ORYZA OIL & FAT CHEMICAL CO., LTD.
Ver. 9.0HS
1. Introduction

The patients with allergies are increasing every year, and the diet is said to be one of the most important factor of this disease. Daily intake of ω-6 fatty acids, commonly found in fish or plant oil such as safflower, are accumulated as arachidonic acid which is converted to allergic mediators.

PERILLA SEED EXTRACT inhibits the production of allergic mediators, leukotrienes (LTs). The mediators are metabolites of arachidonic acid through 5-lipoxygenase (5-LO) pathway. PERILLA SEED EXTRACT selectively inhibits 5-LO activity (in vitro).

PERILLA SEED EXTRACT also inhibits type IV allergy as well as TPA-induced inflammation (in vivo).

Moreover, the serum IgE levels were suppressed by administration of PERILLA SEED EXTRACT, and allergic rhinitis, hay fever and urticaria were significantly improved on human.

2. What is Perilla Seed?

*Perilla frutescens* and a lot of herbs like lavandula belong to *Fam. LABIATAE*. Perilla seed has been cultivated in Japan, China, Korea and Southeast Asia and used as spices and also main supply for ω-linolenate rich oil.
3. The Functional Compounds of PERILLA SEED EXTRACT

The functional compounds of PERILLA SEED EXTRACT are flavonoid aglycons, such as luteolin, apigenin, chrysoeriol, and rosemarinic acid. Though flavonoids are normally exist as glycosides in the plant, perilla seeds contain aglycons. It is known that antioxidative activity and lipoxygenase inhibitory activity of flavonoid aglycons are stronger than that of corresponding glycosides.

![Fig.1 Polyphenols Isolated from Perilla Seed](image)

4. Allergy and Metabolites of Arachidonic Acid

Arachidonic acid is released from cell membrane by a stimulation and converted to prostaglandins (PGs), thromboxanes (TXs), leukotrienes (LTs). LTs, the product of 5-lipoxygenase (5-LO) pathway, induce allergic reactions so that the specific inhibitors of 5-LO have the potentialities to regulate or prevent allergy and inflammation.

![Diagram of Allergy and Metabolites of Arachidonic Acid](image)
Fig.2  Arachidonic Acid Cascade
5. Effects of PERILLA SEED EXTRACT
5-1. Lipoxygenase Inhibitory Activity *(in vitro)*

PERILLA SEED EXTRACT control allergy and inflammatory responses due to its lipoxygenase inhibitory activity. The anti-lipoxygenase activity of PERILLA SEED EXTRACT is more than 50 times stronger than Ten-cha (Chinese tea) and more than 100 times stronger than perilla leaves. Ten-cha and perilla leaves contain mainly glycosides which anti-lipoxygenase activity is weaker than that of aglycons.

![Fig.3  5-Lipoxygenase Inhibitory Activity of Plant Extract](image)

Table 1 shows the IC$_{50}$ values of phenolic compounds isolated from perilla seed as well as other chemicals reported having anti-lipoxygenase activity. IC$_{50}$ of luteolin was 100 times stronger than that of caffeic acid isolated from olive.

**Table 1. IC$_{50}$ Values for Inhibition of Lipoxygenase Activities by Phenolic Compounds**

<table>
<thead>
<tr>
<th>Compound</th>
<th>IC$_{50}$(µM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luteolin*</td>
<td>0.1</td>
</tr>
<tr>
<td>Chrysoerid*</td>
<td>38.9</td>
</tr>
<tr>
<td>Rosmarinic acid*</td>
<td>6.4</td>
</tr>
<tr>
<td>Quercetin</td>
<td>0.2</td>
</tr>
<tr>
<td>Caffeic acid</td>
<td>72.0</td>
</tr>
</tbody>
</table>

*Main compounds of PERILLA SEED EXTRACT*
5-2. Anti-allergic Activity (in vivo)

Anti-allergic action of PERILLA SEED EXTRACT was examined by means of ear edematization test in mice. PERILLA SEED EXTRACT proved to oxazolone-induced type IV allergy. In endermatic test, luteolin have much strong inhibitory activity than other samples which are known for antihistamines or antiphlogistics.

