

LEGUMES, CEREALS AND PSEUDO-CEREALS:

the history, property and innovation updates

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THE HISTORY OF LEGUMES, CEREAL AND PSEUDO-CEREAL GRAINS

Legumes: Affordable protein-rich food



Soybean
China



Red bean
China



Mung bean
India and Burma

Cereals: Calorie, Dietary fiber, Staple foods



Millet
China



Highland barley
China



Corn
Central and South America

Pseudo-cereals: Ancient crops, Gluten-free choice, Partial substitution of staple foods



Quinoa
South America



Buckwheat
China



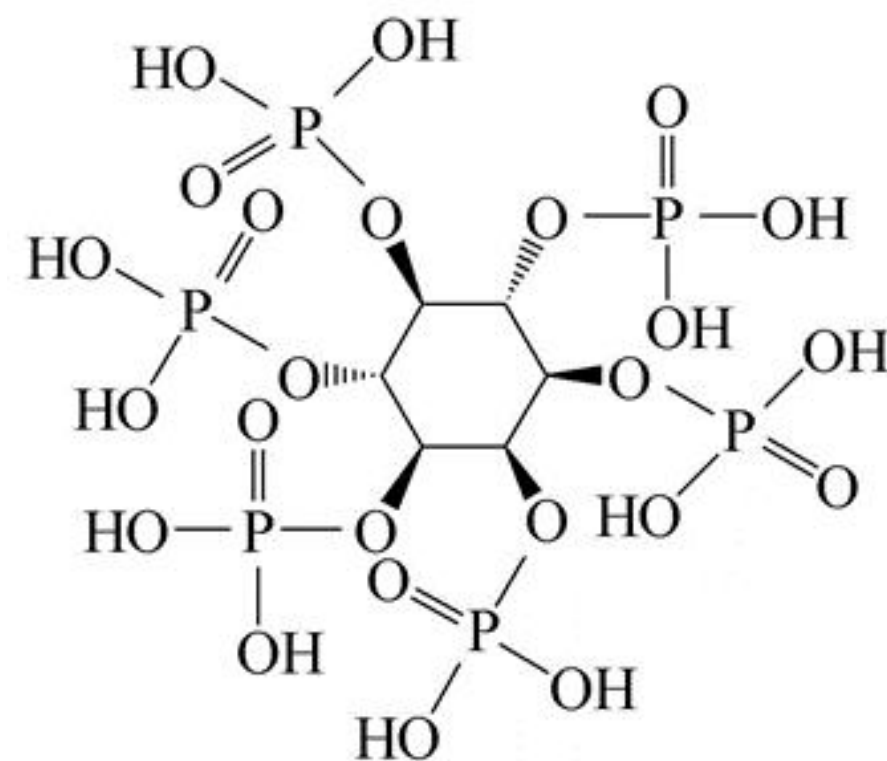
Grain amaranth
Mexico and Central America

