



Dole Specialty Ingredients (DSI)

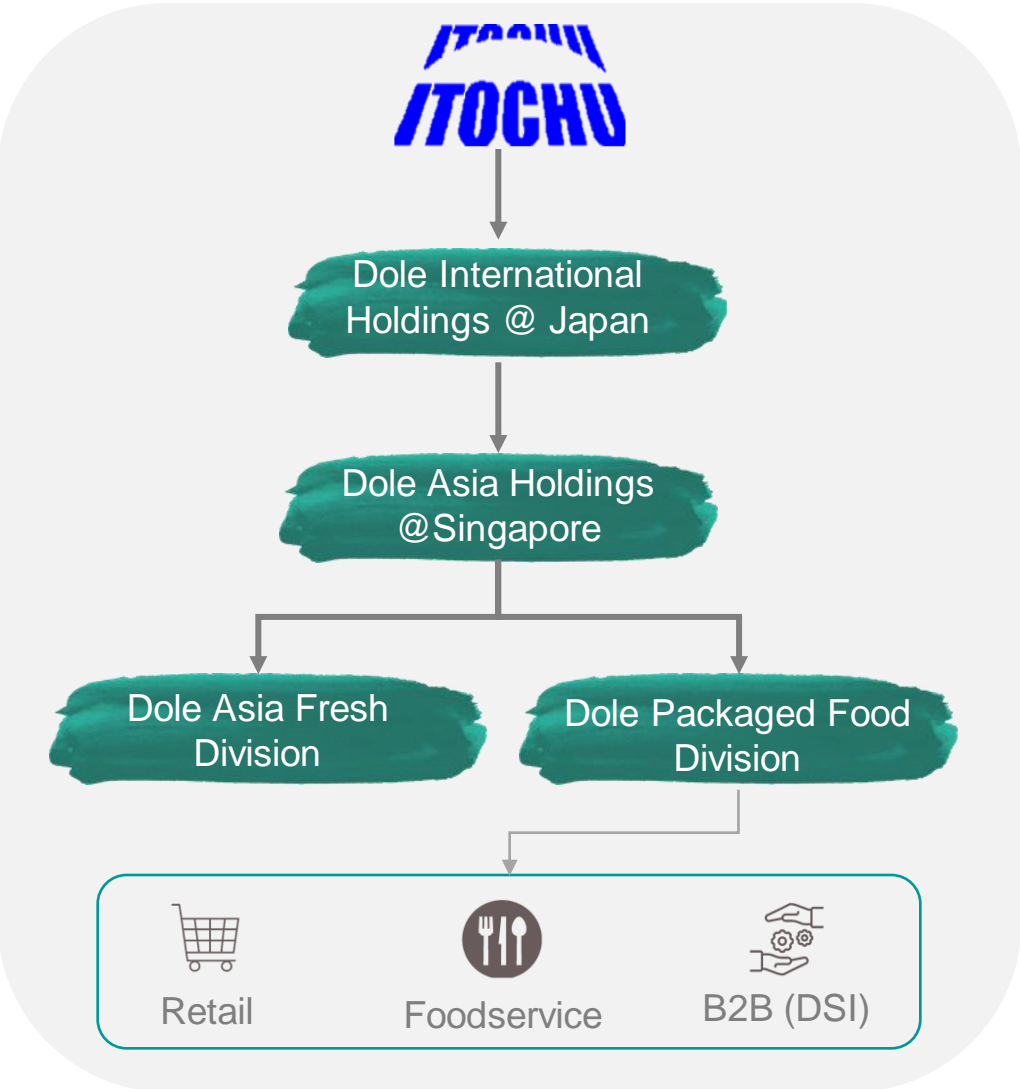
Unlocking the world of plant-based goodness of the earth



Company Overview

One of the largest fruit players in the industry

Company Structure



Channels



The foundations of Dole were laid in **1851**.

Exporting to more than **>70 countries**



> 50,000 Hectares of farms in Philippines, Thailand Sierra Leone, Sri Lanka and others.

