SIRIO

Plantegrity™

PLANT-BASED
SOFTGEL TECHNOLOGY
WITH A PURPOSE

SIRIO

Trusted Technical Excellence in Softgel Manufacturing

Clean Label Capabilities

A full range of carrageenan-based and carrageenan-free shell options to support clean-label claims. These solutions meet consumer expectations for transparency, allergen-free labeling and wellness-focused formulations.

High-Quality and Precision Dosing

Softgels are made to strict standards with consistent dosing and uniformity. Fill weight, shell thickness, and active content are tightly controlled for quality and compliance.

Versatile Customization

Softgels can be customized in color, shape, and size, with logo embossing available. Flavor masking and odor control improve the consumer experience.

Specialized Softgel Capabilities

- Extensive experience with complex formulas, including single oils, oil suspensions, semi-solid pastes, viscous gels, or beadlet-in-oil systems, with controlled delivery or added stability.
- Advanced delivery technologies, enable the combination of multiple active ingredients, providing targeted release and enhanced product performance.
- Specialized techniques protect oxidation and pH-sensitive actives, such as omega-3s, probiotics, enzymes, and botanicals, from degradation during processing, storage, and digestion.

Global Facilities – Certified plants in Asia, Europe, and North America.

Supply Chain – Reliable sourcing and on-time delivery worldwide.

Local Solutions – Formulations tailored to market needs and regulations.

Plantegrity®
Sirio's Comprehensive, Solution Of Plant-Based Softgel

With decades of manufacturing excellence, Sirio Pharma elevates softgel production with advanced technology, formulation expertise, and market-driven innovation.

4 Cutting Edge Plant-Based Shell Technologies

- Carrageenan -based
- Gellan Gum -based
- Enteric Plant -based Non -coated
- Tapioca Starch-based

Wide Applications

- ☑ Health food, functional food, etc.
- ☑ Filling - pure oil,suspension, etc.
- ☑ 100+ ready-to-toformulation
- ☑ 500+ mil. softgels commercialized

Strong Barriers

- ☑ 1st commercialized gellan gum softgel
- ☑ 13 patents covering 4 countries
- ☑ Meet USP pharmacopoeial standards

Plantegrity®: Comprehensive Plant-Based Softgel Solutions

Carrageenan Based

Carrageenan

- Soft, translucent shell
- Can be formulated for chewable versions
- Affordable and reliable

Carrageenan Free

Gellan Gum

- Silky, shell
- Affordable and reliable
- Excellent heat & humidity resistance

Enteric Plant-based Non-coate

- Translucent shell
- Excellent acid resistance: less aftertaste, protects acid-sensitive active ingredients

Tapioca Starch

- 100% plant-derived, sustainable
- Ideal for "natural" positioning

Cross-Benefits Across All Formats

- Excellent heat resistance
- Clean-label compliant
- Odorless
- Easy to store and transport
- Easy to swallow
- Environmental friendly
- Excellent Stability

Plantegrity® APPLICATIONS

PURE OIL

- Omega-3: DHA Algal Oil, Linseed Oil, Fish Oil
- Omega-6: Evening Primrose Oil, Borage Seed Oil, Perilla Oil
- Fat-soluble Vitamins: VA, VD, VE, VK
- Phospholipid: PC/phosphatidylcholine, PS/phosphatidylserine

SUSPENSION

- Multi-vitamins: Calcium + VD + VK, etc.
- Calcium: Milky Calcium
- Vitamins: Folic Acid, VB, Biotin, etc.
- Carotene: Lutein, Zeaxanthin, β-carotene
- CoQ10
- Melatonin

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Plantegrity®
Carrageenan Softgel

Carrageenan is a hydrophilic colloid derived from red algae seagrasses, also known as Eucheuma Gum, Gelidium gum and Chondrus gum.

