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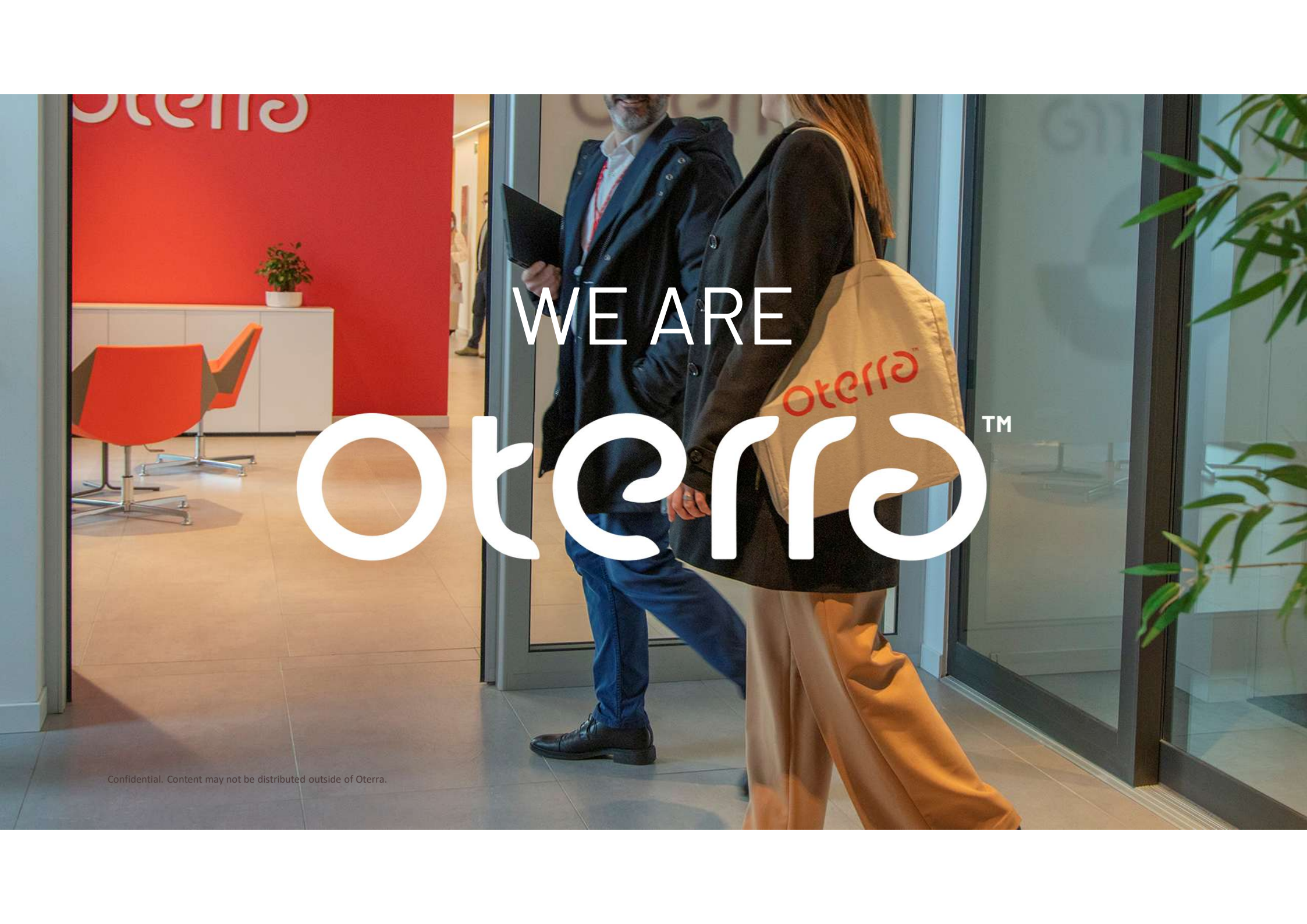
ConTech2026

Where nature meets performance in
natural colours for confectionery









WE ARE
oterra™

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Helping you make *natural* food and beverage easy

