

A photograph of two whole pineapples and several sliced rounds of pineapple arranged on a rustic wooden surface. The pineapples have green crowns and golden-brown, textured skins. The slices show the bright yellow, juicy interior of the fruit.

Future Portfolio

Dole Specialty Ingredients (DSI)

Unlocking the world of plant-based goodness of the earth

Nov 29, 2021

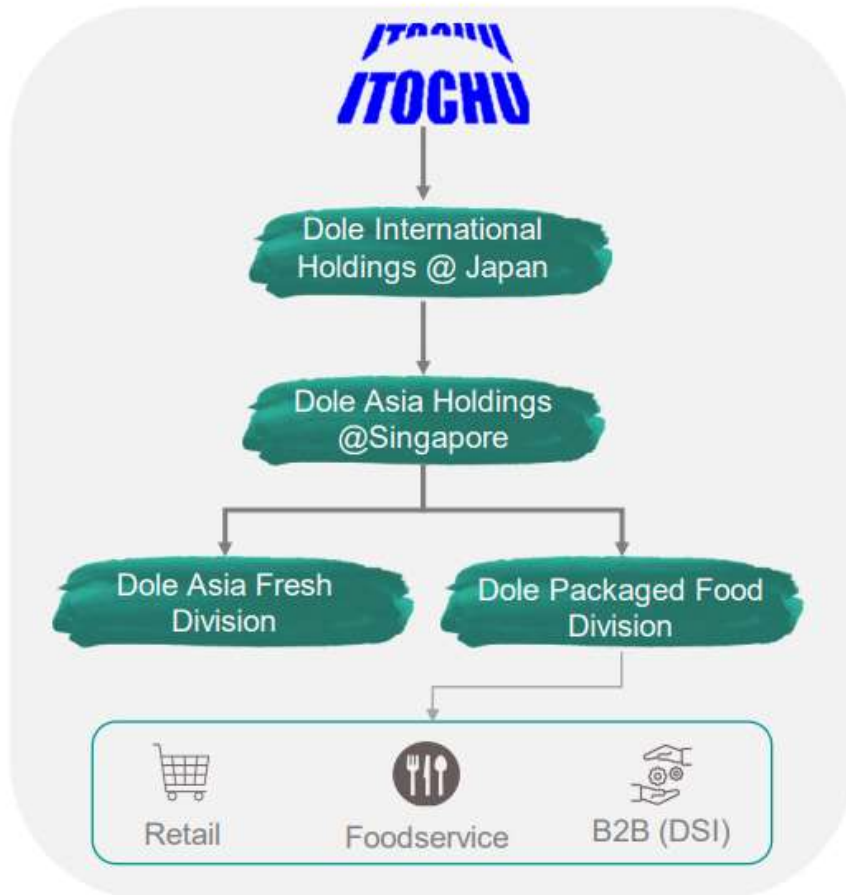
Company Overview

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



DSI's Legacy Portfolio



A B2B business for fruit ingredients which will undergo further processing by our customers for end-consumers in Non-Dole branded products

Solutions for >20 Fruits

		Supply Period												Order Timing
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Pineapple		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Banana		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Tamarind		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Coconut		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Lime					■	■	■	■	■	■	■	■	■	30 days prior
Watermelon		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Mango		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Mangosteen						■	■	■	■	■	■	■	■	30 days prior
Passionfruit								■	■	■	■	■	■	30 days prior
Aloe Vera		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Peaches		■	■	■	■	■	■	■	■	■	■	■	■	30 days prior
MO		■	■	■	■	■	■	■	■	■	■	■	■	30 days prior
Pears		■	■	■	■	■	■	■	■	■	■	■	■	30 days prior
Apple		■	■	■	■	■	■	■	■	■	■	■	■	30 days prior
Lychees						■	■	■	■	■	■	■	■	30 days prior
Jack Fruit		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Papaya		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Avocado		■	■	■	■	■	■	■	■	■	■	■	■	All Year
Longan							■	■	■	■	■	■	■	30 days prior
Rambutan							■	■	■	■	■	■	■	30 days prior
Nata De Coco		■	■	■	■	■	■	■	■	■	■	■	■	All Year

Juices/Purees/ Concentrates



NFC
Concentrate
Purée

Fruit Ingredients



Canned
Pouch
Frozen
Dried
Drum

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 farms, we aim to deliver high quality ingredients, and offer Large, Traceable and Sustainable Supply throughout the year.



Green banana powder

- Originating from freshly picked green banana, it is a good source of **Dietary fiber, Phenolic compounds, Minerals and Resistant starch**
- Application : in **Gluten-Free formulas, Beverage, Pasta, Bakery, Cereal bars & other**



Seed oil

- Product "**Papaya seed oil**"
- Originating from the seeds of Papaya, it is a good source of Fatty acid, Vitamin A C & E, Omega 6 & 9, Carotenoid, Tocopherols and Papain
- Application : **Skin/Body/Hair Care** (anti-acne, antioxidant, anti-microbial and others)



Fruit enzyme

- Product "**Bromelain**"
- Originating from various parts of the pineapple, it is a **Protein digestive enzyme**.
- Application : **Supplements, Bakery, Meat tenderization, Skin care (Exfoliation lightening) & other**

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.