Over 15 Years of Commercial Success

Proven global usage with strong consumer trust

Consumer Familiarity & Trust

Seaweed-derived and plant-based, aligns with clean-label requirements

High Clarity & Gloss

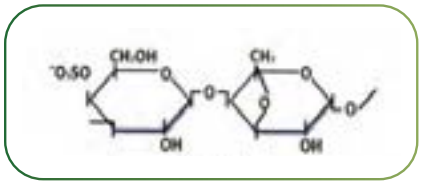
Attractive shelf presentation with customizable colors and transparency

Formulation Versatility

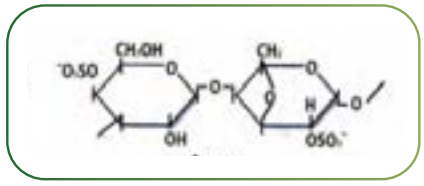
Compatible with oils, suspensions, and botanical blends

Carrageenan

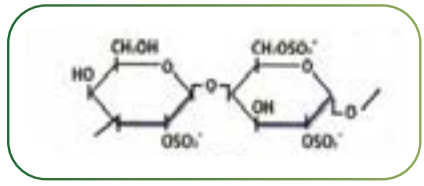
- Ester sulfate-amount & position
- 3,6 anhydro-D-galactose
- Molecular composition