Committed to driving positive outcomes for nature, climate and people

NATURE



- Breeding
- Harvest
- Deforestation

CLIMATE



- Science Based Targets
- Reduce Emissions
- Renewable Energy

PEOPLE



- Diversity
- Equal Terms
- Safe and Inclusive

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A Few Facts

2021

Established – worked with
colour since 1874

1250+

Employees worldwide
across 40+ nations

2200+

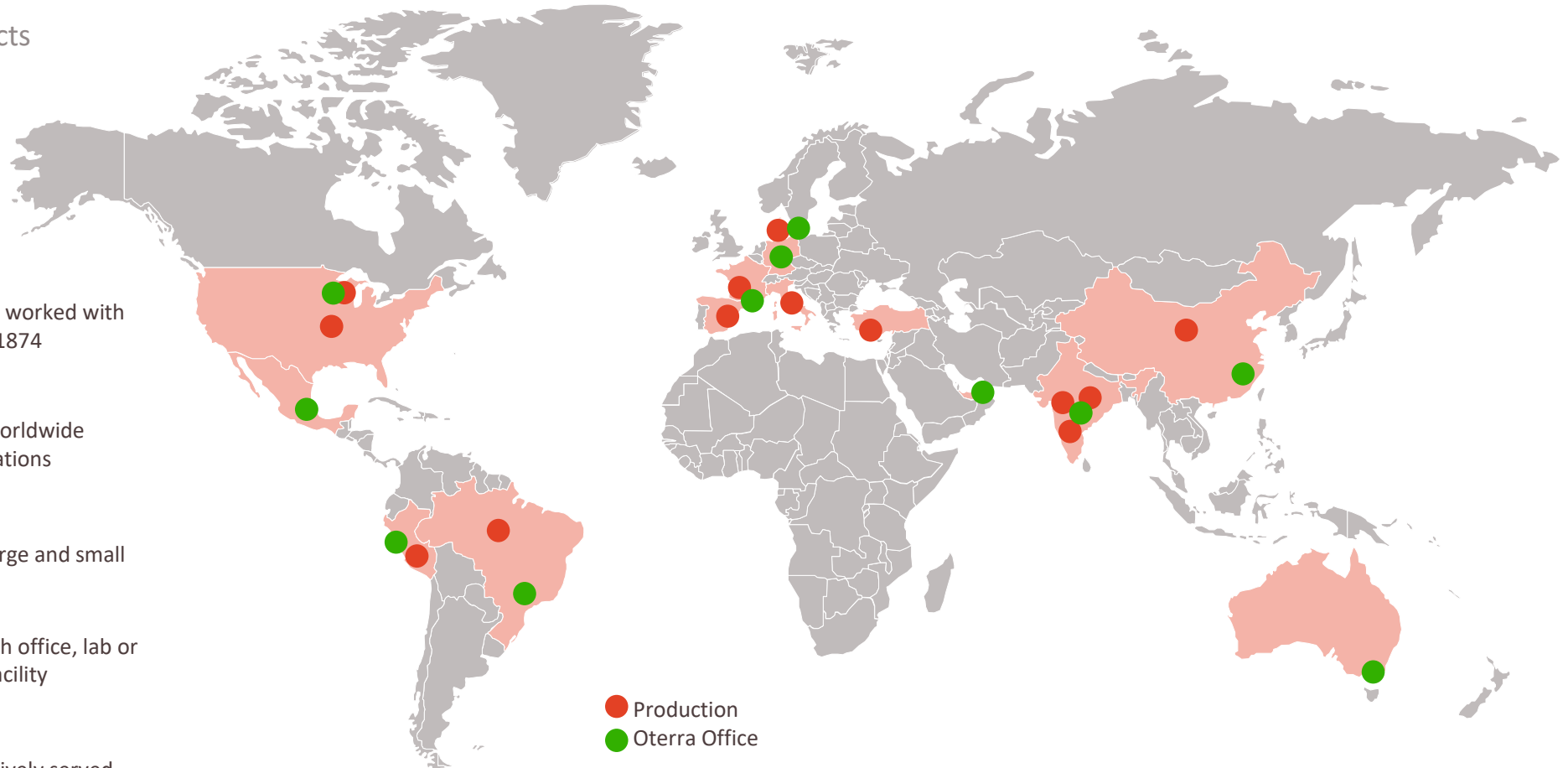
Customers large and small

40

Locations with office, lab or
production facility

110+

Countries actively served



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Why Colour matters to Consumers





First impressions are important!

