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LILY LOVE: THE HOLISTIC BEAUTY SOLUTION

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ABSTRACT :

Lily plant have been utilized for centuries in conventional pharmaceutical & skincare but their restorative potential remains undeveloped. A plethora of research has demonstrated that Lilium plants are replete with bioactive compounds including phenolic acids, flavonoids & polysaccharides, which possess exceptional cosmetic potential. This study investigates the skincare benefits, focusing on their ability to combat oxidative stress and microbial growth. The cosmetic utility of lilies is remarkably diverse, spanning a wide range of products that cater to various skincare needs. From protective sun care and sunscreens that shield the skin from harmful UV rays, to moisturizing and emollient skincare products that hydrate and soften the skin, lilies play a valuable role. Their benefits extend to rejuvenating facial oils and treatments that nourish and revitalize the skin, as well as toning and purifying skincare preparations that balance and skin clarifying. Moreover lilies are also used in aromatic perfumes and fragrances, lending a sweet and elegant scent. Finally their ability to illuminate and even skin tone makes them a key ingredient in serums and creams designed to brighten and perfect the skin. We examine the current state of research on lily extracts and their applications in skincare, haircare and makeup. Our analysis reveals that lily plants possess a unique combination of bioactive compounds, making them an attractive natural ingredient for cosmetic formulations. Lily-based skincare is natural solution for aging skin, acne, and hyperpigmentation, offering effective and gentle beauty benefits. Therefore survey gives comprehensive approach of application, benefits & future prospects in cosmetics industry.

INTRODUCTION :

In the realm of natural beauty, few flowers have captivated the hearts of skincare enthusiasts like the majestic Lily. Lilies are a popular ornamental plant, coming in a variety of colors beyond the classic white, including pink, yellow, orange, and bi-colored. With its snow-white petals and golden anthers, this botanical beauty has been a symbol of purity and elegance. Lily extract has emerged as a powerhouse ingredient in the world of cosmetics.[1] For centuries, lilies have been admired for their stunning appearance, captivating scent, and healing powers. With a rich history dating back to ancient civilizations in Egypt, Greece, and China, lilies have been used in traditional herbal remedies to promote health, wellness, and beauty. Lilies have evolved over millions of years, with fossil records dating back to the Cretaceous period (145-65 million years ago).[2] The Liliaceae family, commonly referred to as the lily family, comprises 16 distinct genera and approximately 700 species of herbaceous and shrub-like plants, predominantly originating from temperate and subtropical zones within the Liliales order of flowering plants.[3] Derived from the Lilium genus, comprising over 90 species of flowering plants, lily extracts and essential oils have been prized for their antioxidant, anti-inflammatory, and antimicrobial properties. The sweet fragrance of Lilies is also used in perfumes, and their bulbs can be roasted or boiled as a starchy vegetable. In modern cosmetics, lily plant extracts are increasingly sought after for their ability to soothe and calm irritated skin, reduce the appearance of fine lines and wrinkles, and promote a radiant, even-toned complexion. From their biological source in the lush, green valleys of Asia and Europe to their current status as a coveted ingredient in luxury skincare, lily plants have come to represent the perfect union of nature, beauty, and wellness. Lilium is a rich source of bioactive compounds, including amino acids, polysaccharides, phenolics, and saponins. Amino acids, the building blocks of proteins, are essential for skin health and collagen production. Polysaccharides, complex carbohydrates with anti-inflammatory and antioxidant properties, also contribute to the plant's benefits. Phenolics, a class of antioxidants, exhibit UV absorption, anti-inflammatory, and antimicrobial effects. This group includes phenolic acids, such as chlorogenic acid, caffeic acid, and ferulic acid, as well as flavonoids like quercetin, kaempferol, and naringenin. Additionally, saponins, natural surfactants with anti-inflammatory, antimicrobial, and antioxidant effects, are present in Lilium. Lignin, a polyphenol with antioxidant, anti-inflammatory, and UV absorption properties, is also found in the plant.[4] These bioactive compounds contribute to the various health benefits and cosmetic effects of Lilium, including anti-aging and skin rejuvenation, anti-inflammatory and antioxidant effects, UV protection and skin damage prevention, improved skin elasticity and firmness, hydration and moisturization, and antimicrobial and antifungal effects. The specific composition and concentration of these compounds may vary depending on the Lilium species, cultivar, and growing conditions. Lilium candidum, a species of lily, has been found to be effective in treating freckles and hyperpigmentation, as well as relieving periorbital hyperchromia, commonly known as dark circles.[5] This is due to its beneficial compounds, including flavonoids and phenolic acids. Another species, Lilium lancifolium, has been approved for use in cosmetic products in China and may have anti-aging and antioxidant effects, thanks to its content of compounds like lycorine and galantamine. Lilium japonicum, used in traditional Japanese medicine for skin issues, may have anti-inflammatory and antioxidant properties, making it a potential ingredient for cosmetic products. Its compounds, including japonicine and lilijaponine, contribute to its benefits. The flower oil of Lilium brownii is used in cosmetics for its fragrance and benefits, which may include antimicrobial and anti-inflammatory effects, courtesy of compounds like linalool and beta-pinene.[6] The cosmetic benefits of lilies include skin regeneration and rejuvenation, anti-aging and wrinkle reduction, hyperpigmentation and freckle treatment, anti-inflammatory and antioxidant effects, and fragrance and aroma therapy benefits.[7] While