PHYTOCHEMICALS IN LEGUMES, CEREAL AND PSEUDO-CEREAL GRAINS

Legumes

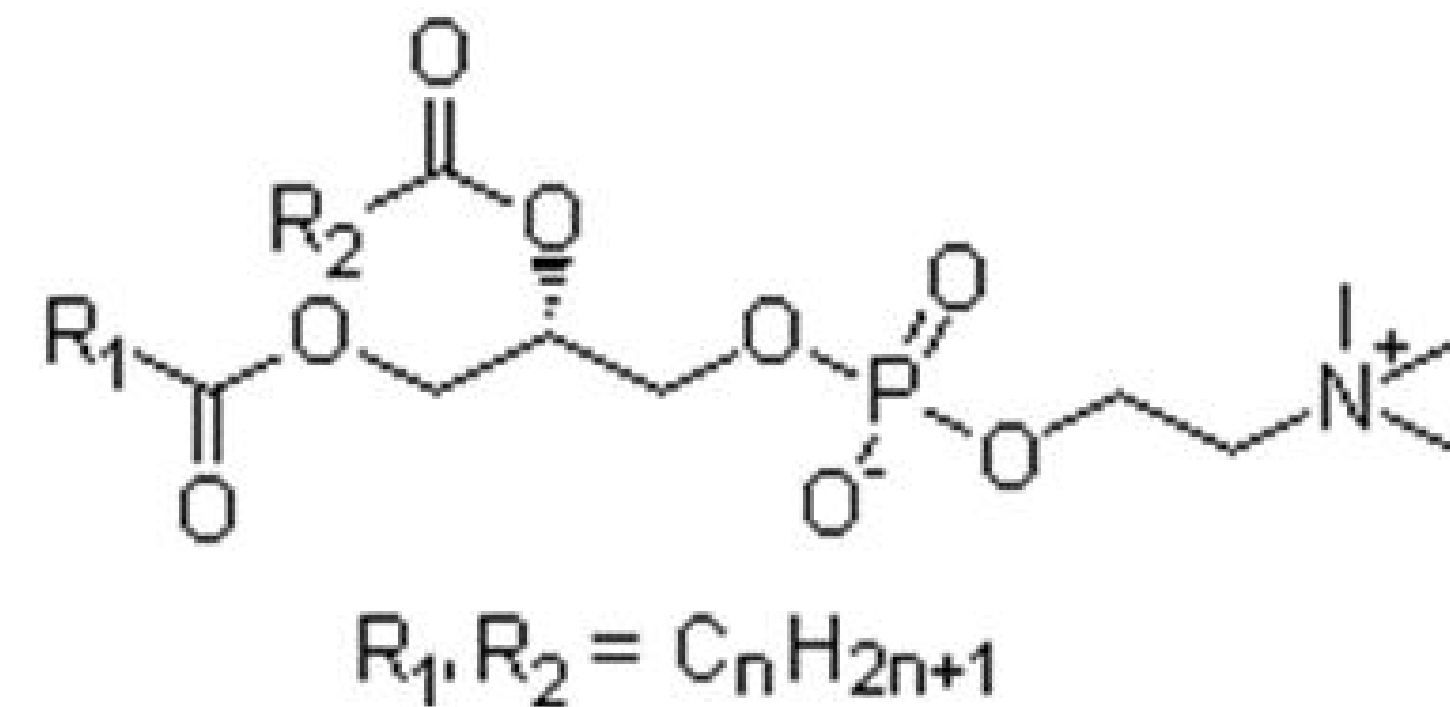
Phytic acid

- 1.0%-2.3% in soybean, wet-milling by-product of industrial production of protein isolate, starch, etc.
- Function: anti-cancer, anti-oxidation, kidney protection, blood lipid regulation, etc.
- Prescription drugs (e.g. Inositol hexaphosphate for bone and cardiovascular health)



Lecithin

- 1.3%-2.1% (soy), by-products of soybean pressing industry
- Function: Prevention and treatment of cardiovascular disease, repair of liver cells, prevention of senile dementia, enhance memory
- Dietary supplement



PHYTOCHEMICALS IN LEGUMES, CEREAL AND PSEUDO-CEREAL GRAINS

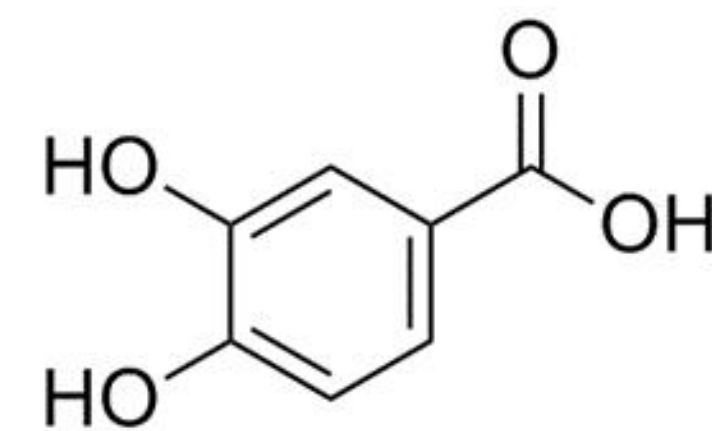
Legumes

White kidney bean extract

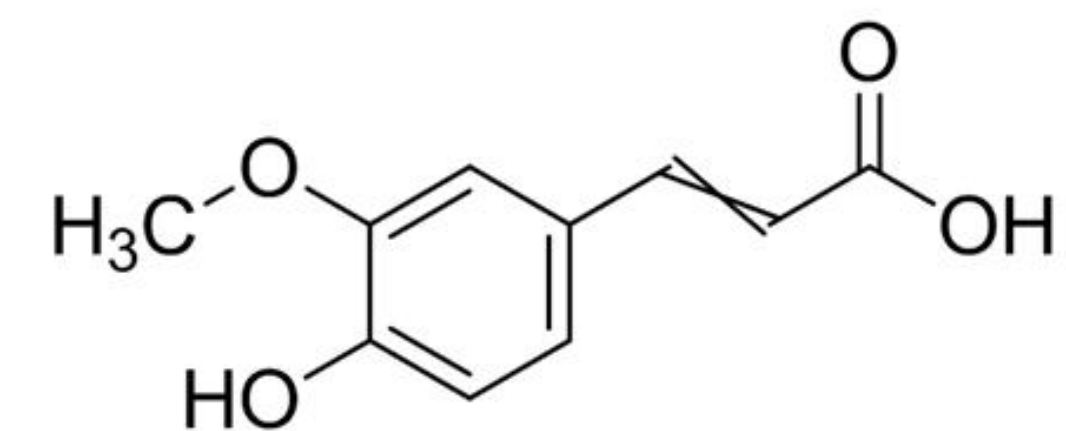
- Lectins and α -amylase inhibitor, 3%-5%
- Function: Interfere with digestion, control glycemic response, obesity and diabetes
- **Drug type:** Prescription drugs and no-prescription dietary supplement for weight loss

Adzuki bean & Mung bean

- Both have long been used in traditional Chinese herbal medicine
- Adzuki bean: antidote, diuretic, antipyretic and estrogenic
- Mung beans: Detoxification, quenching summer heat, quenching thirst
- Water extracts, paste for medicinal diet and external use



