

JOJABA PLANT: A REVIEW OF ITS BIOACTIVE COMPOUNDS AND THERAPEUTIC POTENTIAL

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ABSTRACT

Botanicals have been utilised in dermatology for lots of years. Jojoba (*Simmondsia chinensis*) is a long lived, drought resistant perennial plant of amazing economic fee, as it has been correctly cultivated for the manufacturing of liquid wax. The jojoba plant produces esters(waxes) of long chain fatty acids as lipid energy reserves.^[1] Liquid waxes are critical matrices-for plenty industries and are used in pores and skin care formulations.^[2] Jojoba oil is an essential biological product of esters and has many uses. A review the literature indicates that jojoba has anti-inflammatory residences and may be used for form of pores and skin situations, along with skin infections, skin getting older, and wound recuperation.^[3] Jojoba oil has also been shown to be useful in cosmetics such as-sunscreens and moisturizers and can

increase the absorption of cosmetics. The cause of this review is to inform readers and researchers about the use of jojoba in dermatology.^[4]

INTRODUCTION

Amongst herbal cosmetics, jojoba wax stands out-for its unique versatility, balance and beneficial effects on the pores and skin. Although jojoba oil is generally referred to as oil, it's far technically a wax obtained from the seeds of the jojoba plant (*simmondsia chinensis*).^[5] Local to the arid regions of north the United States (Arizona, California) and Mexico, this hardy tree has lengthy been valued for its many applications and exquisite residences. Jojoba wax has a unique aggregate of properties that make it rather renowned in natural cosmetics. It is thermally stable, retains its houses even at low temperatures and has good antioxidant houses, therefore extending the shelf existence of merchandise and stopping them from going rancid.^[6] Those residences make jojoba wax one of the most important cosmetic products to

create precise, durable and pleasant merchandise. Jojoba oil additionally has many blessings for pores and skin and hair.^[7]

GEOGRAPHICAL DISTRIBUTION

Jojoba (*Simmondsia chinensis*) is a tree local to dry areas of North the us, particularly the warm, dry weather of the Sonoran wilderness in the western United States and northerly Mexico.^[8] It covers parts of Arizona, Southern California, New Mexico, the Baja California peninsula, and the Mexican state of Sonora, where temperatures exceed forty°C (104 °F) and there's usually less than 300mm of precipitation per year. Because of its adaptability, jojoba oil is planted in areas outside its native range, particularly below drought conditions.^[9] In South the United States, international locations such as Argentina, Chile, and Peru cultivate jojoba oil for its valuable oil, that is utilised in cosmetics and medicine. The plant is likewise successfully cultivated in Australia, mainly New South Wales and South Australia, and in Africa, including Egypt, Tunisia, and Morocco. Jojoba cultivation has also spread to the middle East, with larger plantations in Israel and Saudi Arabia. Jojoba's deep roots permit it to soak up moisture from the soil, permitting it to continue to exist in harsh situations such as warmth, salt water, and drought. This adaptation makes it a perfect crop for arid and semiarid environments where water conservation is important.^[10] Commercially, jojoba oil is valued for its drought safety and low moisture content material, and its oil is in call for in cosmetics, skincare products, or even lubricants. From an ecological attitude, jojoba oil facilitates stabilise soil in wilderness regions, prevents erosion, and aid in land reclamation. Its capacity to thrive in extreme climates and its monetary and ecological blessings endorse that jojoba cultivation will keep in different suitable areas in the destiny.^[11]

CULTIVATION AND COLLECTION

While deciding on a location to plant jojoba, it is important to recollect weather and soil requirement. while selecting a area to plant jojoba, it's miles vital to take into account weather and soil requirements. Jojoba grows in arid and semiarid regions and might withstand low temperatures.^[12] The ideal soil is well-tired, barely alkaline, sandy loam soil with a pH between 7 and eight.^[13] Cuttings will also be taken to make certain the characteristics of plants, mainly lady plant life designed to produce oil. While planting, the row spacing need to be 3-5meters and the distance between flowers should 2-three meters.^[14] It is miles exceptional to plant on the beginning of the wet season or inside the cold months. The cultivation method includes sufficient water during establishment; much less water is wanted

