



ISSN 2278- 4136

ZDB-Number: 2668735-5

IC Journal No: 8192

Volume 1 Issue 4

Online Available at www.phytojournal.com

Journal of Pharmacognosy and Phytochemistry

Aloe vera: The Miracle Plant Its Medicinal and Traditional Uses in India

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Aloe vera is the oldest medicinal plant ever known and the most applied medicinal plant worldwide. Extracts of *Aloe vera* is a proven skin healer. *Aloe vera* help to soothe skin injuries affected by burning, skin irritations, cuts and insect bites, and its bactericidal properties relieve itching and skin swellings. It is known to help slow down the appearance of wrinkles and actively repair the damaged skin cells that cause the visible signs of aging. Aloe is a powerful detoxifier, antiseptic and tonic for the nervous system. It also has immune-boosting and anti-viral properties. Research has proven that adding *Aloe vera* to one's diet improves digestion. As a general health tonic. *Aloe vera* is a useful source of vitamins. *Aloe vera* Gel contains a large range of vitamins - even vitamin B₁₂, Vitamin A, contains B-Group vitamins, Vitamin C, Vitamin E and folic acid. *Aloe vera* Gel contains important ingredients including 19 of the 20 amino acids needed by the human body and seven of the eight essential ones that just cannot be made.

Keyword: *Aloe vera*, Nervous System, Immune-Boosting, Anti-Viral Properties. Skin Healer.

1. Introduction

Aloe vera has been used externally to treat various skin conditions such as cuts, burns and eczema. It is alleged that sap from *Aloe vera* eases pain and reduces inflammation. It has antiseptic and antibiotic properties which make it highly valuable in treating cuts and abrasions. It has also been commonly used to treat first and second degree burns, as well as sunburns and poison oak, poison ivy, and poison sumac infections, and eczema.

It can also be used as a hair styling gel and works especially well for curly or fuzzy hair. It is also used for making makeup, moisturizers, soaps, sunscreens, shampoos and lotions. *Aloe vera* gel

is useful for dry skin conditions, especially eczema around the eyes and sensitive facial skin. Its juice may help some people with ulcerative colitis, an inflammatory bowel disease. Aloe has been marketed as a remedy for coughs, wounds, ulcers, gastritis, Diabetes, Cancer, headaches, arthritis, immune-system deficiencies, and many other conditions when taken internally. However, the general internal use is as a laxative. The lower leaf of the plant is used for medicinal purpose. If the lower leaf is sliced open, the gel obtained can be applied on the affected area of the skin. Aloe (*Aloe vera*) is an important and traditional medicinal plant belonging to the family Liliaceae. It is indigenous to Africa and

Mediterranean countries. It is reported to grow wild in the islands of Cyprus, Malta, Sicily, Canary cape, Cape Verde and arid tracts of India. This is a hardy perennial tropical plant that can be cultivated in drought prone areas and is one of the crops whose potential is yet to be exploited, despite being identified as 'a new plant resource with the most promising prospects in the world'. In India, it is scattered in the wild, along the coast of southern India.

1.1 Chemical Constituents:

Aloe contains two classes of Aloins: (1) nataloins, which yield picric and oxalic acids with nitric acid, and do not give a red coloration with nitric acid; and (2) barbaloins, which yield aloetic acid ($C_7H_2N_3O_5$), chrysammic acid ($C_7H_2N_2O_6$), picric and oxalic acids with nitric acid, being reddened by the acid. This second group may be divided into a-barbaloins, obtained from Barbados aloes, and reddened in the cold, and b-barbaloins, obtained from Socotrine and Zanzibar aloes, reddened by ordinary nitric acid only when warmed or by fuming acid in the cold. Nataloin forms bright yellow scales. Barbaloin forms yellow prismatic crystals.



Fig 1: *Aloe vera*

The plant produces at least 6 antiseptic agents such as lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulphur. All of these substances are recognized as antiseptics because they kill or control mold, bacteria, fungus and viruses, explaining why plant has the ability to eliminate many internal and external

infections. Lupeol and salicylic acid present in the juice are two very effective pain-killers.