Fig. 4 The Effect of PERILLA SEED EXTRACT on Oxazolone-induced Inflammation in Mice

1. Control (100%)
2. 1% PERILLA SEED EXTRACT (2 weeks)
3. Luteolin (0.3mg/ear)
4. NDGA (1.0mg/ear)
5. Ketoprofen (1.0mg/ear)
6. Phenidone (1.0mg/ear)
7. Mebrophehylamine (1.0mg/ear)
5-3. Anti-inflammatory Activity (*in vivo*)

Anti-inflammatory action of PERILLA SEED EXTRACT was examined by edematization test in ears of mice. PERILLA SEED EXTRACT proved to inhibit on TPA-induced inflammation.

![Bar graph showing the effect of PERILLA SEED EXTRACT on TPA-induced inflammation in mice.](image)

1. Control (100%)
2. 1% PERILLA SEED EXTRACT (1 month)
3. Luteolin (0.3 mg/ear)
4. PERILLA SEED EXTRACT (0.5 mg/ear)
5. NDGA (0.5 mg/ear)

*Fig.5 The Effect of PERILLA SEED EXTRACT on TPA-induced Inflammation in Mice*
5-4. Inhibitory Effect on Histamine Release (*in vitro*)

PERILLA SEED EXTRACT have inhibitory efficacy on histamine release. Studies on histamine release, PERILLA SEED EXTRACT have been found to inhibit the release of histamine from mast cell in a dose-dependent manner, thus PERILLA SEED EXTRACT was considered to be effective for improving symptoms of hay fever.

![Inhibitory Activity of PERILLA SEED EXTRACT on Histamine Release](image)

PERILLA SEED EXTRACT is a mixture of phenolic compounds and showed synergistic inhibitory effect which was stronger than that of sodium cromoglycate, a mast cell stabilizer and other flavonoids such as catechin, quercetin and caffeic acid.

![Inhibitory Activity of PERILLA SEED EXTRACT and Compounds 2-9 on Histamine Release (125µg /ml)](image)
6. Effect on Serum IgE Level

The effect of PERILLA SEED EXTRACT on human serum IgE level was conducted. PERILLA SEED EXTRACT demonstrated selective inhibitory effect on serum IgE production as illustrated in graphs A and B below. PERILLA SEED EXTRACT has significantly reduced serum IgE level 150 mg/day, but increased again after discontinuation of PERILLA SEED EXTRACT.

**Fig.8** Serum IgE Level Before and After Administration of PERILLA SEED EXTRACT

7. Effect on Patient with Allergy

<table>
<thead>
<tr>
<th>Symptom</th>
<th>0</th>
<th>20</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sneeze</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stuffed nose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blow nose</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye itchy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin itchy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cured | Significantly improved | Improved | Unchanged

**Fig.9** The Effect of PERILLA SEED EXTRACT on Patient with Allergy Before and After Administration of PERILLA SEED EXTRACT for Two Weeks (100mg-150mg/day)
8. Effect on Deodorization

PERILLA SEED EXTRACT has deodorizing effect on acetaldehyde, ammonia and methylmercaptan, which are commonly found in tobacco, alcohol, sweat and bad breath.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Smell</th>
</tr>
</thead>
<tbody>
<tr>
<td>acetaldehyde</td>
<td>The smell of Tobacco and Alcohol</td>
</tr>
<tr>
<td>ammonia</td>
<td>The smell of Tobacco, Alcohol and Sweat</td>
</tr>
<tr>
<td>methylmercaptan</td>
<td>Bad breath</td>
</tr>
</tbody>
</table>

PERILLA SEED EXTRACT has demonstrated similar deodorizing effect to Oreganon powder against acetaldehyde, ammonia and methylmercaptan. Thus, PERILLA SEED EXTRACT is an effective deodorizing against tobacco, alcohol, sweat and bad breath.

(Protocol)

After deodorization sample is dissolved to distilled water, smelly substance is added. The concentration of acetaldehyde, ammonia and methylmercaptan in headspace is measured with Gas Detector Tubes.

Fig.10  Effective against acetaldehyde
Fig.11. Effective against ammonia
Fig.12  Effective against methylmercaptan
In addition, we evaluated the effect of PERILLA SEED EXTRACT on ageing smell (aldehyde smell) in human. We gave PERILLA SEED EXTRACT-WSP (100 mg/day) to healthy male volunteers (n=6) and determined aldehyde in under wear. As a result, PERILLA SEED EXTRACT-WSP suppressed aldehyde smell from 1 to 3 weeks compared to the control group (Fig. 13).

