

Aloe vera –Gift to mankind

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ABSTRACT

Aloe vera plants consist mostly of 95% water and they are not habitat of cold regions. That is the region they are mostly found in tropical and subtropical region. Hot climate suits the growth of Aloe Vera plants. Growing aloe Vera plants in warm climates make them flourish and widely spread. Planting of Aloe vera should be in full sun. On reaching maturity, one can harvest aloe for its nutritional benefits. To harvest leaves from aloe vera, mature leaves to be selected from the outermost section of the plant. It should be cut as close to the base as possible without disturbing the roots.

Keywords : Aloe vera, cultivation, chemical properties, health benefits, future research

INTRODUCTION

Aloes have been used worldwide for more than 3,500 years but it has gained popularity in recent times due to its medicinal and beauty enhancing properties. It is mainly taken in the form of gel or juice. It is a succulent plant which has almost 250 species, all of which have medicinal benefits. It's amazing how natural remedies, like aloe Vera, seem to have so many health benefits, it's almost unbelievable. Nature did give us a cure for every disease; we just have to find it.

As Aloe vera plants consist mostly of 95% water they are not habitat of cold regions. That is the region they are mostly found in tropical and subtropical region. Hot climate suits the growth of Aloe Vera plants. Growing aloe Vera plants in warm climates make them flourish and widely spread. Planting of Aloe vera should be in full sun. On reaching maturity, one can harvest aloe for its nutritional benefits. To harvest leaves from aloe vera, mature leaves to be selected from the outermost section of the plant. It should be cut as close to the base as possible without disturbing the roots.

TAXONOMIC CHARACTERS

Aloe vera belongs to family Asphodelaceae is succulent, almost sessile perennial herb; leaves 30–50 cm long and 10cm broad at the base; colour

pea-green (when young spotted with white); bright yellow tubular flowers 25–35 cm in length arranged in a slender loose spike; stamens frequently project beyond the perianth tube (Atherton, 1997).

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.

CULTIVATION

It is propagated by root suckers. 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. 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 have 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).



Figure 1: Aloe Vera Plants

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). The crop responds well to the application of farm yard manure and compost. During the first year of plantation, FYM @20 t ha⁻¹ is applied at the time of land preparation and the same is continued in subsequent years. Besides vermicompost @2.5 t ha⁻¹ can also be applied. 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. 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.

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.

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 t ha⁻¹ (on fresh weight basis).

CHEMICAL PROPERTIES

Aloe vera contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids (Atherton, 1997; Atherton,1998).

Vitamins: It contains vitamins A (beta-carotene), C and E, which are antioxidants. It also contains vitamin B12, folic acid, and choline. Antioxidant neutralizes free radicals.

Enzymes: It contains 8 enzymes: aliiase, alkaline phosphatase, amylase, bradykinase, carboxypeptidase, catalase, cellulase, lipase, and peroxidase. Bradykinase helps to reduce excessive

inflammation when applied to the skin topically, while others help in the breakdown of sugars and fats.

Minerals: It provides calcium, chromium, copper, selenium, magnesium, manganese, potassium, sodium and zinc. They are essential for the proper functioning of various enzyme systems in different metabolic pathways and few are antioxidants.

Sugars: It provides monosaccharides (glucose and fructose) and polysaccharides: (glucomannans/polymannose). These are derived from the mucilage layer of the plant and are known as mucopolysaccharides. The most prominent monosaccharide is mannose-6-phosphate, and the most common polysaccharides are called glucomannans [β -(1,4)-acetylated mannan]. Acemannan, a prominent glucomannan has also been found. Recently, a glycoprotein with antiallergic properties, called alprogen and novel anti-inflammatory compound, C-glucosyl chromone, has been isolated from Aloe vera gel (Kim *et al.*, 2007; Langmead *et al.*, 2004).

Anthraquinones: It provides 12 anthraquinones, which are phenolic compounds traditionally known as laxatives. Aloin and emodin act as analgesics, antibacterials and antivirals.

