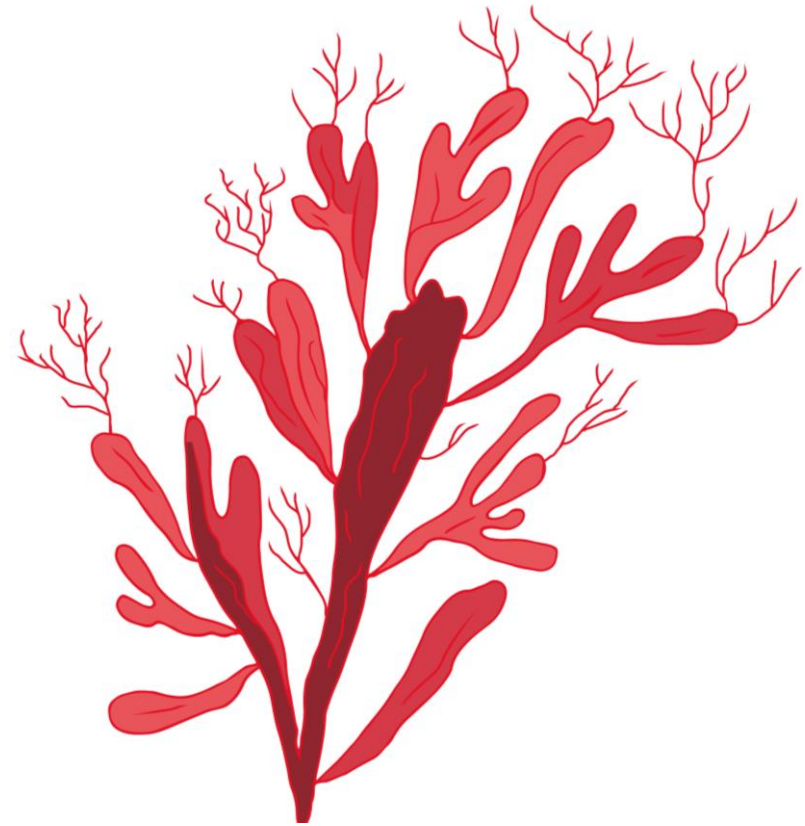


DulseaFerm

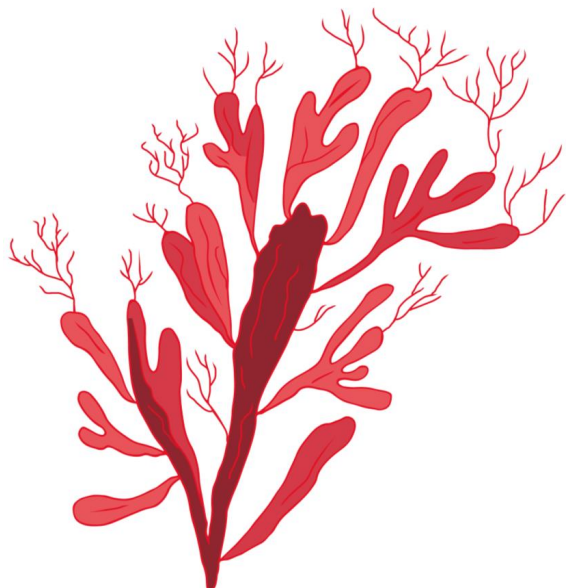
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Plant Story



Palmaria palmata is a red alga grown in the northern coasts of Atlantic and Pacific Ocean. It is commonly called dulse, sea lettuce flakes or dilsk.

P. palmata contains abundant vitamins, minerals, fibers, and higher levels of protein than other vegetables. As it is a nutrient seaweed, it is commonly consumed as snack in northern Europe.

Abundant mineral in *P. palmate* has also benefits for skin care and its anti-oxidant effect is well studied.

DulseaFerm™ is a solid fermented seaweed extract by probiotic *Saccharomyces*. It shows significant anti-wrinkle effect *in vitro*.

Natural Trend, Gastronomica

Gastronomia, combining food and beauty, is now steady trend in cosmetic industry. Consumers always look for the cosmetic made from which I can eat and it makes consumer feel safe.

