

# **Aloe Vera Handbook Cultivation, Research Finding, Products, Formulations, Extraction & Processing**

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Aloe Vera is a semi tropical plant. It is one of the oldest known medicinal plants gifted by nature, Aloe Vera often called Miracle plant known by many names. It contains more than two hundred tonic ingredients including essential amino acids, enzymes, glucose and more. Also contains the most essential components required by the human body. It is grown wild in hedge rows in dry soil conditions and almost all parts of India. It can be grown even under constant drought conditions. Commercial cultivation and utilization of this plant with the application of technology can be of great value. There are various benefits of this plant; it is used to support the natural healing of skin that has been damaged. A common usage is to sooth sunburned skin. Aloe Vera can also be made into juices, gels, powders and is often added to products. For example it can be found in cosmetics, shampoos, lotions and many other common household Aloe Vera products. The many benefits of Aloe Vera are not fully researched as of yet. Processing of Aloe Vera gel derived from the leaf pulp of the plant, has become a big industry worldwide due to the application in the food industry. It has been utilized as a resource of functional food, especially for the preparation of health drinks which contain Aloe Vera gel and which have no laxative effects. Given the exponentially growing demand for it in the international market, it presents the finest commercial opportunity among the various medicinal plants. Also, India is among the few countries gifted with the unique geographical features essential for cultivation of Aloe Vera and other high potential medicinal plants.

Some fundamentals of this book are chemical investigations of different parts of the leaf, agro technique: Aloe Vera, economics of cultivation per hector, aloe (Aloe Vera) investment opportunity, specialty raw material market for cosmetics/toiletries, strategy for capacity creation and marketing, influence of Aloe Vera on the glycol amino glycans in the matrix of healing dermal wounds in rats, effects of low molecular constituents from Aloe Vera gel on oxidative metabolism and bactericidal activities of human neutrophils, Aloe Vera & aids research, anti diabetic activity of aloes: preliminary, aloe reduction in ulcers, erosions & hemorrhages, extraction process, processing steps, extraction process of aloe gel and powder etc.

This book highlights such technical details to guide and encourage new entrepreneurs. It is very useful book for consultants, farmers, students of Agricultural universities, libraries etc.

**CULTIVATION, RESEARCH FINDINGS, PRODUCTS,  
FORMULATIONS, EXTRACTION & PROCESSING**

**1. Historical Developments**

**Antibacterial findings**

Anti-inflammatory findings  
Anaesthetic findings  
Analgesic findings  
Thermal burns  
Anti-fungal findings  
Immuno-stimulatory findings  
Dysmenorrhea  
Superoxide dismutases  
2. Geographical Distributions  
Distribution  
Nomenclature:  
Geographical origin  
Morphology  
3. Anatomy of Aloe Vera Leaves  
Anatomy of leaf  
Chemical investigations of different parts of the leaf  
Aloe vera-var. *barbadensis*  
Other Aloe species  
4. Agro-Technique: Aloe Vera  
Preparation of Land  
Propagation  
Sowing  
Irrigation  
Diseases & their Control  
Harvesting & Storage  
Production & Yield  
Market Price  
Economics of Cultivation per Hectore  
Aloe India : *Aleo Barbadensis*  
*Aloe Littoralis*  
*Aloe Perryi*  
5. Aloe (Aloe Vera) Investment Opportunity  
Family Liliaceae  
Common Names  
Botanical Trait  
Uniqueness  
Cultivation  
Type & Extent  
Propagation  
Harvest  
Yield  
Applications  
Variety of Products  
Process for Aloe Gel  
Process Conditions:  
Strategy for Process Control  
Advantages of wholeleaf cold process  
Price  
Global Scenario  
International Aleo Science Council  
Estimated global market for Aloe Vera Gel:  
Speciality, cosmetics and toiletery market  
Speciality raw material market for cosmetics/toileteries

Japanese Scenario

Scenario

Important Overseas Players

Forever living

Santrel international

Selected Indian Players

Emami

Siri Agritech

Driving Factor For Demand

Indian Skin Cream Market

Driving Factor for Capacity Creation:

Strategy for Capacity Creation and Marketing

6. Research Findings

Aloe vera and the inflamed synovial pouch model

Isolation of a stimulatory system in an Aloe extract

Aloe vera as a biologically active vehicle for hydrocortisone acetate.

The stimulation of postdermabrasion wound healing with stabilized aloe vera gel-polyethylene oxide dressing

Aloe-emodin effects on arylamine N-acetyltransferase activity in the bacterium *Helicobacter pylori*.

Influence of aloe vera on the healing of dermal wounds in diabetic rats.

Influence of Aloe vera on the glycosaminoglycans in the matrix of healing dermal wounds in rats.

