

*Extension Bulletin*

# **Cultivation of *Aloe vera***



**National Research Centre for Medicinal and Aromatic Plants  
Boriavi, Anand - 387 310, Gujarat, India**

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by

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## Preface

*The first detailed discussion of Aloe's medicinal value is probably that which is found in the Papyrus ebers, an Egyptian document written about 1550 B.C. This document gives twelve formulas for mixing Aloe with other agents to treat both internal and external human disorders. The first milestone in Western man's detailed understanding of medicinal plants is the work of Hippocrates (460B.C.- 375B.C.), the father of modern medicine (doctors today still take the Hippocratic Oath). His Material Medica makes no direct mention of Aloe, but during that same period, according to Chopra's Indigenous Drugs of India, this plant came into widespread use. Interestingly, Chopra writes, "The use of Aloes, the common musabbar, for external application to inflamed painful parts of the body and for causing purgation [internal cleansing] are too well known in India to need any special mention."*

*At present, Aloe vera has little official standing in the western medical community. In spite of the lack of official promotion, it is among the most widely used substances in the U.S. for the treatment of burns and bruises. Additionally, it is used in a plethora of cosmetics, and also consumed as a healthful drink. While it has not yet won the full endorsement of the medical community, serious examination continues. At moment, it may be taken as an indication of the serious nature of such a study that the FDA has approved development aimed at the eventual use of Aloe vera in the treatment of cancer and AIDS! More and more, attention is turning to Aloe's unexamined possibilities as a powerful healing agent.*

*This crop has rightly been included as one of the mandate crops of the NRC for Medicinal and Aromatic Plants for in depth investigations. Package of practices presented in this bulletin is to provide information to the farmers available so far which of course needs refinement in the future.*

*I take this opportunity to express my sincere thanks to Dr. Gautam Kalloo, Deputy Director General (Horticulture) and Dr.*

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Anand  
February 7, 2002

*Satyabrata Maiti*

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## Introduction:

*Aloe barbadensis* Mill. popularly known as *Aloe vera* originated in the warm, dry climates of Africa. However, because of its wide adaptability as well as its importance as medicinal plants, it is well distributed.

The virtues of the plant have been recorded by many great civilizations, from those of Persia and Egypt in the Middle East, to those of Greece and Italy in Europe, to those of India and the African continent. The plant is widely known in Asia and the Pacific, and is found in the folklore of the Japanese, the Philippines and the Hawaiians. The Spanish used Aloe, and carried it with them to their new world colonies in South America and the Caribbean. In each age, on each continent, in each culture, Aloe vera has drawn the attention of the most sophisticated minds.



*Field view of Aloe vera*

In India, it is grown commercially for its high demand in cosmetic industries as well as in Indian System of Medicines. The succulent leaves are economic part of this plant. *Aloe* is known by several names in India such as Ghrith Kumari, Kunvar pathu and Indian Aloe. Its multifarious uses

as medicinal plants, vegetables, pickle purposes etc. has inspired growers for commercial cultivation in many parts of the country. The gel produced from its mature leaves is used in cosmetic industry for preparation of shampoo, face creams and moisturising agents.

The characteristic bitter taste of Aloe vera leaves possesses many medicinal properties. The leaves are alterative, stomachic, aphrodisiac, cathartic, emmenagogic, astringent, antidotal, anthelmintic and hepatic stimulant. After removing the skin of leaves, they are given in fevers, enlargement of liver, spleen and other glands, skin diseases, gonorrhoea, constipation, menstrual suppressions, piles, jaundice, rheumatic diseases, and for the treatment of burns and bruises.

### **Climate**

It is grown in almost all parts of India, even under constant drought conditions. However, the crop grows well in entire tropical and sub-tropical regions. Since its water requirement is very low, it is best suited for cultivation in Arid and semiarid region specially in Rajasthan, Gujarat, Madhya Pradesh and Maharashtra.

### **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 soils 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.

### **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 levelling may be done. Field may be divided into suitable sized plots (10-15 m x 3 m) considering the slope and source of irrigation available.

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## **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).

## **Varieties/genotypes**

Released varieties of *Aloe vera* are not available in India. However, some high aloin content (20.7–22.8 %) genotypes identified by the National Bureau of Plant Genetic Resources, New Delhi such as IC-111271, IC 111280, IC 111269 and IC 111273 may be cultivated.

## **Planting material**

Planting material recommended for commercial cultivation is by suckers only. About three to four months old suckers having 4-5 leaves and about 20-25 cm in length are used as planting material.