Fatty acids: It provides 4 plant steroids; cholesterol, campesterol, β -sitosterol and lupeol. All these have anti-inflammatory action and lupeol also possesses antiseptic and analgesic properties.

Hormones: Auxins and gibberellins that help in wound healing and have anti-inflammatory action.

Others: It provides 20 of the 22 human required *amino acids* and 7 of the 8 essential amino acids. It also contains salicylic acid that possesses anti-inflammatory and antibacterial properties. Lignin, an inert substance, when included in topical preparations, enhances penetrative effect of the other ingredients into the skin. Saponins that are the soapy substances form about 3% of the gel and have cleansing and antiseptic properties.

Health benefits of Aloe Vera

1. Detoxification: Aloe Vera gel 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. Some people more often than others! Drinking aloe

Vera provides a fantastically rich cocktail of vitamins, minerals and trace elements to help our bodies deal with these stresses and strains every day.

2. Healthy Digestion: A healthy digestive system makes sure that we absorb as many of the nutrients as possible from the foods we eat. Aloe Vera has natural detoxifying abilities; and drinking aloe Vera seems to improve bowel regularity and increases protein absorption. It also helps to decrease the amount of unfriendly bacteria and yeast in our gut. Aloe vera has been shown to help reduce and soothe heartburn and other digestive problems.

3. Natural Immune Support: Aloe Vera is full of anti-oxidants - natural immune enhancers which fight free radicals within our body. Free radicals are the unstable compounds produced as a side-effect of our metabolism. They are thought to cause various ailments, as well as contributing to the ageing process. Drinking aloe Vera gel regularly gives the body a regular supply of anti-oxidants, which can boost and enhance the immune system.

4. Reduce Inflammation: Aloe Vera contains 12 substances which can slow down or inhibit inflammation, without any side-effects (Davis *et al.*, 1994) Some people say that drinking aloe Vera helps with their stiff, swollen or painful joints.

5. Collagen and Elastin Repair for Healthy Skin: Drinking aloe Vera adds a rich supply of raw materials to your diet, which can produce and maintain really healthy skin. The skin replaces itself every 28 days. Using the nutritional building blocks of aloe vera, the skin can use these nutrients daily to help combat the effects of ageing. Aloe Vera also helps in soothing minor burns, cuts, scrapes and skin irritations.

6. Regulate Weight and Energy Levels: Drinking aloe Vera naturally allows the body to cleanse the digestive system. Our diets include many substances which can cause fatigue and exhaustion. Taken regularly, aloe Vera gel ensures a greater feeling of well-being, allowing energy levels to increase and helps maintain a healthy body weight. Aloe Vera supplements contain a rare natural ingredient called Saponins, which is provided by nature to cleanse and flush out waste products and toxins.

7. Daily Dose of Vitamins and Minerals: Aloe Vera gel contains vitamins A, B1, B2, B6, B12 (the aloe vera plant is one of the few plants in the world to contain vitamin B12), C, E, Folic Acid and Niacin. The human body cannot store some of these vitamins, so we need to supplement them regularly through our diet.

The minerals found in aloe vera juice include Calcium, Sodium, Iron, Potassium, Copper, Zinc, Manganese, Magnesium, Chromium and more plenty of good nutrition in aloe Vera. Drinking Aloe Vera Gel is a natural and healthful way to replenish the body's supply.

8. Amino Acids: The human body requires 20 amino acids to build protein; 8 of these amino acids are 'essential' which means the body can't make them itself. Aloe Vera contains 19 of these amino acids, and 7 of the essential amino acids. So drinking aloe vera gel tops up your body's daily supply.

Amino acids are our body's building blocks. Drinking Aloe Vera Juice on a regular basis allows you to help maintain your health by replenishing your body naturally with these essential amino acids. An analysis of the aloe Vera plant shows that it comes closer than any other known plant to the duplication of essential amino acids.