Shoppers decide
within the
first 90 seconds
after interacting
with products

70%
of purchase
decisions are
made in front of
the shelf

Consumers use colours to navigate...

60% to 90%
of product
evaluation is
based on colours
alone*

Colour is a strong
proxy for flavor
confidence

Source: Neilpatel – Color psychology 2022, The color Authority

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Today's consumers are more
informed than ever

57%

of Australian
consumers
actively seek
natural colours*

81%

of Australian
consumers find
“No artificial
colours”
appealing

US moving in the natural direction

Ripple effects in other markets



CNN Health Life, But Better Fitness Food Sleep Mindfulness Relationships

Over half of US states are trying to eliminate food dyes. Here's what you can do now

By Kristen Rogers, CNN
7 min read · Published 12:00 PM EDT, Sat March 29, 2025

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General Mills Announces Plans to Remove Certified Colors from All U.S. Cereals and All K-12 Foods by Summer 2026



Two more states ban food colors in schools

Tell Kellogg's To Stop Targeting Kids With Cereals Full of Artificial Ingredients (PETITION)

By Food Babe

10

When I first saw Kellogg's new Baby Shark Cereal my heart sank. My daughter, who is 2 years old, LOVES Baby Shark – and I knew when she saw this she would beg me for a box just look at all those artificial ingredients...

	% Daily Value	% Daily Value
Folate (folic acid)	50%	100%
Vitamin B12	100%	100%
Vitamin B6	100%	100%
Vitamin B3	100%	100%

Ingredients: Corn flour blend (whole grain yellow corn flour, deglutinated yellow corn flour), sugar, wheat flour, whole grain soft flour, deglutinated marshmallow flavored bits (sugar, corn syrup, modified corn starch, dextrose, natural and artificial flavor, gelatin), contains 2% or less of: salt, fiber, salt, soluble corn fiber, natural flavor, gum arabic, red 40, color additive, turmeric extract color, annatto extract color, blue 1, yellow 6, yellow 5, red 3, BHT for freshness.

Vitamins and Minerals: Vitamin C (ascorbic acid, sodium ascorbate), disodium reduced iron, zinc oxide, vitamin B6 (pyridoxine hydrochloride), vitamin B3 (niacinamide), vitamin B12 (cyanocobalamin), vitamin A palmitate, folic acid, vitamin B2, vitamin E.

CONTAINS WHEAT INGREDIENTS.

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FOOD BABE

CNN Health Life, But Better Fitness Food Sleep Mindfulness Relationships

FDA says it will phase out petroleum-based food dyes, authorize four natural color additives

By Jen Christensen, CNN
6 min read · Updated 7:04 PM EDT, Tue April 22, 2025

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11 synthetic colours being removed in PL portfolio



Source: walmart.com



“

*"Our customers have told us that they want products made with **simpler, more familiar ingredients** — and we've listened. By eliminating **synthetic dyes** and other ingredients, we're reinforcing our promise to deliver affordable food that families can feel good about."*

- John Furner, President and CEO, Walmart U.S.



To meet
consumer
demands
natural colours is
becoming a
“license to
operate”

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The Power of LTO's A Global Study





35%

of confectionery
launches in AU the
past 5 years are
LTOs*

+24%

Average annual
growth in
confectionery with
LTO claims
(Global, 2022-2024)*

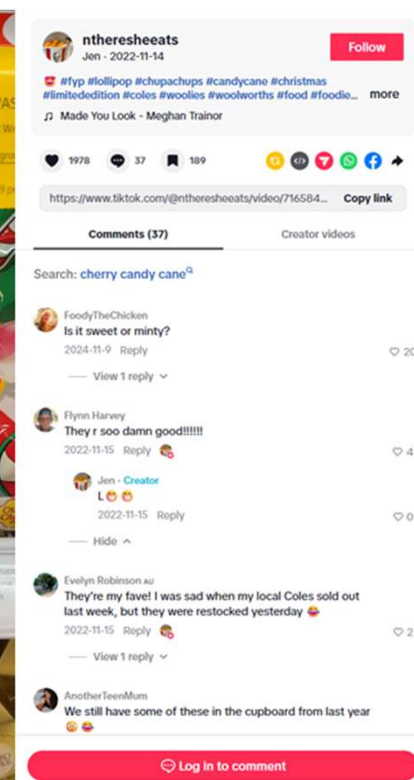
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Source: *Based on data from the last 5 years, November 2025. Top Trends in Sweet Confectionery, Global 2025. GlobalData. Oterra Natural Selections in Confectionery, July 2025.