Catechins



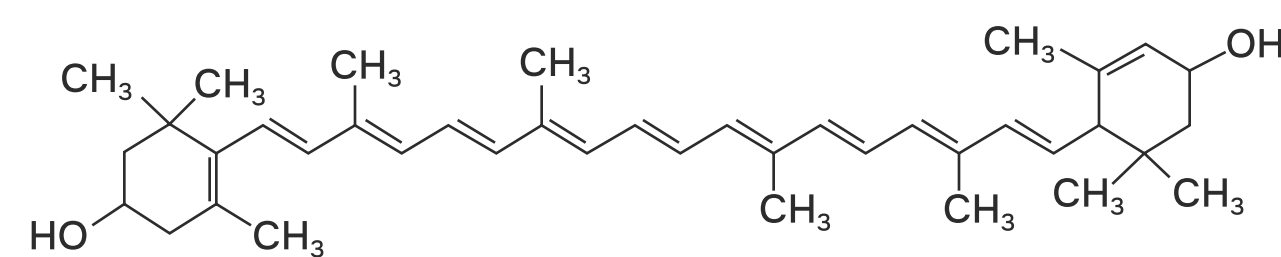
Ferulic acid

PHYTOCHEMICALS IN LEGUMES, CEREAL AND PSEUDO-CEREAL GRAINS

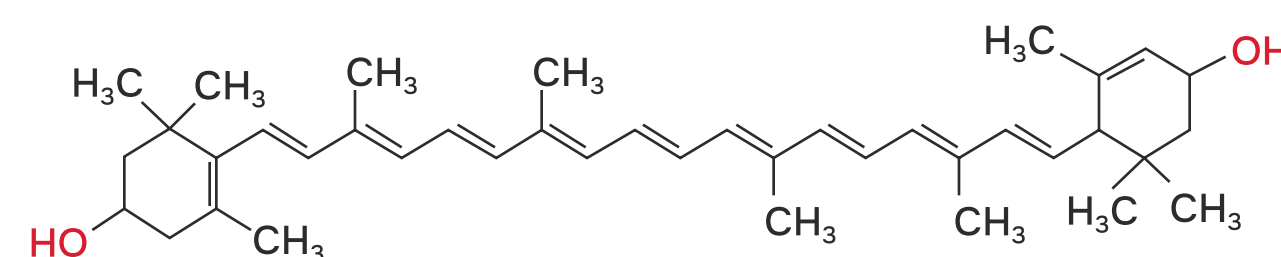
Cereal

Carotenoid

- Mainly lutein and zeaxanthin, 0.19 mg/100g (Foxtail millet)
- Function: Antioxidant, protect vision, improve immunity
- Prescription drugs or dietary supplement



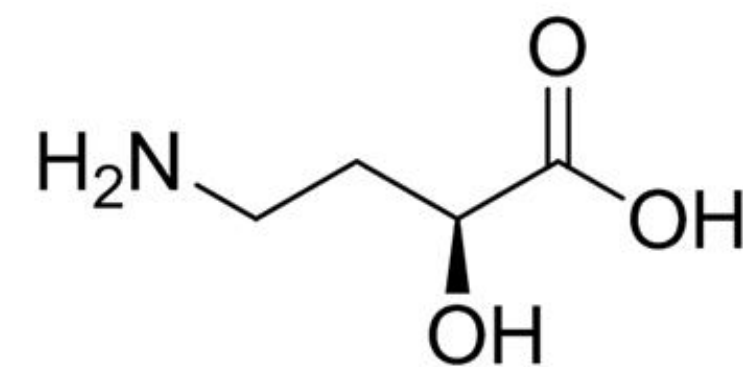
Lutein



zeaxanthin

γ -aminobutyric acid (GABA)

- 5.28 mg/100g in rice
- Function: Nerve inhibitors, enhance brain activity, etc.
- Prescription drugs (sedative-hypnotic) and germinated cereals



Traditional Chinese herbal medicine

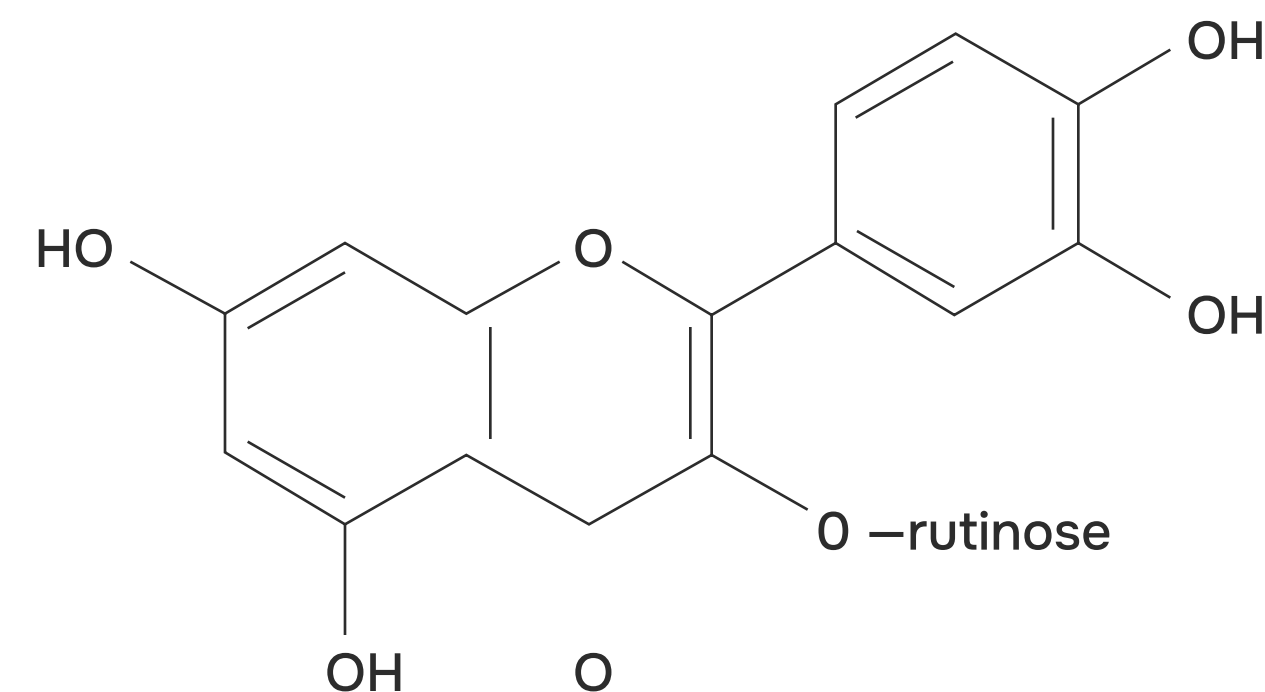
- **Foxtail millet:** dietary remedy for gastric mucosal injury & women postpartum recovery
- Porridge, millet flour

