

PROJECT PROFILE
ON
HERBAL EXTRACTS

MONTH & YEAR
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PREPARED BY
TANSTIA – FNF SERVICE CENTRE
B – 22, INDUSTRIAL ESTATE,
GUINDY, CHENNAI – 600 032

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Friedrich Naumann
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HERBAL EXTRACTS

PRODUCT CHARACTERISTICS

General details

Different parts of the herbal plants are used for extractions ranging from roots, stem, leaves, and flowers to fruits.

The extracted products are either in the form of powder or mixture of oil and oleoresins.

Standards

The Bureau of Indian Standards has formulated following specifications for herbal products

IS 326-1986 Methods of sampling and test for natural and synthetic perfumery materials.

IS 6774:1972 Classifications of essential oil bearing aromatic plants.

Specifications of Selected Herbal Extracts

Amla

Ingredients	Amla
Colour	Creamish
Flavour and Taste	Characteristics of amla
Total soluble solids	100 to 120 brix
Acidity%(as Citric acid)	2.5 + 1.0
P _H	3.6 + 0.4
Mesh Ratings	1.5 mm

Aloe Vera gel

Appearance	Translucent
Odour	Slight vegetable like odour
Taste	Slick/Tangy
Specific gravity	1.006± 0.006
PH	3.8 To 4.8
Solids	0.5%
Calcium	99 Mg/L
Magnesium	26 Mg/L
Heavy Metals	Less Than 0.001%
Storage	Store in sealed, light resistant containers at cool, dark, dry place