What encourages consumers to try LTO's

Oterra Study

LTO shoppers	Global
A unique or interesting flavour	75%
Seasonal themes	49%
Eye-catching packaging	47%
Discounts or promotions	29%
The colour of the confectionery	26%
Co-branding with other brands	24%
Tie-ins with movies	19%
Recommendations on social media	21%



Source: GlobalData – Oterra Natural Coloring in Confectionery July 2025

Consumers care about natural colors in LTO's

Premium value of natural colours in LTO's

71%

...increases my
likelihood to
purchase

49%

...would pay more for
LTOs with natural
colors

10%

price premium is
acceptable for natural
colours!

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Color Code



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Color Code



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Color Code



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Source: AI Generated by Oterra



Color Code



In Conclusion:

- Consumers are actively looking for natural colours
- Willingness to pay a premium for natural
- Colours is a key lever to offer excitement and innovation in your LTO's



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Natural colours in
confectionery

Challenges and Solutions



Facts and myths about colours from natural sources

	Myth	Facts
Stability	Natural colours are unstable	
Shade	Natural colours lack vibrancy and variety	
Standardization	Natural colours vary from batch to batch	
Off flavour	Off flavour is always a problem	
Cost-in-use	Natural colours are too expensive	
Complexity	All natural colours are complicated to work with	

Facts and myths about colours from natural sources

	Myth	Facts
Stability	Natural colours are unstable	New technologies and formulations have improved stability
Shade	Natural colours lack vibrancy and variety	Very bright and vibrant colours are available
Standardization	Natural colours vary from batch to batch	All products are standardized for colour
Off flavour	Off flavour is always a problem	Application-specific technology and formulations prevent off-flavour
Cost-in-use	Natural colours are too expensive	Natural colours are more expensive than artificial, but the benefits generally outweigh the added cost
Complexity	All natural colours are complicated to work with	There are easy-to-learn, basic rules about pigment groups which determine how to work with them

What you need to consider when working with colours from natural sources



1.
Compliance



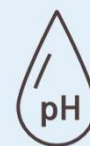
2.
Macro
ingredients



3.
Flavours



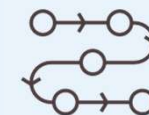
4.
Packaging



5.
Acid to base



6.
Fortification



7.
Production
process

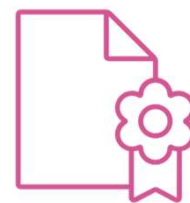
1. Regulatory compliance – the key to smooth, safe conversion



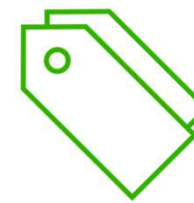
Is the **raw material** that provides the colour **permitted** and is it food safe?



Are the **additives** and the **process** used to standardize this colour formulation **compliant** with local legislation?



Is this colour solution permitted in this type of food product and in the end-market?



How should the colour be **labelled** and what is the most accurate and informative front-of-pack **claim**?

2. Macro ingredients can affect colour and stability



Fat or sugar crystals

– presence of fat content or sugar crystals tend to lighten the shade; higher colour dose is required to increase intensity

*Jelly gum: 0.07% (L) carmine colour and cream paste 0.48% (R) carmine colour



Background colour

– the background colour of a product is influenced by the colour of added ingredients or the browning of fruit juice and sugars, which can impact the final shade and colour brightness

*Chocolate lentils with TiO_2 (Top)
Chocolate lentils without TiO_2 (Bottom)

3. Flavors and essential oils can impact natural colour functionality and stability

Natural flavours tend to be weaker in strength, so a higher dosage is often needed.

However, the addition of more flavour increases the concentration of reactive carriers and solvents.

Essential mint, citrus oils and other strong flavours may degrade certain pigments and breakdown emulsions or encapsulations.

The reaction between colour and flavour is unpredictable and degradation may occur slowly over time.

It is advisable to add flavours, acids, alcohols, separately from colours in application.

Examples of how flavours can impact color



New flavour



Flavour added together with colour



Approved flavour



Flavour added separately

4. Packaging can influence colour stability

Not all colours are equally light stable.

