PROJECT PROFILE

ON

SHG - OTHER INDUSTRIES

ALOE VERA CULTIVATION

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INTRODUCTION

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 on islands of Cyprus, Malta, Sicily, Carary cape, Cape Verde and arid tracts of India. This is a hardy perennial tropical plant that can be cultivated in drought areas. But its potential is yet to be exploited. Aloe, despite being identified as 'a new plant resource with the most promising prospects in the world', remains a disregarded plant. It is scattered in the wild, along the coast of southern India. China, U.S.A., Mexico, Australia and some of the Latin American countries are the major producers and exporters of aloe products. These countries are exploiting the plant potential with the growing cosmetic and neutraceutical market. Aloe can substitute synthetic ingredient used in cosmetic industry very competitively and is finding increasing use in the ever growing consumer product segment.

In India, aloe is cultivated in Alwar in Rajasthan, Satanapalli in Andhra Pradesh, Rajpipla in Gujarat and some parts of Tamil Nadu.

Medicinal properties and uses

Aloe contains a mixture glucosides collectively called 'aloin', which is the active constituent of the drug. Aloin and its gel are used as skin tonic, has cooling effect and moisturizing agent and so it is used in preparation of creams, lotions, shampoos and allied products. It is also used in gerontology and rejuvenation of aging skin.

The aloin is extensively used as active ingredient in laxative and anti obesity preparations. The products prepared from aloe leaves have multiple properties such as emollient, purgative, antibacterial, anti-oxidant, anti-fungal, antiseptic

and cosmetic. The Food and Drug Administration of the UAS has approved the developmental study of aloevera in the treatment of cancer and AIDS.

Traditionally, aloe is extensively used in treating urine related problems, pimples, ulcers, etc.

Soils

The plant can be grown in a variety of soils ranging from sandy coastal soils to loamy soils of plains. It is sensitive to water logged conditions. The crop also comes up well in light soils. It can tolerate higher pH and high Na and K salts. Growth is faster under medium fertile, heavy soils such as black cotton soils. In well drained, loam to coarse sandy loam in a pH range upto 8.5, it grows well with higher foliage.

Climate

Aloe has wide adaptability and can grow in various climatic conditions. It can be seen growing equally good in warm humid or dry climate. However, it is intolerant to extreme cool conditions. The plant flourishes well on dry sandy soils at localities with lower annual rainfall of 50 to 300mm. It needs protection against frost and low winter temperature.

Varieties

Commercially important sub-species are *Aloe barbedensis, A. chinensis, A. perfoliata, A. vulgaris, A indica, A. littoralis and A. abyssinica.* National Botanical and Plant Genetic Resource, ICAR, has released varieties like IC111271, IC111269, IC111280 etc. Central Institute of Medicinal and Aromatic Plants, Lucknow, has also released the variety AL-1 for cultivation.

Propagation

It is generally propagated by root suckers or rhizome cuttings. For this purpose, medium sized root suckers are chosen 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 length cuttings which should have a minimum of 2-3 nodes on them. It is rooted in specially prepared sand beds or containers and after starting sprouting, it is ready for transplanting. On an average, about 36500 suckers are required for a nursery of 1 ha size (14550 for 1 acre nursery).

Spacing and plant population

Normally a spacing of 40cm x 45cm or 60cm x 30cm is followed. This accommodates about 55000 plants per hectare.

Land preparation and planting

The land is ploughed and cross ploughed thoroughly. Farm yard manure is added @ 15 t/ha during the last ploughing. Ridges and furrows are formed at 45 or 60cm apart. The plot may be irrigated if necessary. The suckers are planted at 40 or 30cm apart, maintaining the spacing suggested.

Manures and fertilizers

The crop responds well to the application of farm yard manure and compost. In the first year of plantation, FYM @15 t/ha is applied during the land preparation. During the subsequent years, the same dose of FYM is applied every year. Besides 50 :50:50 kg/ha of N:P:K is applied as basal dose.

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 yields. However, the plants are sensitive to water logged conditions.

Plant protection

Aloe is known to be infected by fungus causing leafspot disease. This effects yield and quality of the gel adversely. The disease can be controlled by spraying recommended fungicides.

Interculture

In order to facilitate healthy soil atmosphere, soil works like spading, earthing up, etc. are required in aloe plantation. Weeding at regular intervals are some important intercultural operations.

