Relying on artificial colors to achieve color vibrancy may not be an option or a sustainable business choice in the face of consumer tastes. A recent study of US adults found that just under half prefer to avoid artificial additives in the food and drink that they consume, and the level of 'naturalness' associated with a product is key to its acceptance in today's market.

All of Lycored's colors are extracted from mother nature using innovative methods that leverage a proprietary Lycopene-rich tomato breed, and Beta-Carotene from a unique super-producing strain of *Blakeslea trispora*. These naturally derived colors are pH independent, so work well even in challenging beverage and juice applications unlike several artificial red colors.

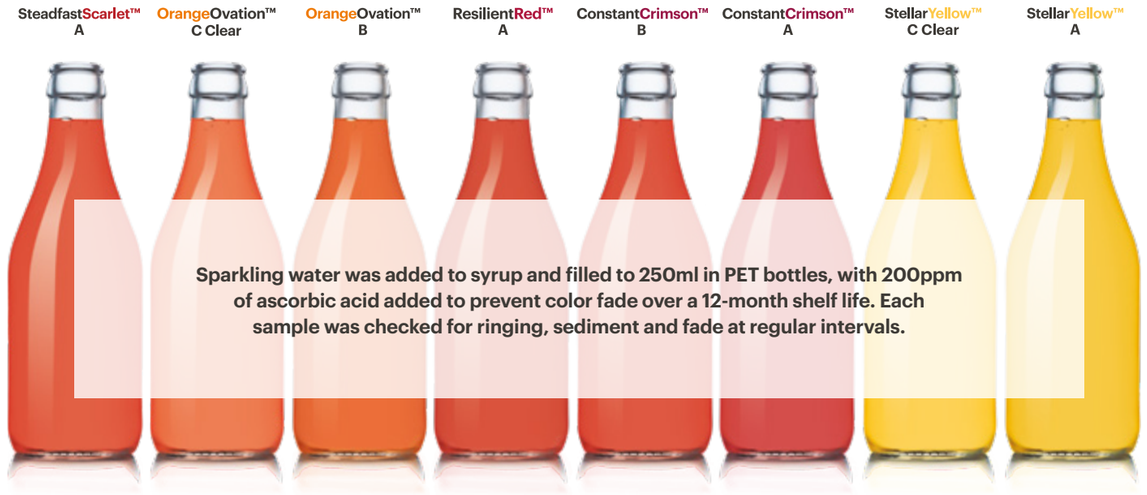
Fully backward-integrated, Lycored colors are actually synergistic with Vitamin C offering more options and fewer compromises for today's beverage innovators and entrepreneurs looking to capitalize on the health and wellness and clean label trends.



Putting Lycored's natural colors to the test in beverage applications

Lycored set out to test how well its cast of all-natural colors performed in flavored waters, one of the fastest-growing non-alcoholic beverage categories. Researchers conducted a study on a standard flavored water base not containing juices or fruit. The results were then evaluated on six key criteria - stability, ringing, sediment, clarity, fade and homogenization. As the flavored water recipe and process is similar to that of carbonates, this insight also applies to the carbonate category.

Lycored's cast of all-natural color shades were given a 'dress rehearsal' to demonstrate their talent and assess their performance and stability on the main stage—store shelves. Typical shelf-life for these types of beverages is six to nine months. Lycored checked for advanced talent to the 12-month mark. Those showing stability to 12 months are the star performers allowing extended shelf-life with high quality visual appeal even beyond the standard life-cycle.



The results

Stability

Researchers found six of the shades delivered good stability over 12 months, with only OrangeOvation B and ConstantCrimson A displaying slightly diminished hues, with eight and nine months of good stability respectively, well within the standard shelf-life range.

In contrast, synthetic Lycopene displayed poor stability over a similar period, demonstrating significant color loss even when stored in the dark.

Ringing

Ringing, the undesirable effect of color additives coalescing along container liquid interfaces over time, is another shelf-life issue. For most of Lycored's cast of colors, there was no ringing after 12 months in six of the samples. Although Lycored's study did note slight signs of ringing after nine months in test samples colored with ResilientRed A, and after seven months with StellarYellow C Clear, this wouldn't be a concern given the standard 6 to 9 month standard shelf life.

Sediment

Researchers found no sediment in six of the eight samples, although in samples colored with OrangeOvation B and ConstantCrimson B, they noted a slight amount of sediment gathering at the base of the bottle only at the end of the 12 months.