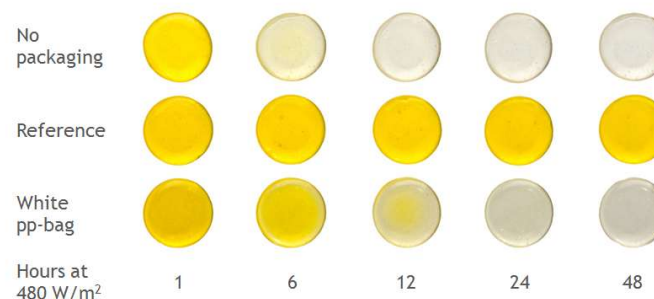
Curcumin is light-sensitive. Encapsulation technology improves curcumin's stability against light.

Oxidative or light stability is influenced by package composition, packaging material and storage conditions.

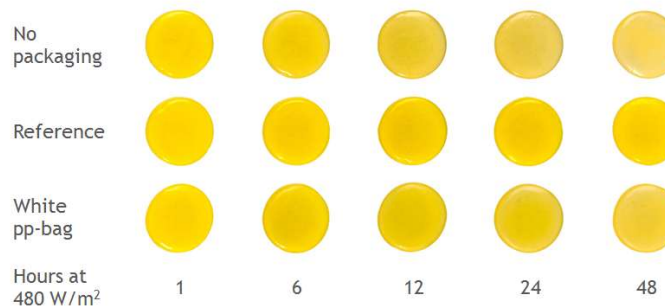
Consider the actual need for light stability and how long the product may sit on the shelf.



Curcumin faded with exposure to light:



Encapsulated curcumin exhibited improved stability against light exposure:



5. pH levels can impact colour appearance and stability

pH levels can shift the shade of some pigments, i.e. anthocyanins, carminic acid, and curcumin:

Anthocyanins at various pH levels in water

pH range from 2 to 7



Anthocyanins at various pH levels in milk

pH range from 4 to 7



Carminic acid at various pH levels in water



Curcumin at various pH levels in water



5. pH levels can impact colour appearance and stability

Low pH can result in precipitation of carmine, annatto (norbixin) and Cu-Chlorophyllin if not acid-proof:

Carmine at low pH water



pH 3.0

Annatto (norbixin) in neutral pH versus low pH water



pH 6.5

pH 3

Cu-Chlorophyllin in neutral pH versus low pH water

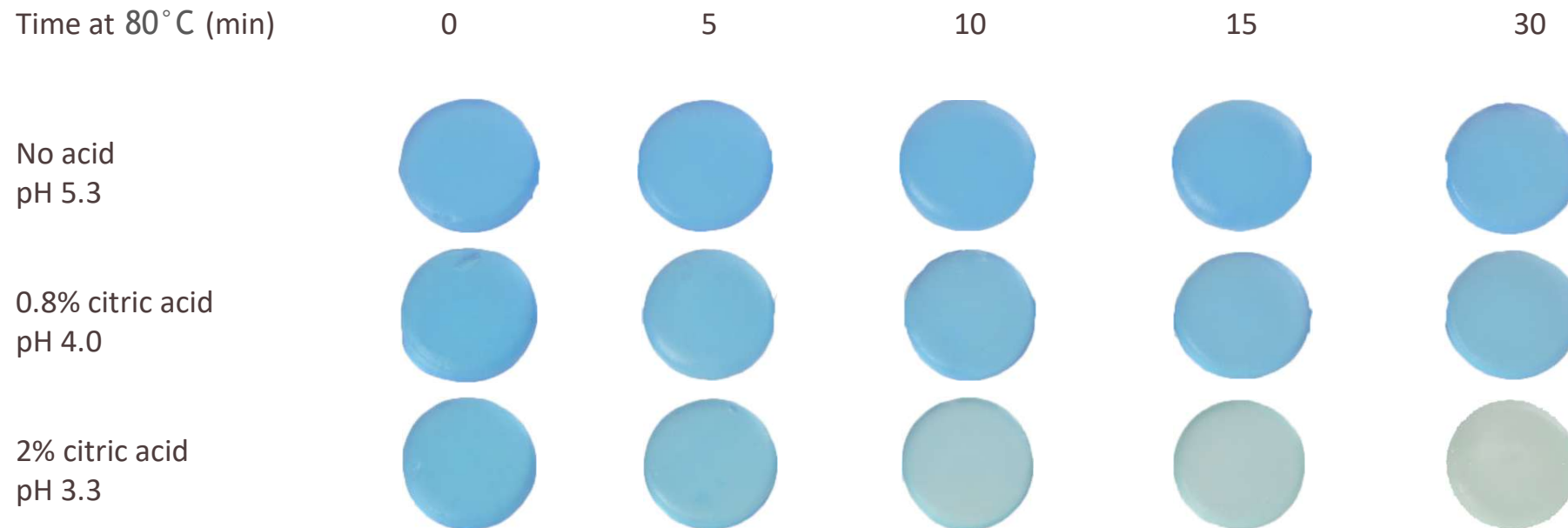


pH 6.5

pH 3.0

5. pH levels can impact colour appearance and stability

Low pH can result in degradation of spirulina blue, accelerated by elevated temperature:



Tested in gelatin jelly gum mass added with spirulina blue colour
Jelly kept in water bath at 80°C before moulding

6. Fortification can impact colour stability

Vitamins and **minerals** interact with some pigments and can cause colour shifting, precipitation and destabilization of the colour.

Ascorbic acid stabilizes carotenes, but can destabilize anthocyanins, resulting in fading or browning.

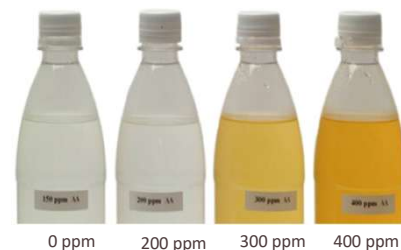
Calcium and iron destabilize anthocyanins, resulting in fading; calcium destabilize carminic acid, resulting in black precipitation.

Sulphites destabilize anthocyanins, resulting in fading:

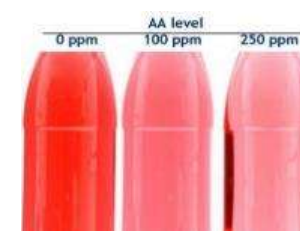


Same dosage of anthocyanins in jelly recipe where SO₂ has been removed respectively in a standard jelly recipe

Increasing ascorbic acid content;
beta carotene colour



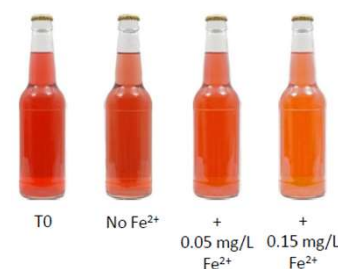
Increasing ascorbic acid content;
anthocyanins colour



Increasing calcium content;
anthocyanins colour



Increasing iron content;
anthocyanins colour



Carminic acid precipitation due
to calcium content in dairy



7. Production processes can alter colour appearance

Heat

Not all colours are equally heat stable.

Red beet colour is light-sensitive. Thus, it is not suitable for processes that involved exposure to high heat for extended period.

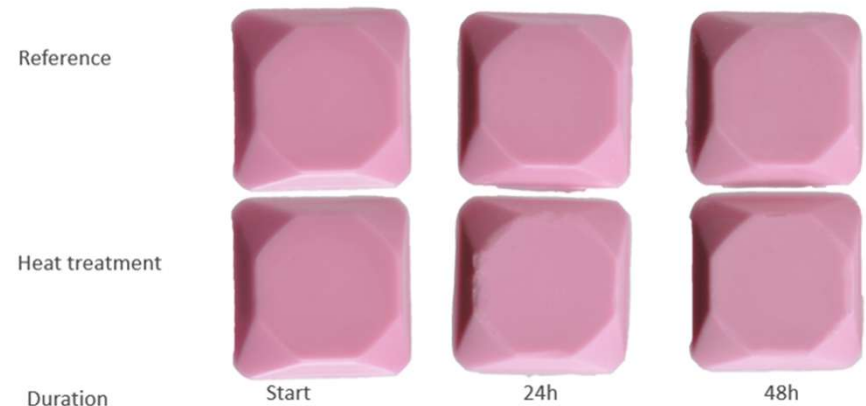
Red beet colour in jelly gum mass, kept in water bath at 80°C before moulding:



Red beet colour in syrup and water, kept in water bath at 65°C:



Red beet colour in fat compound mass, kept at 45°C before moulding:



Reference: Fat compound mass stored in dark condition at ambient temperature

7. Production processes can alter colour appearance

Aeration

Incorporated air will make the colour of confectionery product lighter and might change the shade of the colours.
Higher colour dose is required to increase shade intensity.