Kappa



Iota



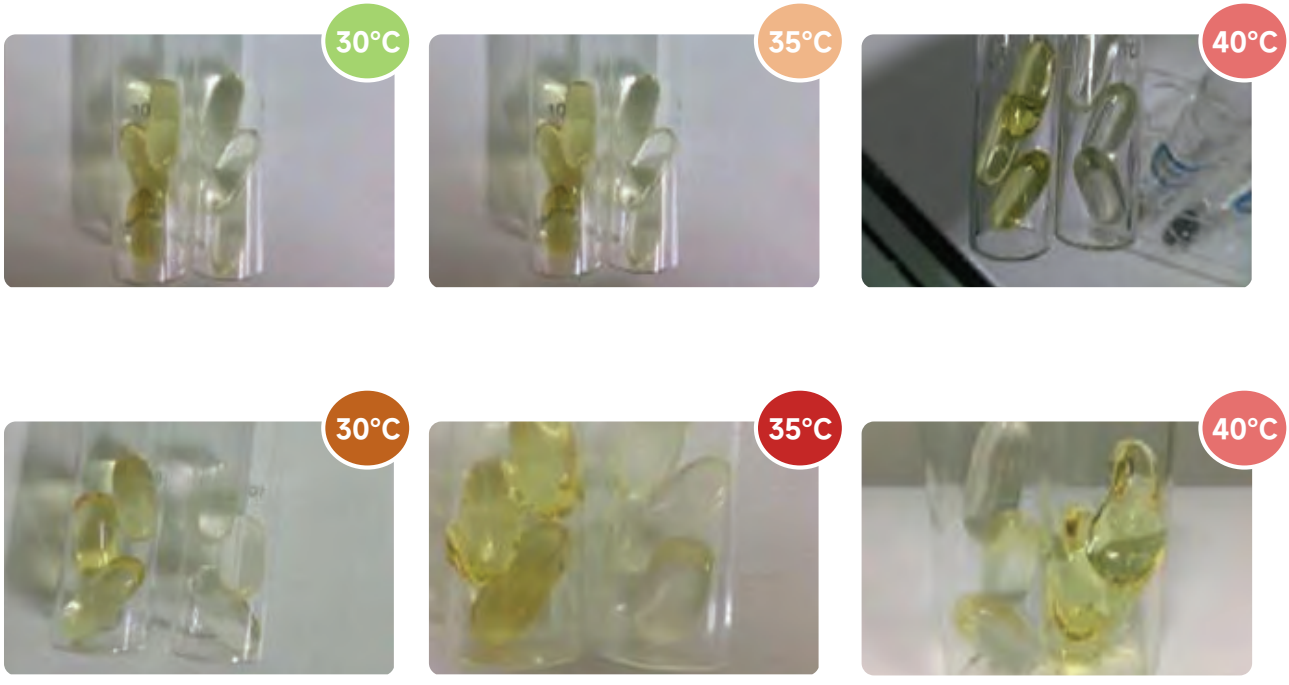
Lambda

The chemical structure of carrageenan is mainly composed of calcium, potassium, sodium and ammonium salts of polycarbohydrate sulfate composed of galactose and dehydrated galactose, and can be divided into κ-type (Kappa), ι-type (Iota) and λ-type (Lambda) according to the different binding forms of sulfate.

The FDA has recognized carrageenan as Generally Recognized as safe (GRAS), which indicates that carrageenan is considered safe for adults and children under specified conditions of use. In 2001, the Expert Committee on Food Additives (JECFA) of the International Food and Agriculture Organization (FAO) and the World Health Organization (WHO) removed the allowable daily intake (ADI) of carrageenan.

Plantegrity® Carrageenan Softgel
Good Temperature Resistance

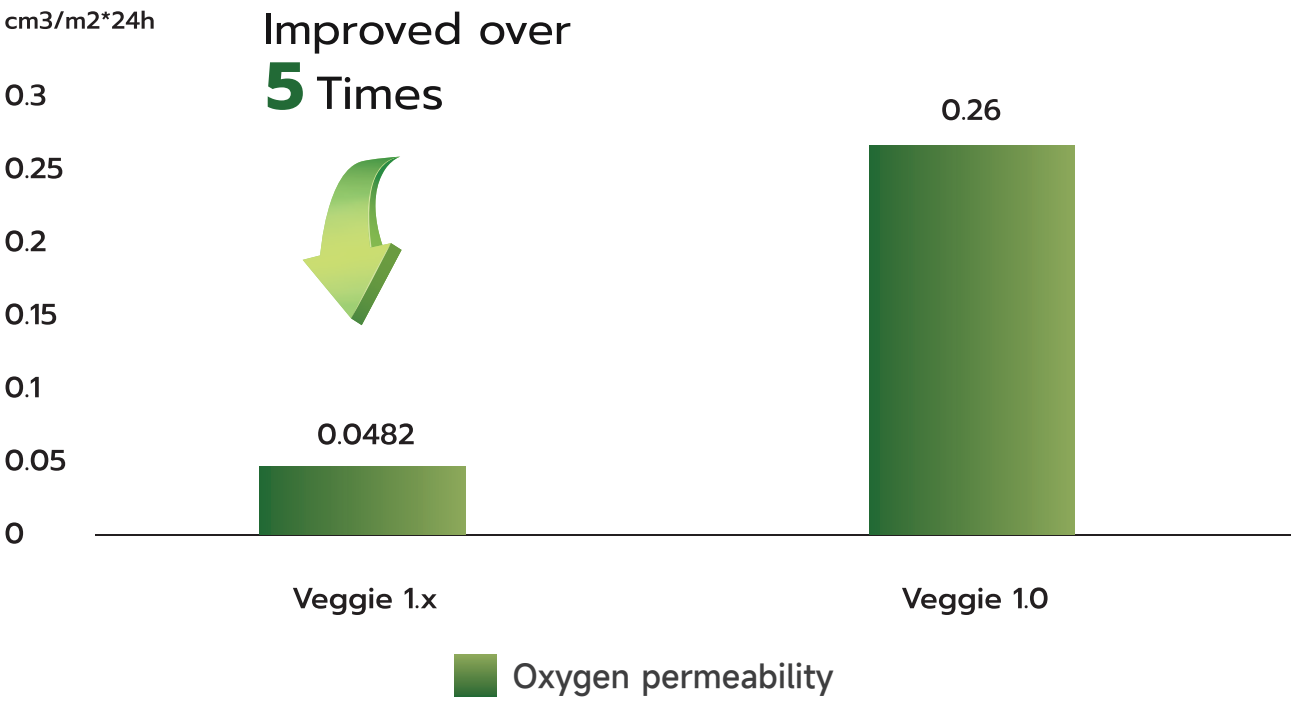
The dark color is gelatin softgel, and the light color is carrageenan softgel.