More than **5 Manufacturing facilities**

> 400 fresh produce packing facility &
> 80 Co-Manufacturing partners



Our Global Presence

Great access across Fresh Produce, Manufacturing, Sales & Distribution



Philippines Operations

- More than 32,000 ha of Dole Farms
- Pineapple, Banana, Papaya
- More than 350 Packing Plants
- 2 Manufacturing Facilities
- Type of Side Streams: Leaves, Stems, Pomace, Seeds, Peels & Other plant material



DSI's Transformation



We aim to become a **SIDE STREAM SPECIALIST** focused on tropical fruits.

Guided by our parent company, Dole, and its mission of zero fruit loss by 2025, we aim to divert organic waste and repurpose them into **EXTRACTS, OILS, ENZYMES, FIBERS AND OTHERS.**

Through science-backed innovation, and direct processing at our farms, we aim to deliver high quality ingredients that complement our customer's own **SUSTAINABILITY AGENDA.**



DSI's Future Portfolio

Through Science-Backed Innovation, and direct processing at our farms, we aim to deliver high quality ingredients and offer Large, Traceable, and Sustainable Supply throughout the year.

Product Categories

Fruit Enzymes

Product: Bromelain

Description: Originating from various parts of the pineapple, it is a Protein Digesting enzyme

Application: Supplements, Bakery, Meat tenderization, Skin care (exfoliation, lightening) & Others



Fruit Extracts

Products: Peel Extracts from Pineapple, Papaya & Banana

Description: Originating from the peels, these Extracts are a good source of Dietary Fibers, Minerals and Polyphenols

Application: Food & Beverage, Supplements, Skin/ Hair/ Body care (skin conditioning, humectant, antioxidant) & Others



Green Banana Powder

Description: Originating from freshly picked green banana, it is a good source of Dietary Fibers, Phenolic compounds, Minerals and Resistant Starch

Application: in Gluten-Free Formulas, Beverages, Pasta, Bakery, Cereal bars & Others



Seed Oil

Product: Papaya Seed Oil

Description: Originating from the seeds of Papaya, it is a good source of Fatty Acids, Vitamin A, C & E, Omega 6 & 9, Carotenoids, Tocopherols and Papain.

Application: Skin/ Body / Hair Care (anti-acne, antioxidant, anti-microbial) & Others



Dietary Fiber

Products: Pineapple & Banana Dietary Fiber

Description: Originating from various parts of Pineapple & Banana Fruit, these Dietary Fibers are a good source of Soluble/Insoluble Dietary Fibers and Polyphenols

Application: Emulsifier, Texturizing, Anti Caking, Bulking & Prebiotic in F&B, Supplements & Others



Pilot Plant - Philippines

Great access across Fresh Produce, Manufacturing, Sales & Distribution



Peels Stem Pressed Pulp

> 500, 000 MT



Green Banana Stem Flower

Pulp Peel

> 500, 000 MT



Peel Seed Leaf

> 10, 000 MT

OUR PILOT FACILITY



- **Initial Products: Bromelain, Papaya Seed Oil, Green Banana Powder & Pineapple Pomace Powder**
- Product Pipeline:
 - Peel Extract Powders, Extract Powder (Banana Blossom, Banana Stem Juice), Papain, Pineapple/Papaya Leaf Extract
 - Dietary Fiber, Pectin, Resistant Starch

Green Banana Powder

Green banana is naturally rich in Resistant Starch and is also rich in minerals such as Potassium and Magnesium



Physical & Chemical Properties

Total Starch	>50%
Resistant Starch	>35%
Dietary Fiber	>5%
Potassium	NMT 15000 ppm
Magnesium	NMT 750 ppm
Moisture content	<5%

Sensory Information

Colour	Light yellow/white/cream
Appearance	Free flowing powder

- Parts used: Whole Green Banana
- Initial results from a few trials. Trials are still ongoing for various iterations (process parameters & upstream variables)

Reported Benefits

Mineral Enrichment

According to nutritional literature, Potassium is good for the nervous system and reducing blood pressure.

Gluten-free Flour

It can be used as a gluten free flour or in baking mixes.