It contains at least three anti-inflammatory fatty acids, cholesterol, campesterol and β -sitosterol. These are highly effective in treatment of burns, cuts, scrapes, abrasions, allergic reactions, rheumatoid arthritis, rheumatic fever, acid indigestion, ulcers, plus many inflammatory conditions of the digestive system and other internal organs, including the stomach, small intestine, colon, liver, kidney and pancreas. β -sitosterol is also a powerful anti-cholesterol which helps to lower harmful cholesterol levels, helping to explain its many benefits for heart patients.

About 23 polypeptides are present in Aloe juice which helps to control a broad spectrum of immune system diseases and disorders. The polypeptides plus the anti-tumor agents, Aloe emodin and Aloe lectins, are now also used in treatment of cancer.

1.2 Medicinal Properties

Aloes have long been in use for several diseases, particularly connected with the digestive system; they have also been used for wounds, burns and skin problems. The term Aloes stand for the dried juice, which flows from transversely cut bases of its leaves. It is the best herbal answer to support the health and healing mechanisms of the body because it does not heal, rather it feeds the body's own systems in order for them to function optimally and be healthy.

Pharmacologically it is an immunity booster and detoxifies the system. It is recommended in adjuvant therapy with antibiotics, NSAIDs (Non-steroidal Anti-Inflammatory Drugs) and chemotherapy to eliminate drug induced gastritis and other adverse effects. Useful in various diseases such as type II diabetes, arthritis, eye disease, tumor, spleen enlargement, liver complaints, vomiting, bronchitis, asthma, jaundice and ulcers. Relieves constipation, maintains a good gastric pH, helps in inflammatory bowel diseases, non-ulcer dyspepsia, gastric and duodenal ulcers. A dietary supplement in pre and post-operative patients,

postmenopausal women and in cases of osteoporosis.

1.3 Cultivation

1.3.1 Soil

It is grown successfully in marginal to sub marginal soils having low fertility. The plants have tendency to tolerate high pH with high Na and K salts. However, it is observed that its growth was faster under medium fertile heavier soil such as black cotton soils of central India. Though well drained loam to coarse sandy loam soils with moderate fertility and pH upto 8.5 are preferred for its commercial cultivation.

1.3.2 Varieties

Several species of the genus have been in use under the common name of Aloe, viz. *Aloe vera* Linn. *A. barbadensis* Miller, *A. ferox* Miller, *A. chinensis* Baker, *A. indica* Royle, *A. perryi* Baker, etc., belonging to family liliaceae. Among these, *A. vera* Linn. syn. *A. barbadensis* Miller is accepted unanimously as the correct botanical source of Aloe. In most reference books, *A. barbadensis* Miller is regarded as the correct name but as per the WHO monograph, *A. vera* linn is accepted as the legitimate name for this species.

1.3.3 Land preparation

The soil should not be disturbed too deep as the root system of Aloe does not penetrate below 20-30 cm. depending upon the soil type and agro-climatic condition, 1-2 ploughing followed by leveling may be done. Field may be divided into suitable sized plots (10-15 m × 3 m) considering the slope and source of irrigation available.

1.3.4 Propagation

It is propagated by root suckers or rhizome cuttings. For this purpose, medium sized root suckers are identified and carefully dug out without damaging the parent plant at the base and directly planted in the main field.

1.3.5 Planting time

Suckers should be planted in July – August during monsoon season to get better field survival

and subsequent growth of the plants. However, under irrigated condition, planting can be done around the year except in winter months (November – February).

1.3.6 Manuring

The crop responds well to the application of farm yard manure and compost. During the first year of plantation, FYM @20 t/ha is applied at the time of land preparation and the same is continued in subsequent years. Besides vermicompost @2.5 tonnes/ha can also be applied.

1.3.7 Spacing and Planting

Suckers are planted in about 15 cm deep pits made just at the time of planting at 60×60 cm apart. After planting of suckers, the soil around the root zone must be firmly pressed and drainage must be made proper to avoid water stagnation. About 28000 – 34000 suckers are needed for one hectare planting.

1.3.8 Irrigation

Aloe can be successfully cultivated both under irrigated and rainfed conditions. Provision of irrigation immediately after planting and during summer season will ensure good yield. However, the plants are sensitive to water logged conditions.