Immunochemical distinction of Aloe vera, *A. arborescens*, and *A. chinensis* gels.

Aloe barbadensis extracts reduce the production of interleukin-10 after exposure to ultraviolet radiation.

Influence of Aloe vera on collagen characteristics in healing dermal wounds in rats.

Influence of Aloe vera on collagen turnover in healing of dermal wounds in rats.

Studies of aloe. VI. Cathartic effect of isobarbaloin.

[The action of an aqueous extract of Aloe barbadensis Miller in an in-vitro culture of *Trichomonas vaginalis*].

Biotherapy with the pineal immunomodulating hormone melatonin versus melatonin plus aloe vera in untreatable advanced solid neoplasms.

Nitro chemopreventive effects of plant polysaccharides (*Aloe barbadensis* Miller, *Lentinus edodes*, *Ganoderma lucidum* and *Coriolus versicolor*).

The therapeutic potential of Aloe Vera in tumor-bearing rats.

In vitro angiogenic activity of Aloe vera gel on calf pulmonary artery endothelial (CPAE) cells

Isolation of cDNA for an NADP-malic enzyme from Aloe arborescens

Prevention of ultraviolet radiation-induced suppression of accessory cell function of

Langerhans cells by Aloe vera gel components

Beneficial effect of Aloe on wound healing in an

excisional wound model.

Acceleration of the alcohol oxidation rate in rats with aloin, a quinone derivative of Aloe.

Activation of a mouse macrophage cell line by acemannan: the major carbohydrate fraction from Aloe vera gel.

Isolation of a cDNA for a phosphoenolpyruvate carboxylase from a monocot CAM-plant, Aloe arborescens: structure and its gene expression.

A purgative action of barbaloin is induced by Eubacterium sp. strain BAR, a human intestinal anaerobe, capable of transforming barbaloin to aloe-emodin anthrone.

Studies of aloe. V. Mechanism of cathartic effect.

Studies of aloe. IV. Mechanism of cathartic effect.

Prevention of ultraviolet radiation-induced suppression of contact and delayed hypersensitivity by Aloe barbadensis gel extract.

Rhein and aloe-emodin kinetics from senna laxatives in man.

Pharmacokinetic and metabolic studies with <sup>14</sup>C-aloe emodin after oral administration to male and female rats.

Some pharmacological actions of aloe extracts and Cassia abbreviata on rats and mice.

Effects of low molecular constituents from Aloe vera gel on oxidative metabolism and cytotoxic and bactericidal activities of human neutrophils

Studies of aloe. III. Mechanism of cathartic effect.

An anti-complementary polysaccharide with immunological adjuvant activity from the leaf parenchyma gel of Aloe vera.

[Effects of aloe extracts, aloctin A, on gastric secretion and on experimental gastric lesions in rats].

Effect of water extracts of aloe and some herbs in decreasing blood ethanol concentration in rats.

Aloe vera

Comparative evaluation of aloe vera in the management of burn wounds in guinea pigs.

The glucomannan system from Aloe vahombe (liliaceae).

The Aloe vera phenomenon: a review of the properties and modern uses of the leaf parenchyma gel

7. Clinical Trails

Heart Disease

Prevention of Atheromatous Heart Disease

Lowered Blood Pressure

Immunological Benefits : Cancer, Tumours, HIV & AIDS

A Study of 29 AIDS Patients

Cancer Research

Aloe Vera & AIDS Research

Aloe vera may mimic azt without toxicity  
Antimetastatic Properties of Aloe Juice  
Aloemannan, Significant Antitumor Efficacy  
Antimutagen of Aloe plants  
Diabetes  
Aloe vera & gibberellin, anti-inflammatory activity in diabetes  
Normalized Blood Glucose Level  
Antidiabetic activity of Aloes: preliminary clinical & experimental observations  
Aloe vera-anti-edemic & analgesic activity in diabetes  
Gastrointestinal Disorders  
Colitis & Crohn's Disease  
Research - Gastric Ulcers  
Research - Ulcers, Stress Related  
A double-blind trial of a celandin, Aloe Vera & psyllium laxative preparation in adult patients with constipation  
Studies of Aloe III. Mechanism of Cathartic Effect  
Aloe Vera to treat gastrointestinal Problems  
Research - Duodenal Ulcers  
Aloe Reduction In Ulcers, Erosions & Hemorrhages in the Stomach  
Radiation, Burns & Frostbite  
Aloe vera gel hindered wound healing of experimental second-degree burns: a quantitative controlled study.  
Experimental & clinical observations on frostbite  
Alvigel as a therapeutic agent in the treating of radiation burns  
Beneficial effects of aloe in wound healing  
The external use of Aloes  
Treatment of experimental frostbite with pentoxifylline & Aloe vera cream  
Psoriasis  
Management of psoriasis with Aloe vera extract in a hydrophilic cream: a placebo-controlled, double-blind study.  
Skin Disorders/Inflammation  
Anti-inflammatory activity of Aloe vera against a spectrum of irritants  
Wound healing. Oral and topical activity of Aloe vera.  
Processed Aloe vera administered and topically inhibits inflammation  
Uses of Aloe in treating leg ulcers & dermatosis  
Anti-inflammatory and wound healing activity of a growth substance in Aloe vera.  
Anti-inflammatory & wound healing properties of Aloe vera  
Effects of topical medications on the healing of open pad wounds in dogs  
Antiinflammatory activity of extracts from Aloe vera gel.  
Skin Disorders Virus: Bacteria, Fungi & Parasites  
Dental Disorders  
Aloe Vera Gel Toothpaste  
Aloe in Dentistry