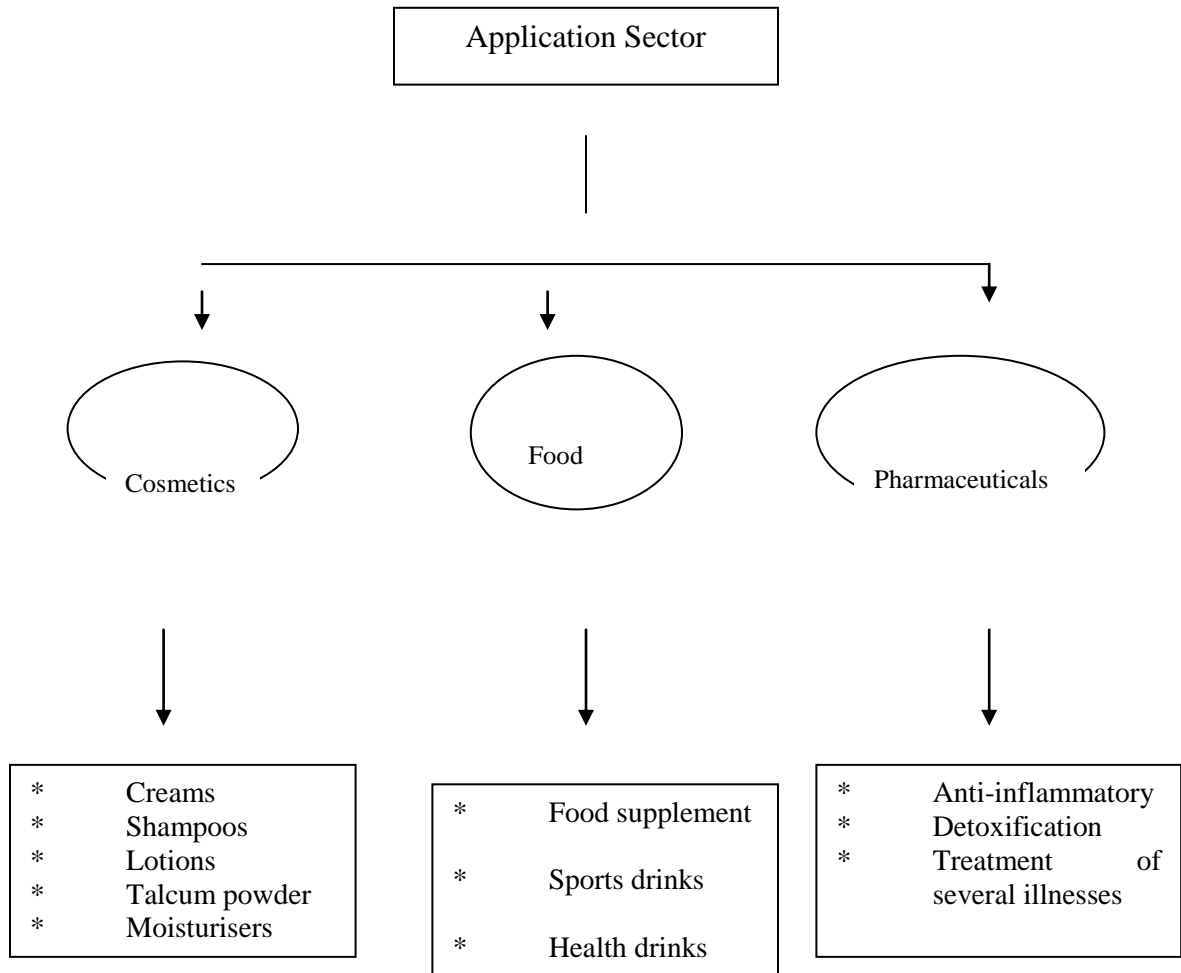
Guggul

Total Guggulsterone content	2.5%, 5 % & 10 %
Alcohol soluble extractives	Min: 50 %
Others	Lipid contents min 20%
Loss on drying	Max 5 % (2hrs@ 105°C)
Extract ratio	7:1
Particle size	100 % through 80 mesh
Solubility	Soluble in alcohol
Shelf life	24 months unopened
Storage	In cool dry place, away from heat and direct light.

Vetiver

	Type I	Type II
Colour and appearance	Light to reddish brown, sometime greenish viscous liquid	Light to reddish brown, sometime greenish viscous liquid
Odour	Characteristic & persistent aroma with pleasant woody character	Characteristic & persistent aroma with pleasant woody character
Specific gravity 30/30 deg.C	0.992 to 1.015	0.990 to 1.032
Opt.rotation	10 to 25 deg	-50 to 130 deg.
Refractive index 30 deg.C	1.516 to 1.530	1.512 to 1.523
Acid value	35 max	40 max
Ester value	25 to 50	25 to 80
Carbonyl value	55 min	24 min
Total alcohol	55 min	70 min

PRODUCT APPLICATIONS



MARKET POTENTIAL

Increasing realization of the side effects of allopathic medicines, coupled with the growing awareness about the medicinal benefits as well as therapeutic effect of herbal products is pushing up the demand for herbal extracts, dietary supplements and herbal-based beauty aids worldwide.

The Associated Chambers of Commerce and Industry of India (ASSOCHAM) has projected that the market size of herbal industry which is currently estimated at Rs. 7,500 crores (Rs. 75 billion) will double to levels at Rs. 15,000 crore by 2015 since this industry would be growing at a compounded annual growth rate of over 20% henceforth.

In a study brought out by ASSOCHAM on Herbal Industry and Global Market 2015, it is pointed out that India's rich resource of medicinal plants and traditional treasure of knowledge in this area, its share at present is considered very meager. A quick estimate of the potential reveals that India can generate raw stock of around Rs. 300 billion and easily achieve around Rs.150 billion value added products. Thus, India is hardly able to exploit less than 50% of its potential. Interestingly both raw materials (herbs) and herbal products have ready market globally.

Releasing the study, ASSOCHAM Secretary General, D.S.Rawat said that ideally, the niche market that India can focus on include Ayurvedic Medicines and Dietary Supplements (including health drinks), extracts, Oils and other derivatives , skin care and beauty aids.

According to the study, the Indian domestic market can be broadly segmented into two categories. The first one will cover raw materials required by the industrial units and direct consumption for household remedies, whereas the second category will cover ready to use finished medicines, health supplements, etc.