lilies have shown promise in cosmetics, further research is needed to fully understand their effects and potential interactions. The lily plant's various parts hold secrets to unlocking its cosmetic potential.[6] Upon microscopic examination the flower petals reveal a treasure trove of flavonoids and phenolic acids which boast antioxidant, anti-inflammatory and skin-brightening properties.[8] Delving deeper the anthers are found to be rich in pollen and bioactive compounds, offering a plethora of benefits including anti-aging, soothing and moisturizing effects. The leaves too possess a unique composition of polysaccharides and glycoproteins providing hydration soothing comfort and protection to the skin. Meanwhile, the bulbs are a storehouse of starch, proteins and bioactive compounds delivering moisturizing, nourishing and anti-aging benefits. Even the roots are not to be overlooked as they contain phenolic acids and terpenoids that exhibit anti-inflammatory, antioxidant and skin-soothing properties. And at the heart of it all lies the pollen packed with bioactive compounds and nutrients that offer a multitude of benefits including anti-aging, soothing and moisturizing effects.[9] By exploring the microscopic world of the lily plant we can tap into its vast cosmetic potential and develop innovative skincare and haircare solutions.[10] Despite the extensive research on the chemical composition of Lilium species, surprisingly few academic studies have explored their applications in cosmetics.[11] In contrast, a vast array of cosmetic products claim to feature lily extracts as a key ingredient, highlighting a gap in research that warrants further exploration.[12] Patent publications offer valuable insights into technological innovation and evolution, serving as essential scientific references that contain a wealth of information and novel findings.[13] Notably, a significant proportion of patent contents remain unpublished in any other format, including scientific research papers, and even when published, there is a notable delay of 1.7-3.7 years.[14] The disconnect between research and industry applications underscores the importance of patent analysis, which can reveal insights into industry trends, competitor activity, and emerging technologies. The cosmetic industry's reliance on lily extracts and other natural ingredients is driven by consumer demand for sustainable and natural products, making it crucial for researchers to leverage patent data to accelerate their discoveries and stay ahead of the curve.[15] Collaboration between academia and industry is also vital for translating research into practical applications. By prioritizing quality control and authenticity, the cosmetic industry can ensure that lily plant-based products meet the highest standards of safety, efficacy, and consumer trust. Lily's benefits are as versatile as they are impressive.[16] In this review, we'll delve into the science behind Lily's beauty-boosting properties, exploring its uses, benefits, and efficacy in skincare products. Get ready to discover the secret to unlocking your natural glow with the botanical beauty boost of Lily."