Potential Applications

Beverages- Texturing Agent

- Green banana flour can be used in vegan and non vegan beverages as a thickener and fibre enrichment.
- Green banana also will increase the mineral content and resistance starch will be beneficial for gut health.

Baby Food

- It is important to provide healthy food to toddlers. Since taste is paramount it is also important for it to be healthy.
- Toddlers generally lack fiber in their diet therefore by incorporating green banana



What Is Resistant Starch?

Resistant starch is a type of carbohydrate that doesn't get digested in your small intestine. Instead, it ferments in your large intestine and feeds beneficial gut bacteria.

This type of starch provides numerous health benefits and has fewer calories than regular starch. Resistant starches have only two and a half calories per gram, while regular starches contain four calories per gram. As such, it's a great addition to your diet if you're looking to lose or maintain weight.

<https://www.webmd.com/diet/what-to-know-resistant-starches#1>

Papaya seed oil

Sources	Papaya seed
Product Format	Oil
Packaging Format	Aluminium bottle, 5gal Carboy, Drum
Health Benefits	<ul style="list-style-type: none">• Rich in Vitamins A, C, E – antioxidant properties• High in omega 6 & 9 – important dietary fats• High in oleic acid and linoleic acid - improve heart condition & inflammation• Source of papain - reduce pain, inflammation, and swelling, improve digestion and to treat infections, diarrhea, and allergies
Applications	<p>Cosmeceuticals :</p> <ul style="list-style-type: none">• Used for scars, stretch marks, rashes, burns, acne, acne scars, cracked skin, psoriasis, eczema, dermatitis, relives irritation, dryness and peeling• Act as a natural moisturizer• Protects from UV rays and helps reduce wrinkles/dark circles



Papaya seed oil

Ingredient Characterization



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

Reported Benefits

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

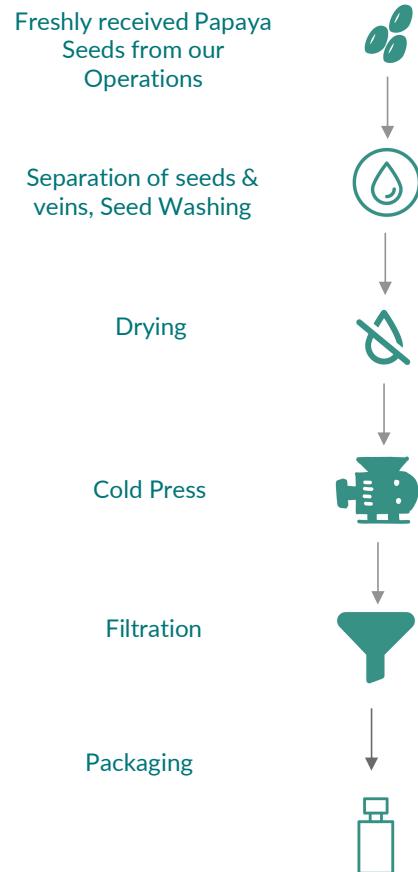


DSI's Papaya Seed Oil is a **non-comodogenic oil** because it doesn't clog pores and helps control sebum.

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.

Process Flow



Certifications & Statements

- Non-GMO
- Kosher
- Halal
- No harmful pesticides
- HACCP & GMP
- ISO-22000

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**.

SKIN HYDRATION

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

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

EMULSIFIER

SKIN MOISTURIZATION

Alleviates skin dryness and improves spreadability in personal care products.

Rich Emollient

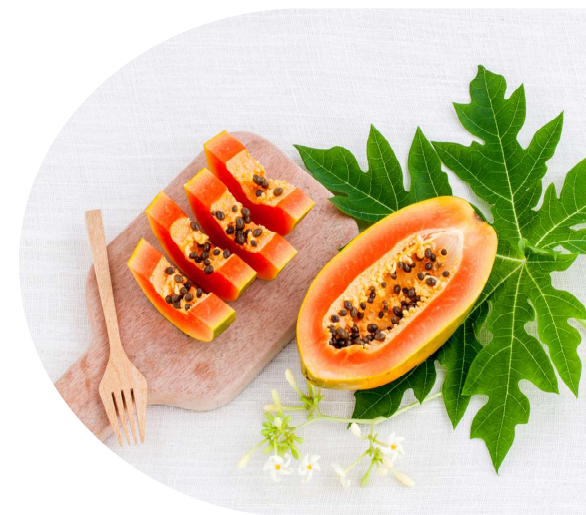
C-Chain	Acid Name	Type of fatty acid	Composition Rating
C16:0	Palmitic	Monounsaturated	★★★★★
C18:0	Stearic	Long chain saturated	★★★★★
C18:1	Oleic	Monounsaturated	★★★★★
C18:2	Linoleic	Polyunsaturated	★★★★★
C20:0	Arachidic	Long chain saturated	★★★★★
C22:0	Behenic	Saturated	★★★★★