There is a strong demand for raw stock which mainly comprises Amla, Isabgol, Senna, Henna, Ashwagandha, Aloe-vera and Myrobalans (Hartaki), which accounts for over 75 % of the raw materials used in Ayurvedic preparations. In terms of volume, it is estimated that current

consumption of the key raw ingredients (as mentioned above) totals approximately 400,000 – 500,000 MT.

With value addition, the market for herbal based products is around Rs. 7,500 crores, which is roughly the current size of the Indian market.

ASSOCHAM expect this market to grow rapidly in the coming years and by 2015, it is expected that the size of the domestic market will rise to Rs. 15,000 crores, reflecting a compound growth rate of over 20 %.

Globally, dependence on herbal medicines, dietary supplements and skin and beauty aids will continue to gain greater share in view of the awareness and comfort level which is akin to the use of organic food products. A quick/indicative estimate of the market potential globally reveals the following breakdown.

	Present Demand	Projected Demand (for 2015)
Europe	US\$ 35 Billion	US\$ 70 Billion
North America	US\$ 6.5 Billion	US\$ 25 Billion
China	US\$ 4.0 Billion	US\$ 12 Billion
India	US\$ 1.5 Billion	US\$ 3 Billion
Others	US\$ 13 Billion	US\$ 30 Billion
Total	US\$ 60 Billion	US\$ 140 Billion

INDICATIVE BREAK UP OF PRESENT GLOBAL DEMAND

The study has recommended that India’s thrust in the export market needs to be focused to achieve the targeted growth and market share. While the ethnic Indian population outside India is utilizing Indian herbal products in a significant way, there is a compelling need to generate awareness among the locals in foreign countries with regard to

Indian products, besides meeting the quality standards in the advanced countries.

INDIAN DEMAND

The Indian demand for Herbal extract is registering steady growth, particularly in pharmaceutical and cosmetic applications.

A few of the herbal extracts are exported from the country, showing an increasing trend in export.

Most of the drugs of established therapeutic value used in the pharmacopoeias of different countries grow in the great abundance and often in a state of nature in many parts of India.

As per an estimate, India has about 4000 species of herbal plants. Over 9% of them are available in wild state. Only 20% of these industrially useful herbs have so far been under commercial cultivation.

In recent times, Indian System of Medicine came to limelight due to its limited side effects and easy accessibility, India is a repository of large number of medicinal plants which needed exploration and experimentation for their sustainable use.

Some of the Indian units operating in the Herbal sector such as Vaidyanath, Dabur, Zandu, Hamdard, Himalaya Drug are reported to have produced 500 to 700 numbers of different herbal medicines, tonics and lotions etc. with extensive business to the tune of Rs.100 to Rs.150 crores per annum by each.

There are at present more than 7000 pharmacies in Indian system of medicine in the country, out of which about 600 are on loan licence and

the remaining are having manufacturing facilities. In addition, there are over 3 lakh Ayurved, 30000 Unani and 12000 Sidha registered practitioners in the country

The present market of Indian System of Medicines (ISM) including Ayurvedic drugs is estimated at around Rs.4300 crores. This includes 16 categories of classical ayurvedic medicines and a large number of patent and proprietary ayurvedic medicines. This include oils, pastes, tablets, pills, capsules and liquids

Market for Indian System of Medicines in India

	Market size (Million Rs.)
Ayurveda	41125
Siddha	282
Unani	1645
Total	43052

ISM System	Number of products
Ayurveda	>600 products
Siddha	> 100 products
Unani	> 30 products

Driving factors for demand

Important use in medicinal applications due to absence of side effects

Eco-friendly nature of the product

Herbal extracts are used extensively in the production of above Indian Systems of Medicines.

In addition Herbal extracts are also used considerably in cosmetic products

Likely Growth rate in demand for Herbal Extracts 9 to 10% per annum

BROAD OUTLINE OF MANUFACTURING PROCESS

General details

The manufacturing process for various herbal extracts depend upon the nature of the individual herbs and the specific process requirements.