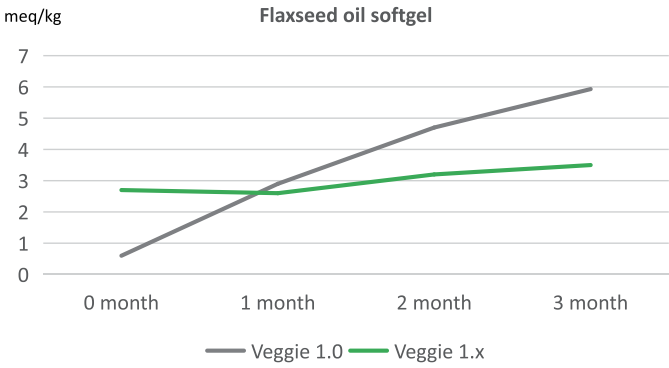
Compared with gelatin softgel, carrageenan softgel maintained capsule integrity at 55°C .

- Deformability
- Non-cohesive
- Unbroken

Plantegrity® Carrageenan Softgel Optimized Protection Against Oxidation



The oxygen permeability of the shell of Veggie 1.x is lower than that of Veggie 1.0, which shows that Veggie 1.x has better oxygen barrier performance and can better protect nutrients.



The result of accelerated stability test (40°C / 75%RH, 3 months) in HDPE bottle for flaxseed oil softgels shows that both Veggie1.x and Veggie 1.0 softgel have excellent stability in peroxide value. Veggie 1.x shows better oxidation barrier than veggie 1.0 in peroxide value.

Plantegrity®
Gellan Gum Softgel

Gellan gum is a microbially fermented polysaccharide derived from the Gram-negative bacterium Sphingomonas paucimobilis. It is an extracellular polysaccharide produced by using small molecule sugars as a substrate.

Superior Thermal & Humidity Resistance

Ideal for global distribution and hot climates

Exceptional Mechanical Strength

Protects capsule integrity during manufacturing and shipping

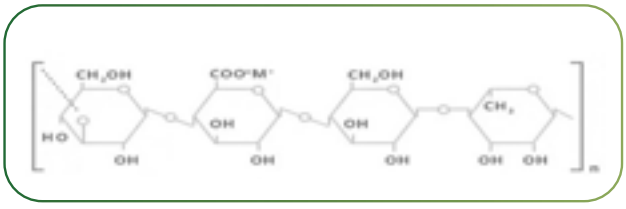
Enhanced Oxygen Barrier

Preserves oxidation-sensitive ingredients like PUFAs and botanical oils

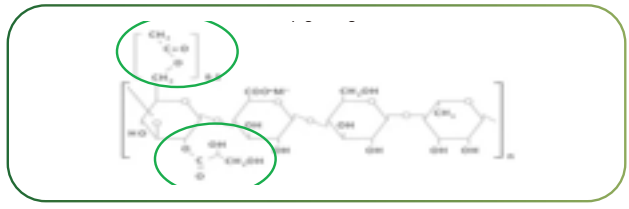
Minimal Cross-Linking

Maintains clarity and efficacy throughout shelf life

Gellan Gum



Low acyl gellan gum



High acyl gellan gum

Gellan gum is a linear polysaccharide composed of fourmonosaccharides as repeating structural units. It is commercialized in two forms: one is high acyl gellan gum (also called natural gellan gum), and the other is low acyl gellan gum. Acyl gellan gum (also called deacylated gellan gum).

As a food additive, gellan gum has been approved by many countries such as China, the United States, the European Union, and Japan. It is widely used as a gelling agent and suspending agent in the fields of food, beverages, industry, and consumer goods.