In 2016, Foodmetic trend was huge trend in Korea market such as packaging inspired by food products. Nowadays, not only packaging like food but also real nutrients in cosmetics are welcomed.



*Haddock pudding with dulse



*Salad with dulse

Dulse is one of abundant edible red alga in Iceland. Long time ago, it was important food source because of the lack of food variety. Thesedays, dulse is consumed in seasoning, chewing like tobacco, salty cocktail snack and cooking in northern Europe. Its nutrition is more recognized as nutrient dietary supplement.

*Referene: *Palmaria palmata* in food formulations as natural antioxidant and functional ingredient, Ólafsdóttir et al., University of Iceland, 2009

Raw Material Changes by Fermentation



Dried dulse



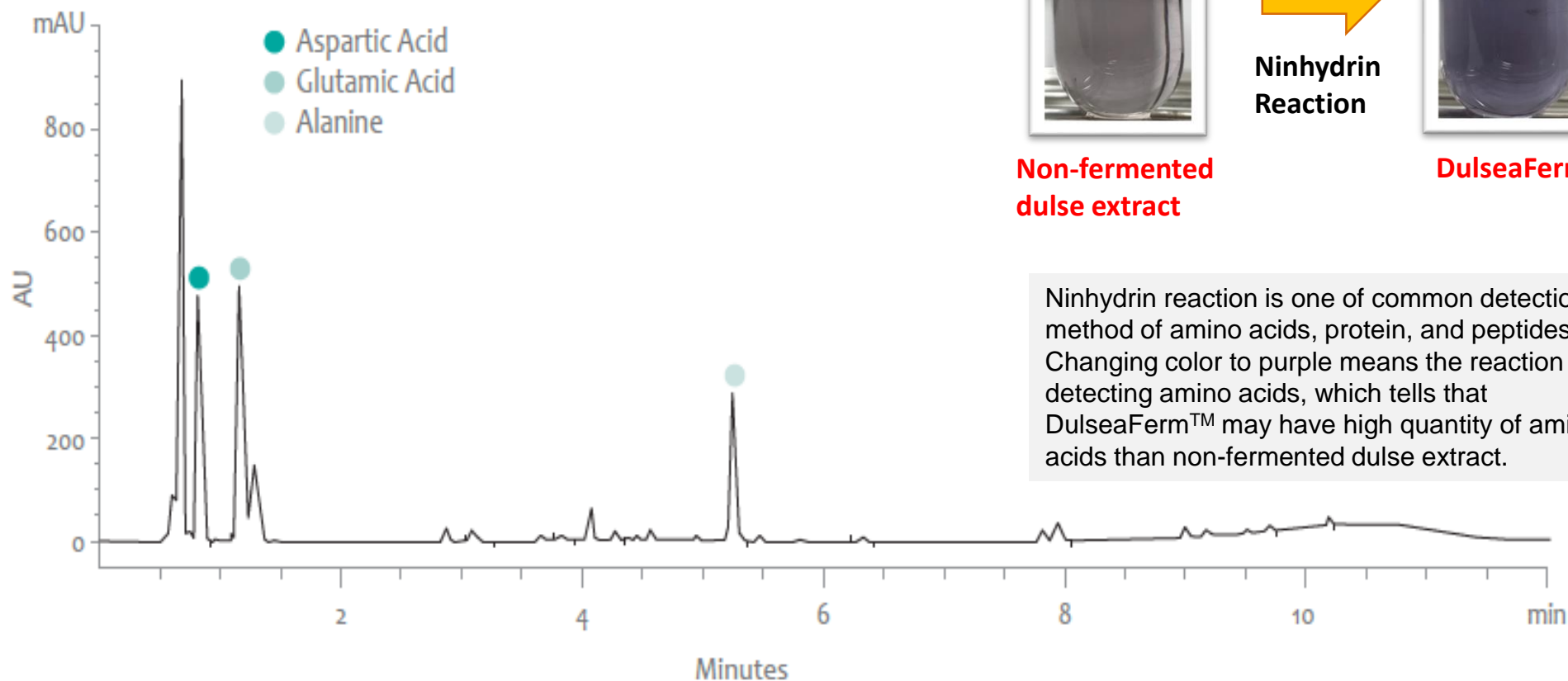
Yeast Fermentation



Fermented dulse

*Dried dulse has its characteristic color 'red' but it has been changed to 'black' color through yeast fermentation. **The fermentation process improve the odor and clarity of the product compared to non-fermented extraction.***