1.4 Plant protection

Not much problems of insect pests and diseases have been observed in this crop from any part of the country. However, mealy bug, anthracnose and leaf spots have been reported from some parts of the country. Sometime termite problem has also been observed which can be easily managed by giving a light irrigation.

It can also be propagated through rhizome cuttings. In this case, after the harvest of the crop, the underground rhizome is also dug out and made in 5-6 cm long cuttings which has at least 2-3 nodes on them. Rooting is done in specially prepared sand beds or containers and after it starts sprouting, transplanting is carried out. On an

average, about 25000 suckers are required for a nursery of 1 ha size (10000 for 1 acre nursery).

1.5 Harvesting and Yield

Leaving the fresh and young leaves from the top, older outer leaves are generally harvested. The plants can be removed manually or with the help of a tractor-drawn disc harrow or cultivator. New leaves grow from the center upward. Offshoots are grown spontaneously next to the mother plant. Crop is ready to harvest after 18 months of sowing. Economic yields are obtained in 5 years after that it needs replanting. In India, the average yield for organically grown Aloe is about 12 tonnes/ha (on fresh weight basis).

1.5.1 Post-harvest management and Processing

Aloe should be processed within a couple of hours of harvest so as to prevent oxidation. The Aloe leaf consists of three layers, a. the outer thick green rind, b. viscous, jelly-like mucilage layer into which the vascular bundles, attached to the inner surface of the rind, protrude and c. the fillet consisting of hexagonal structures containing the fillet fluid. The pericyclic cells located at the top of the vascular bundles contains the "Yellow Sap" or "Latex". This sap is rich in aloin and similar anthraquinones having laxative properties. Aloe leaves are processed either by the traditional hand filleting method or by whole leaf method. The traditional hand-filleting method of processing of aloe leaves was developed to avoid possible contamination of the fillets with the yellow sap. In this method, the lower one inch of the leaf base (the white part attached to the large rosette stem of the plant), the tapering point (2-4") of the leaf top, and the spines located along the leaf margins are removed by a sharp knife. The knife, is then introduced into the mucilage layer below the green rind avoiding the vascular bundles and the top rind is removed. The bottom rind is similarly removed, and the rind parts, to which a significant amount of mucilage remains attached, are discarded. Another portion of the mucilage layer accumulated on the top of the filleting table is of critical concern because of the highest concentration of potentially beneficial aloe

constituents in this layer. The materials of the mucilage layer, subsequent to their synthesis, are distributed to the storage cells (cellulose-reinforced hexagons) of the fillet which is extracted in this process. The hand-filleting method is very labour intensive and therefore machines have been designed and employed which attempt to simulate the Hand-Filleting technique. In the whole leaf method, the base and tip are removed as previously delineated and then the leaf is cut into sections and ground into a particulate slurry. The material is then treated with chemicals which breaks down the hexagonal structure of the fillet releasing the constituents. These constituents are filtered by means of a series of coarse and screening filters, or passage through a juice press to get rid of the rind particles. The expressed juice is passed through various filtering columns which remove the undesirable laxative agents. This process, performed properly, can produce a constituent rich juice, virtually free of the laxative anthraquinones.

1.5.2 Indoor cultivation

Generally, Aloe grows openly in the field, but it can also be grown indoors in pots kept in sunny southern or eastern window. Containers have to be filled a quarter full with drainage material and compost consisting of two parts loam and one part coarse sand, broken bricks and crushed limestone, with a bit of bone meal added. Plant should be potted in the spring and watered carefully until established. During the summer, water can be given as soon as the soil is dry, but from September to March very little water is needed, just enough to prevent the leaves from shriveling. Over watering will kill the plant. Well-rooted plant will benefit from occasional applications of dilute liquid fertilizer in the summer. Large plants, however, do need an occasional top dressing of fresh soil in each spring; any loose soil should be removed and replaced with new. The drainage holes should be plugged up. Once established, the mother plant will send off shoots, which may be transplanted when they are at least 2.5 to 5.0 cm tall. In fact aloes do not need to be repotted often; plants in

large pots will flourish for many years without being moved. The plants take four years to reach the maturity and has a life span of about 12 years. The leaves are harvested after four years when it reaches maturity. The plants can be harvested every 6-8 weeks by removing 3-4 leaves per plant.