The various unit operations are used in the extraction of herbs such as extractors, dryers pulverisers etc.

Observance of specific and stipulated conditions for the production of herbal extracts are necessary to ensure that there would not be any deterioration in product quality or stability.

Technology Practices in Herbal extract Processing

Procurement:

Identification a must, before purchasing or growing fresh/dried herbs. Discriminate look alikes, identical species and adulterated herbs.

Post Harvest:

Cleaning and Drying of plant material; to be specific to species as well as end products.

Freeze drying, Spray drying and Flash drying are important methods

Sun drying is usually the common initial step.

Storage:

Storage in controlled atmosphere in an aseptic lay out is a must to maintain keeping quality in terms of colour, actives and fragrance.

Temperature, air flow and humidity are closely monitored.

Pulverisation:

Grinding media & temperature can play a vital role in quality of final product.

Sifting:

Sifting through various mesh sizes for different end use is strictly followed. This directly determines the absorption and effectiveness of the herb.

Sterilization:

Plant materials contain microbial contamination which resist most of the cleaning techniques. Total Sterilization is mainly effected through exposure to Ethylene Oxide and Gamma radiation.

Filling:

It is a must to automate or semi-automate filling. The guage and material of the packing materials should prevent ingress of air and moisture. This avoids oxidation, discolouration or deterioration.

Tests:

Standard analytical methods are used to determine characteristics.

Organoleptic tests can sometimes determine trace component levels.

Chromatographic methods are used for quantitative analysis.

Microbiological Examination and Toxicological tests have to be performed to determine the safety of the herb.

Pesticide Residue and Heavy metals are to be analysed to ensure nil side effects.

Clinical trials or post marketing surveillance ensures that adverse drug interactions are avoided.

Standardisation

Standardisation and purification are ongoing debates especially in the developed countries.

There are two very strong camps influencing the market scenario.

The leading Herbal player Sabinsa for instance takes the middle ground. They offer both Standardised extracts as well as whole product and leaves the decision to the customer.

It is too premature to conclude on the merits of any single method. The Herbal sector has still some way to go before stabilizing.

Distillation

- * Hydro-distillation.
- * Steam distillation
- * Water-steam distillation
- * CO₂ Supercritical Extraction
- * Hydro-diffusion
- * Molecular Distillation
- * Spinning Cone Column Distillation

Factors determining the Production and Quality

Selection:

Geographical origin, Organ to Extract and distill, Botanical variety, Harvest time, Biochemical specificity, Contamination and Organoleptics

Comminution :

Heat induced deterioration must be prevented during size reduction.

It must also be closely followed by soaking and extraction.

Quality is ensured through:

Physical tests, Chemical tests, GC analysis and Sensory analysis

FCC guidelines for Specific Gravity, Refractive index, Optical rotation and Colour have to be followed.

GC-MS profiling gives accurate chemical information of the constituents.

It can be used to determine: Origin, adulteration, degradation and the complete list of components.

Pesticides residue and Heavy metal analysis yield information on safety.

Sensory analysis and Head space analysis are the final word on colour, flavour and odour.

Extraction:

Generally, water is the main media through which extraction is effected.

The separation of components are in the order of their solubility in water and not their Boiling Point.

Steam Distillation uses high pressure and heated steam optimised so as to keep the spice surface on the false bottom always wet but not saturated, i.e. the moisture content suits the absorptive capacity of the herb material.

Hydro-distillation is slow and ineffective except that it is portable.

Water-Steam Distillation is a blend of the above two processes.

It is suitable for most herbs and is also portable.

Hydro-diffusion is carried out with the flow top-down.

The condensation is at the bottom. Used for seed materials processed in bulk.

Supercritical extraction is an effective method for high value extracts.

SCE uses gases such as CO₂ to diffuse into plant material and extract the soluble components. It can be optimised to yield pure oil.

Post-Treatment and Storage of the extracted oil is vital.

All the methods except SCE yield moisture containing extract.

