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SWOT Analysis of Henna Cultivation in Arid Fringe of Rajasthan

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Abstract: A study was conducted to analyze strengths, weaknesses, opportunities and threats in henna cultivation and trade in arid fringe of Rajasthan. Required information was collected through a sample (n = 100) survey of henna cultivating farmers and other stakeholders, henna processors (n = 45), traders and market officials through structured and semi-structured interviews in Pali district during 1999-2005. The major strengths of henna cultivation include assured production and employment generation, drought resistance, free from bird and animal damage, and availability of regulated market. The major weaknesses are high fluctuations in henna price, rain at harvest that spoils the produce quality, high labor cost and non-availability of laboratory facility for quality testing. Future prospects for henna cultivation lie in the rising preferences for natural dyes and large export potential. The major threats include competition with synthetic dye products, non-availability of labor at critical time, and damage by semi-looper pest. It is concluded that strengths and opportunities of henna crop are strong enough to boost its growth in semi-arid Rajasthan and establish it as a sustainable livelihood enterprise.

Key words: Henna, production, quality, marketing, processing, demand, export.

Henna (*Lawsonia inermis* L.), commonly used as a cosmetic for dyeing hair and palms or feet, has been one of the important plants since ancient times and has been in use for its aromatic and medicinal properties. The rising trend of using herbals has increased henna demand all over the world. About 90% of the world's henna is produced in India. Pakistan, Sudan, Iran, Yemen, Morocco, Niger and Egypt are other major countries where it is cultivated. India produced 2800 tonnes of henna during 1955, when Punjab and Gujarat were the major henna producing states, Rajasthan had only 5% share in the total production (Sastri, 1962). Rajasthan has now become the leading state with 90% of country's henna production. Henna is mainly a kharif season plantation crop, and is cultivated on about 42,299 ha area (2006-07) in Rajasthan. Pali district alone contributes 96% of it (Govt. of Rajasthan, 2007). Sojat and Marwar Jn. tehsils are the main centers of henna production in Pali district. The annual compound growth rate in the area of henna was 7.17% during the 1990s, while other arable crops had either very low or negative growth in the same period (sorghum 2.85%, pearl millet -2.52% and sesame -9.62%; Khem Chand *et al.*, 2002). Pali district also has well developed henna leaf processing industry in Sojat city, providing round the year employment to ~ 3000 families. Around 750 persons are also involved in stitching of gunny bags for filling of henna leaves.

Looking to economic importance of henna as an employment generating enterprise (on an average, it generates employment of 1.71 million man-days per year) and an export-oriented commodity (30% of the production is exported), a SWOT (strengths, weaknesses, opportunities and threats) analysis of henna cultivation was carried out.

Materials and Methods

Pali district of Rajasthan has the highest area under henna cultivation in the state; it was selected for the present study. To generate primary data for the study, a detailed sample survey, using personal interview technique was, conducted with a sample of 100 farmers randomly selected from four villages, two each from Sojat and Marwar Jn. Tehsil. Relevant information, with the help of semi-structured interview, was also collected from a sample of 45 respondents from henna leaf processing entrepreneurs. Besides farmers and processors, it was also discussed with market functionaries, and agricultural officials in Pali district. The data on recent developments in henna research were gathered from this station itself. Secondary data were collected from various publications of Directorate of Economics and Statistics, Government of Rajasthan, Jaipur. Information collected was tabulated and analyzed using tabular and regression analysis. Henna production in the country during the years 1993-94

to 2003-04 was used as a proxy of henna demand. Several studies have projected the aggregate national demand for forest products, estimating the demand by compound growth functions and by the transcendental consumption functions (Rai *et al.*,1983; Chandrakanth *et al.*, 1979; Sharma and Kumar 1999). In the present study, for computing future henna demand following model was fitted:

$D_t = a\ b^t$

where, D_t = Demand of henna (tonnes) in the t^{th} year, t = Time in years.