As a result of questionnaire, improvement of subjective symptoms was observed in 3 volunteers. Thus, PERILLA SEED EXTRACT-WSP was found to reduce aging smell.

[Method]
PERILLA SEED EXTRACT-WSP (100 mg) was given for 3 weeks. After 1- and 3-week ingestion. Amount of aldehyde in undershirt (wearing a day) was determined by a gas analyzer.
9. Comparison of Perilla Leaf and Seed

(1) Contents of polyphenol and flavonoids

<table>
<thead>
<tr>
<th>Contents</th>
<th>Defatted seed</th>
<th>Leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total polyphenol</td>
<td>0.59%</td>
<td>0.091%</td>
</tr>
<tr>
<td>Rosmarinic acid</td>
<td>0.13%</td>
<td>0.022%</td>
</tr>
<tr>
<td>Luteorin (aglycon)</td>
<td>0.058%</td>
<td>Not detected</td>
</tr>
<tr>
<td>Apigenin (aglycon)</td>
<td>0.011%</td>
<td>Not detected</td>
</tr>
<tr>
<td>Crysoeriol (aglycon)</td>
<td>0.015%</td>
<td>Not detected</td>
</tr>
</tbody>
</table>

- Total polyphenol is 6 times higher than leaves.
- Active constituents in seeds are rosmarinic acid and flavonoids. The leaf contains rosmarinic acid only one sixth of leaves.
- The seeds contain large amount of flavonoids as aglycons which are easily absorbed from intestine. On the other hand, flavonoids in the leaves are glycoside forms and the contents are little.

(2) Anti-allergic mechanism

Seeds: Inhibition of 5- and 12-lipoxygenase
Inhibition of mast cell degranulation
Leaves: Inhibition of TNF-α production

(3) Perillaldehyde, perilla ketone and perilla alcohol

Seeds: As a result of GC analysis, the seeds were found to contain no perillaldehyde, perilla ketone and perilla alcohol (Fig. 13). In addition, the seed has no perilla flavor.
Leaves: Perilla flavor is based on perillaldehyde and peril ketone. These compounds cause contact dermatitis.

Thus, perilla seeds are more effective and safety than the leaves. Moreover, the seeds contain more than 40% lipids and the more than 60% of the lipid is α-linolenic acid. α-linolenic acid is easily oxidized, however the lipid is quite stable in the seeds. Polyphenols in the seeds are thought to protect lipids from oxidization.
Fig. 13. Identification of perillaldehyde, perilla ketone and perilla alcohol by GC analysis.
10. Stability of PERILLA SEED EXTRACT

10-1. Thermal Resistance

Evaluation of the heat stability of PERILLA SEED EXTRACT showed no changes in the content of polyphenols even after heating at a normal food processing temperature.

Fig.14  Thermal Resistance of PERILLA SEED EXTRACT

10-2. pH Stability

Polyphenols in the PERILLA SEED EXTRACT was found to be stable from acid to alkali range of pH.

Fig.15  pH stability of the Polyphenols in the PERILLA SEED EXTRACT
10-3. Solubilty

Stability of solubilized PERILLA SEED EXTRACT-WSP in water (pH 3.5) was examined at stipulated in the following conditions. PERILLA SEED EXTRACT-WSP was dissolved in water (pH 3.5) and stored at room temperature, 40°C and 5°C for 16 weeks and sedimentation and color change was observed.

<table>
<thead>
<tr>
<th>Acid (pH 3.5)</th>
<th>Water solubility (0.5 % solution)</th>
<th>Room temperature (light shielding)</th>
<th>40°C (dark)</th>
<th>5°C (dark)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedimentation</td>
<td>Negative (observed in 16 weeks)</td>
<td>Negative (observed in 16 weeks)</td>
<td>Negative (observed in 16 weeks)</td>
<td></td>
</tr>
<tr>
<td>Change color</td>
<td>Negative (observed in 16 weeks)</td>
<td>Negative (observed in 16 weeks)</td>
<td>Negative (observed in 16 weeks)</td>
<td></td>
</tr>
</tbody>
</table>

PERILLA SEED EXTRACT-WSP was without any sedimentation and color change observed in 16 weeks.