Sodium sulphate or Chloride are used to remove moisture.

Nitrogen is purged into the extract and maturation for a few days is allowed.

Storage is usually in clean stainless steel drums.

Control of Microbial Load

Option:

Ethylene oxide (EO) and Propylene oxide (PO) fumigation

Disadvantage: Harmful residues (ethylene chlorohydrin/bromohydrin, ethylene glycol.) & Worker Exposure to toxic gases.

Reported to be banned in a few developed countries

Microwave treatment

Disadvantage: Dry commodities unsuitable.

Ultraviolet irradiation

Disadvantage: Dry commodities unsuitable.

Steam or dry heating

Disadvantage: Heat destroys flavour, aroma and micronutrients.

Methyl bromide

Disadvantage: Ozone depleting chemical. To be phased out by 2005 in advanced countries and 2015 in developing countries.

Radiation processing

Disadvantage: None of the above hazards but cumbersome and expensive.

Radiation Processing

Advantages

It is a cold treatment.

Its penetrating nature permits its use in :

Raw materials, finished products and pre-shipment containers.

Products irradiated are safe and free from residual radiation

Permitted radiation:

Cobalt-60, Cesium-137, X-rays (sub 5 MeV), Electron (sub 10 MeV)

Spices, Herbs and dry vegetable seasoning are largely irradiated.

10 % of the Herbs and Spices are irradiated to enhance shelf life.

Source of technology

- * National Research Development Corporation,
(A Government of India Enterprise),
Anusandhan Vikas, 20-22, Zamroodpur Community Centre,
Zamrudpur, Kailash Colony Extn., New Delhi- 110 048.

- * Central Institute of Medicinal and Aromatic Plants,
(Council of Scientific and Industrial Research)
Kukrail Picnic Spot Road,
P O CIMAP,Lucknow - 226015

- * Central Drug Research Institute,
(Council of Scientific & Industrial Research)
Chattar Manzil Palace,
Mahatma Gandhi Marg,
Post Box No. 173,Lucknow-226 001.

Plant and machinery equipment and suppliers

- * Water Extractor
- * Falling Film Evaporator

- * Filler Decanter
- * Tray Drier
- * Grinder
- * Solvent Extractor with Stripping Condenser and Rectifier
- * Mixing Tanks

Size reduction

The raw materials is available as Leaves, Stems, Barks, roots, Flowers, Seeds, Kernels and Shells. Depending on the physical properties, including shape and size one has to select the equipments from the following.

Jaw crusher

Hammer Mill

Magnetic Separator

Belt Conveyor

Dust Collection Equipment

2. Extraction equipment

3. Filtration Nutch filter
Enclosed filter press

4. Evaporation/Distillation

5. Solvent Recovery

6. Drying of extracts

Tray dryer

Vacuum dryer

Spray dryer

Utilities Equipment

Boiler

Coal fired boiler

Light diesel/Furnace oil fired baby boiler

Packaged boiler

Cooling Tower

Spray ponds

Natural draft cooling tower

Forced/Induced draft cooling tower

Refrigeration Plant

Air Compressor

Supplier of plant and machinery

Boiler	Cethar Vessels Ltd., No.4, Dindigul High Road, Trichy
Refrigeration plant	Voltas Ltd., Chennai
Air compressor	ELGI Equipments Ltd., Elgi Industrial Complex III, Trichy Road, Singanallur, Coimbatore-641 005
Jaw crusher	K.G. Khosla Compressors Ltd., 19.8 KMS, Delhi-Mathura Road, Faridabad-121 003, Haryana
Dryer	Richard Engineering (Bombay) Pvt. Ltd. 42, IIF, Veerabadran Street

There is no particular constraint in expanding the area of cultivation of Aloe Vera to meet the projected increase in the demand. Therefore, the supply scenario of Aloe Vera Plant material is likely to remain comfortable.

Guggul

700 to 900 Kg are produced per hectare of Guggul gum plantation. Gum is dried in shade and stored.