Clarity v Cloudiness

Researchers found no sediment in six of the eight samples. Only at the end of the 12 month study, did a slight amount of sedimentation at the bottom of the bottles develop in those waters colored with OrangeOvation B and ConstantCrimson B.

Fade

Fading is another issue central to shelf life. The only flavored water which faded was the one colored with OrangeOvation C Clear in which there was some fade after six months. The synthetic Lycopene displayed the worst fade of all with significant levels of fade of 12 months.

Homogenization

OrangeOvation C Clear, StellarYellow C Clear and StellarYellow A did not require homogenization for stability. It is recommended that the other shades are homogenized.

Overall, the red, orange and yellow shades from Lycored delivered excellent performance in flavored waters and displayed solid stability characteristics.

Standout shades

The results of the study highlighted four standout shades in the series that were truly top performers over the 12 months:

SteadfastScarlet™

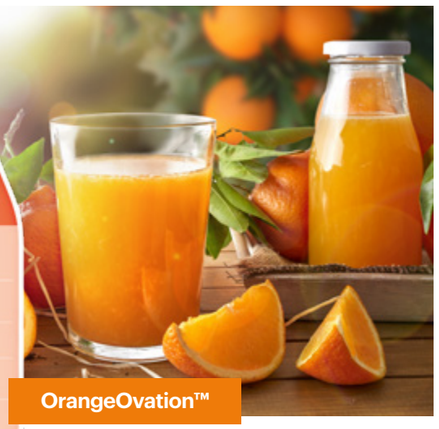
- Blood Orange; at lower dosage
- Pink Grapefruit
- Pink Lemonade
- Alternative to synthetic Lycopene

StellarYellow™

- Lemon
- Good Safflower alternative

ResilientRed™

- Strawberry
- Rhubarb & Strawberry
- Summer Fruits
- Alternative to synthetic Lycopene



OrangeOvation™

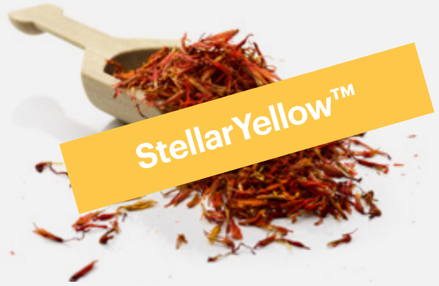
- Energy Drinks
- Fruit Punch
- Peach
- Iced Tea
- Fantasy-type flavors

Replacing artificial colors

The increasing consumer preference for less artificial ingredients and the regulatory considerations that follow means that more manufacturers are compelled to rethink their current product recipes. For manufacturers facing reformulation challenges in an attempt to shed synthetic colorants in their beverage products, Lycored's cast of superstable, colors from natural sources can offer vibrant, stable alternatives to the leading artificial equivalents.

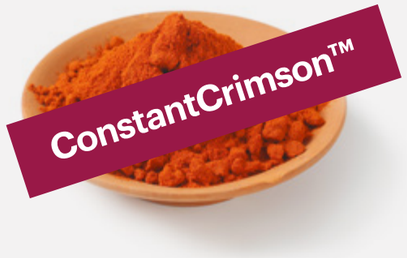
Lycored's team works closely with beverage processors and manufacturers and offers to facilitate the switch to natural colors without sacrificing stability or visual appeal. Colors derived from our Lycopene and Beta-Carotene formulation science offer colorations that present hues more naturally, avoiding neon effects or loud brightness that may be off-putting to consumers in particular applications.

Safflower and turmeric

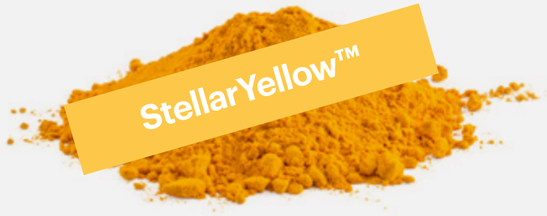


Synthetic Beta-Carotene

Synthetic Lycopene



Tartrazine



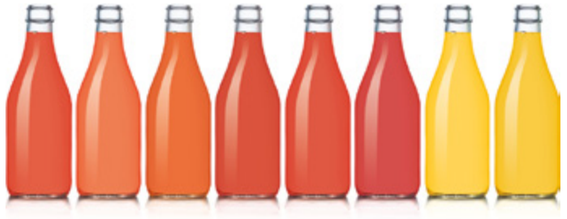
Synthetic Lycopene can be replaced with all of the red shades offered including Steadfast Scarlet, ResilientRed And ConstantCrimson shades – even in dark conditions, synthetic Lycopene has a tendency to fade quickly. Our natural Lycopene colors perform much better than what can be made synthetically.