Harvest

The thick fleshy leaves are ready for harvest from the second year after planting. Normally, three harvests are taken in a year by removing three to four leaves per plant. Harvesting is labour intensive. It is carried out in the morning and / or evening. The leaves will regenerate from the scar and thus the crop can be harvested upto 5 years after planting. Apart from leaves, the side suckers, which can be used as planting material, can also be sold.

Yield

Yield may be as high as 50 - 55 tonnes of thick fleshy leaves from one hectare plantation. However, a conservative yield of about 40 t/ha may be considered for working out day viability of bankable schemes. Suckers from about 55-60% of the plants could be sold out annually.

Post harvest management

Care must be taken in preparing the leafy plant material for drying or distillation. Freshly harvested plant are generally allowed to wilt and loose moisture in the field before transporting, although some volatiles are lost. Wilting is noticed normally within 24 to 72 hours. But the plant should be kept dry and cool to prevent fermentation or mould growth. A concrete floor under shade can be used. The best oil is in the top leaves.

Economic life

Commercially yield is obtained from the second to fifth year, after which it needs replanting.

Technical guidance

Technical guidance for aloe planters is available from different institutes and organisations such as Central Institute for Medicinal and Aromatic Plants, National Research Centre for Medicinal and Aromatic Plants, State Agricultural Universities (e.g. Kerala Agricultural University, University of Agricultural Sciences, Bangalore), Regional Research Laboratories, etc. National Medicinal Plants Board may also be approached for technical guidance and marketing of the produce.

Marketing and export potentiality

The produce can be marketed in different commercial pharmaceutical and herbal firms located in India. Cosmetics containing aloe content command phenomenal rates in the markets abroad. But hardly any export takes place. Traded in processed form such as gel, juice and concentrate, aloe content is present in over 80 per cent of the cosmetics in the European market.

The major marketing centres of medicinal and aromatic plants in India are presented in Annexure.

Unit cost

In the present model, the unit cost for the development of aloevera in 1 ha of land works out to be Rs.68700.00. This may be modified to suit the local conditions taking into account the different techno-economic parameters prevailing in the locality. The details are presented in Annexure.

Margin money

As per NABARD norms, the margin money for different farmers is as follows :

Marginal farmers : 5%,

Small farmers : 10%

Big farmers : 15%

However, in the present model, 15% of the unit cost (i.e. Rs.10340.00) has been considered as margin money.

Bank loan

Bank loan may be considered as 85% of the unit cost i.e. Rs.58396.00

Interest rates for ultimate borrowers

We have assumed the rate of interest as 12% p.a.

Financial analysis

The financial analysis has been done considering the income from the leaves which is the primary product of the scheme.The results are as follows:

NPW at 15% DF : 116489

BCR	:	2.23 : 1.00
IRR	:	> 50%

The scheme is financially viable even without taking into account the income from selling the suckers which is the secondary product. Therefore, any income from the suckers will be only additional benefit to the farmer.

The details are furnished in Annexure .

Repayment schedule

The bank loan along with the interest can be repaid within 4 years including 1 year of grace period. The details are furnished in Annexure

Conclusion

Aloe, despite being identified as 'a new plant resource with the most promising prospects in the world', remains a disregarded plant. Its potential is yet to be exploited. It is one of the commercially attractive medicinal plants that can be cultivated in India. Hence, the banks may like to offer necessary assistance for the promotion of this plants.

Annexure	
MAJOR MARKETING CENTRES OF MEDICINAL & AROMATIC PLANTS	
State	**Districts / Places**
Rajasthan	Kota, Jhalawar, Jaipur, Ajmer, Jodhpur, Udaipur, Bharatpur
Punjab	Amritsar, Ludhiana, Hoshiarpur, Ropar, Jalandhar
Delhi	Delhi
Haryana	Ambala
J & K	Jammu, Srinagar, Rajouri, Baramula, Udhampur
Uttar Pradesh	Allahabad, Lakhimpur, Saharnpur, Bijnor, Agra, Varanasi
	Rishikesh, Lucknow, Areilly, Kanpur
Himachal Pradesh	Kallu, Kinnour, Joginder Nagar, Chamba, Mandi, Shimla,
	Solan, Una
Madhya Pradesh	Gwaliar, Katni, Bhopal, Indore, Jabalpur, Bilaspur, Dhamtari,
	Shivpuri, Neemuah
Assam / North	Guwahati, Shillong, Udaypur (S.Tripura), Dimapur, Kohima,
Eastern States	Kerang, Aizwal, Saiha (Mizoram), Silchar, Lakhimpur, Dhimaji,
	Pasighat, Darang, Tinsukhia, Shibsagar, Agartala, Dualgahi
Gujarat	Ahmedabad, Baroda, Rajkot, Bhavanagar, Surat, Junagarh,
	Jamnagar, Sidhpur
Maharashtra	Nasik, Mumbai, Dhule, Jalagaon, Akola, Nanded,
	Ahmednagar, Aurangabad, Nagpur, Kolhapur, Pune, Kannad,
	Kopergaom, Thane, Satara