1.6 Health Benefits

1.6.1 Helps digestion: Drinking *Aloe vera* juice naturally allows the body to cleanse the digestive system. It encourages the bowels to move and helps with elimination if a person is constipated. And if you have diarrhea, it will help slow it down.

1.6.2 Increases energy levels: Our diets include many substances which can cause fatigue and exhaustion. Taken regularly, *Aloe vera* juice ensures a greater feeling of well-being, allowing energy levels to increase and also helps maintain a healthy body weight.

1.6.3 Builds immunity: It is especially great for those who have chronic immune disorders like polysaccharides or fibromyalgia since the polysaccharides in *Aloe vera* juice stimulate macrophages, the white blood cells that fight viruses.

1.6.4 Detoxifies: *Aloe vera* juice is a great natural aid to detox. With our stressful lives, the pollution around us and the junk foods we eat, we all need to cleanse our systems from time to time. Drinking *Aloe vera* juice provides a fantastically rich cocktail of vitamins, minerals and trace elements to help our bodies deal with these stresses and strains every day.

1.6.5 Reduces inflammation:

It improves joint flexibility and helps in the regeneration of body cells. It strengthens joint muscles, which therefore reduces pain and inflammation in weakened or aged joints.

1.7 Medicinal Uses:

Scientific evidence for the cosmetic and therapeutic effectiveness of *Aloe vera* is limited

and when present is frequently contradictory. Despite this, the cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturizing and healing properties of *Aloe vera*, especially via Internet advertising.

- *Aloe vera* gel is used as an ingredient in commercially available lotion, yogurt, beverages and some desserts.
- *Aloe vera* gel is used for consumption and relief of digestive issues such as heart burn and irritable bowel syndrome.
- It is common practice for cosmetic companies to add sap or other derivatives from *Aloe vera* to products such as make up, tissues, moisturizers, soaps, sunscreens, incense, razors and shampoos.
- Other uses for extracts of *Aloe vera* include the dilution of semen for the artificial fertilization of sheep, use as fresh food preservative, and use in water conservation in small farms.
- *Aloe vera* has a long association with herbal medicine, although it is not known when its medical applications were first discovered. *Aloe vera* is non-toxic, with no known side effects, provided the aloin has been removed by processing. Taking *Aloe vera* that contains aloin in excess amounts has been associated with various side effects. However, the species is used widely in the traditional herbal medicine of China, Japan, Russia, South Africa, The United States, Jamaica and India. *Aloe vera* is alleged to be effective in treatment of wounds.
- Evidence on the effects of *Aloe vera* sap on wound healing, however, is limited and contradictory.
- Some studies, for example, show that *Aloe vera* promotes the rates of healing, while in contrast, other studies show that wounds to which *Aloe vera* gel was applied were significantly slower to heal than those treated with conventional medical preparations.

- A more recent review (2007) concludes that the cumulative evidence supports the use of *Aloe vera* for the healing of first to second degree burns.
- In addition to topical use in wound or burn healing, internal intake of *Aloe vera* has been linked with improved blood glucose levels in diabetes, and with lower blood lipids in hyper lipidaemic patients, but also with acute hepatitis (liver disease).
- In other diseases, preliminary studies have suggested oral *Aloe vera* gel may reduce symptoms and inflammation in patients.
- Compounds extracted from *Aloe vera* have been used as an immune stimulant that aids in fighting cancers in cats and dogs; however, this treatment has not been scientifically tested in humans.
- The injection of *Aloe vera* extracts to treat cancer has resulted in the deaths of several patients.
- Topical application of *Aloe vera* may be effective for genital herpes and psoriasis.
- However, it is not effective for the prevention of radiation-induced injuries.
- Although anecdotally useful, it has not been proven to offer protection from sunburn or suntan.
- In a double-blind clinical trial both the group using an *Aloe vera* containing dentifrice and the group using a fluoridated dentifrice had a reduction of gingivitis and plaque but no statistically significant difference was found between the two.
- *Aloe vera* extracts have antibacterial and antifungal activities, which may help in the treatment of minor skin infections, such as benign skin cysts.
- *Aloe vera* extracts have been shown to inhibit the growth of fungi that cause tinea; however, evidence for control beneath human skin remains to be established.
- For its anti-fungal properties, *Aloe vera* is used as a fish tank water conditioner.
- For bacteria, inner-leaf gel from *Aloe vera* was shown to inhibit growth of *Streptococcus* and *Shigella* species *in vitro*. In contrast, *Aloe vera* extracts failed to show antibiotic properties against *Xanthomonas* species.
- *Aloe vera* used to heal skin wounds, burn and Helps in speeding recovery time after surgery.
- *Aloe vera* Plants are also helpful in healing insect bites, rashes, sores, herpes, urticaria, fungal infection, vaginal infections, conjunctivitis, and allergic reactions.
- Aloe gels are applied on dry skins to give them glowing effect, reducing acne, reduce sunburn, screening out x-ray radiation.
- *Aloe vera* helps to fight frostbite and shingles, reduce psoriasis, reduce rosacea, reduce warts and reduce ageing, reduce wrinkles and also it reduce the eczema.
- Seeing so many medicinal uses of *Aloe vera* plant it is pretty easy to say that *Aloe vera* is of great importance in our lives and solves great purpose in medical field as well. Apart from above mentioned medicinal uses of *Aloe vera* there are other more important points to be noted about *Aloe vera* plant which are of more importance and critical issues:

1.8 Side Effects

Topical: It may cause redness, burning, stinging sensation and rarely generalized dermatitis in sensitive individuals. Allergic reactions are mostly due to anthraquinones, such as aloin and barbaloin. It is best to apply it to a small area first to test for possible allergic reaction.

1.8.1 Oral: Abdominal cramps, diarrhea, red urine, hepatitis, dependency or worsening of constipation. Prolonged use has been reported to increase the risk of colorectal cancer. Laxative effect may cause electrolyte imbalances (low potassium levels).

1.8.2 Contraindication: Contraindicated in cases of known allergy to plants in the Liliaceae family.

1.8.3 Pregnancy and breastfeeding: Oral aloe is not recommended during pregnancy due to theoretical stimulation of uterine contractions, and in breastfeeding mothers, it may sometime causes gastrointestinal distress in the nursing infant.

1.8.4 Interactions: Application of aloe to skin may increase the absorption of steroid creams such as hydrocortisone. It reduces the effectiveness and may increases the adverse effects of digoxin and digitoxin, due to its potassium lowering effect. Combined use of *Aloe vera* and furosemide may increase the risk of potassium depletion. It decreases the blood sugar levels and thus may interact with oral hypoglycemic drugs and insulin.

Thus, though *Aloe vera* has wide spectrum of the properties and uses, some of them could be myths and some of them could be real magic. In future, controlled studies are required to prove the effectiveness of *Aloe vera* under various conditions.

1.9 Cosmetic Values of *Aloe vera*

- *Aloe vera* stimulates the production of collagen and elastin that prevents aging of the skin.
- *Aloe vera* is used in soaps, shampoos, creams and lotions for beauty purposes.
- *Aloe vera* gel lightens the dark spots on the face and reduces the intensity of pigmentation.
- When applied topically, the gel acts as best moisturizer, removes dead skin cells and rejuvenates the skin.
- Also it conditions the damaged hair. All you need to do is mix *Aloe vera* gel and lemon juice. Apply this mixture on your hair after shampooing it. Leave this for 4-5 minutes and then rinse thoroughly with water.
- It hastens the skin repair and hydrates your skin resulting in healthy and glowing skin.

- People with oily skin can prevent formation of pimples and acne by using this gel
- Scarring and scratch marks are some of the signs of aging which can be prevented by the antioxidants present in this plant.
- The gel of the plant should be rubbed on the scalp for 30 minutes and rinsed well thereafter, in order to naturally treat dry hair and dandruff.

2. Conclusion

Aloe vera is a medicinal plant and due to its extensive medicinal, nutraceutical and other uses its enjoy a great demand in the market across the globe. The major markets for *Aloe vera* and its extracts are Australia, US and the entire Europe. Given the exponentially growing demand for it in the international market, *Aloe vera* presents the finest commercial opportunity among the various medicinal plants. India is among the few countries gifted with the unique geographical features essential for cultivation of *Aloe vera* and other high potential medicinal plants.

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