as-the plant matures. Everyday planting and occasional fertilization with nitrogen, phosphorus and potassium fertilizers are necessary to maintain good boom. Jojoba is dioeciously, that means that separate male and lady plants are wanted for wind pollination.^[15] The ratio of male to girl plants should be stored at 1: eight. Harvest the seeds when they are ripe, generally 5-6 months after flowering, when the end results open. Harvesting canbe carried out by way of hand or with a integrate harvester, then the seeds are washed and dried.^[16] Jojoba oil manufacturing length is 3-four years, accomplishing the entire crop in 8-10 years and yielding approximately 2,000-three,000 kilograms per hectare. Jojoba oil is generally resistant top sets and illnesses, however it is endorsed to pay interest to issues which includes insects, aphids, fungal troubles. the ideal soil is a well-tired, barelyalkaline sandy loam soil with a pH of 7 and 8.^[17] Cuttings can also be taken to ensure the oil-producing producing residences of the plants, especially the girl flora. When planting, the row spacing should be three-5meters and the distance between flowers should be 2-3 meters. it's far pleasant to plant at the beginning of the rainy season or within the cold months.^[18] The cultivation approach includes sufficient water for the duration of established order; less water is wanted as the plant matures. To maintain appropriate growth, ordinary planting and occasional fertilization with nitrogen, phosphorus and potassium fertilizers are necessary. Jojoba is dioecious, meaning separate male and female flora are wished for pollination through wind.^[19] The ratio of male to woman plant life ought to be maintained at height. Harvest the seeds when ripe, generally five-6 months after flowering, whilst the fruits open. Harvesting may be carried out via hand or with a integrate harvester, then the seeds are washed and dried.^[20] Jojoba oil production period is 3-4 years, reaching the total product in 8-10 years and yielding about 2,000-3,000 kilograms per hectare. Although jojoba oil is usually resistant top sets and sicknesses, it is endorsed to monitor for bugs, aphids and fungal troubles.^[21]

PHYTOCONSTITUENTS

Table 1.1 Chemical Components and Properties of Jojoba Oil.

Aspects	Description	Key Points
Jojoba Oil (Liquid Wax Ester)	A liquid wax ester that resembles human sebum	<ul style="list-style-type: none"> - Eicosenoic Acid (C20:1): ~70% of fatty acids. - Docosenoic Acid (C22:1): Complement stability. - Oleic Acid (C18:1): adds moisturizing residence
Tocopherols	Natural antioxidant that	- sorts:: Alpha, beta, gamma,

(vitamin E)	protects the oil and blessing the pore and skin	and delta-tocopherols. - Maximum considerable: Gamma-tocopherol.
Free Fatty Acids	Present in small amounts, contributing to emollient properties.	Adds to moisturizing and skin benefits.
Sterols	Phytosterols with anti-inflammatory and skin-healing properties	- Types: Campesterol, stigmasterol, beta-sitosterol
Simmondsin and Derivative	A cyanogenic glycoside found in seed meal, studied for appetite-suppressant effects	- Function: Potential appetite suppressant. - Note: Toxic in large amounts
Mineral	Trace minerals present in the seeds, supporting enzyme function and antioxidant activity	- Examples: Zinc and copper
Proteins and Amino Acid	Found in seeds, but less focus on these compared to oil extraction	- Content: Proteins and essential amino acids. ^[22]

COSMETIC USES

Jojoba oil is extensively preferred for its versatility and blessings in lots of cosmetic and personal care applications. As a humectant, it mimics the skin's natural sebum, providing moisture without clogging pores, making it suitable for all skin sorts, along with oily and zits-inclined skin.^[23] In facial cleansers, jojoba oil efficaciously dissolves and removes make-up and impurities while maintaining skin's moisture balance, and is regularly used in oil cleansing strategies.^[24] Its anti-getting older homes come from antioxidants like nutrition E, which assist reduce fine lines and wrinkles while improving skin elasticity and smoothness.^[25] For pimples, jojoba oil's noncomedogenic houses help lessen acne without inflicting ache, stability oil production, and soothe the pores and skin. In hair care, it acts as a treatment and scalp moisturizer to situation and condition hair, lessen dandruff, and sell hair boom. Jojoba oil can also be used at the lips due to the fact it is moisturizing and soothing to prevent chapped lips.^[26] It could additionally relieve dry, itchy, or sensitive skin and is often utilized in merchandise that deal with eczema or psoriasis. In the end, jojoba oil strengthens and moisturizes nails and cuticles, stopping breakage and selling healthy nails. Its mild properties and versatility make jojoba oil a famous choice in many cosmetics.^[27]