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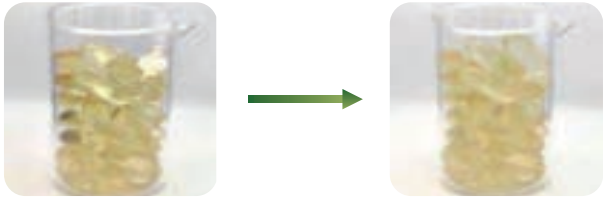
Plantegrity® Gellan Gum Softgel Superior Stability In Challenging Conditions

◆Better heat and humidity resistance, less stickiness and deformation.

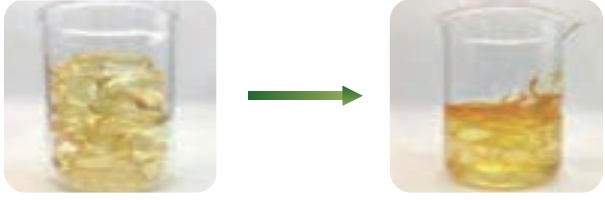
Open Environment

Plantegrity® Softgel



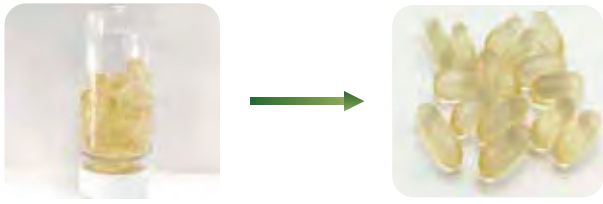
50° C 75%RH 24h

Gelatin Softge



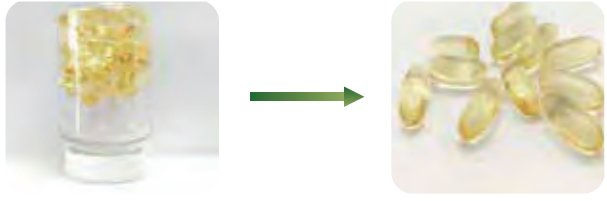
In Finished Packaging

Plantegrity® Softgel



50° C 75%RH 5h

Gelatin Softge



Land transportation

In double-layer film bag (contain 8000 softgels, 0.5g per softgel) and aluminum compound bag (contain 3000 softgels, 1g per softgel) Have been successfully transported in a round trip between the South China and the North China for 15 days in Aug, 2020 No cold-chain transportation (14.8° C-33.6° C)

Shipping

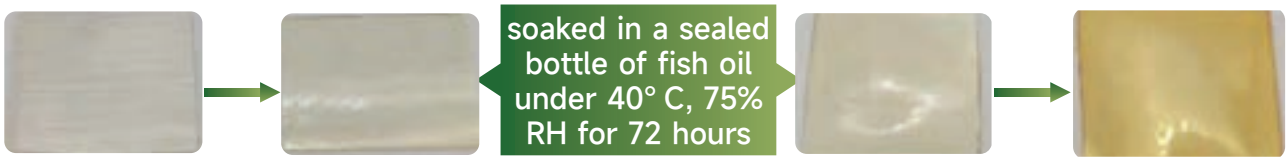
In double-layer film bag (contain 5000 softgels, 1g per softgel) Have been successfully transported from Shantou to Ayanda for 20 days in 2021 No cold-chain transportation (27.5° C-31° C)

