Next Frontier of Functional Clean Label Red

FruitMax® Huckleberry 501 WS

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Types of Clean Label Colors

- Natural colors are natural sourced with no chemical alteration
- Fruit & vegetable juices are minimally processed
What is a natural color? 
- and how does it differ from a synthetic?

Chemical + Chemical → Chemical Reaction/Synthesis = Synthetic Dye

Plant → Grow → Harvest → Wash → Extract → Concentration = Natural Color
Clean Label Colors can Reduce the Brand Risk

Certified Colors
Artificial

Colors Exempt from Certification
Natural Colors
Fruit & Vegetable Juice

High Impact

Low Impact

Strength of Consumer Communications

Artificial Colors
Yellow 6

Natural Colors
Annatto (for Color)

Fruit & Vegetable Juice
Carrot Juice (for Color)
Red Remains Critical Shade among Key Industries - Despite Multiple Sources, Functionality of Natural Reds is a Challenge

**Key Food Industries and their Share of Shades**

### Beverage

- 26% Red
- 25% Blue
- 17% Green
- 12% Yellow
- 8% Orange
- 7% Brown
- 4% Black
- 2% White

### Confectionery

- 34% Red
- 16% Blue
- 16% Green
- 12% Yellow
- 12% Orange
- 3% Black
- 3% White
- 2% Brown

### Ice Cream

- 20% Red
- 16% Blue
- 16% Green
- 12% Yellow
- 12% Orange
- 12% Black
- 8% White
- 8% Brown

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### Examples of Natural Sources of Red Shades and their Technical Constraints

- **Red Radish** matches Red 40 and have good stability but have high off-flavor
- **Cabbage** have fairly good stability but some off-flavor and purplish shade
- **Beet** have low process and shelf life stability
- **Black carrot** have low off-flavor and fairly good stability, but is pinkish
- **Carmine** matches Red 40 replacer, but is not vegetarian

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* Based on pigments and exclude blends
Source: Mintel - New Product Launch Database
Raw Materials are Critical Cost Drivers
- Creating Optimal Solutions Require Teaming up with Farmers

![Diagram of Indicative cost structure of Red vegetable juice concentrates (\%)](image)

- We strive towards making natural colors more affordable and more stable through careful natural selection and breeding of fruit and vegetables
- We constantly improve production methods and using advanced color formulation technologies to deliver higher color intensity and stability
Chr. Hansen’s Approach to Clean Label Color Solutions

Agronomy
- Transfer of technology to farmers
- Agronomic trials
- Unique Chr. Hansen’s crops

Selection
- Careful natural selection
- Identify genotypes
- Screen for color and yield, in literature and trials

Breeding
- Global, multipolar sourcing network
- New phenotypes
- Selection and multiplication of crops with high color content

Extraction
- R&D optimizes extraction methods improving color yield

Formulation
- R&D improves formulation & yield
- Blending of anthocyanins improves stability

Application
- Global reach through Global Expertise Centers by region and multiple local RACs
FruitMax® Huckleberry 501 WS - an Ultra Stable Red Color

A unique & synergistic red blend of vegetable juices
It is naturally sourced and minimally processed
Red 40 replacer with superior process and shelf life stability
The Ultra Stable Red Colors Overcomes Traditional Challenges in a Multitude of Food Products

- Cordials / Concentrates
- Carbonated drinks
- Juice drinks
- Sports drinks
- Flavored waters
- Alcoholic drinks
- Jelly gums
- Jelly beans
- Gelatin
- Extruded cereals
- Dry cake mix
- Frostings
Capable to match FD&C Red No. 40

Using the colors only

- FruitMax® Huckleberry Red 501 WS 1,1g/l
- FD&C Red No. 40 0,04g/l

With cloudifier

- FruitMax® Huckleberry Red 501 WS 1,3g/l
- FD&C Red No. 40 0,06g/l
USR™ provides value to the different applications

- Carbonated soft drinks
- Juice containing drinks
- Near waters
Ascorbic acid affecting coloration in carbonated soft drinks

- FD&C Red No. 40 or mixes of anthocyanin and carotenes are common in order to give a red orange shade.
- Some carbonated soft drinks use high amounts of ascorbic acid.
- Ascorbic acid degrades anthocyanin causing fading and shifting.
- USR™ reduces the effect fading while avoiding the shifting towards brown shades.
In containing ascorbic acid matrices

FruitMax® Huckleberry Red 501 WS

Freshly prepared | 28 days exposed to light
Still brightly colored

Synthetic FD&C Red No. 40

Freshly prepared | 28 days exposed to light
Severe fading and color shift
Fortification may compromise stability

- Nowadays different consuming trends point towards fortified juice containing drinks
- Fortifying components such as vitamin C, B and other minerals have a direct impact in the stability of the product
- It may generate fading in the final application
- Transparent packaging added to fortifying ingredients accelerate the effect
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Mineral and Vitamin base Target

**ColorFruit® Violet 160 WS**

- Freshly prepared
- 15 days exposed to light

Still brightly colored

**Standard Black carrot**

- Freshly prepared
- 15 days exposed to light

Almost complete fading
Lower dosages - the threat in near waters

- Near waters tend to have a lower color dosage in order to provide a natural edge.
- This lower dosage of the color is not enough to last the product’s shelf life.
- USR™ can last longer than other anthocyanin reducing the risk of scrapping for the manufacturer.
Stability at low dosage

FruitMax® Huckleberry Red 501 WS

- Freshly prepared
- 15 days exposed to light
- Still brightly colored

Standard Blackcarrot

- Freshly prepared
- 15 days exposed to light
- Almost complete fading
FruitMax® Huckleberry 501 WS
The Most Complete Choice for Natural Red Colors

**UNIQUENESS**

- Vegetable juice providing a bright vivid red color in a multitude of food product
- Superior shelf life and process stability compared to other red anthocyanin based colors
- Simple claim: Colored with vegetable juice
- Robust towards ascorbic acid content
- Low off-flavor
- Globally compliant
- Affordable cost-in-use
Thank You for Your Attention
Any Questions?