Total Amino Acid Analysis



**Non-fermented
dulse extract**



**Ninhydrin
Reaction**



DulseaFerm™

Ninhydrin reaction is one of common detection method of amino acids, protein, and peptides. Changing color to purple means the reaction of detecting amino acids, which tells that DulseaFerm™ may have high quantity of amino acids than non-fermented dulse extract.

in vitro Evaluation

Anti-wrinkle Activity

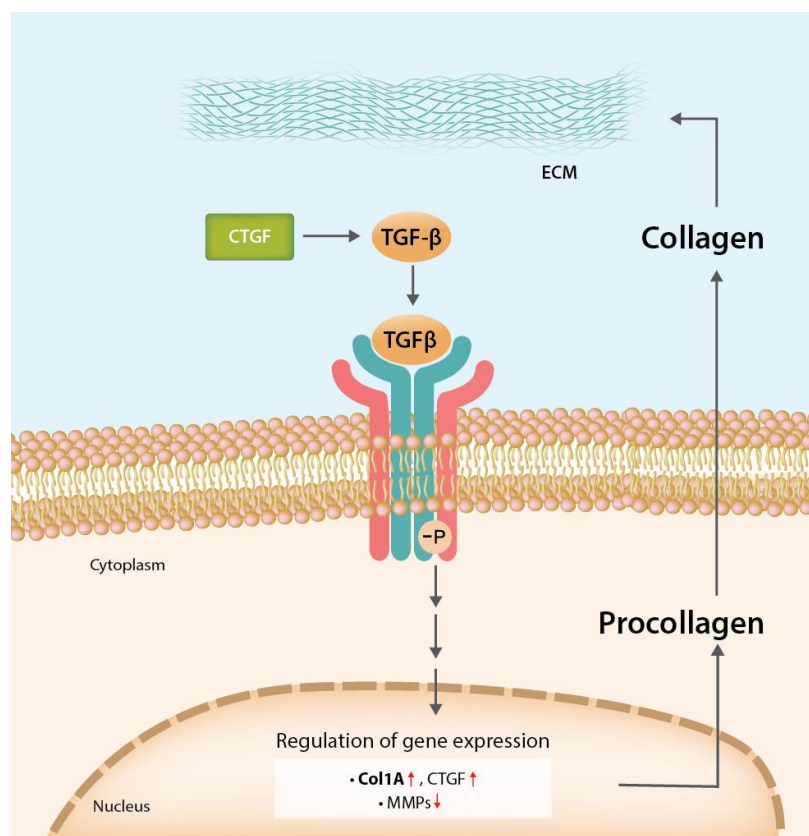
Collagen Synthesis Activity in Fibroblast cell

TGF- β and COI1A Synthesis Activity



in vitro: Anti-wrinkle Effect

Mechanism of Collagen Synthesis



Type I collagen is the most abundant collagen-rich extracellular matrix (ECM) protein.