Plantegrity® Gellan Gum Softgel Proven Stability & Consistent Performance

Appearance stability and cross-linking comparison

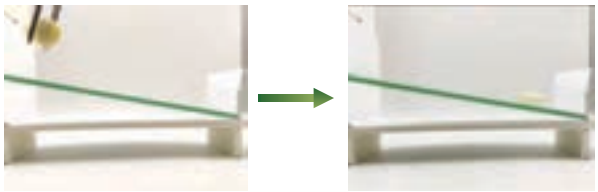
Plantegrity® Ribbon

Gelatin Ribbon



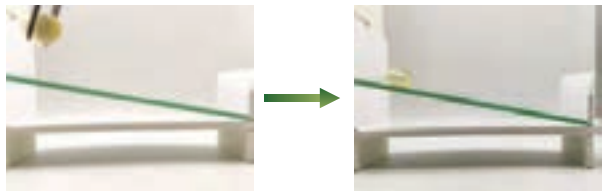
Swallow test comparison

Plantegrity® Softgel



The surface of the Plantegrity® softgels was smooth when exposed to water, indicating that they are less sticky and easier to swallow.

Gelatin Softgel



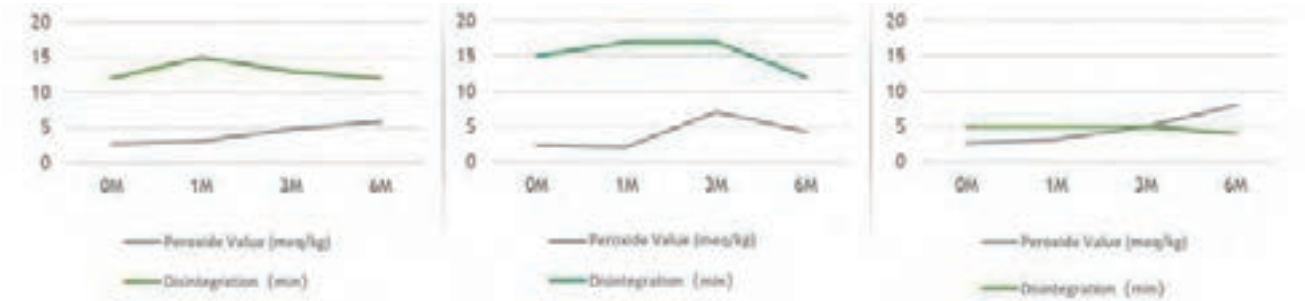
The surface of the gelatin softgels was stickier when exposed to water.

Good stability results in different applications

DHA Algae Oil 500mg

Natural Vitamin E 400IU

Fish Oil 18/12 1000mg



The results of the accelerated stability test (40° C/75%RH, 6 months) in HDPE bottles of DHA algae oil, vitamin E and fish oil soft capsules met the internal control standards that disintegration* time less than 30min and Peroxide Value less than 10 meq/kg.

Plantegrity® EnteriClear™

Plantegrity® Enteric Plant-based Non-coated Softgel

Sirio's end-to-end manufacturing expertise enables brands to launch differentiated enteric softgel products faster, without compromising on quality or compliance.

EnteriClear™ integrates pH-responsive plant-based polymers into the capsule shell matrix to create a barrier that

- ☑ **Acid-Resistant Protection:** Withstands the low pH of the stomach, preventing premature release or degradation of actives.
- ☑ **Targeted Intestinal Delivery:** Rapidly dissolves at the higher pH of the small intestine, releasing actives where absorption is optimal.

