

Purslane in Cosmetics: A Review

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Abstract: Purslane is a real power herb that strengthens and protects our body and skin against damaging environmental influences. Purslane (*Portulaca oleracea*) is an herbaceous plant belongs to the family *Portulacaceae*. Purslane is an annual succulent and widely distributed around the globe. This plant possesses mucilaginous substances which are of medicinal importance. It has potential benefits in skin care. Purslane has incredible antioxidant, antimicrobial, anti-inflammatory and wound healing properties and brightens the complexion and even prevents future signs of aging. The key ingredients are omega-3 fatty acid, vitamin A, E and B complex. This review helps to create an interest in purslane in developing new formulation in skin care.

Keywords: purslane, antioxidant, prevent aging, skin care, formulation

1. Introduction

Portulaca oleracea, known as purslane plant naturally found as a weed in field crops and lawns. Purslane is an annual succulent. It is an important component of green salad and as vegetable juice. Its medicinal value is evident from its use for treatment of pain and edema. Purslane has strong regenerative effects on a cellular level and is loaded with antioxidants (beta carotene, C, and vitamin E), and it also contains a high amount of the omega-3 fatty acids, which helps to reduce wrinkles [1]. All these ingredients are powerful antioxidants that can help to brighten the complexion and even prevent future signs of aging by reducing UV-induced damage [2]. Purslane is a key to a great anti-ageing skin care regimen. It should reduce inflammation in the skin, improve overall blood flow, and stimulate cell repair, which decreases the appearance of scars and wrinkles. This plant is also pharmacologically studied for its anti-fungal, anti-inflammatory, anti-oxidant, anti-microbial and wound healing properties.

2. Biological Sources

This herbaceous leafy vegetable belongs to the family of **Portulacaceae** and scientifically known as *Portulaca oleracea* (Purslane). This hardy herb plant requires relatively less water and soil nutrients and grows well sunny climates. The plant grows up to 12-15 cm in height as a low-lying spread [3].

3. Vernacular Name

Hindi: Lunia
Sanskrit: Ghotaka
Punjabi: Dhamni
Bengali: Nunia sag
Gujarati: Luni
Tamil: Koli-k-kirai
Malayalam: Koluppa
Telugu: Peddapavilikura
Marathi: Ghol

4. Geographical Sources

Purslane is native to Indian sub-continent and now distributed widely across the continents but actually as a wild weed. There exist varieties of pusley with variation in leaf size, thickness, and leaf arrangement and pigment distribution. Purslane is widely grown in many Asian and European regions as a staple leafy vegetable. Its leaves appear thick, mucilaginous, and have a slightly sour and salty (piquant) taste. Leaves and tender stems are edible. In addition to succulent stems and leaves, its yellow flower buds are also favored, especially in salads [3]. The purslane growing season is limited to the hottest months of the year (June to September). Plants are sensitive to cold and are killed by chilling temperatures [4].

5. Morphology

Purslane is an annual succulent, 10-40 cm tall. The stems can either grow horizontally or vertically. Stems are cylindrical, up to 30 cm long, 2-3 mm in diameter, green or red, swollen at the nodes, smooth, glabrous apart from the leaf axils, and diffusely branched, and the internodes are 1.5–3.5 cm in length. The dark green egg-shaped leaves are arranged opposite or alternate. Leaves are flat, fleshy, having variable shapes, obovate, 1–5 cm long, and 0.5–2 cm across, obtuse or slightly notched at the apex, tapering at base, sessile or indistinctly petiolate, glabrous, smooth, and waxy on the upper surface, with entire margin, small stipules, and cluster of hairs up to 1 mm long. Leaves are green or green with red margin [1], [5]. The fruit is 4-9 mm large, oval shaped capsule containing numerous small, shiny black seeds [1]. It is the leaves that are used in cosmetics and herbal medicines.



