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RK Nagar

Research Scholar, Forestry,
Department of Forest Products
and Utilization, College of
Horticulture and Forestry,
Jhalawar, Rajasthan, India.

SBS Pandey

Head, corresponding author,
Department of Forest Products
and Utilization College of
Horticulture and Forestry,
Jhalawar, Rajasthan, India.

Amol Vasishth

Assoc. Prof. & HOD, Dept. of
Forest Products and Utilization,
NAU, Navsari (Guj.), India.

PS Chauhan

College of Horticulture and
Forestry, Jhalawar, Rajasthan,
India.

JS Ranawat

College of Horticulture and
Forestry, Jhalawar, Rajasthan,
India.

Correspondence

RK Nagar

Research Scholar, Forestry,
Department of Forest Products
and Utilization, College of
Horticulture and Forestry,
Jhalawar, Rajasthan, India.

Economics of *Aloe barbadensis* cultivation Suitable for South East region of Rajasthan

RK Nagar, SBS Pandey, Amol Vasishth, PS Chauhan and JS Ranawat

Abstract

The field experiment was conducted during kharif season of 2016-17 to study "Evaluation of *Aloe barbadensis* Genotypes Suitable for South East Region of Rajasthan" at the Herbal garden, Department of Forest Product & Utilization, College of Horticulture & Forestry, Jhalrapatan, Jhalawar (Agriculture University, Kota). The experiment consisted of 15 genotypes of *Aloe barbadensis* IC-111267, IC-111269, IC-111271, IC-111279, IC-111280, IC-112527, IC-112531, IC-112533, IC-112534, Ajmer local, Baran Local, Mangrol Local, Siswali Local, Kota Local and Jhalrapatan Local laid out in randomized block design with three replications. The genotypes recorded Highest gross income in [T₅, IC-111280 Rs. (476917)], [T₂, IC-111269 Rs. (475775)], and [T₆, IC-112527 Rs. (460305)] and are suitable for farmers of the South East Region of Rajasthan. The highest benefit: cost ratios (1:2.59) were recorded in genotypes IC-111280 compared to Jhalrapatan Local (minimum) (1:1.81).

Keywords: *Aloe barbadensis*, Genotype, Cost of cultivation, Net returns and Benefit cost Ratio

1. Introduction

Medicinal and aromatic plants constitute major segments of the flora, which provides raw materials for use in the pharmaceuticals, cosmetics and drug industries. The indigenous system of medicines, development in India for centuries, makes use of many medicinal herbs. These systems include Ayurveda, Siddha, Unani and many other indigenous practices. More than 9,000 native plants have established and recorded curative properties and about 1500 species are known for their aroma and flavor (WHO). India and China are the two major producing countries, having 40 percent of the global diversity and availability of rare species. These are well known as the home of medicinal and aromatic crops that constitute a segment of the flora, and provide raw material to the pharmaceutical, cosmetic, fragrance, flavor etc. industries.

The area under aromatic and medicinal cultivation in India during 2013-14 was 493 thousand hectare area with production of 895 MT. Area wise leading aromatic and medicinal growing states in India are Rajasthan (231.24 thousand ha), Uttar Pradesh (133.70 thousand ha) and Madhya Pradesh (29 thousand ha). (Anonymous, 2013) [2].

Aloe is a herbaceous succulent that are widely distributed in tropical and subtropical areas, particularly South Africa and Madagascar. *Aloe barbadensis* Miller is an important medicinal plant of xerophytic habitat from Liliaceae family of African origin. About 300 species have been described in the genus *Aloe*. Among them, *Aloe barbadensis* is the most commonly grown in the world and it is considered as an important medicinal plant in many countries, (Hazrati *et al.* 2012) [6].

The use of *aloe* chemical and synthetic drugs has increased tremendously in the last half century. However, the harmful effects of chemical and synthetic drugs have on human life had resulted in more emphasis on herbal remedies. Medicinal plants encompass a wide variety of plants which are used for the prevention of infections, (Yavari *et al.*, 2013) [9].

The sobriquet of *Aloe* is "Gwarpatta". The *Aloe* name is derived from the Arabic word *Aloe* mean "shining bitter substances". *Aloe* is a stem less, perennial, drought resisting, succulent plant, bearing rosettes of leaves at the end of juicy green branches and has reportedly been used since ancient times for medicinal purposes. (Rathod *et al.*, 2014) [7].

Aloe is in high demand owing to its therapeutic, cosmetic and nutraceutical properties. Its leaves contain a very small quantity of viscous yellow fluid known as *Aloe latex*, which is embedded in the pericyclic cells of the vascular bundles. The *Aloe gel* widely used in cosmetic industry as a skin tonic. It is used to soothe the burn the pains, rashes, insect bites and other skin irritations, (Ahmad *et al.*, 2016) [1].