PHYTOCHEMICALS IN LEGUMES, CEREAL AND PSEUDO-CEREAL GRAINS

Pseudocereal

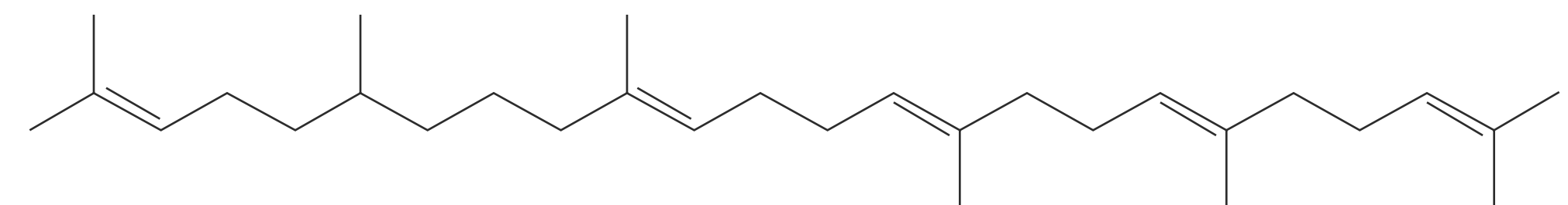
Rutin

- Rich in Tartary buckwheat 1%
- **Function:** Anti-inflammatory, antioxidant, hemostatic, improve vascular permeability
- Prescription drugs and dietary supplement