Figure 1: *Portulaca oleracea*

6. Taxonomical Classification

Kingdom:	<u>Plantae</u>
Clade:	<u>Angiosperms</u>
Clade:	<u>Eudicots</u>
Order:	<u>Caryophyllales</u>
Family:	<u>Portulacaceae</u>
Genus:	<u>Portulaca</u>
Species:	<u><i>P. oleracea</i></u>

7. Composition

Purslane is a very good source of alpha-linolenic acid. Alpha-linolenic is an omega-3 fatty acid. Omega-3 fatty acids belong to a group of polyunsaturated fatty acids essential for maintenance of a healthy skin [5]. The leaves contain more omega-3 fatty acids (α -linolenic acid) than any other leafy vegetable plant. 100 grams of fresh purslane leaves provide about 350 mg of α -linolenic acid [3]. Omega-3 fatty acids greatly benefit skin by regulating oil production to boost hydration and prevent acne, and by delaying the skin's aging process to stave off wrinkles.

It is rich in vitamin A which is a natural antioxidant. Purslane contains the highest content of vitamin A among green leafy vegetables [5]. Antioxidants protect skin by limiting the production of free radicals, which can damage skin cells. It also contains two types of betalain alkaloid pigments, the reddish betacyanins (visible in the coloration of the stems) and the yellow betaxanthins (noticeable in the flowers and in the slight yellowish cast of the leaves). Both of these pigment types are potent antioxidants and have been found to have anti-mutagenic properties [6]. Antioxidants in purslane can do a lot for the health and appearance of your skin, including reducing the signs of aging. It also contains vitamin C and B-complex vitamins like riboflavin, niacin, and pyridoxine and many minerals (magnesium, potassium, and nitrate) [5], [1].

Table 1: Purslane (*Portulaca oleracea*) (Nutritive value per 100 g) [5].

Principle	Nutrient value	Percentage of RDA DA
Energy	16 Kcal	1.5%
Carbohydrates	3.4 g	3%
Protein	1.30 g	2%
Total Fat	0.1 g	0.5%
Cholesterol	0 mg	0%
Vitamins		
Folates	12 μ g	3%
Niacin	0.480 mg	3%
Pantothenic acid	0.036 mg	1%
Pyridoxine	0.073 mg	5.5%
Riboflavin	0.112 mg	8.5%
Thiamin	0.047 mg	4%
Vitamin A	1320 IU	44%
Vitamin C	21 mg	35%
Electrolytes		
Sodium	45 mg	3%
Potassium	494 mg	10.5%
Minerals		
Calcium	65 mg	6.5%
Copper	0.113 mg	12.5%
Iron	1.99 mg	25%
Magnesium	68 mg	17%

Manganese	0.303 mg	13%
Phosphorus	44 mg	6%
Selenium	0.9 μ g	2%
Zinc	0.17 mg	1.5%

8. Use of Purslane in Cosmetics field

- Treatment of wrinkles
- Ameliorate signs of dermatological aging
- Improve aesthetic appearance of skin
- Treating fine lines
- Skin protection from UV-rays
- An exfoliation promoter, and an antioxidant
- Minimizes sunburning and tanning
- Remove scars and blemishes
- Iron and copper also aid in improving hair growth

Purslane can be used in following ways

Pick up some purslane supplements that contain dried and powdered leaves. Empty 4-5 capsules in a cup and pour on 1/2 cup boiling water. Stir and let the mixture rest for 1 hr. Strain and bottle the resulting purslane extract. For sunburn, pour it in a spray bottle, add 1 cup of water and 1 teaspoon olive oil. Shake and spray for genuine sunburn relief.

It can also be used as the purslane extract as a base for a mask. For dry skin whip up one teaspoon extract with an egg yolk (For oily skin, use the egg white in the same way). Put the egg mixture on the face and allow the mask to dry for 30 minutes. Rinse off and enjoy a cool, calm complexion [7].

8.1 Anti oxidant property

Purslane could provide multiple minerals as well as antioxidants. Higher amounts of alpha-tocopherol, ascorbic acid, and beta-carotene were present in the leaves of purslane. Vitamin C (ascorbic acid) and beta-carotene have been reported to possess antioxidant activity, because of their ability to neutralize free radicals. Leaves had the highest content of beta-carotene, ascorbic acid, and DPPH, followed by flowers and stems [5]. The beta-carotene content in the leaf was two times higher than in the stems and slightly higher than in the flowers [12]. Purslane is amongst the group of plants with high oxalate contents. Melatonin is a ubiquitous and versatile molecule that exhibits most of the desirable characteristics of a good antioxidant [13].