◆ Excellent Acid Resistant and Stability

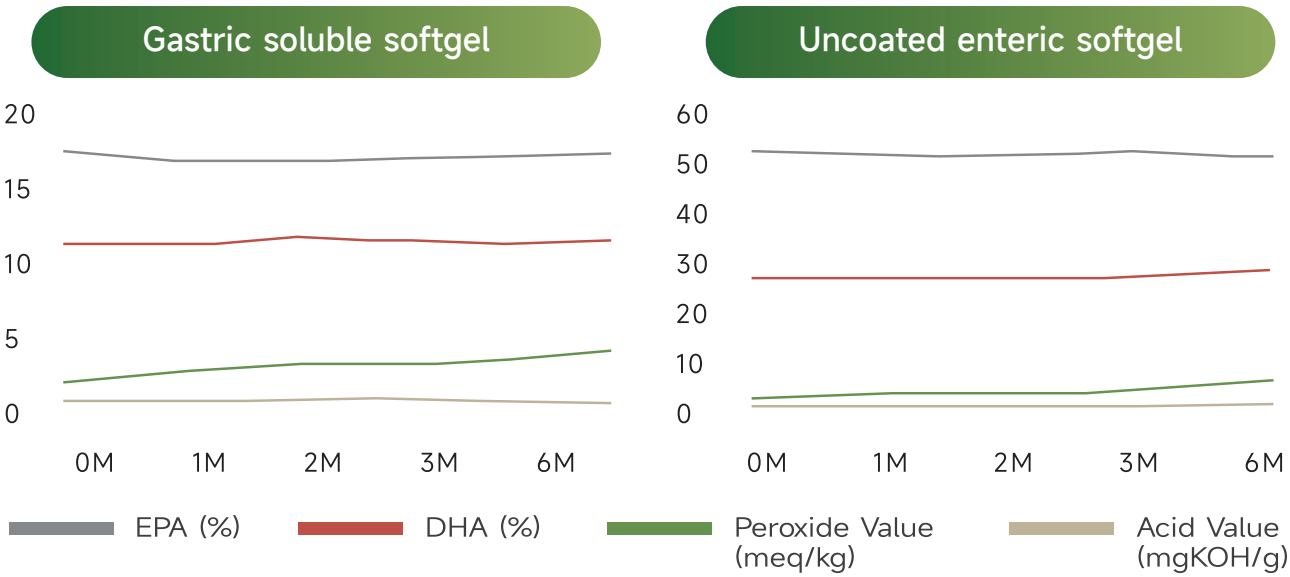
Detect the sample in simulated gastric fluid (pH 1.2) after 3 months accelerated Stability (40°C /75%RH), the result shows the EnteriClear™ uncoated enteric softgel has excellent acid resistant.

Sample after 3 months accelerated stability

After 1 hour in simulated gastric fluid (pH 1.2)

After 2 hours in simulated gastric fluid (pH 1.2)

EnteriClear™ Excellent Stability



The result of accelerated Stability Test (40° C/75%RH, 6months) with HDPE bottle for fish oil 18/12 TG in gastric soluble softgel and fish oil 50/25 EE in uncoated enteric softgel shows both Plantegrity® and EnteriClear™ softgel have the excellent stability.

From Plantegrity to EnteriClear™ Uncoated Enteric Softgel

	Enteric-Coated Gelatine softgel	Enteric Softgel GXX®ec.	EnteriClear™ Uncoated Enteric Softgel
RM Source	Gelatin	Gelatin	Plant-based
Process	Two step	One step	One step
Appearance	Non-transparent	Transparent	Transparent
Odor	Fishy smell	Fishy smell	Odorless
Color	Maillard reaction	Maillard reaction	Stable

Based on Plantegrity® plant-based softgel technology, gellan gum and modified starch are used to make enteric-coated soft capsules through a one-step molding process without additional coating. The disintegration time of the product complies with the USP requirement.

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Plantegrity® Tapioca Blend Shell

Balanced Performance with Trusted Ingredients

A next-generation plant-based softgel that blends the clean-label appeal of tapioca with the proven strength of carrageenan. Designed for brands seeking reliable vegan delivery with smooth texture, scalability, and broad consumer acceptance.

Dual Plant-Origin

Tapioca + red seaweed for a trusted vegan shell

- Tapioca ensures a soft, pleasant, non-tacky texture
- Carrageenan adds strength and consistency in production

Efficient Scale-Up

Compatible with large-scale manufacturing for oil-based and blended fills.

Versatile Appeal

Customizable colors, translucencies, and finishes

Formulation Highlights

- Works with oils, suspensions & semi-solid actives
- Moderate oxygen barrier for stable shelf life
- Maintains clarity & shape across climates
- Flexible for small to mid-range active loads

Sustainability and plant-based innovation are redefining the future of softgels.