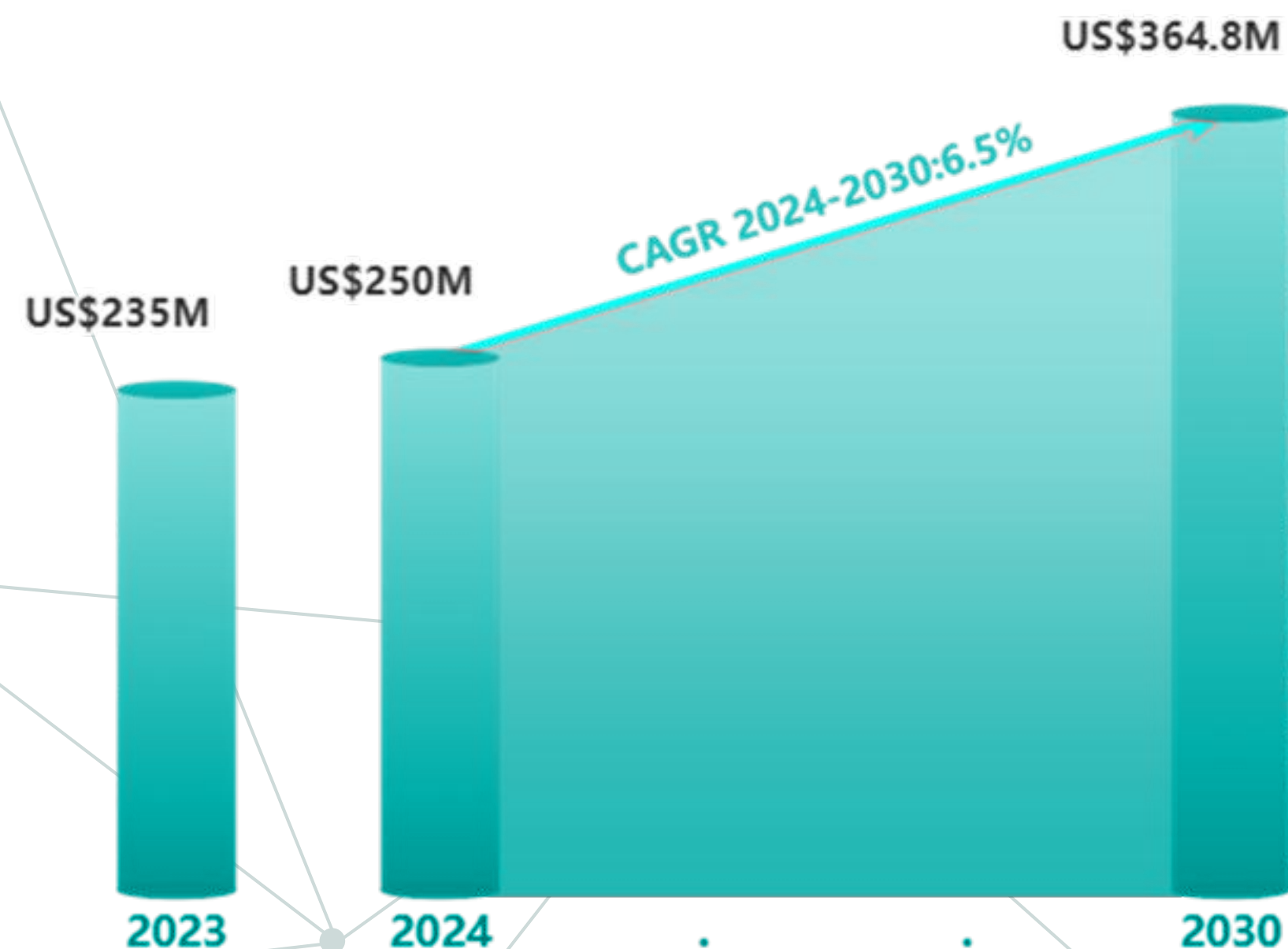


Squalene

- 1%-5% in grain amaranth grain
- **Function:** Promote blood circulation, activate and repair cells
- Prescription drugs (hypoxia-resistant), cosmetics (after hydrogenation)



THE INNOVATION UPDATES: PHYTIC ACID



The global market value is projected to grow from \$250 million in 2024 to \$364.8 million by 2030, at a Compound Annual Growth Rate (CAGR) of 6.5%

Applications

In daily chemicals

- Inhibit the dissolving of calcium phosphate in tooth
- Oral health care products, such as **toothpaste** and mouthwash

In food industry

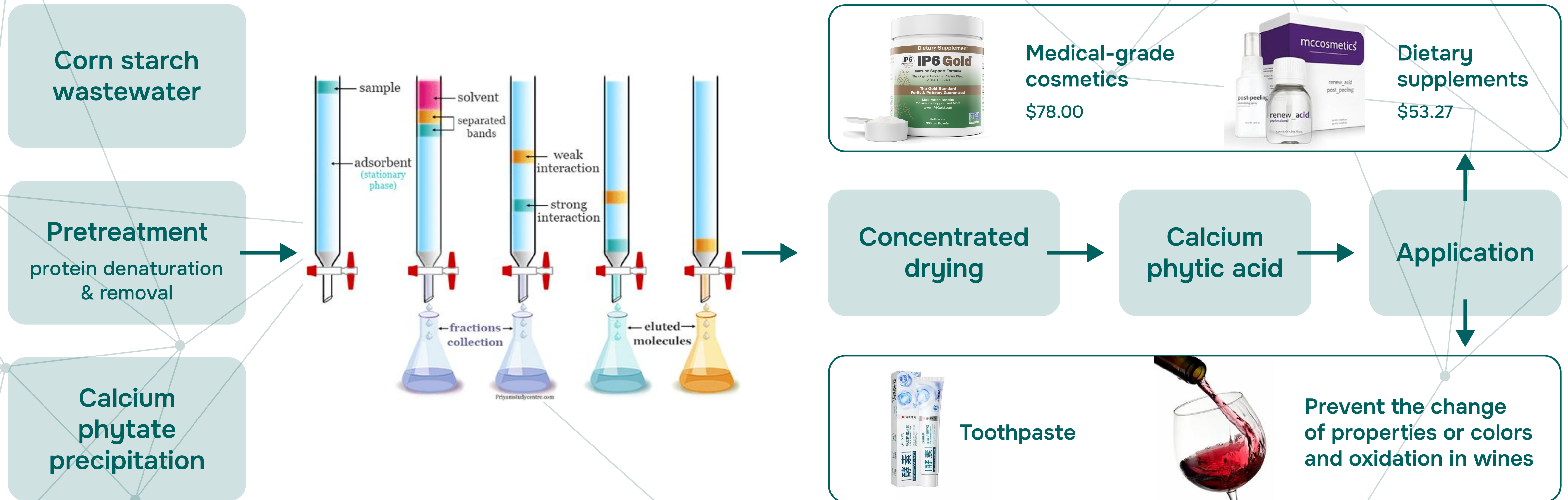
- Reduce fermentation time in **winery industry**
- Avoid **oxidation/ color change** in food processing