11. Daily Dosage of PERILLA SEED EXTRACT

PERILLA SEED EXTRACT-P (powder)  
PERILLA SEED EXTRACT-WSP (powder)  
PERILLA SEED EXTRACT-L (liquid)  

150  
100~150mg/day

12. Nutrition Facts of PERILLA SEED EXTRACT

<table>
<thead>
<tr>
<th>Items Analyzed</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>3.1 g/100g</td>
</tr>
<tr>
<td>Protein*1</td>
<td>0.9 g/100g</td>
</tr>
<tr>
<td>Fat</td>
<td>0.2 g/100g</td>
</tr>
<tr>
<td>Ash</td>
<td>0.8 g/100g</td>
</tr>
<tr>
<td>Available carbohydrate*2</td>
<td>95.0 g/100g</td>
</tr>
<tr>
<td>Energy*3</td>
<td>385 kcal/100g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>0 g/100g</td>
</tr>
<tr>
<td>Sodium</td>
<td>7.1 mg/100g</td>
</tr>
</tbody>
</table>

*1 N 6.25
*2 100-(Moisture + Protein + Fat + Ash + Dietary fiber)
*3 Factors for calculating the energy value:
Protein - 4, Fat - 9, Available carbohydrate -4
Tested by : Japan Food Research Center Foundation
Research result issue number : 397060549-001
13. Residual Agricultural Chemicals

<table>
<thead>
<tr>
<th>Assayed Items</th>
<th>Results</th>
<th>Detection Limits</th>
<th>Assay Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>BHC</td>
<td>Not Detected</td>
<td>0.02ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>DDT</td>
<td>Not Detected</td>
<td>0.02ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Aldrin</td>
<td>Not Detected</td>
<td>0.01ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Dieldrin</td>
<td>Not Detected</td>
<td>0.01ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Endrin</td>
<td>Not Detected</td>
<td>0.01ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Diazinon</td>
<td>Not Detected</td>
<td>0.05ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Parathion</td>
<td>Not Detected</td>
<td>0.05ppm</td>
<td>Gas Chromatography</td>
</tr>
<tr>
<td>Malathon</td>
<td>Not Detected</td>
<td>0.05ppm</td>
<td>Gas Chromatography</td>
</tr>
</tbody>
</table>

Tested by: Japan Food Research Center Foundation
Research results issue number 397060549-002

Moreover, we determined 456 agricultural chemicals in 2006. No chemicals were determined in PERILLA EXTRACT.

14. Acute Toxicity and Safety

14-1. Acute Toxicity

After administering 2,000 mg/kg for 2 weeks, no toxic effects were observed, thus the LD₅₀ (mouse) is more than 2000 mg/kg.

After administering 7.0g/day for two consecutive weeks on human, no toxic effects were observed.

14-2. Primary Cutaneous Irritation Test on the Albino Rabbit.

PERILLA SEED EXTRACT was applied on normal skin in 3 rabbits for 4 hours. The methodology indicated in the Official EEC Gazette of September 19, 1984 was used in this study. Examination of the skin at hour 1, 24, 48 and 72 after removed of the dressing reveals the absence of a desquamation reaction or a reduction in the cutaneous extensive range. The local tolerance is good. In these conditions, the product can be rated as: NON IRRITANT.

14-3. Test to Assess the Sensitizing Power on the Albino Guinea Pig.

PERILLA SEED EXTRACT at the Maximum Non Irritant Concentration did not display any sensitizing potential in the animals tested. The positive reference (1-chloro -2-4 dinitrobenzene 1 %), tested in the same conditions displayed 100 % of positive reactions. The product in accordance with the method described in the protocol displays a VERY SLIGHT sensitizing power in the albino guinea pig.

14-4. Ocular Irritation Test.

PERILLA SEED EXTRACT was instilled in the fornix of the conjunctiva of 3 rabbits, by a 0.1 ml dosage. The eye was not rinsed. The procedure used in
this study complies with OECD guidelines No 405 of February 24, 1987 and EEC guidelines 67/548. In these conditions, the product is rated as: SLIGHTLY IRRITANT.

14-5. Ocular Irritation Test.
0.03 g of PERILLA SEED EXTRACT -LC was spread over film. The film was patched on 12 subject for just stick and 24 hours. No irritation on skin of human ware found.