ESG

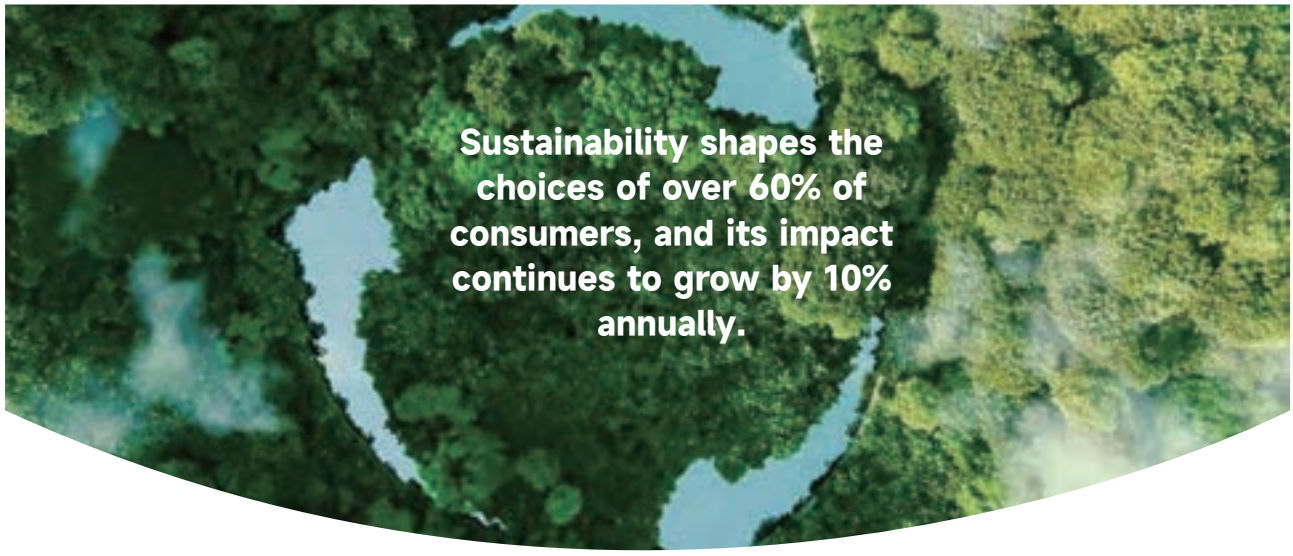
- Companies lead in ESG enjoy faster growth and higher valuations by a margin of 10-20%.
- Most of the top healthcare companies singed up to SBTi (an NGO aims at specific emission reduction), BSRT (Biopharma Sustainability Round Table), etc.

Clean-Label

- 76% food & beverage manufacturers The number of new products with consider clean label an important part of their business strategies.
  The global clean label market is projected to grow at a CAGR rate of 6.75%.
- Hydrocolloids (e.g. gums, pectins) are increasingly being used to meet the clean-label megatrend.

Plant-based

- The number of new products with a plant-based claim has increased by 302% between 2018-2022. The market is expected to grow to $160 billion by 2030.
- 45% of consumers would like to see more plant-based vitamin, mineral and dietary supplements.



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Manufacturing Locations

City of Industry, California, USA
17758 Rowland St, City of Industry, CA 91748

Shangtou (Head Quarter), China
Industrial Park I: No.83 Taishan Rd, Longhu District
Industrial Park II: No. 11 Zhuye South Street, Huangshan Rd, Longhu District

Ma'anshan, China
No. 1980, South Hongqi Rd, Yushan District, Ma'anshan, Anhui

Zhuhai, China
2F&4F, Zone A, Yinji Cross-border Complex Building, 37# Warehouse, Zhongxin Rd., Cross-Border Industrial Area, Zhuhai Free Trade Zone, Xiangzhou District, Zhuhai, Guangdong, China

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