Biswas (2010) [4]. reported that the expenditure to be incurred for *Aloe vera* cultivation normally amounts to about Rs.1,10,000 / ha. The expected income with a yield of about 110 – 115 quintal would be about Rs.3,40,000/ha. The net profit would be about Rs.2,30,000 /ha/year. In addition to monetary benefit, social benefit would be enormous. Better management can results in much higher income and net profit. Baris and Rahim (2012) [3]. studied that the economics of cultivation of *Aloe vera* solely as well as together with coconut, guava and lemon trees has been analyzed to ascertain economically profitable combinations as feasible observed higher cost of production was found in sole cropping of *Aloe vera* due to larger area being cultivated (100%) for *Aloe vera* production. *Aloe vera* can therefore be advantageously cultivated in coconut based multistoried Agroforestry systems.

Guleria *et al.* (2014) [5]. Reported that the plantation cost incurred in the cultivation of *Aloe vera* for different years farmers incurred on an average, a total cost of Rs.140057.88 per hectare, in the first year of plantation. Cost incurred on material inputs averaged nearly 61.97 per cent of the total cost while human labour investment was around 11.25 per cent. Rental value of land shared 7.60 per cent of the total cost at large farms. Risk margin and managerial cost each accounted for 6.89 per cent of the total cost. The gross returns obtained for different years were Rs.5755.51, 97867.66, 109381.81, 112318.20 and 110227.19 for 1st, 2nd, 3rd, 4th and 5th year respectively. The net return was negative in the first year and gradually increased up to 4th year then started declining.

Samsai and Praveena (2016) [8]. Observed that the average yield of *Aloe Vera* was 35 tonnes per hectare and gross return was Rs.1,05,000. The total cost of cultivation was around Rs.41,210 and net return was around Rs.63,790. So if one invest one rupee in *Aloe Vera* cultivation they could get Rs.1.38.

Materials and Methods

A field experiment entitled “Evaluation of *Aloe barbadensis* Genotypes Suitable for South East Region of Rajasthan” was conducted at the Herbal garden, Department of Forest Products and Utilization, College of Horticulture and Forestry, Jhalrapatan city, Jhalawar (Agriculture University, Kota) during July, 2016 to February, 2017. The college is situated at 23⁰⁴’ to 24⁰⁵2’ N-Latitude and 75⁰²⁹’ to 76⁰⁵⁶’ E-Longitude in the South-Eastern Rajasthan. Agro-climatically, the district falls in Zone–V (Humid South-Eastern Plains) of Rajasthan.

The climate of the zone is sub-humid and sub-tropical characterized by mild winter and warm summer associated with relatively high humidity during the month of July to September. The region has mean annual rainfall of 954.7 mm mostly received from South-West monsoon during last week of June to Sept. and sometimes receives scanty showers during winter season. Meteorological data showed that during

the growing period of the crop the mean maximum and minimum temperatures ranged between 36.59 °C and 3.34 °C while, the mean maximum and minimum relative humidity ranged between 63.14 and 24.57 percent.

The gross realization in terms of rupees per hectare was worked on the basis of the yield of each treatment. The price of economic yield of particular crop was accounted on the basis of the prevailing market price. The net returns per hectare were calculated by deducting the cost of cultivation from gross return per hectare. The benefit cost ratio was calculated as per following formula:

$$\text{Benefit cost ratio} = \frac{\text{Gross returns}}{\text{Cost of cultivation}}$$

Result and Discussion

The data pertaining to cost of cultivation for different genotypes of *Aloe barbadensis* have been presented in (Table 1. and Fig. no.1 to 2). A perusal of the data revealed that highest gross income per hectare was obtained in genotype [T₅, IC-111280 Rs. (476917)], followed by in genotype [T₂, IC-111269 Rs. (475775)], and genotype [T₆, IC-112527 Rs.(460305)], whereas, lowest gross income per hectare was calculated in genotype [T₁₅, Jhalrapatan Local Rs.(373066)]. On the other hand, the total cost of cultivation per hectare incurred in all genotype remained Rs. (132747), Net returns per hectare were however, highest in genotype [T₅, IC-111280 Rs.(344170)], followed by in [T₂, IC-111269 Rs.(343028)], and genotype [T₆, IC-112527 Rs.(327558)], whereas, lowest net return was calculated in genotype [T₁₅, Jhalrapatan Local Rs.(240319)].

The data pertaining to cost: benefit ratio revealed that maximum cost: benefit ratio was obtained in that genotypes of *Aloe barbadensis* which fetched highest gross return. Maximum cost: benefit ratio was observed in genotype IC-111280 (1: 2.59), followed by genotype IC-111269 (1: 2.58), and genotype IC-112527 (1: 2.47), whereas, minimum cost: benefit ratio was observed in genotype Jhalrapatan Local (1: 1.81). In the genotype IC-112534, the leaf yield found highest but the number of suckers found highest in Mangrol Local genotype. Hence, the benefit: cost ratio remained highest in genotype IC111280 as this genotype is having the optimum leaf yield coupled with sufficient number of suckers. The results obtained with respect to cost: benefit ratio are in line with the findings of Baris & Rahim. (2012) [3] in *Aloe vera*, Biswas. (2010) [4] in *Aloe vera*, Guleria *et al.* (2014) [5] in *Aloe vera*. So by the help of above economic analysis, the genotypes having highest cost: benefit ratio [T₅, IC-111280 (1: 2.59)], [T₂, IC-111269 (1: 2.58)] and [T₆, IC-112527 (1: 2.47)] and Highest gross income [T₅, IC-111280 Rs.(476917)], [T₂, IC-111269 Rs.(475775)], and [T₆, IC-112527 Rs.(460305)] are suitable for farmers of the South East Region of Rajasthan.