15. Practical Applications of PERILA SEED EXTRACT

<table>
<thead>
<tr>
<th>Applications</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confectionery</td>
<td>Candies, Gum, Cookies, Pudding, Jelly, Yogurt and Chocolate.</td>
</tr>
<tr>
<td>Drinks</td>
<td>Tea, Blended tea, Functional drinks and Nutritional drinks.</td>
</tr>
<tr>
<td>Others</td>
<td>Functional foods, Health foods and Nutraceutical foods.</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>Base cosmetics (Lotion, Milk, Cream and so on)</td>
</tr>
<tr>
<td></td>
<td>Body cosmetics (Body lotion, Body cream, and so on)</td>
</tr>
<tr>
<td></td>
<td>Cleansing cosmetics (Soap, and so on)</td>
</tr>
<tr>
<td></td>
<td>Make up cosmetics (Lipstick, Foundation, and so on)</td>
</tr>
<tr>
<td></td>
<td>and so on.</td>
</tr>
</tbody>
</table>

16. Packing

PERILLA SEED EXTRACT-P (Powder, for food)
PERILLA SEED EXTRACT-WSP (Powder, for food)
5kg Interior packaging: a double-layerd plastic plastic bag, can
Exterior packaging: cardboard box
PERILLA SEED EXTRACT-L (Liquid, for food)
5kg Interior packaging: cubic polyethylene container
Exterior packaging: cardboard box
PERILLA SEED EXTRACT-LC (Liquid, for cosmetics)
5kg Interior packaging: cubic polyethylene container
Exterior packaging: cardboard box

17. Storing Method

Store in cool, dry place. Avoid humidity

18. Expression of PERILLA SEED EXTRACT

PERILLA SEED EXTRACT
*Please refer to your nation’s standard.
19. Others

PERILLA SEED EXTRACT-LC is recommended for cosmetics.
CTFA FILE NUMBER : 426
INCI name : Water (and) Butylene Glycol (and) Perilla Ocymoides Seed Extract
20. United States Patent

Murai et al.

(54) INHIBITORS OF LIPOXYGENASE

(75) Inventor: Hiroshi Murai, Ichinomiya, Thulasi
Olava, Gifu-ken; Hiroyo Yamamoto, Ichinomiya, city of (JP)

(73) Assignee: Oryza Oil & Fat Chemical Co., Ltd.,
Aichi-ken (JP)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: 69/053,064

(22) Filed: Apr. 1, 1998

(30) Foreign Application Priority Data

Apr. 23, 1997 (JP) 910589

(51) Int. Cl.7 A61K 37/00

(52) U.S. Cl. 424/185.1

(58) Field of Search 424/185.1

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Hsieh, R.I. et al., Relative Inhibitory Potencies of
Flavonoids on 12-Lipoxygenase and Fish Gill, Lipida,
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Biswas, K.M. et al., Isolation of Chrysoselin 7-0-β-D-
Glucopyranosyl-Sidly (2→1)-D-Afpolulosanose from

24 Claims, 8 Drawing Sheets
This product is extracted from the seeds of perilla (*perilla frutescens var. japonica, p.frutescens var. frutescens or perilla frutescens var. crispa*) with aqueous ethanol. It guarantees a minimum of 3.0% polyphenols.

**Appearance**
Yellowish powder with slightly unique smell.

**Certification Test**
- **Flavonoid**
  To 1.0g of this product, add 8.5ml of 90% diethlene glycol and 0.5ml of 1N NaOH. Then it changes yellow. (DAVIS method)

**Polyphenols**
Min. 3.0% (Folin-Denis method)

**Loss on Drying**
Max. 5.0% (Analysis for Hygienic Chemists, 1g, 105°C, 2h)

**Purity Test**
1. **Heavy Metals (as Pb)**
   Max. 30 ppm (Sodium Sulfide Colorimetric Method)
2. **Arsenic (as As₂O₃)**
   Max. 1 ppm (Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)

**Standard Plate Counts**
Max. 1 × 10³ cfu/g (Analysis for Hygienic Chemists)

**Moulds and Yeasts**
Max. 1 × 10² cfu/g (Analysis for Hygienic Chemists)

**Coliforms**
Negative (Analysis for Hygienic Chemists)

**Composition**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrin</td>
<td>70 %</td>
</tr>
<tr>
<td>Perilla seed extract</td>
<td>30 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>
PERILLA SEED EXTRACT (Anti-allergy) ver. 8.0HS

PRODUCT STANDARD

PRODUCT NAME

PERILLA SEED EXTRACT-WSP

(FOOD)

This product is extracted from the seeds of perilla (*perilla frutescens var. japonica, p.frutescens var. frutescens* or *perilla frutescens var. crispa*) with aqueous ethanol. It guarantees a minimum of 3.0 % polyphenols. This product is water-soluble.