Fat Replacement

It can be used to replace fat up to a certain proportion without impacting the functionality of end use applications. Can also be used as a low-carb replacement

Source of Resistance Starch (RS)

RS has low glycemic index and increased insulin sensitivity which helps to manage sugar levels. Also, helps to burn fat and manage weight. RS also acts as a prebiotic to improve gut health.



Potential Applications



NATURALLY GLUTEN-FREE & GRAIN-FREE

It is a good source of dietary fiber (resistance starch) & minerals, thus can help to enhance nutritional profile of several food products.

MUFFINS / CAKES

Green Banana Powder with its strong **binding properties** can provide binding activity similar to gluten.

CEREAL BAR

In order to make cereal bars, ingredients are required which provide adequate **binding**. Green banana flour provides binding capacity and increases the nutrition content.

EXTRUDED SNACK

With advancement in technology extruded snacks need not undergo deep frying process which was not the case earlier. Due to the high **starch content** and natural taste it has shown that it is favourable ingredient for extrusion process.

PASTA

Pasta with green banana powder can achieve similar appearance, aroma, flavor, and overall quality and less amount of lipids.

FAT REPLACER IN CAKES

It is feasible to substitute fat with Green Banana Powder to produce low fat cakes with very little impact on acceptance and sensory characteristics.

BREAD FORTIFICATION

Partially replacing wheat flour with green banana powder can increase the resistance starch and minerals content which will improve overall nutrition of bread.

Pineapple Pomace Powder

It is a free-flowing powder with a neutral taste, is rich in Dietary Fiber and minerals such as Potassium and Magnesium.



Physical & Chemical Properties

Total Dietary Fiber	>65%
Potassium	4500 - 5000 ppm
Magnesium	350 - 450 ppm
Calcium	750 - 850 ppm
Iron	NMT 50 ppm
Phosphorus	NMT 450 ppm
Moisture content	<5%

Sensory Information

Colour	Light yellow/white/cream
Appearance	Free flowing powder

Note

- Parts used: Pressed Pulp after Juicing operations
- Initial results from a few trials. Trials are still ongoing for various iterations (process parameters & upstream variables)

Pineapple pomace Powder Waste



Sieving (#45 mesh)



Sieving (#80 mesh)

Potential Applications



Due to its nutritional and functional benefits it can be used as an ingredient in various applications in bakery, snacks beverages and health supplements for fiber enrichment. It can also be used as texturizer in products such as extruded snacks, bread, biscuits , baby food etc.

FIBER ENRICHED WHEAT BREAD

Pineapple Pomace Powder can be added to increase dietary fibre of wheat bread. At 5% addition, it doesn't alter specific volume and texture by a lot, and also increases the total fiber content.

FIBER ENRICHMENT- EXTRUDED SNACK

Pineapple Pomace Powder can also offer fiber enrichment of nutritionally poor products, such as some extruded snacks. Up to 10% could be added without affecting the properties of the final extruded product.

FORTIFIED BISCUITS

Fibre rich biscuits can be prepared by substituting whole wheat flour with Pineapple Pomace Powder at 5% or 10%, this can help increase crude fiber, ash content and hardness of the biscuits.

BABY FOOD

A study, utilized pulse, pineapple pomace and banana flour to increase the nutritional value of weaning food and the sensory evaluation showed promise for satisfying consumer taste and preferences in the market.

Bromelain

Manufactured by deploying several physical extraction and separation unit operations on freshly harvested pineapple stems from Dole's sustainably-managed plantations in the Philippines



Physical & Chemical Properties

Enzyme Activity	Above 1200 GDU/g Food Grade (>1200) Nutraceutical (2400)
Moisture content	7-8%
Mesh size (40 Mesh)	NLT 98%

Sensory Information

Colour	Light yellow/white/cream
Appearance	Free flowing powder

Note

- Parts used: Pineapple Stem
- Initial results from a few trials. Trials are still ongoing for various iterations (process parameters & upstream variables)

Bromelain

Anti-Inflammatory

Clinical trials have shown promising results in relieving symptoms of general, nose inflammation and breathing difficulties (acute sinusitis).