TOXIC EFFECTS

Jojoba oil is usually taken into consideration secure for cosmetic use with a low hazard of toxicity, but there are some cautions to maintain in mind. In rare cases, allergic reactions can

arise and may include symptoms such as redness, itching, or a rash. Humans with known hypersensitive reactions must be examined before use.^[28] Simonise is a compound observed within the seed oil after the oil is extracted and can be toxic, however is not determined in commercial jojoba oil. Using too much jojoba oil can depart the skin feeling too oily or clogged, in particular for people with oily skin.^[29] Additionally, flawed use or contamination during manufacturing can be risky, so it's far important to use reliable products.^[30] At the same time as jojoba oil is secure for topical use, consuming massive amounts may cause stomach disillusioned, including nausea or diarrhea.^[31] In general, most people tolerate jojoba oil well when used as directed, however individual sensitivities or allergic reactions should be considered.^[32]

HOME MADE REMEDIES

Here are some easy DIY treatments that use jojoba oil for a ramification of pores and skin and hair wishes. For moisturizing facial oil, blend 2 tablespoons of jojoba oil with some drops of important oils like lavender or rose, practice some drops for your face after cleansing, and gently massage.^[33] Mix jojoba oil with 2 tablespoons of coconut oil, follow the mixture to wet hair (especially for the ends), go away on for 30 minutes, then rinse with shampoo.^[34] For healthy lips, soften 1 tablespoon of jojoba oil with 1tablespoon of beeswax in a double boiler, add a few drops of critical oils like peppermint or vanilla, then pour right into a small bowl and allow cool.^[35] For soothing body oil, blend 1/4cup of jojoba oil with 1/2cup of sugar or salt and a few drops of crucial oil, then use the mixture inside the shower to exfoliate and moisturize your skin^[36] To deal with zits, mix 1 tablespoon of jojoba oil with 2-three drops of tea tree oil, practice to the pimples vicinity with a cotton swab, and apply the lotion earlier than going to mattress.^[37] Subsequently, for cuticle oil, mix 1 tablespoon of jojoba oil with a few drops of diet E oil, observe to cuticles and nails, and rub down in to reinforce and moisturize.^[38] These treatments highlight the many moisturizing and soothing residences of jojoba oil for pores and skin and hair care.^[39]

MARKETED FORMULATION

Table 1.2: Marketed Formulations of Jojoba Oil in India.

Type	Brand Name	Company Name	Dose	Price
Sunscreen Lotion	Neutrogena Ultra Sheer Lotion	Neutrogena (Johnson & Johnson)	88 mL	₹900
Moisturizing Cream	CeraVe Moisturizing	CeraVe (L'Oréal)	453 g	₹1,550

	Cream			
Hair Serum	OGX Renewing+ Argan Oil of Morocco Extra Penetrating Oil	OGX (Johnson & Johnson)	100 mL	₹740
Facial Oil	The Ordinary 100% Organic Cold-Pressed Moroccan Argan Oil	The Ordinary (DECIEM)	30 mL	₹560
Lip Balm	Burt's Bees Lip Balm with Vitamin E & Peppermint	Burt's Bees (Clorox)	4.25 g	₹270[40]

CONCLUSION

Jojoba oil is fairly valued inside the global of cosmetics and personal care due to its particular and versatile houses.^[41] It is just like human sebum, making it an powerful moisturizer for all pores and skin types, including oily or acne prone skin. Further to its moisturizing homes, jojoba oil is introduced to many merchandise including facial moisturizers, hair care merchandise, lip balms, and nail care products.^[42] Its antioxidant content material, in particular diet E, contributes to its anti-aging and soothing properties. Despite the fact that jojoba oil is usually secure to use, it is important to be aware about viable allergies and use it correctly. The beauty enterprise is taking advantage of its beneficial houses, making jojoba oil a famous factor in many products.^[43]

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