Tartrazine can be replaced with StellarYellow. Already prohibited in Europe following studies linking it to hyperactivity in children, tartrazine is still used in some yellow beverages in the US.

Conclusion

Using natural colors is a great way to enhance a product's consumer appeal in today's market where artificial ingredients are under increasing scrutiny. And the great news is that using natural colors in a beverage product does not mean sacrificing stability, shelf-life or visual appeal. In fact, with Lycored's superstable colors across red, orange, gold and yellow spectrum, shelf life can actually be extended while providing consistent visual quality over processing and shelf life cycle.

Lycored continues to deliver great science and even greater application experience to the beverage industry. From nature to consumer, our colors bring natural vibrancy and appeal to thousands of products that people enjoy every day.



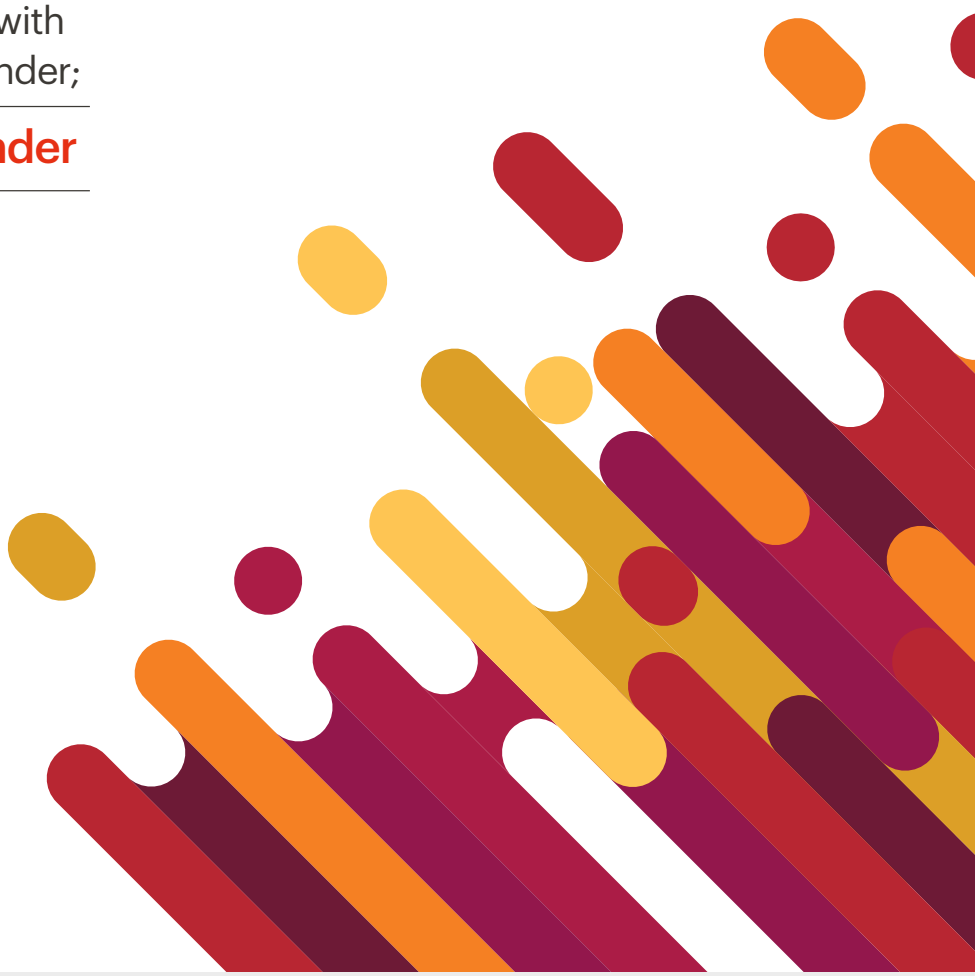
[1]FMI LI Transparency Imperative Report
[2]Mintel, Beverage Flavors to Watch
[3]Simmons National Consumer Study, Spring 2018.

Discover your perfect color match for plant-based meat and fish alternatives with Lycored's HueFinder

HueFinder is a unique online color-matching tool which allows manufacturers to find the perfect shade for food and beverage products, access valuable application specific insights and accelerate new product development or natural reformulation projects.

Find your perfect color match with HueFinder,™ our online color finder;

www.lycored.com/huefinder



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