In medicine

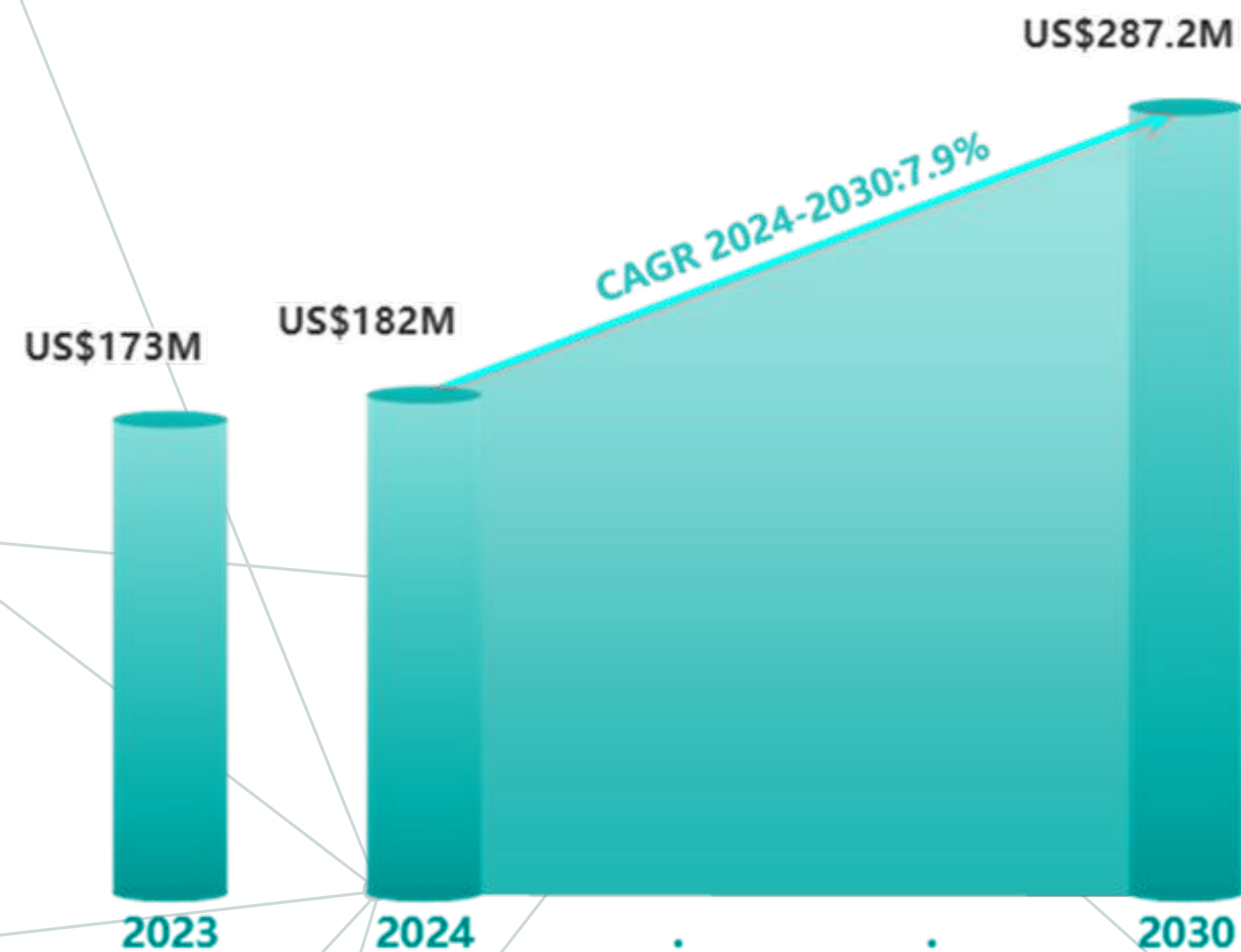
- Protect against other **inflammatory bowel diseases**
- Bone health by enhance **calcium absorption**

THE INNOVATION UPDATES: PHYTIC ACID

Phytic acid production from wet milling wastewater



THE INNOVATION UPDATES: WHITE KIDNEY BEAN EXTRACT



The global White Kidney Bean Extract market value is projected to grow from \$ 182 million in 2024 to \$ 287 million by 2030, at a Compound Annual Growth Rate (CAGR) of 7.9%

Applications

In food industry

- Body weight management
- Glycemic level control
- Satisfying the special needs of **diabetic patients** as an adjuvant treatments



Foods containing white kidney beans

candy, functional drinks, coffee powder



Dietary supplement

Kidney and urinary tract cleansing and detoxification (1000mg \$17~49)