Why Aloe may work

Use of Whole-Leaf Aloe

8. Patent

U.S. Patent 6, 027, 728 (2000)

Herbal Skin regeneration and method

A method for skin regeneration comprising

Description

Background of the Invention

Summary of the Invention

Detailed Description of the Invention

U.S. Pat. 6, 030, 622

Herbal Extract composition and method

(2000) with immune boosting capability

Background of the Invention

Field of the Invention

Description of the Background Art

Summary of the Invention

Detailed Description of the Preferred Embodiments

Extract Preparation

Preparation of Extract of ARUM ALOE

Preparation of Extract of POMEGRANATE.

Preparation of Extract of TEA.

Preparation of Extract of HIBISCUS.

Preparation of Combined Extracts of ARUM and POMEGRANATE

Preparation of Combined Extracts of ARUM, POMEGRANATE, TEA and HIBISCUS

In Vitro Blast Transformation of Lymphocytes

From Normal Patients

In Vitro Blastogenesis of Peripheral Blood Lymphocytes from Patients With Renal Failure

Stimulation of Cytokine Production in

Normal Persons

In Vitro Inhibition of gp 120 Binding to MT-4 Cells Measured with OKT4A Monoclonal Antibody.

In Vitro Inhibition of gp 120 Binding to MT-4 Cells Measured with Anti-gp 120 Monoclonal Antibody.

Chemical Analysis of Combined Extracts

Aloe vera gel toothpaste

United States Patent 5, 294, 434 March 15, 1994

Summary of Invention

Detailed Description

United States Patent 5,989,560

November 23, 1999

Herbal intestinal tract cleanser

Field of the Invention

Background of the Invention

Summary of the Invention

Detailed Description of the Preferred Embodiments

Aloe vera ointment

United States Patent 4,725,438 February 16, 1988

Field of the Invention

Background of the Invention

Summary of the Invention

Objects of the Invention

Description of the Preferred Embodiment

Summary of the Achievements of the Objects

of the Invention  
United States Patent 5,288,492 February 22, 1994  
Decongestant composition containing aloe vera  
Background of the Invention  
Field of the Invention  
Description of the Prior Art  
Summary of the Invention  
Detailed Description of the Invention  
United States Patent: 6,004,558  
Technical Field  
Background of the Invention  
Summary of the Invention  
Detailed Description of the Invention  
Separation of primary isoflavones using  
chromatographic techniques  
Method for extraction and removal of genistein,  
daidzein, formononetin and biochanin  
Anti-cancer activity of isoflavone free cell extracts  
Treatment of a sixty two year old male diagnosed  
with prostate cancer  
Herbal Remedies  
Summary of the Invention  
Brief Description of the Drawings  
Detailed Description of a Preferred Embodiment  
Herbs and Preparation of Formulations  
Patient Selection  
Herbal Preparation and Dosage  
Results of the Study  
Effect of Discontinuing Usage of the Present Invention  
Conclusion  
United States Patent 5,904,924 May 18, 1999  
Green nutritional powder composition  
Summary of the Invention  
Detailed Description of the Present Invention  
U.. Pat. 5,876,728 (1999)  
National Composition extracted from Plants  
used in the treatment of Cancer  
Background of the Invention  
Objectives of the Invention  
Summary of the Invention  
Detailed Description of the Invention  
Test Substances  
Cell Culture  
Cytotoxicity Assay  
Fresh Tumor Specimens  
Turmeric & Aloe Vera for treating health ailments  
Summary of the Invention  
U.S. Pat. 4591, 387 (1986)  
Aloe Vera Leaf Processor  
Brief Description of the Invention  
Detailed Description of the Invention  
U.S. Pat. 5, 215, 760 (1993)  
Detailed Description of the Preferred Embodiments