Results and Discussion

Strengths

The first and foremost step of SWOT analysis is to examine the strength of henna with respect to the surrounding environment, which proves its superiority over the competitive enterprise. Henna has got many specific qualities as a crop enterprise, which gives an extra edge to it over-competitive enterprises, as discussed below.

Plantation crop: Henna is a plantation crop and gives economic returns to farmers for 25 years. Though it starts yielding from second year itself, but the yields are meager. From the third year onward, it reaches to full potential. In subsequent years, the cultivators need not invest much; only one or two hoeing-cum-weeding are needed and crop gets ready for harvest. So, in comparison to arable crops, recurring expenditure is low because neither land preparation nor planting material is required. Farmers, therefore, are diverting even their highly fertile lands from other crops to henna cultivation despite the fact that it can be grown even on marginal lands.

Assured income and employment generation ability: Cultivation of arable crops (pearl millet, sorghum, sesame and pulses) in arid region is a risky enterprise as production levels are always governed by the quantity and distribution of rainfall during cropping season. Due to high risk and low returns from these crops farmers do not adopt improved techniques involving inputs and intensive labor. Henna gives assured returns of Rs. 12,450 ha^{-1} (Khem Chand *et al.*, 2005) even with low and erratic rainfall (Rao *et al.*, 2002). It motivates farmers to pay more attention to its weeding and harvesting operations. Since cultivation of one ha of henna requires about 50 man-days of labor, its cultivation in Pali district generates about 1.71 million man-days per year. The high labor cost and poor returns from arable crops during low rainfall years sometimes compel farmers to leave the stalks of poor crops in the field, but henna hardly faces this situation due to high economic return.

Soil conservation by henna plantation: The henna growing area is often subjected to wind and water erosion. Henna being a perennial crop, its plantation is maintained under coppice system, which prevents wind erosion. The high plant regeneration rate during the rainy season with its root growth at peak also binds the soil and checks erosion. The shedding of mature leaves and other plant parts, as well as weeding operations help in managing the organic matter in the soils, thereby improving soil physical, chemical and biological properties.

Drought-resistant and no damage by birds/animals: Birds and animals damage arable kharif crops like pearl millet, sorghum, clusterbean, sesame, pulses, etc., at various growth and production stages, and need extra labor to save the crops. Since birds and animals do not prefer henna, farmers need not to take protective measures. Further, if drought persists for one or more years, the henna plantation remains dormant and gets regenerated after the rains.

Availability of regulated market: There is a regulated market (sub-mandi) for henna leaf trading in Sojat City, working under the jurisdiction of Regulated Market of Agricultural Produce, Sojat Road, of State Agricultural Marketing Board, Ministry of Agriculture, Govt. of Rajasthan. This facilitates round the year trading of henna leaves. The farmers can sell their produce here with fair trading practices and can even store the produce for better price. About 90% of henna produced in Rajasthan is marketed at this mandi.

Weakness

Henna cultivation in the region has some weaknesses as discussed below.

High fluctuations in henna leaf price: The price of henna leaves fluctuates widely (Table 1), as it is not covered by the minimum support price policy of Government of India. In a good production year, the price goes down as low as Rs. 9000-12500 t^{-1} in comparison to low production year when it goes as high as Rs. 25000-29000 t^{-1}. During the low price year, profits are drastically reduced and being a plantation crop, it is not easy for farmers to shift to arable crops. If such trends continue for long period, it may discourage farmers to maintain henna plantation.

Table 1. Trends of henna price at Sojat Mandi

Year	Trade (t)	Average price (Rs. t^{-1})	Trade value (million Rs.)
1993-94	19382	9380	181.8
1994-95	8800	14000	123.2
1995-96	10264	20000	205.3
1996-97	11123	19000	211.3
1997-98	13959	18000	251.3
1998-99	18612	17000	316.4
1999-00	17286	19050	329.2
2000-01	20770	18420	382.6
2001-02	21852	18250	398.9
2002-03	13838	28640	396.3
2003-04	24744	26420	653.7
2004-05	27416	18060	495.0

Source: Office of Mandi Secretary, Regulated Market for Agricultural Produce, Sojat Road, District-Pali.