THE INNOVATION UPDATES: WHITE KIDNEY BEAN EXTRACT

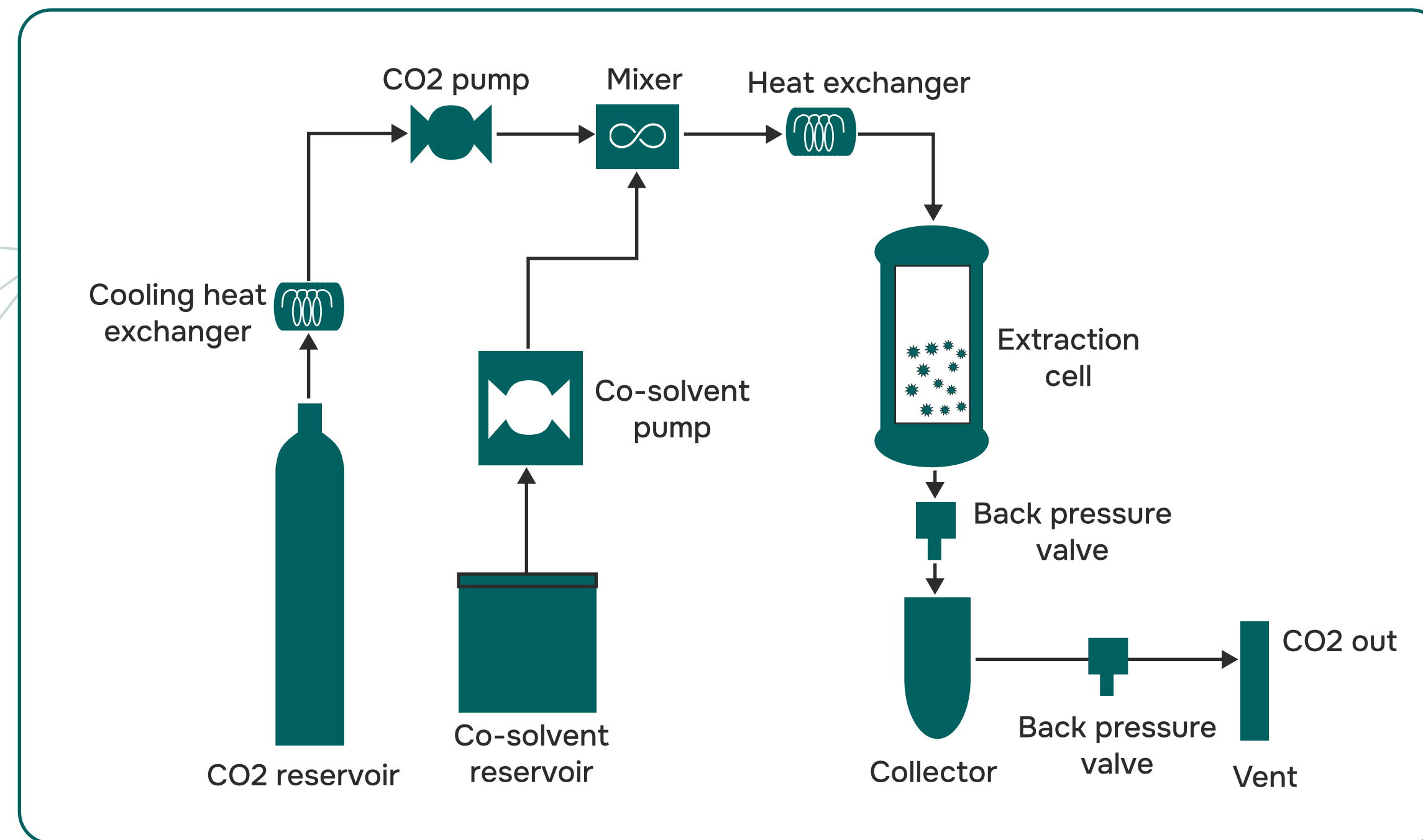
White kidney bean extract production

- Fermentation
- Plant extraction
- **Supercritical fluid extraction**



White kidney bean

Flour



Supercritical fluid extraction

White kidney bean
(compound)