U.S. Pat 4,309,180 (1983)  
Cosmetic facial preparation containing aloe vera  
Detailed Description of the Preferred Embodiment  
U.S. Pat. 6,013, 259 (2000)  
Aloe Vera Ophthalmic Solution  
Background of the Invention  
Brief Summary of the Invention  
Detailed Description of the Invention  
Allantoin  
Extract of Lavender  
Topical Compositions  
Pharmaceutical/Cosmetic Compositions  
Cleaning Compositions  
Weighing  
Washing  
Filtration  
Grinding  
Homogenization  
pH Adjustment  
Selective Precipitation  
Centrifugation  
Weighing/Storage  
Tray loading  
Drying  
Milling  
Blending  
Storage and Exportation  
Moderate or Medium Filtration  
(Filtration Using A Medium Filter)  
Fine Filtration (Filtration Using A Fine Filter)  
Ultrafiltration/Concentration  
Ultracentrifugation  
Low Speed Centrifugation  
Dialysis  
Anion Exchange Chromatography  
Size Exclusion Chromatography  
Step-Wise Filtration  
Preparation of Bulk Pharmaceutical  
Mannan (Mannan)  
Pilot Scale Sizing of Bulk Pharmaceutical  
Mannans by Ultra-filtration  
Purification and Depyrogenation of FBA using  
Chromatography with subsequent Molecular  
Sizing (DFBA)  
Anti Viral Effects of Different Factors Obtained by  
Chromatographic Separation of FBA  
Cells and Culture media:  
Reagents and Preparation:  
Protocol of Mouse Pulmonary Inflammation  
Model  
Myeloperoxidase (MPO) Assessment of Lavage  
Fluid and Tissues  
Lavage Fluid



Tissue MPO Assessment  
MPO Reaction  
Mouse Croton Oil Ear Inflammation Model  
Protocol for Cytokine Analysis from Macrophages  
Mouse TNF-.alpha. Assay In Biological Fluids  
Centrifugation of Suspension of Results Obtained  
from Bioassays used to Evaluate Different Factors  
Results from Factors using Methods as Described  
IL-6 Production:  
IL- 1 .alpha. Productions:  
Microparticulate Factor From FBA and No Production  
Macrophage Activation and Anti-inflammatory  
Activities  
Epitheleal Cells (â€œECâ€•) Proliferation  
IL-6 Assay  
RAW Cells Secreted Interleukin-6 in Response  
to FBA  
â€œMFâ€• Stimulated IL-6 Production  
Anti-Inflammatory Activities of â€œSoluble Factorsâ€•  
Filtration with 0.1 .mu.m Filters of â€œMicroparticle  
Factorsâ€•  
Factors of FBA Sized Filtration through Syringe  
Filters of Various Pore Sizes  
Carbohydrate Content in the Filtrate  
Factors Sized and Isolated by 5 .mu.m Filtration  
and No Assay  
Topical Anti-Inflammatory Activity of Freeze-  
Dried Aloe Vera Extract and FBA  
Other Related Applications  
Summary of the Present Invention  
9. Herbal Formulations  
Basliqun Kabir  
Preparation  
Administration  
Uses and indications  
Sufuf Dama  
Hab Hilitit  
Hab Soranjan  
Hab Shabyar  
Halwa-i-ghaikwar  
Qurs Tankar  
Kuhl-ul-jawahar  
Kuhl Roshania  
Kushta Abrak Safaid  
Kushta Busud  
Kushta Khubs-ul-hadid  
Kushta Khar Mohra  
Kushta Tila Kalan  
Kushta Faulad  
Kushta Gaodanti  
Kushta Nuqra  
Majun Talkh  
10. Cultivation Practices

General details  
Origin and distribution  
Propagation  
Harvest  
Yield  
Cultivation Practices  
Soil  
Climate  
Land Preparation  
Propagation  
Planting  
Manuring  
Irrigation  
Weeding  
Diseases and Management  
Harvesting the Yield  
11. Extraction Process  
Organ used for manufacture  
Timing of Leaf Harvest  
Leaf Harvesting and Handling  
General process outline for Herbal extract  
Cleaning and size reduction:  
Solvent extraction:  
Solvent recovery  
Spray dried extract  
Soft extract  
Phytochemicals:  
Effluent treatment:  
Aloe Vera Gel Process  
Highlights  
Guidelines for production  
Process outline  
Process conditions:  
Advantages of wholeleaf cold process  
Strategy for process control  
Patent details  
Extraction Process  
Processing Steps  
Extraction process of Aloe Gel and Powder  
12. Patents and Know-how  
Description  
Background of the Invention  
Brief Summary of the Invention  
Detailed Description of the Invention  
Preparation of the Aloe Vera gel eye drops:  
Summary of the Invention  
Objects of the Invention

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