Spirulina blue colour 0.4%
in foam and jelly candy:



Hard boiled candy with anthocyanins
With and without air pulled in:



Chewy candy coloured with carmine
With different amount of air pulled in:



There are colour solutions based on natural pigments/sources suitable for confectionery applications

For ANZ

Applications	Yellow	Orange	Red/ pink	Blue	Green	Purple	Black	Brown	White
Hard candy	Curcumin Lutein Safflower Carotenes Orange carrot	Paprika Annatto Carminic acid Carotenes Orange carrot Lycopene Yellow + red	Carmine Anthocyanins	Spirulina	Cu- Chlorophyllin Blue + yellow	Carmine Anthocyanins Blue + red	Vegetable carbon	Caramelised sugar Cooked apple juice Malted barley	Approach Oterra to find out more about the new plant- based solution!
Jelly gum									
Chewy candy									
Marshmallow									
Chewing gum			Carmine Anthocyanins Beet red						
Panned confectionery									
Fat compound			Carmine Beet red			Blue + red			

Updates from US FDA – April 22, 2025

HHS, FDA to phase out
petroleum-based synthetic
dyes in nation's food supply



- Establishing a national standard and timeline and working with industry to transit from petrochemical-based dyes to natural alternatives by **December 31, 2026**:
 - Green 3 (INS 143, Fast Green FCF)**
 - Red 40 (INS 129, Allura Red)**
 - Yellow 5 (INS 102, Tartrazine)**
 - Yellow 6 (INS 110, Sunset Yellow)**
 - Blue 1 (INS 133, Brilliant Blue)**
 - Blue 2 (INS 132, Indigotine)**
- Requesting food companies to **remove Red 3 (erythrosine) sooner than the 2027-2028** deadline previously required.
- Partner with **National Institutes of Health (NIH)** to conduct comprehensive **research on how food additives impact children's health and development.**

[HHS, FDA to Phase Out Petroleum-Based Synthetic Dyes in Nation's Food Supply](#) | FDA

There are colour solutions based on natural pigments/sources suitable for confectionery applications

For USA

Applications	Yellow	Orange	Red/ pink	Blue	Green	Purple	Black	Brown	White
Hard candy	Curcumin Lutein Safflower Carotenes Orange carrot	Paprika Annatto Carminic acid Carotenes Orange carrot Lycopene Yellow + red	Carmine Anthocyanins	Spirulina Jagua blue Gardenia blue	Blue + yellow Cu- Chlorophyllin	Carmine Anthocyanins Blue + red	Vegetable carbon	Caramelised sugar Cooked apple juice Malted barley	Approach Oterra to find out more about the new plant- based solution!
Jelly gum									
Chewy candy									
Marshmallow									
Chewing gum			Carmine Anthocyanins Beet red						
Panned confectionery									
Fat compound			Carmine Beet red			Blue + red			

~~Not permitted in USA~~ ; permitted in USA but not ANZ

Mini Lab Session



Logistics

Items in 1 toolkit:

- 3 bottles of colours, labelled A, B and C
- 1 bottle of milk, 100 ml
- 1 bottle of soft drink, 100 ml
- Droppers x 6
- Small tasting cups x 6
- Tissue pack x1
- Marker x 1



Based on the knowledge of how some pigments behave at different pH, deduce the identity of the three unknown colour pigments!

- Instructions:

3 unknown red colours in bottles



To dose into
→

soft drink (low pH) and
milk (neutral pH)

Please pour the soft drink
and milk into the cups
provided before dosing the
colours



→

Note down the observations
and deduce the identity of the
three unknown colour
pigments!



Revealing the identity

Unknown Colour	Identity of pigment	In soft drink (low pH)	In milk (neutral pH)
A		Transparent red 	Purple 
B		Transparent red 	Pink 
C		Transparent red, more bluish than B 	Pink, more bluish than B 



Thank you

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