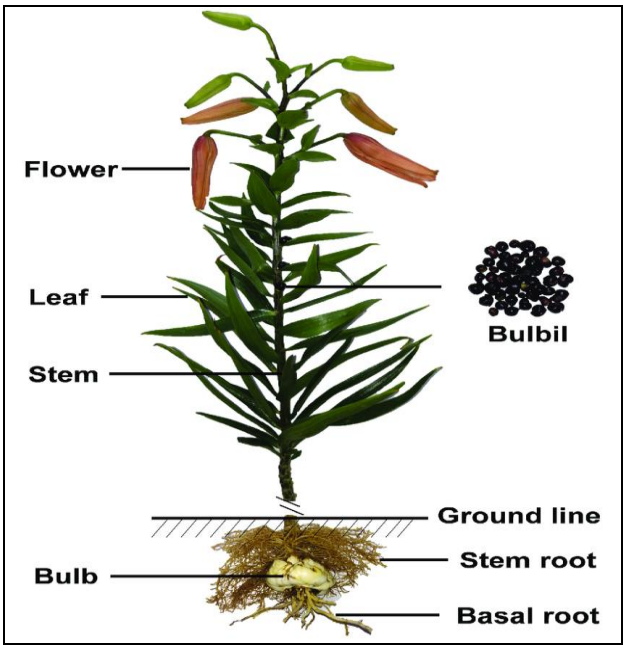

Fig 1. Whole Plant of Lilium Iancifolium

GEOGRAPHICAL DISTRIBUTION :

Lily plants are widely distributed across the Northern Hemisphere, with various species found in diverse regions. In Asia, China is home to several species, including Lilium auratum, Lilium candidum, Lilium dauricum, and Lilium lancifolium, particularly in the provinces of Yunnan, Sichuan, and Gansu. Japan, Korea, India, and Nepal also have their own native lily species, such as Lilium auratum, Lilium candidum, and Lilium lancifolium . In Europe, the Mediterranean region, Alps, and Pyrenees are home to several lily species. Lilium candidum, Lilium martagon, and Lilium pyrenaicum are found in the Mediterranean region, including Spain, France, Italy, and Greece. The Alps are home to Lilium alpinum and Lilium martagon, while the Pyrenees are home to Lilium pyrenaicum and Lilium martagon.In North America, the Eastern United States is home to Lilium canadense, Lilium philadelphicum, and Lilium superbum, particularly in the Appalachian Mountains.[17] The Western United States is home to Lilium columbianum, Lilium humboldtii, and Lilium parryi, especially in California and Oregon. Canada also has its own native lily species, including Lilium canadense and Lilium philadelphicum.Beyond these regions, lily plants can also be found in the Middle East, where Lilium candidum and Lilium auratum are found in Turkey and Iran. In Africa, Lilium auratum has been introduced and naturalized in South Africa. Human activity has led to the introduction and spread of lily species to new regions, further expanding their geographical distribution.Lily plant cosmetics have a widespread geographical distribution, with

various regions utilizing these plants for their beneficial properties. In Asia, China, Japan, Korea, and India are prominent users of lily plant cosmetics, incorporating them into traditional medicine, skincare products, fragrances, and haircare products. In Europe, France, Italy, and the UK also utilize lily plant extracts in luxury skincare products, perfumes, and organic haircare products. In North America, the USA and Canada employ lily plant cosmetics in natural skincare products, fragrances, and haircare products. Similarly, in South America, Brazil and Argentina use lily plant extracts in natural skincare products, haircare products, and traditional fragrances. In Africa, South Africa and Morocco incorporate lily plant cosmetics into natural skincare products, haircare products, and traditional fragrances. Lastly, in Oceania, Australia and New Zealand utilize lily plant extracts in natural skincare products and organic haircare products.[18] The use of lily plant cosmetics is not limited to these regions, as their popularity can vary within countries and depend on cultural and market trends. Nonetheless, the widespread geographical distribution of lily plant cosmetics highlights their versatility and appeal in the beauty and personal care industry.[19]

Fig 2: Lillium Species

COLLECTION :

Lily plants are collected for cosmetic use through both wild and cultivated methods. Wild collection involves hand-picking plants from their natural habitats, such as forests, grasslands, and mountainous regions, typically during the spring and summer months when they are in bloom. Cultivated collection, on the other hand, involves mechanically harvesting plants from fields, gardens, and greenhouses, usually during the summer and fall months. The parts of the lily plant collected for cosmetic use include the flowers, leaves, bulbs, and roots. Flowers are valued for their fragrance, color, and bioactive compounds, while leaves are sought for their bioactive compounds and antioxidants.[20] Bulbs are used for their starch, mucilage, and bioactive compounds, and roots are used for their bioactive compounds and antioxidants. The collection methods employed depend on the scale and type of collection. Hand-picking is used for wild collection and small-scale cultivated collection, while mechanical harvesting is used for large-scale cultivated collection. Cutting is used to collect leaves and stems, and digging is used to collect bulbs and roots. After collection, the plant material undergoes post-collection processing, which includes cleaning to remove dirt and debris, drying to preserve the material, extraction to obtain bioactive compounds and oils, and storage in a cool, dry place to maintain quality. The specific methods used may vary depending on the species of lily plant, its intended use, and local regulations.[21]