**Appearance**

Yellowish powder with slightly unique smell.

**Certification Test**

**Flavonoid**

To 1.0g of this product, add 8.5ml of 90% diethlene glycol and 0.5ml of 1N NaOH. Then it changes yellow. (DAVIS method)

**Polyphenols**

Min. 3.0% (Folin-Denis method)

**Loss on Drying**

Max. 5.0% (Analysis for Hygienic Chemists,1g, 105°C, 2h)

**Purity Test**

(1) **Heavy Metals (as Pb)**

Max. 30 ppm (Sodium Sulfide Colorimetric Method)

(2) **Arsenic (as As₂O₃)**

Max. 1 ppm (Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)

**Standard Plate Counts**

Max. $1 \times 10^3$ cfu/g (Analysis for Hygienic Chemists)

**Moulds and Yeasts**

Max. $1 \times 10^2$ cfu/g (Analysis for Hygienic Chemists)

**Coliforms**

Negative (Analysis for Hygienic Chemists)

**Composition**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrin</td>
<td>70 %</td>
</tr>
<tr>
<td>Perilla seed extract</td>
<td>30 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
PRODUCT STANDARD

PRODUCT NAME

PERILLA SEED EXTRACT-L
(FOOD)

This product is extracted from the seeds of perilla (*perilla frutescens* var. *japonica*, *p.frutescens* var. *frutescens* or *perilla frutescens* var. *crispa*) with aqueous ethanol. It guarantees a minimum of 2.0 % polyphenols.

**Appearance**
Dark brown liquid with unique smell.

**Certification Test**

<table>
<thead>
<tr>
<th>Flavonoid</th>
<th>To 1.0g of this product, add 8.5ml of 90% diethlene glycol and 0.5ml of 1N NaOH. Then it changes yellow. (DAVIS method)</th>
</tr>
</thead>
</table>

**Polyphenols**
Min. 2.0% (Folin-Denis method)

**Residue on Evaporation**
18.0 to 22.0% (Analysis for Hygienic Chemists)

**Purity Test**

<table>
<thead>
<tr>
<th>(1) Heavy Metals (as Pb)</th>
<th>Max. 20 ppm (Sodium Sulfide Colorimetric Method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Arsenic (as As₂O₃)</td>
<td>Max. 1 ppm (Standard Methods of Analysis in Food Safety Regulation, The Third Method, Apparatus B)</td>
</tr>
</tbody>
</table>

**Standard Plate Counts**
Max. $1 \times 10^3$ cfu/g (Analysis for Hygienic Chemists)

**Moulds and Yeasts**
Max. $1 \times 10^2$ cfu/g (Analysis for Hygienic Chemists)

**Coliforms**
Negative (Analysis for Hygienic Chemists)

**Composition**

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol</td>
<td>50 %</td>
</tr>
<tr>
<td>Purified water</td>
<td>30 %</td>
</tr>
<tr>
<td>Perilla seed extract</td>
<td>20 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 %</strong></td>
</tr>
</tbody>
</table>

22
PERILLA SEED EXTRACT (Anti-allergy) ver. 8.0HS

PRODUCT STANDARD

PRODUCT NAME

PERILLA SEED EXTRACT-PC

(COSMETIC)

The product is extracted with aqueous ethanol from the seeds of perilla (Perilla frutescens var. japonica, P. frutescens var. frutescens or Perilla frutescens var. crispa). It includes more than 3.0 % of polyphenols.

Appearance

Yellowish powder with slightly unique smell.

Certification Test

Flavonoid
To 1.0g of this product, add 8.5ml of 90% diethlene glycol and 0.5ml of 1N NaOH. Then it changes yellow. (DAVIS method)

Polyphenols

Min. 3.0% (Folin-Denis method)

Loss on Drying

Max. 5.0% (1g, 105 °C, 2 h)

Purity Test

(1) Heavy Metals (as Pb) Max. 30 ppm (The Second Method of The Japanese Standards of Quasi-Drug Ingredients)

(2) Arsenic (as As₂O₃) Max. 1 ppm (The Third Method of The Japanese Standards of Quasi-Drug Ingredients)

Standard Plate Counts

Max. 1 x 10² cfu/g (Analysis for Hygienic Chemists)

Moulds and Yeasts

Max. 1 x 10² cfu/g (Analysis for Hygienic Chemists)

Coliforms

Negative (Analysis for Hygienic Chemists)

Composition

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrin</td>
<td>70 %</td>
</tr>
<tr>
<td>Perilla Ocymoides Seed Extract</td>
<td>30 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
This product is extracted from the seeds of perilla (*perilla frutescens var. japonica*, *p.frutescens var. frutescens* or *perilla frutescens var. crispa*) with aqueous ethanol. It guarantees a minimum of 3.0% polyphenols. This product is water-soluble.