9. Dental Health: Aloe Vera is extremely helpful for your mouth and gums. As well as its natural anti-bacterial and anti-microbial actions, it contains vitamins and minerals which promote cell growth and healing. It can be used to treat injuries that occurred on soft tissue, such as mouth ulcers, canker sores, fever blisters and other lesions. It has also been used effectively to treat bleeding gums and to soothe pain and discomfort after oral surgery or extensive dental treatment.

10. Better than Nutritional Supplements: Recent research has shown that adding good foods to our diets, rich in naturally occurring vitamins and minerals, is far better than adding supplements alone. The good news is that Aloe Vera juice is considered a food, rather than a manufactured supplement. So drinking aloe Vera is probably better than taking supplements alone, because our bodies can absorb all the nutrients in aloe Vera more easily, and utilize them more effectively.

11. Skin Care (Tyler,1993; Atherton,1997)

Apart from its effect on the internal organs, Aloe Vera has a beneficial effect on the skin (Hormann and Korting, 1994)

- It is rich in anti-oxidants, which neutralize free radicals. As a result, Aloe Vera wards off wrinkles and age related changes.
- It nourishes the skin, by boosting the circulatory system.
- Aloe Vera is effective in treating skin disorders, like dermatitis, and even psoriasis.
- It heals cuts and wounds, blisters and burns, including sunburns, and even minor second degree burns (Heggars *et al.*, 1993).
- Aloe Vera clears acne and skin allergies, dark spots and skin blemishes, and makes the skin clearer.
- It is also good for the hair and scalp.
- Aloe Vera sap is slightly viscous, despite being composed of a good percentage of water. Its base can scatter rays of sunlight, preventing the focused heating of a sensitive surface such as our skin.

12. Anti-Fungal/Anti-Bacterial Supplement

In 2004, biologists tested the effects of aloe Vera on certain bacteria. The test results showed that aloe extract inhibited the growth of the Streptococcus and Shigella bacteria. In effect, aloe has been proven to prevent human conditions like rheumatic fever, pneumonia, meningitis and diarrhea. You can take the oral aloe Vera gel to prevent bacteria from acting up on your insides. You can also rub aloe Vera on your skin to keep it free from microbes.

13. Diabetes Prevention:(Rajasekaran, 2006)

After undergoing research, aloe extract has been proven to decrease blood glucose levels. Research claims that aloe can prevent or at least slow down the development of diabetes. Medications given to diabetics also contain significant amounts of aloe. The plant is clearly the herbalist's method to control the deadly disease.

14. Aids in Healthy Digestion

A healthy digestive tract ensures that nutrients from the foods we eat are absorbed into the blood

stream. Aloe Vera Juice has natural, detoxifying abilities. Drinking Aloe Vera Juice made from the pure aloe gel regularly may improve bowel regularity and increase protein absorption, while at the same time decrease unfriendly bacteria and yeast.

15. Immune Support and Function

Aloe Vera juice provides natural support for the immune system. Since the immune system works around the clock protecting the body, aloe vera, with its natural immune enhancers, gives the body a continual arsenal from which to draw.

16. Regulates Weight and Energy Levels

Aloe Vera Gel naturally, and with regular use, allows the body to cleanse the digestive system. Our diets include many unwanted substances which can cause lethargy and exhaustion. Taken regularly, Aloe Vera Juice from the pure aloe gel ensures a greater feeling of well-being, allowing energy levels to increase and helping to maintain a healthy body weight.

17. Wound Treatment: (Chithra *et al.*, 1998)

Given its bacteria-killing effects, aloe vera can be used to disinfect wounds. It can protect your open wounds from certain microorganisms that can cause infections.

18. Heartburn Prevention

Heartburn may not be life-threatening but it can certainly cause discomfort. Instead of waiting for the condition to subside, you can ingest oral aloe or aloe extract to speed up the healing process. Aloe is pretty bitter, so you better take it with water.