Table 1: Economics of cultivation in *Aloe barbadensis*.

Treatment (Gnotypes)	Yield/ha		Cost of various products (Rs/ha)			Total cost of production (Rs/ha)	Total Gross Returns (Rs/ha)	Net returns (Rs/ha)	B:C ratio
	Leaf	No. of suckers	Sucker	FYM & NPK	Cost of cultivation				
T ₁ (IC-111267)	47.54	102253	38297	40850	53600	132747	387473	254726	1: 1.92
T ₂ (IC -111269)	44.57	208335	38297	40850	53600	132747	475775	343028	1: 2.58
T ₃ (IC -111271)	45.71	146677	38297	40850	53600	132747	420917	288170	1: 2.17
T ₄ (IC -111279)	43.02	199910	38297	40850	53600	132747	458010	325263	1: 2.45
T ₅ (IC-111280)	46.87	195697	38297	40850	53600	132747	476917	344170	1: 2.59

T ₆	(IC -112527)	44.80	191485	38297	40850	53600	132747	460305	327558	1: 2.47
T ₇	(IC -112531)	48.81	161613	38297	40850	53600	132747	454473	321726	1: 2.42
T ₈	(IC -112533)	47.34	93444	38297	40850	53600	132747	377484	244737	1: 1.84
T ₉	(IC -112534)	48.85	157400	38297	40850	53600	132747	450500	317753	1: 2.39
T ₁₀	(Kota Local)	39.62	157400	38297	40850	53600	132747	395140	262393	1: 1.98
T ₁₁	(Ajmer Local)	43.47	186889	38297	40850	53600	132747	447729	314982	1: 2.37
T ₁₂	(Baran Local)	37.00	212548	38297	40850	53600	132747	434548	301801	1: 2.27
T ₁₃	(Mangrol Local)	36.44	216761	38297	40850	53600	132747	435401	302654	1: 2.28
T ₁₄	(Siswali Local)	40.34	194548	38297	40850	53600	132747	436478	303731	1: 2.29
T ₁₅	(Jhalrapatan Local)	34.54	165826	38297	40850	53600	132747	373066	240319	1: 1.81

1. Rate of suckers: 1 Rs/sucker 6. Price of DAP: 25 Rs/kg.
2. Whole sale price of fresh leaf: 6 Rs/kg. 7. Labor charges: 200 Rs/day
3. Whole sale price of sucker: 1 Rs/sucker 8. FYM: 2500 Rs/ton.
4. Price of Urea: 6.40 Rs/kg.
Price of Mop: 19.60 Rs/kg

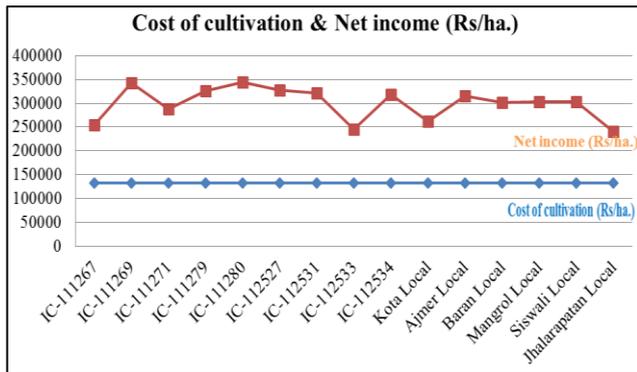


Fig 1: Evaluation of *Aloe barbadensis* Genotypes with cost of cultivation and net income (Rs/ha.).

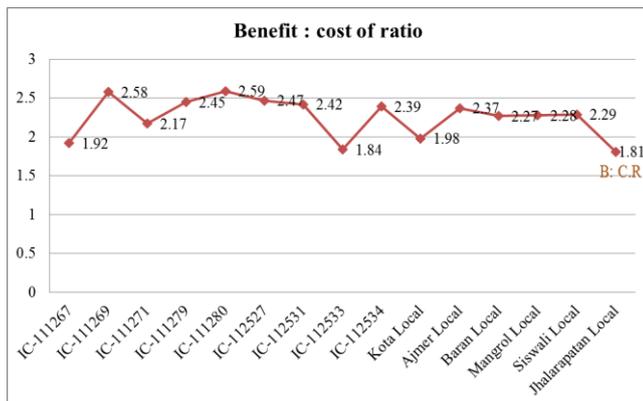


Fig 2: Evaluation of *Aloe barbadensis* Genotypes with benefit: cost ratio (Rs/ha.).

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