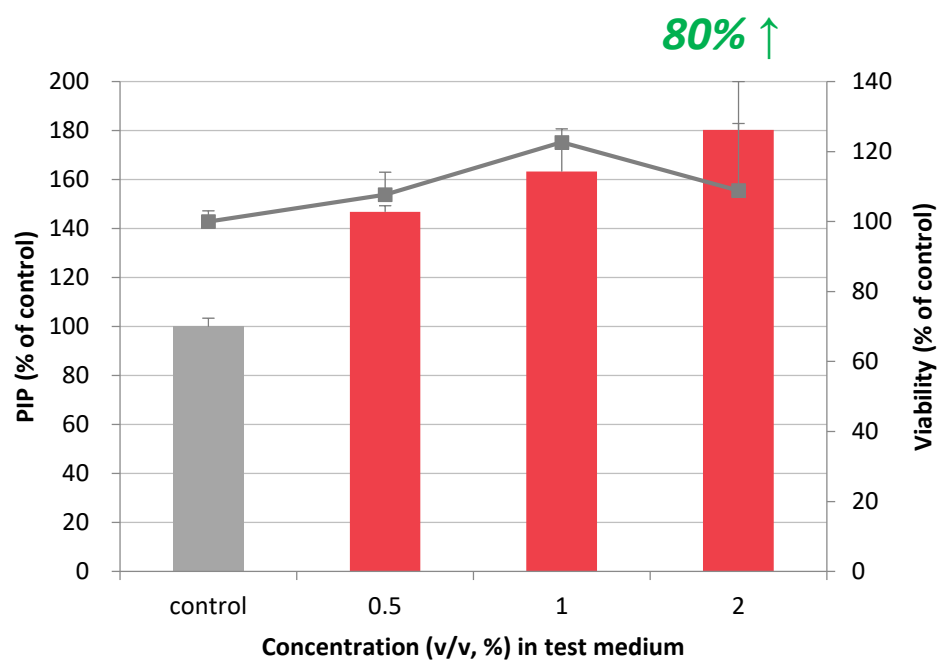
Transforming Growth Factor (TGF)-beta, a key mediator of fibroblast activation, is known to induce the expression of ECM proteins and to stimulate the production of protease inhibitors that prevent enzymatic breakdown of the ECM by matrix metalloproteinases (MMPs).

Connective Tissue Growth Factor (CTGF), which is induced by TGF-beta, has been reported to mediate stimulatory actions of TGF-beta ECM synthesis. Among other factors, Col1A is also affected to help procollagen synthesis.

in vitro: Anti-wrinkle Effect

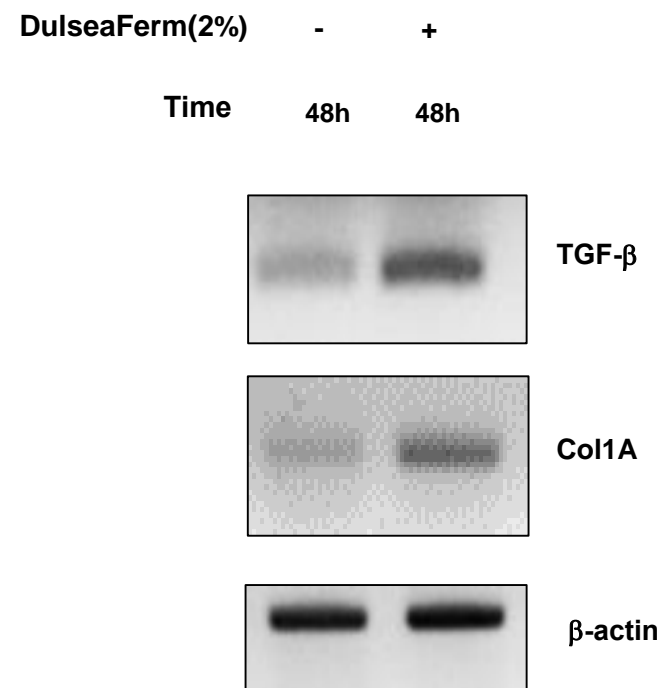
Anti-wrinkle Effect

Collagen Synthesis Activity in Fibroblast cell



Anti-wrinkle Effect

TGF-β and Col1A Synthesis Activity by Western Blotting



Product Information

- 🌿 **Product Name:** DulseaFerm(GPD)-RSPO
- 🌿 **INCI Name:** Palmaria Palmata Extract, Saccharomyces Ferment
- 🌿 **Dosage:** 1 – 3%
- 🌿 **Formulation:** Add to the formulation when the temperature is lower than 55°C. Recommended to add after the cooling process.
- 🌿 **Storage:** Avoid direct light or UV. Keep it in a cool and dry area.

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