CULTIVATION :

Cultivating lily plants for cosmetic use involves several steps. Propagation can be done through scales, bulbs, or seed, with scales and bulbs being the most common methods. Lily plants prefer well-draining soil with a pH between 6.0 and 7.0 and require full sun to partial shade and consistent moisture. The ideal temperature for growth is between 65°F and 75°F (18°C and 24°C). Planting typically occurs in the fall or early spring, with bulbs being planted 2-3 times deeper than their height and 3-6 inches apart.[22] Consistent moisture is crucial, especially during the growing season, and fertilization is done in the spring and summer months with a balanced fertilizer. Pest and disease management is also essential, with common pests including aphids, slugs, and snails, and common diseases including botrytis, powdery mildew, and root rot. Harvesting occurs at different times depending on the plant part. Flowers are typically harvested in the summer months when they are in bloom, while leaves and stems can be harvested throughout the growing season. Bulbs are harvested in the fall after the foliage has died back. Post-harvest handling involves drying or extracting flowers immediately to preserve their bioactive compounds, cleaning and drying leaves and stems for use in cosmetics, and storing bulbs for future use

or replanting. Overall, cultivating lily plants for cosmetic use requires careful attention to detail, from propagation to post-harvest handling, to ensure the highest quality plant material for use in cosmetics.[23]

PHYTOCONSTITUENTS

Phytoconstituent	**Type**	**Part of plant**	**Biological activity**	**Reference**
Galantamine	Alkaloid	Bulbs, Flowers	Cholinesterase inhibitor, neuroprotective	4
Lycorine	Alkaloid	Bulbs, Flowers	Antiviral, anticancer, anti-inflammatory	5
Lilioside	Glycoside	Bulbs, Leaves	Antioxidant, anti-inflammatory	4
Tuliposide	Glycoside	Bulbs, Leaves	Antioxidant, anti-inflammatory	6
Kaempferol	Flavonoid	Flowers, Leaves	Antioxidant, anti-inflammatory, anticancer	5
Quercetin	Flavonoid	Flowers, Leaves	Antioxidant, anti-inflammatory, anticancer	4
Ferulic acid	Phenolic acid	Bulbs, Leaves	Antioxidant, anti-inflammatory, antimicrobial	5
Sinapic acid	Phenolic acid	Bulbs, Leaves	Antioxidant, anti-inflammatory, antimicrobial	4
Liliosaponin	Saponin	Bulbs, Roots	Antioxidant, anti-inflammatory, immunomodulatory	5
β-Sitosterol	Steroid	Bulbs, Leaves	Antioxidant, anti-inflammatory, antimicrobial	4
Stigmasterol	Steroid	Bulbs, Leaves	Antioxidant, anti-inflammatory, antimicrobial	4
Lilial	Terpenoid	Flowers, Leaves	Antioxidant, anti-inflammatory, antimicrobial	4
Tiglic acid	Terpenoid	Flowers, Leaves	Antioxidant, anti-inflammatory, antimicrobial	5
Starch	Carbohydrate	Bulbs, Roots	Energy storage, antioxidant	4
Mucilage	Carbohydrate	Bulbs, Roots	Soothing, protective, antioxidant	6
Lilium protein	Protein	Bulbs	Enzyme inhibition, antioxidant	5