Proteolytic activity

It helps to breakdown protein into amino acids which aids in digestion. The same activity also helps to tenderize meat.

Anti Clotting

Bromelain influences the coagulation pathway and helps to keep blood flowing by increasing serum fibrinolytic activity and inhibiting the formation of fibrin threads.

Anti-Microbial

Due to its anti-microbial nature, bromelain has been shown to improve skin conditions such as acne by targeting bacteria (*S. aureus* and *P. acnes*)

Wound Healing

Bromelain aids in wound healing. Its anti-inflammatory action aids in reduction of pain and swelling. Further, its exfoliation properties allows the shedding of dead cells to make way for new cells, making it helpful for wound care.



Papaya Seed Oil

DSI's, 100% Natural Papaya Seed Oil is manufactured by the cold-pressed extraction of Cavite papaya seeds. It is an oil rich in Omega 3 & 6 essential fatty acids, Vitamins A, C and E, and antioxidants like tocopherols (Vitamin E), Vitamin C and polyphenols (Carotenoids), making it a valuable ingredient in skin care and hair care products

DSI's sunshine yellow Papaya Seed Oil is a stable oil with low free fatty acid content, low acid value, low peroxide value, and low iodine value. Its low iodine value indicates a more stable, less reactive oil that in turn is less prone to oxidation and rancidification.



Physical & Chemical Properties

Moisture content	Max 0.1%
Heavy metals	<1-2 ppm

Sensory Information

Colour	Sunshine Yellow
Appearance	Oily Liquid
Odour	Characteristic

Papaya Seed Oil



DSI's Papaya Seed Oil's fatty acid profile includes **a high content of monounsaturated fatty acids** (Palmitic and Oleic - 78.9%). According to literature, oils rich in monounsaturated fatty acids (MUFA) **have excellent emollient properties.**

C-Chain	Acid Name	Type of fatty acid	Composition Rating
C16:0	Palmitic	Monounsaturated	☀️☀️☀️☀️☀️
C18:0	Stearic	Long chain saturated	☀️☀️☀️☀️☀️
C18:1	Oleic	Monounsaturated	☀️☀️☀️☀️☀️
C18:2	Linoleic	Polyunsaturated	☀️☀️☀️☀️☀️
C20:0	Arachidic	Long chain saturated	☀️☀️☀️☀️☀️
C22:0	Behenic	Saturated	☀️☀️☀️☀️☀️

SKIN HYDRATION

Enhances skin hydration by trapping skin's moisture and decreases moisture loss due to evaporation to the surroundings.

EMULSIFIER

Functions as an emulsifier and thickening agent in skin care products.

SKIN MOISTURIZATION

Alleviates skin dryness and improves spreadability in personal care products.

Papaya Seed Oil

DSI's Papaya Seed Oil is a **non-comodogenic oil** because it doesn't clog pores and helps control sebum.

In hair care, **its anti-fungal and anti-microbial** properties help relieve a dry, itchy scalp and prevent dandruff.

It's high content of **monounsaturated fatty acids** makes it an excellent **emollient** that moisturizes, hydrates and nourishes the skin and hair.

Through its free **radical scavenger activity, high Vitamin C content and powerful antioxidant** properties, it shields the skin and hair from environmental damage and retards the signs of ageing.





...for better EARTH & Business

We are committed to zero fruit loss by 2025 by diverting organic waste from landfill and repurposing it into fruit extracts, oils, enzymes and fibers



Natural, sustainable and cruelty-free

All our products are plant based



Upcycling fruit side streams

We use 100% upcycled tropical fruit streams from agriculture and manufacturing operations



Green technologies

To ensure our processes are eco-friendly without impacting earth's resources



Going carbon neutral

Reducing carbon footprints as our production factory is located right at the farms



Traceability to our own plantations

Ensuring food safety, operational efficiency and end consumer sustainability demands



Ensuring sustainable economies for farmers

We create economic opportunities for our farmers and ensure safe work environments



Thank you.