Kamal Uddin *et al* (2012) had reported the antioxidant activity of *Portulaca oleracea* over the different stages by using 1, 1-diphenyl-2-picrylhydrazyl (DPPH), ferric reducing antioxidant power (FRAP) assays and ascorbic acid content. There was a correlation between the result of total phenol content 174.5 ± 8.5 to 348.5 ± 7.9 mg GAE/100g and ascorbic acid equivalent antioxidant activity 60.5 ± 2.1 to 86.5 ± 3.9 mg/100 and between DPPH scavenging IC_{50} (1.30 ± 0.04 to 1.71 ± 0.04 mg/ml) and ferric reducing antioxidant power assay ($r^2 > 0.9$). The concentration of Ca, Mg, K, Fe and Zn increased with plant maturity. Calcium (Ca) was negatively correlated with sodium (Na) and chloride (Cl) but positively correlated with magnesium (Mg), potassium (K), iron (Fe) and zinc (Zn). It was concluded that mature plant of

Portulaca oleracea had higher total phenol content and antioxidant activities than plant at immature stages [14].

8.2 Anti microbial property

Antimicrobial play an important role in making sure that products are free of microorganisms during storage and after they are opened. Ramesh Londankar and Hanumantappa (2011) had reported antimicrobial activity in aerial parts of chloroform and ethanolic extract of *Portulaca oleracea* by agar diffusion method against 5 bacteria and three fungi (bacteria like *Staphylococcus aureus*, *Bacillus cereus*, *Klebsiella pneumonia* and fungi like *Aspergillus fumigatus* and *Nerospors crassa*). Ethanolic crude extract showed maximum effect on organisms like *Staphylococcus aureus*, *Klebsiella pneumonia* and *Nerospors crassa*. Whereas chloroform extract showed moderate effect on *Klebsiella pneumonia*, *Aspergillus niger* and *Nerospors crassa*. The results of this present study supported the folklore usage of the studied plant and suggest that this plant extract posse's compound which is having antimicrobial properties and helps in developing antimicrobial agent [15].

9. Skin care Benefits

Purslane owes its anti-aging properties to vitamin C, copper and manganese, powerful antioxidants that stimulate the production of collagen. Collagen is the ultimate anti-wrinkle remedies. Omega-3s are essential for keeping skin youthful. These fats help keep skin-cell walls strong and flexible. Without them, cell membranes become stiff. Purslane is rich in one special type of omega-3 fat called ALA (alpha-linolenic acid). Research reveals that ALA is the best type of omega-3 for keeping your skin looking young. Purslane is also rich in vitamins E and C, carotenes and other antioxidants. These compounds help reduce oxidative damage to skin cells that can lead to fine lines, wrinkles, dark spots and other signs of aging [12].

The whole plant is considered antiphlogistic (takes the heat out), a bactericide, antidiabetic, anaphrodisiac (opposite to aphrodisiac), emollient, calmative, diuretic, and refreshing agent [13], [14]. Sanja et al has proved the antioxidant activity of the methanol extract using methods such as DPPH free radical scavenging, reducing power estimation by FeCl₃, nitric oxide free radical scavenging, and super oxide scavenging activity [15]. The extract has a tendency to scavenge the free radicals involved in the ageing process and skin wrinkling and thus may provide some photo protective action.

10. Future Prospective

- As purslane is an herb having various beneficial properties, it can be used to make various cosmetic preparations.
- Purslane contains Omega-3 fatty and betalain alkaloid pigments, antioxidant compounds that protects against aging. It improves the appearance of skin by removing toxins and stimulating the circulation, resulting in the delivery of more nutrients to the skin. Thus purslane extract can be incorporated to formulate anti-aging cream, face serum.

- As purslane is considered antiphlogistic and refreshing agent. It can be used in formulation of sunscreen as well as face mask can be formulated.

11. Conclusion

It is quite evident from this review that *Portulaca oleracea* (purslane) contains a number of phytoconstituents, which reveal its use for various cosmetics purposes. Presence of high content of antioxidants (vitamins A and C, alpha-tocopherol, beta-carotene) and omega-3 fatty acids and its wound healing and antimicrobial effects as well as its traditional use in the topical treatment of inflammatory conditions suggest that purslane is a highly likely candidate as a useful cosmetic ingredient and in pharmacy.

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