Source: <https://www.scielo.br/j/cta/a/wy3vT7kkwJnrCTnVt5WfBJx/?format=pdf&lang=en>
<https://www.lorealparisusa.com/ingredient-library/fatty-acid#:~:text=Fatty%20acids%20are%20most%20often,agent%20for%20skin%20care%20products>

Papaya seed oil

Rich in Bio-Actives and Phytochemicals

Papaya Seed Oil's high polyphenolic content indicates antioxidant, anti-inflammatory and antimicrobial benefits.



Stimulates fibroblasts for collagen and elastin synthesis, improving skin density, elasticity and firmness leading to smoothing deep wrinkles and crow's feet around the eyes, and mimic wrinkles.

**STIMULATES
FIBROBLASTS**

**FREE RADICAL
SCAVENGER ACTIVITY**

Promotes skin repair and Anti-ageing through free radical scavenger activity (free oxygen radicals are captured and peroxy radicals scavenged).

Rich in Carotenoids which are powerful antioxidants that shield the skin and hair from the damages caused by stress, chemicals, sun and pollution.


CAROTENOIDS

**REDUCES
PIGMENTATION**

Reduces pigmentation caused by UV radiation, hormones or inflammatory conditions such as acne, by decreasing melanin levels and the size of melanocytes.

Source: https://www.researchgate.net/publication/272841160_Polyphenols_as_active_ingredients_for_cosmetic_products
<https://www.cosmeticsandtoiletries.com/formulating/function/antioxidant/Carotenoids-In-Skins-Defense-417214033.html>

Bromelain



Sources	Pineapple stem
Product Format	Powder
Packaging Format	Aluminium, Polyethylene Bag in Fibre Drum
Health Benefits	<ul style="list-style-type: none">• Protein digesting• Anti-inflammatory, antithrombotic and fibrinolytic effects,• Anticancer activity and immunomodulatory effects• Wound healing and circulatory improvement agent
Applications	<ul style="list-style-type: none">• Food additive - Clarifying agent, meat tenderiser, baking enzyme• Health supplement -Healthy functioning of the digestive system when taken with food and musculoskeletal comfort, arthirits treatment• Nutraceuticals - Bromelain in combination with curcumin – immunomodulatory & anti-inflammatory properties• Cosmeceuticals - Removes dead cells, lightens skin, removes freckles

Bromelain

Bromelain is a protein-digesting enzyme mixture derived from the stem, fruit, and juice of the pineapple plant. The highest enzyme concentration occurs in the lower parts of mature pineapple plant stems.

Product Format

Powder
Hard capsule
Tablet
Jelly
Liquid

Packaging Format

Standard pack size – 10 Kgs
Inner layer – aluminium foil bag
Outer layer – coated Al. drum

Shelf Life

Controlled conditions: 12 months
Storage temperature: 2 – 8 °C
Dry, relative humidity < 60%
Away from direct light

Quality Standard

Optimal pH limit: 4.5 – 5.
GDU: Food grade 1200-1600
Drug grade 2000 onwards
Cert: Non-GMO, Kosher, Halal



Bromelain

Applications

Food and Beverage
Pharmaceutical
Healthcare
Industrial
Cosmetics

Substitutes

Plant-based: Papain (Papaya)
Non plant-based: Trypsin, Ficin,
Chymotrypsin and Subtilisin
Preferred: Clean label, natural

Refer Appendix 1 for details on substitutes

Note: GDU stands for Gelatin Digestion Units

Applications Analysis



Food & Beverage

Used as meat tenderizer, to reduce marination time. US, UK and Brazil are key markets.
Used in dairy processing to enhance protein and fat content in milk
Used by bakeries for dough preparation, particularly popular in Middle East and Africa



Pharmaceutical

Used as dietary supplement to reduce swelling and pain from sinus and osteoarthritis
Aids digestion and weight loss. Removes dead skins from burns when applied topically.
Growing market for dietary supplements, specially in EU. Not heavily regulated.



Healthcare

Anti-inflammatory & immunity boosting – potential application for cancer & HIV AIDS cure
Approved post-surgery medication to reduce swelling and inflammation



Industrial

Used in textile processing to improve product quality, major market in APAC
Addition to animal feed improves digestibility, major markets in Brazil & Argentina



Cosmetics

Applications for skin smoothening, treating acne, dry skin and wrinkles
Used as post-cosmetic surgery drug to avoid bruising and swelling
Cosmetic companies are increasingly moving towards clean-label ingredients



...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