Bihar	Kodarma Garwa, Gaya, Daltongang, Patna, Sasaram,
	Munger, Nawada, Rajgeer, Nalanda, Biharsharif, Bhagalpur
West Bengal	Calcutta, Kharangpur, Siliguri, Malda
Andhra Pradesh	Hyderabad, Anantpur, Kareem Nagar, Elluru, Cuddappa,
	Vizaywad, Guntur
Karnataka	Cochin, Ernakulam, Palaghat, Trichur, Aluva, Tuticorin
Tamil Nadu	Chennai, Salem, Madurai, Virudhnagar
Orissa	Behhrampur, Puri, Bhubaneswar, Cuttack, Bolangir
Chhatishgarh	Jagdalpur, Raipur
Uttaranchal	Dehradun, Hardwar, Ramnagar, Tanakpur
Jharkhand	Ranchi, Dhanbad
U.T.Chandigarh	Chandigarh
	Source : Demand study for selected Medicinal Plants (Vol.I) CERPA, New Delhi (2002)

Annexure

COST OF DEVELOPMENT OF ALOE

Unit Size : 1.0 ha.

(Figs. in Rs.)

Sr. No.	**Item**	**Year**		
I	MATERIALS	**1**	**2**	**3 onwards**
1	Planting materials	27,500		
2	FYM	4,500	4,500	4,500

3	Fertilizers	1,850	1,850	1,850
4	Irrigation	1,200	1,200	1,200
5	Plant protection chemicals	1,200	1,200	1,200
	Sub Total - I	**36,250**	**8,750**	**8,750**
II	LABOUR			
1	Land preparation	4,500		
2	Preparation of ridges and furrows and planting	4,500		
3	Application of manures and fertilizers	600	600	600
4	Spraying of plant protection chemicals	600	600	600
5	Irrigation	900	900	900
6	Inter culture	3,000	3,000	3,000
7	Harvesting	-	3,000	4,500
8	Packing, loading etc.		1,500	3,000
	Sub Total - II	**14,100**	**9,600**	**12,600**
	GRAND TOTAL	**50,350**	**18,350**	**21,350**

Unit cost : Rs. 68700.00 (capitalised upto the 2nd year)

Yield schedule

	Year 2	Year 3 to 5
Leaves (t/ha)	30	40

Technical parameters

Varieties : IC111271, IC111269, AL-1, etc.

Spacing : 45cm x 40cm , 60cm x 30cm

Plant population: 55000 / ha

FYM : 15 t/ha

Fertilizers : 50 : 50 : 50 kg/ha of N : P : K

Financial parameters :

		Rs.
Planting material (per sucker)		0.50
Wage rate (per manday)		60.00
FYM (per tonne)		300.00
Fertilizers per kg		
	N	10.50
	P_2O_5	19.00
	K_2O	7.50
Sale prices of leaves / t		2000
Maintenance cost : Year 3 - 5 (per year)		21350

ANNEXURE -					
FINANCIAL ANALYSIS OF ALOE PLANTATION					
YEAR	1	2	3	4	5
COST	50350	18350	21350	21350	21350
BENEFIT		60000	80000	80000	80000
NET BENEFIT	-50350	41650	58650	58650	58650
NPV of Cost	94517				
NPV of Benefit	211007				
NPW at 15% DF	116489				
BCR	2.23:1.00				
IRR	>50%				

ANNEUXRE –

REPAYMENT SCHEDULE OF ALOE PLANTATION

Year	Bank Loan	Bank Loan Outstanding	Interest @ 12% p.a.	Deferred interest	Gross income	Maintenance cost	Surplus	Repayment Interest	Principal	Total	Net surplus
1	42797	42797	5136	5136	Nil	BL	Nil	-	-	-	Nil
2	15598	58396	7007	12143	60000	BL	60000	12143	17857	30000	30000
3	-	40538	4865	-	80000	21350	58650	4865	24635	29500	29150
4	-	15903	1908	-	80000	21350	58650	1908	15903	17230	41420
Total	**58395**		**18916**					**18916**	**58395**		

Repayment within 4 years with 1 year grace period