ion-exchange
chromatography

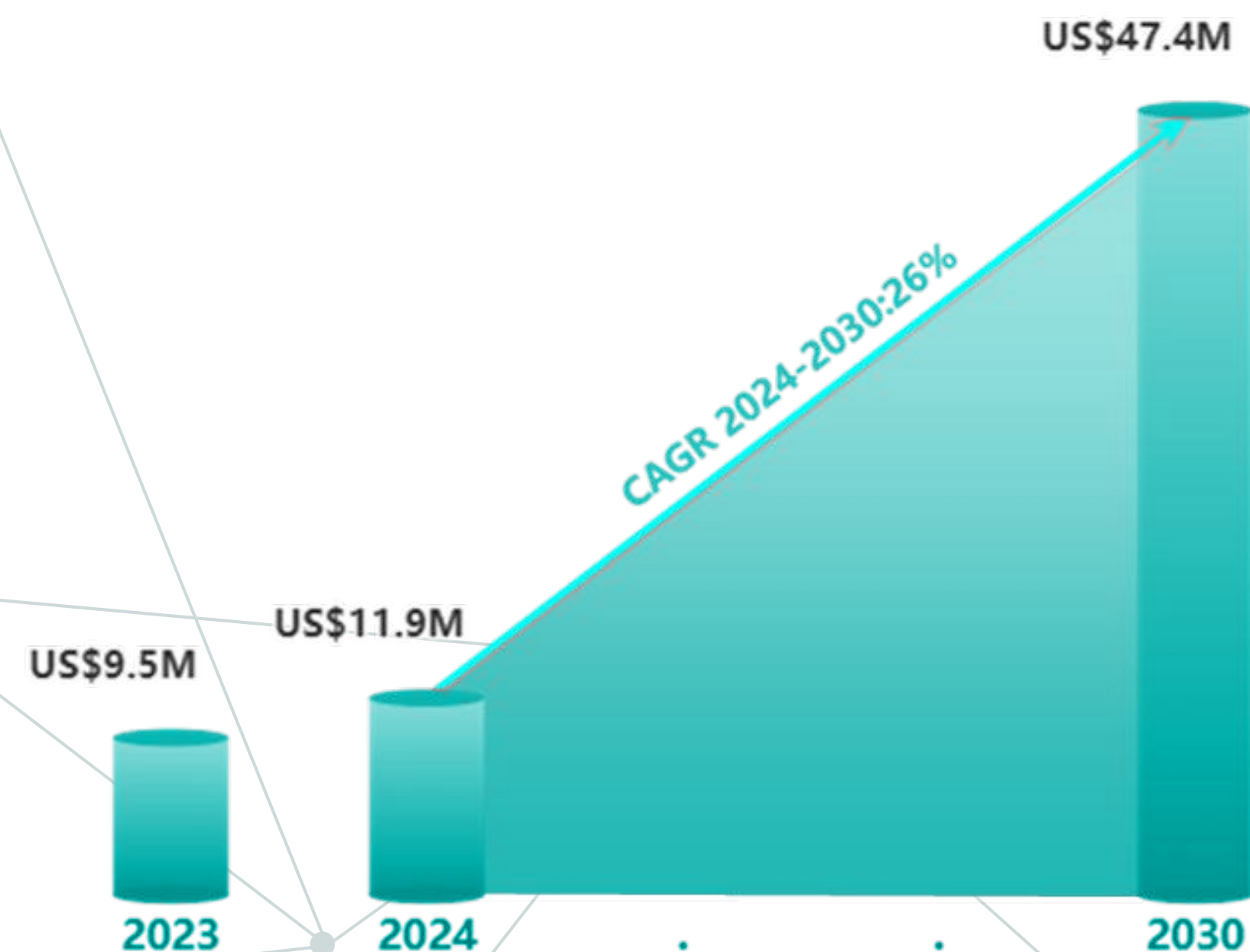
Crude extract

gel filtration
chromatography

α -amylase
inhibitor

Lectins

THE INNOVATION UPDATES: SQUALENE & DERIVATIVES



The global Squalene market value is projected to grow from **\$ 11.9 million** in 2024 to **\$ 47.4 million** by 2030, at a Compound Annual Growth Rate (CAGR) of **26.0%**

Applications

In skin-care products

- Promising moisturizer and antioxidant in cosmetics
- Help the skin stay hydrated and resist ultraviolet ray-induced damage

In food industry

- Antioxidation & enhance the anoxia tolerance
- Improving immunity
- Functional foods

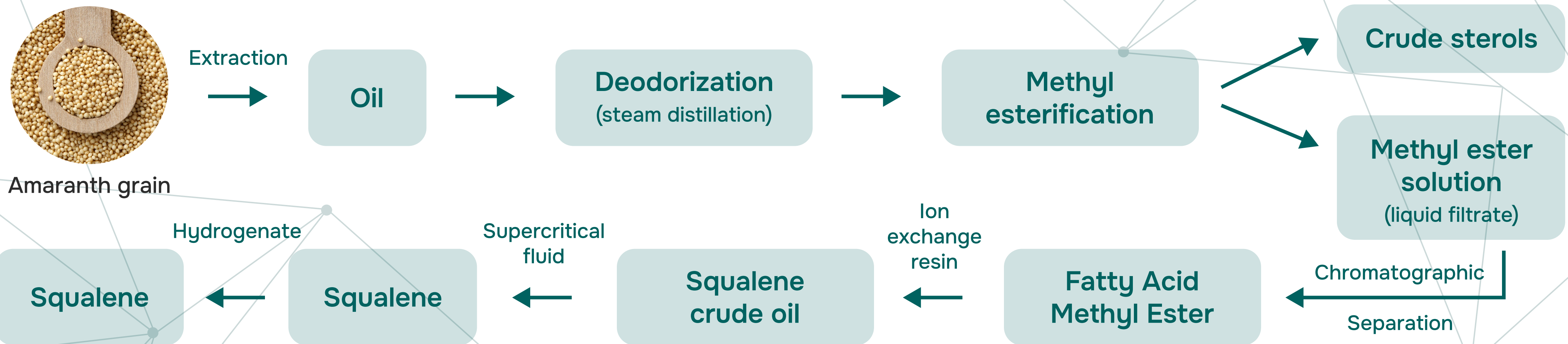
In medicine

- Anti-inflammatory & lowering blood lipids for cardiovascular health
- Biocompatibility and biodegradability: as a drug carrier to improve the efficacy of drugs and reduce side effects.

THE INNOVATION UPDATES: SQUALENE & DERIVATIVES

Squalene production from oil crops/pseudocereals

- Reduce shark hunting, more sustainable and eco-friendly
- Value-added production for the pressing and extraction industry



Application

Requirements:
Purity \geq 90%

Skin-care products:



Moisturizing capsule



Squalane oil

Prescription drugs:



Squalane capsules

Treatment of cardiovascular disease, anti-fatigue and immune regulation

THE INNOVATION UPDATES: THERAPEUTIC FEEDING PRODUCTS



Fermented soy food – Natto

Moisten bowel & lower blood pressure



Roasted buckwheat – tea

Modulate blood lipids, blood sugar, blood pressure



**Grink containing red beans
(tea, convenience drink)**

Remove dampness and antioxidation



Instant foods containing millet (Millet infant formula, millet porridge)

Nourishing stomach



Summer drinks containing mung beans (drinks, beverages, bean paste)

Avoid heatstroke and antioxidation

Recovery and utilization of plant-based bioactive ingredients

- High-value utilization of by-products
- Reduce liquid and solid waste, eco-friendly

Offer alternative herbal medicine-based choice

- Consumption of pharmaceutical molecules with nutrients and food matrix
- Diversify dietary choices, learn from ancient wisdoms
- Low cost, sustainable
- Reduce the medical burden and improve the health status



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