Sensitive to rain at harvest time: Green colored dry leaves of henna are highly preferred by traders and processors, and farmers fetch good price for such quality produce. Henna leaf color turns brownish yellow if there is rainfall at maturity or harvesting stage. The price of such a produce in the market is only 20-25% of the normal produce that causes heavy losses to the farmers.

High labor cost: Henna cultivation requires skilled labor for its planting and for harvesting of the matured leaves. Since farmers in the region mainly grow rainfed arable crops in kharif season, there is high demand of labor for hoeing and weeding of both arable and henna crops at the same time. The farmers are, therefore, forced to pay higher wages for timely hoeing and weeding in henna crop. The current rate for harvesting matured leaves is Rs. 500 per day for a couple of labor, which is 150% higher than the wages paid to labors in arable crops. Since employment opportunities in non-agricultural sectors are rising, the competition for labor at harvesting time is increasing and wages rates are going up.

Non-availability of recognized laboratory facility: The approval of chemical analysis report on henna is a pre-requisite for its export in most of the countries. Henna exporters in Sojat depend on laboratories in Delhi and Mumbai as there is no government-recognized facility for analyzing henna samples in and around Sojat city. Since it takes 2-3 weeks to get the results of analysis, the foreign buyers often avoid importing henna from India, causing heavy losses to the traders. Therefore, reliable analysis facilities need to be developed in the vicinity of the production belt.

Opportunities

Following opportunities exist for future prospects of henna.

Rising preference for natural dyes: Henna leaves (containing lawsone -the organic dye compound) are used to color skin, nail, body and hair as a natural herbal dye all over the world and is also getting popular for tattooing. The demand for henna is growing in the world in general and in the Middle East and western world in particular due to the growing fear of carcinogenic effects of synthetic dyes (Korwar and Pratibha, 1998). The increasing consumer awareness for natural dye products will help in creating higher demand for henna as a base or dye source for a variety of products.

Well-developed processing industry: Henna processing industry is mainly concentrated in Sojat city. Commercial henna leaf processing in the city began in 1957. Initially, stone grinders in the traditional flour mills were used for making powder from dried henna leaves. In the early 1980s, processing of henna leaves began in the hammer mills with a much higher turn over. By 1985, the original cast iron hammers were replaced by stainless steel hammers. Finally, for greater control and efficient processing of leaves the pulverizers, used in the limestone industry of Sojat, were adopted. Presently, there are around 180 henna processing units in Sojat city, providing gainful employment to more than 3000 persons (District Industrial Center, Pali, 2005). The henna processing industry in the city also has facility for good packaging for export.

Export demand: About 30% of henna produce is exported to different countries, leaving about 70% for domestic consumption. India exported 4500 to 7600 t of henna per annum during the period 1988-93 (Green, 1995). During 2002-03, the country exported 2384 t henna as powder to Turkey, UAE, USA and several other countries (Table 2), and 150 t as leaves, mainly to Middle East countries. Considerable amount is also exported as henna dye, henna-based hair care and cosmetic products (N. Prajapati, Henna exporter, Jodhpur, 2004, personal communication). The present estimate of henna export in all forms is about 10,500 t (2003-04). The exported henna is estimated to be worth Rs.

Table 2. Export of henna powder (2002-03)

Country	Quantity (t)	Value (million Rs.)	Per cent (quantity)
Turkey	580	23.0	24.33
UAE	233	37.3	9.77
Turks CIS	218	5.3	9.14
USA	166	12.3	6.96
Japan	124	28.1	5.20
Saudi Arab	121	7.5	5.08
German F Rep	112	7.1	4.70
Syria	102	3.6	4.28
France	99	3.6	4.15
Malaysia	71	6.3	2.93
Sub total	1826	134.1	76.59
Others	558	71.9	23.41
total	2384	206.0	100.00

Source: Monthly Statistics of Foreign Trade of India (2002-03), DGCI & S, GOI.

910 millions at an average price of US $ 1870 t^{-1} (Narain *et al.*, 2005).