COSMETIC USE

Lily extract is a versatile ingredient used in various cosmetic products due to its antioxidant and anti-inflammatory properties. In skincare, it helps protect the skin from environmental stressors, reduce fine lines and wrinkles, and soothe irritated skin. Additionally, lily essential oil is used in aromatherapy to promote relaxation, reduce stress, and improve mood with its sweet, floral scent.[21] The antibacterial and antifungal properties of lily also make it an effective ingredient in preventing acne, redness, and infections. Furthermore, lily's moisturizing and hydrating properties soften, smooth, and plump the skin, leaving it with a radiant and youthful appearance. Its skin illuminating and tone balancing properties help fade hyperpigmentation and dark spots, revealing a brighter, more even-toned skin. In makeup, lily extracts are used in foundations, powders, and blushes to provide a natural, flawless finish. The anti-inflammatory and soothing properties of lily also make it an effective ingredient in bath and body products, such as soaps, body washes, and lotions. These products help to calm and soothe irritated skin, leaving it feeling soft and supple. In hair care, lily extract nourishes and conditions hair, improving manageability, reducing frizz, and adding shine. In makeup, lily extract provides a natural, flawless finish and soothes irritated skin with its anti-inflammatory properties.[5] Furthermore, lily extract is used in bath and body products, such as soaps, body washes, and lotions, to moisturize and soothe irritated skin. Specific cosmetic uses of lily include using lily extract in eye creams to reduce puffiness and dark circles. Lily essential oil is also used in face masks to soothe and calm irritated skin. In hair care, lily infusion is used to nourish and condition dry hair. Finally, lily absolute is used in perfumes to add a sweet, floral fragrance. Overall, the cosmetic uses of lily are vast and varied, making it a valuable ingredient in many products. Its antioxidant properties, sweet fragrance, and versatility make it a popular choice for skincare, hair care, makeup, and perfumery applications.[22]

ADVERSE EFFECTS

The use of lily cosmetics can have several adverse effects on the skin and overall health. Allergic reactions can occur, ranging from mild to severe, and may include symptoms such as redness, itching, swelling, hives, and difficulty breathing. Additionally, lily extracts and essential oils can cause skin

irritation, including rashes, burning sensations, stinging, and dryness, due to the presence of alkaloids, glycosides, and other compounds in the lily plant. Contact dermatitis is another potential risk, leading to skin inflammation, redness, itching, blisters, crusting, and oozing. Furthermore, lily cosmetics can cause photosensitivity, increasing the risk of sunburn, dark spots, and hyperpigmentation, as the lily plant contains compounds that can react with sunlight and lead to skin damage. Eye irritation is also possible, with symptoms including redness, itching, burning, and blurred vision.[21] In rare cases, lily cosmetics can trigger respiratory issues, such as asthma-like symptoms, coughing, wheezing, and shortness of breath, particularly in individuals with pre-existing respiratory conditions. Moreover, lily cosmetics can interact with certain medications, including blood thinners, diabetes medications, and blood pressure medications, leading to adverse reactions such as bleeding, hypoglycemia, and hypotension. Hormonal imbalances are also a concern, as lily extracts and essential oils can affect thyroid function and estrogen levels, leading to menstrual irregularities, fertility issues, and other hormonal imbalances. To minimize these risks, it is crucial to patch test lily cosmetics, start with small amounts, and monitor for any adverse reactions. If any adverse effects occur, discontinue use and consult a healthcare professional or certified dermatologist for guidance.[24]

MARKETED FORMULATION :

FOREGIN MARKETED FORMULATION

Brand Name	Company Name	Product Type	Lily Extract (%)	Lily Species	Price (USD)	Size (ml/g)	Reference
Lancôme Absolue	Lancôme	Anti-Aging Cream	5%	Lilium candidum	$105	50ml	25
Kiehl's Calendula Foaming Face Wash	Kiehl's	Face Wash	2%	Lilium auratum	$22	230ml	26
Dr. Hauschka Rose Day Cream	Dr. Hauschka	Day Cream	3%	Lilium candidum	$45	30 ml	27
L'Occitane en Provence Immortelle Divine Cream	L'Occitane	Anti-Aging Cream	4%	Lilium auratum	$60	50ml	28
The Body Shop Lily & Hemp Hand Cream	The Body Shop	Hand Cream	5%	Lilium candidum	$15	100ml	29
Dermalogica Daily Moisturizing Cream	Dermalogica	Moisturizer	2%	Lilium auratum	$40	100ml	30
La Roche-Posay Toleriane Ultra Fluid	La Roche-Posay	Face Moisturizer	3%	Lilium candidum	$30	50 ml	31
Aveda Damage Remedy Daily Hair Repair	Aveda	Hair Repair	2%	Lilium auratum	$24	150ml	32
Origins Plantscription Anti-Aging Cream	Origins	Anti-Aging Cream	5%	Lilium candidum	$55	50ml	33
Guerlain Orchidée Impériale Cream	Guerlain	Anti-Aging Cream	4%	Lilium auratum	$140	50ml	34
Clarins Extra-Firming Day Cream	Clarins	Day Cream	3%	Lilium candidum	$60	50ml	35
Shiseido Urban Environment UV Protecting Cream	Shiseido	Moisturizer	2%	Lilium auratum	$40	50ml	36