## **Spacing and planting**

Suckers are planted in about 15 cm deep pits made just at the time of planting at 60 x 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 28,000 - 34,000 suckers are needed for one hectare planting.

## **Manuring**

In general, the crop responds well to application of manure (FYM or compost). About 10-15 t of FYM may be applied at the time of soil preparation and also in subsequent years. But, it is not a common practice since this crop is cultivated in marginal and sub-marginal lands. If sufficient quantity of wood ash is available can be applied in the pits at the time of planting that helps in establishment of plants and their subsequent growth.

## **Irrigation**

The crop withstands stress condition very well but to get good crop, irrigation at critical stages of growth must be given.

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First irrigation is required just after planting of suckers followed by 2-3 irrigations till plant get established. However, 4-6 irrigations per year may be enough for proper growth of the plants. After each picking of leaves light irrigation may be given depending upon the availability of water.

### **Interculture**

The field should be kept weed free throughout the growing period of crop. Two to three hand weedings followed by light hoeing per year promote growth and suckering in Aloe. First weeding cum hoeing should be completed within a month after planting. However, in subsequent years two weeding cum light hoeing in each year found to be sufficient to minimize the weed population in the field. Unproductive and diseased plants and dried flower stakes must be removed regularly.

### **Intercropping**

During the first year of planting, more than 40% land remains unutilized thus an attempt should be made to utilize the field in efficient manner. For this purpose, suitable leguminous or less competitive intercrops like cluster bean, groundnut, sesame, isabgol, coriander, cumin etc. could be grown successfully in the interspaces under arid and semiarid condition that can generate additional income. Besides, the soil condition will also improve with leguminous crops. Second year onwards such crops may not be encouraged otherwise foliage yield and quality of the produce will be adversely affected.

### **Insect pests and diseases**

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. Some time termite problem has also been observed which can be easily managed by giving a light irrigation.

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## Harvesting and yield

An aloe plantation gives commercial yield from second year to fifth year of transplanting. Generally 3-4 pickings per year can be taken up depending upon the growth of plants. On an average 15-20 t/ha fresh leaf is obtained from second year plantation. However, well managed irrigated crop can give upto 30-35 t/ha fresh leaf. Fully developed mature leaves should be harvested for extraction of aloe juice.

## Marketing

Marketing of leaves of *Aloe vera* is not well organized in our country. However, in the recent past, a lot of interest has been showed for its cultivation as well as marketing looking to its international demand. Therefore, one should ascertain its demand in the local market or one must establish contact for its sale, before taking up its commercial cultivation.

## Processing

The term 'Aloe' used in medicine stands for the dried juice, which flows from the transversely cut bases of the leaves. For processing of "Aloe", the juice is allowed to drain from the cut leaves into vessels and then concentrated by evaporation, either spontaneously or frequently by boiling. The juice is colourless or yellow when obtained fresh from the leaves but becomes dark brown due to evaporation and boiling. Sun dried or concentrated "Aloe" juice over a fire gives an amorphous, opaque, waxy extract called 'hepatic' or 'livery' aloe. When the juice is concentrated rapidly over a strong fire, the product obtained on cooling is amorphous and semi transparent and is called 'glassy' or 'vitreous' aloe.

Besides the dry juice, gel is also very important product of *Aloe vera*. The mucilaginous pulp from the leaf, which is mainly carbohydrate in nature, is used in cosmetic industries and also in treatment of many human diseases. The leaves left over after the removal of their exudates is cut open and mucilage is scraped out with a blunt edged knife for isolation of gel. Extracted mucilage is stirred

vigorously in a blender to make it homogeneous mixture (solution). This mixture is strained with the help of a muslin cloth and then filtered. The gel is precipitated from the extract by slowly adding acetone while stirring. This whole content is kept for overnight and the gel is isolated by centrifugation. This gel is re-dissolved in slightly warm water and transferred to a tube of known weight. It is dried at a high temperature (below 100 °C).

### **Chemical composition**

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-killer.

It contains at least three anti-inflammatory fatty acids, cholesterol, campersterol and  $\beta$ -sitosterol (plant sterols). These are highly effective in treatment for 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.  $\beta$ -sitosterol is also a powerful anti-cholestromatic which helps to lower harmful cholesterol levels, helping to explain its many benefits for heart patients.

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

### **Economics**

A net profit of about Rs: 8,000 -10,000 can be obtained from one hectare of marginal to sub-marginal lands.

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