Guggul is cultivated in Gujarat, Karnataka and Rajasthan.

Vetiver

For 1.5 kg of Vetiver oil 100 Kg Vetiver

Raw material availability

The herbs are grown all over India in different climatic and seasonal conditions. In the present case vetriver root extraction (herbal extraction is taken as the product. The annual requirement of the material is estimated as follows:

Calculation of Raw Materials	Unit	Qty	Rate-Rs	Rs.lakhs
Vetiver roots	66.66 MTs	299.97	65000	194.98 194.99

The extraction percentage is 6.75% from the raw material.

INSTALLED CAPACITY:

Economic Capacity

30 tonnes per annum

1. Land

Description	Cost Rs.in Lakhs
Cost of land of 1.0 acre	15.00
Sub total	15.00

2. Building

Description	Cost Rs.in Lakhs
Factory building - 2000 sqft @ Rs.800 per Sq ft	16.00
Sub total	16.00

3. Cost of Plant and Machinery

Description	Cost Rs. In lakhs
Cost of basic plant and machinery	25.00
Instrumentation and control	2.00
Pipelines and valves	2.00
Structurals for erection	1.00
Subtotal	30.00

FINANCIAL ASPECTS

1. COST OF PROJECT

	[Rs.lakhs]
Land	15.00
Building	16.00
Plant & Machinery	30.00
Other Misc. assets	2.00
Pre-Operative expenses	5.00
Margin for WC	6.12

	74.12

2. MEANS OF FINANCE

Capital	28.37
Term Loan	45.75

	74.12

3. COST OF PRODUCTION & PROFITABILITY STATEMENTS

Years	1	2	3
Installed Capacity MTs per annum	4.50	4.50	4.50
Utilisation	60%	70%	80%
Production/Sales Mts per annum	3	3	4
Selling Price	Rs.7,000,000	MT	
Sales Value	210.00	210.00	280.00
Sales Value	210.00	210.00	280.00
Raw Materials	117.14	136.67	156.19
Power	1.79	2.09	2.38
Wages & Salaries	10.37	10.89	11.43
Repairs & Maintenance	1.20	1.26	1.32
Depreciation	6.96	6.01	5.20
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Cost of Production	137.45	156.92	176.52
Admin, & General expenses	12.00	12.60	13.23
Interest on Term Loan	6.41	5.60	4.00

Interest on Working Capital	3.83	3.83	3.83
Total	159.69	178.95	197.58
Profit Before Tax	50.31	31.05	82.42
Provision for tax	17.10	10.56	28.02
Profit After Tax	33.21	20.49	54.40
Add: Depreciation	6.96	6.01	5.20
Cash Accruals	40.16	26.50	59.60

4. WORKING CAPITAL:

	Months Consumptions	Values	%	Margin Amount	Bank Finance
Raw Materials	1.00	9.76	25%	2.44	7.32
Finished goods	0.50	5.73	25%	1.43	4.30
Debtors	1.00	17.50	10%	1.75	15.75
Expenses	1.00	0.50	100%	0.50	0.00
		33.49		6.12	27.37

Say -
-> Rs.27.34 lakhs

5. PROFITABILITY RATIOS BASED ON 80% UTILISATION

<u>Profit after Tax</u>	54.40	
Sales	280.00	19%
<u>Profit before Interest and Tax</u>	90.25	
Total Investment	101.46	89%
<u>Profit after Tax</u>	54.40	
Promoters Capital	28.37	192%

6. BREAK EVEN LEVEL

Fixed Cost
(FC):

[Rs.lakhs]

Wages & Salaries	11.43
Repairs & maintenance	1.32
Depreciation	5.20
Admin. & General expenses	13.23
Interest on TL	4.00
	<hr/>
	35.18
	<hr/>

Profit Before Tax (P) 82.42

$$\text{BEL} = \frac{\text{FC} \times 100}{\text{FC} + \text{P}} = \frac{35.18}{117.60} = 0.80$$

24% of installed capacity