**Appearance**
Yellowish powder with slightly unique smell.

**Certification Test**
- **Flavonoid**
  - To 1.0g of this product, add 8.5ml of 90% diethlene glycol and 0.5ml of 1N NaOH. Then it changes yellow. (DAVIS method)

**Polyphenols**
Min. 3.0% (Folin-Denis method)

**Loss on Drying**
Max. 5.0% (1g, 105°C, 2h)

**Purity Test**
- (1) Heavy Metals (as Pb)
  - Max. 30 ppm (The Second Method of The Japanese Standards of Quasi-Drug Ingredients)
- (2) Arsenic (as As₂O₃)
  - Max. 1 ppm (The Third Method of The Japanese Standards of Quasi-Drug Ingredients)

**Standard Plate Counts**
Max. $1 \times 10^2$ cfu/g (Analysis for Hygienic Chemists)

**Moulds and Yeasts**
Max. $1 \times 10^2$ cfu/g (Analysis for Hygienic Chemists)

**Coliforms**
Negative (Analysis for Hygienic Chemists)

**Composition**
<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dextrin</td>
<td>70 %</td>
</tr>
<tr>
<td>Perilla Ocymoides Seed Extract</td>
<td>30 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
PERILLA SEED EXTRACT (Anti-allergy) ver. 8.0HS

PRODUCT STANDARD

PRODUCT NAME

PERILLA SEED EXTRACT-LC
(COSMETIC)

This product is extracted from the seeds of perilla (perilla frutescens var. japonica, p.frutescens var. frutescens or perilla frutescens var. crispa) with aqueous 1,3-butylene glycol.

Appearance
Yellow or pale brown clear liquid with slightly unique smell.

Certification Test
(1) Tannins
The solution (1→5) of this product shows blue color after ferric chloride is added.

(2) Polyphenols
The solution (1→5) of this product shows no color after potassium permanganate is added.

Polyphenols
Min. 2.0% (Folin-Denis method)

pH
5.00 to 6.50 (10% solution)

Specific Gravity
1.020 to 1.060 (25 ºC)

Purity Test
(1) Heavy Metals (as Pb) Max. 20 ppm (The Second Method of The Japanese Standards of Quasi-Drug Ingredients)

(2) Arsenic (as As₂O₃) Max. 1 ppm (The Third Method of The Japanese Standards of Quasi-Drug Ingredients)

Standard Plate Counts
Max. 1 × 10² cfu/g (Analysis for Hygienic Chemists)

Moulds and Yeasts
Max. 1 × 10² cfu/g (Analysis for Hygienic Chemists)

Coliforms
Negative (Analysis for Hygienic Chemists)

Composition

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Butylene Glycol</td>
<td>69 %</td>
</tr>
<tr>
<td>Water</td>
<td>30 %</td>
</tr>
<tr>
<td>Perilla Ocymoides Seed Extract</td>
<td>1 %</td>
</tr>
<tr>
<td>Total</td>
<td>100 %</td>
</tr>
</tbody>
</table>
ORYZA OIL & FAT CHEMICAL CO., LTD. striving for the development of the new functional food materials to promote health and general well-being.

From product planning to OEM - For any additional information or assistance, please contact:

ORYZA OIL & FAT CHEMICAL CO., LTD.
No.1, Numata Kitagata-cho, Ichinomiya-city, Aichi-pref.,
493-8001 JAPAN
TEL: +81 (0) 586 86 5141
FAX: +81 (0) 586 86 6191
URL: http://www.oryza.co.jp/
E-mail: info@oryza.co.jp

Tokyo sales office:
5F of Big Tokyo Building, Kanndasuda-cho 1-24-10
Chiyoda-ku, Tokyo, 101-0041 JAPAN
TEL (03)5209-9150 FAX (03)5209-9151
E-mail: tokyo@oryza.co.jp

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