Improvement in production technology: Considerable work on improvement of production technology has been carried out at CAZRI, RRS, Pali-Marwar. Farmers usually grow this crop at high density (30 cm x 30 cm) plantation that gives yield of about 0.7 to 0.8 t ha^{-1} without any nutrition input. Rao *et al.* (2003) reported a dry leaf yield of about 1.4 t ha^{-1} under spacing of 45 cm/60 cm between the rows and 30 cm with in rows with a rainfall of about 500 mm. They also reported improvement in dry leaf yield by 16% due to application of 60 kg N ha^{-1} over control. Further research on effect of farmyard manure, intercropping, weed control and drip irrigation is under progress. If adopted, this package of practices will help in improving the productivity of crop in near future.

Henna leaf price based on lawsone content: Presently, the henna leaf traders judge the quality of produce by visual/physical method. They judge the quality by leaf weight, thickness, aroma, color appearance, brittle nature, foreign matter, rainfed or irrigated produce, site of production, etc., and accordingly fix the price of produce. There is great opportunity for the farmers to produce quality leaves if prices are based on the lawsone content in henna leaves.

Increasing future demand: Demand of henna in the country and abroad is increasing due to its herbal nature, multiple uses and rising consumer awareness. The henna demand was estimated using equation, Ln D_t = 11.7064*** + t (Ln 0.0663)**, R^2 = 0.35 (***, ** significant at 1 and 5% level, respectively). The demand of henna grew at ACGR of 6.86% during 1993-94 to 2003-04. Its demand during the year 2005 was about 31,909 t; by 2020 the demand is expected to grow to 80,847 t (Khem Chand *et al.*, 2006). To meet the demand, an estimated 102209 ha is to be put under henna cultivation, which may come from the high-risk, low-return traditional arable crop lands. Some area of cultivable wasteland may also come under henna cultivation provided export is increased and infrastructure development is encouraged.

Threats

The major threats to growth and survivals of henna cultivation are discussed below.

Competition with synthetic dye products: Discussion with henna processors and traders revealed that synthetic dyes are posing a major threat to henna dye market. Synthetic dye-based products are available at a lower price, but their potential health hazard and the benefits of henna are not known to many, which restrict the henna market.

Non-availability of labor at critical time: Henna requires skilled labor for establishment, hoeing-cum-weeding and harvesting. There is no machine in the market for cutting and harvesting of henna leaves and, therefore, the operations are performed manually. Few innovative farmers/entrepreneurs tried their best to find out a mechanical device, but failed. Farmers want to complete the harvesting operation in minimum possible time because the quality of leaves gets severely affected if exposed to rain. Availability of skilled labor for all the farmers at the same time is difficult in the area, compelling farmers to travel up to 70-80 km to arrange labor for timely harvest. Similarly, during establishment of henna also the wage rates are high, as it requires skill of planting. Farmers opting for new planting try to complete the work in rainy season, because delay in planting reduces the establishment percentage. The high demand of labor raises the wages considerably.

Damage by semi-looper: In recent year sporadic/erratic incidence of caster semi-looper, causing light to heavy damage to henna plants, has been observed. Farmers avoid using chemical pesticides to control semi-looper, because henna is sold as an herbal product in foreign market. Effective

bio-control measures are needed to save the crop from such damage.

Conclusion

Henna being a natural dye source and closely associated with many traditions and religious occasions, has a standing demand in the national and international markets. Presently the market price of henna leaf is low due to competition from synthetic dye, but the input costs are increasing. This calls for government intervention in the form of minimum support price for the crop. Henna generates employment of about 1.71 million man-days a year, and about 3000 families depend on henna processing industry for their livelihood. Development of a low-cost machine for harvesting henna leaves will ease the labor problem and reduce the chances of loss. Effective bio-control measures to control semi-looper are also to be developed. Despite many weaknesses and threats to henna cultivation and trade, its strengths/opportunities are stronger. This gets expressed in the higher growth rate of its cultivation area as compared to arable crops.

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