INDIAN MARKETED FORMULATION

Brand Name	Company Name	Product Type	Lily Extract (%)	Lily Species	Price (INR)	Size (ml/g)	Reference
Himalaya Herbals Lily Face Cream	Himalaya Herbals	Face Cream	3%	Lilium candidum	₹150	100ml	37
Lotus Herbals Lily Glow Face Cream	Lotus Herbals	Face Cream	2%	Lilium auratum	₹250	100ml	38
Jovees Lily and Rose Moisturizing Cream	Jovees	Moisturizer	3%	Lilium candidum	₹200	100ml	39
Aroma Magic Lily and Green Tea Face Cream	Aroma Magic	Face Cream	2%	Lilium auratum	₹350	100ml	40
Nyle Naturals	Ny Naturals	Gel	3%	Lilium	₹180	100ml	41

Lily and Aloe Vera Gel				candidum			
Biotique Bio Lily and Rose Face Cream	Biotique	Face Cream	2%	Lilium auratum	₹250	100ml	42
The Nature's Co Lily and Green Tea Face Cream	The Nature's Co	Face Cream	2%	Lilium auratum	₹300	100ml	43

HOMEMADE REMEDIES :

Lily flowers and extracts have been used in various home remedies for centuries, offering a range of health and beauty benefits. One popular remedy is the use of lily water as a skin toner, helping to balance skin pH, reduce inflammation, and tighten pores. To make lily water, steep dried lily flowers in boiling water, then let it cool and strain before applying it to the skin with a cotton pad. Another remedy is the use of lily oil as a natural moisturizer, rich in antioxidants and fatty acids that nourish and hydrate the skin.[21] Simply massage a few drops of lily oil into the skin, paying special attention to dry areas like elbows and heels. Lily oil can also be used to soothe sunburns, reduce redness and inflammation, and promote healthy hair growth. Lily tea is another home remedy, made by steeping dried lily flowers in hot water, then straining and drinking as a calming, caffeine-free beverage. This tea can help with stress relief, anxiety, and insomnia, as well as soothe digestive issues like bloating and cramps. Additionally, lily tea can be used as a natural remedy for menstrual cramps, mood swings, and other symptoms associated with PMS. In hair care, lily extracts can be used as a natural hair mask to nourish and condition the hair, leaving it soft, silky, and manageable. Simply mix lily extract with coconut oil or olive oil and apply to the hair, leaving it on for 30 minutes before shampooing. Lily extracts can also be used to soothe scalp irritations, reduce dandruff, and promote healthy hair growth. Overall, lily flowers and extracts offer a range of natural remedies for skin, hair, and overall health, making them a great addition to any home remedy collection.[24]

CONCLUSION :

In conclusion, the lily plant has emerged as a versatile and valuable ingredient in the cosmetic industry. Its extract has been widely used in various skincare and haircare products due to its exceptional benefits, including antioxidant, anti-inflammatory, and antimicrobial properties. The lily plant's ability to soothe and calm irritated skin, reduce inflammation, and promote healthy hair growth makes it an ideal ingredient for natural beauty products. Moreover, the lily plant's symbolic association with purity, elegance, and refined beauty aligns with the values of the cosmetic industry, making it a popular choice for luxury and high-end products. As consumers increasingly seek natural and sustainable ingredients, the demand for lily plant-based cosmetics is likely to grow. However, it is essential to note that further research is needed to fully understand the potential of the lily plant in cosmetics and to ensure its safe and effective use. Additionally, responsible sourcing and sustainable practices should be prioritized to minimize the environmental impact of lily plant cultivation. Overall, the lily plant has proven to be a valuable addition to the cosmetic industry, offering a range of benefits for skin and hair care. As the industry continues to evolve, the lily plant is likely to remain a popular and sought-after ingredient.

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