19. Hair Grower Substitute

Hair loss is an unflattering condition that is usually attached with aging. People go through expensive treatments like hair grafting or attaching toupees to their scalps. Even a tiny bottle of hair grower is pricey, given the amount of the solution. Before going through all these expensive anti-hair loss methods, you can try rubbing aloe gel on your scalp. Research says that aloe extract is known to promote the hair growth. In fact, some hair growers have a good dose of aloe Vera mixed in the solution.

It has a natural property to alkalize digestive juices and prevents over-acidity, which is one of

the common causes of digestive ailments. Aloe vera juice concentrates are high in essential enzymes, which stimulate digestion and liver functions. The synergistic effect of aloe Vera juice used in combination with a few other herbs does wonders as a liver-cleansing agent.

FUTURE THRUST

Constipation (laxative): Dried latex from the inner lining of aloe leaves has been used traditionally as a laxative taken by mouth. Although few studies have been conducted to assess this effect of aloe in humans, the laxative properties of aloe components such as aloin are well supported by scientific evidence. A combination herbal remedy containing aloe was found to be an effective laxative, although it is not clear if this effect was due to aloe or to other ingredients in the product. Further study is needed to establish dosing and to compare the effectiveness and safety of aloe with other commonly used laxatives.

Genital herpes: Limited evidence from human studies suggests that extract from Aloe vera in a hydrophilic cream may be an effective treatment of genital herpes in men (better than aloe gel or placebo). Additional research is needed in this area before a strong recommendation can be made.

Psoriasis vulgaris: Early evidence suggests that an extract from aloe in a hydrophilic cream may be an effective treatment of psoriasis vulgaris. Additional research is needed in this area before a strong recommendation can be made.

Seborrheic dermatitis (seborrhea, dandruff): Early study of aloe lotion suggests effectiveness for treating seborrheic dermatitis when applied to the skin. Further study is needed in this area before a strong recommendation can be made.

Cancer prevention: There is early evidence that oral aloe may reduce the risk of developing lung cancer. Further study is needed in this area to clarify if it is aloe itself or other factors that may cause this benefit.

Canker sores (aphthous stomatitis): There is weak evidence that treatment of recurrent aphthous ulcers of the mouth with aloe gel may reduce pain and increase the amount of time between the appearances of new ulcers. Further

study is needed before a firm recommendation can be made.

Diabetes (type 2): Study results are mixed. More research is needed to explore the effectiveness and safety of aloe in diabetics.

Dry skin: Traditionally, aloe has been used as a moisturizer. Early low-quality studies suggest aloe may effectively reduce skin dryness. Higher quality studies are needed in this area.

HIV infection: Without further human trials, the evidence cannot be considered convincing either in favor or against this use of aloe.

Lichen planus: Limited study suggests that aloe may be a helpful, safe treatment for lichen planus, which is a chronic inflammatory disease that affects the lining of the mouth. Additional study is needed.

Skin burns: Early evidence suggests that aloe may aid healing of mild to moderate skin burns. Further study is needed in this area.

Skin ulcers: Early studies suggest aloe may help heal skin ulcers. High-quality studies comparing aloe alone with placebo are needed.

Ulcerative colitis (including inflammatory bowel disease): There is limited but promising research of the use of oral aloe vera in ulcerative colitis (UC), compared to placebo. It is not clear how aloe vera compares to other treatments used for UC.

Wound healing: Study results of aloe on wound healing are mixed with some studies reporting positive results and others showing no benefit or potential worsening of the condition. Further study is needed, since wound healing is a popular use of topical aloe.

Mucositis: There is early evidence that oral aloe vera does not prevent or improve mucositis (mouth sores) associated with radiation therapy.

Pressure ulcers: Early well-designed studies in humans found no benefit of topical acemannan hydrogel (a component of aloe gel) in the treatment of pressure ulcers.

Radiation dermatitis: Reports in the 1930s of topical aloe's beneficial effects on skin after radiation exposure lead to widespread use in skin

products. Currently, aloe gel is sometimes recommended for skin irritation caused by prolonged exposure to radiation, although scientific evidence suggests a lack of benefit in this area.

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