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An empirical appraisal of production, export potentialities and policy reform for lac cultivation in India

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Abstract

This empirical study was carried out under operation research project in Jamtara and Dumka district of Jharkhand for achieving the lac cultivation as well as different constraints regarding lac cultivation. The study revealed that West Bengal state stood first in lac cultivation with about 2.814 million while Jharkhand ranked second by 2.647 millions lac cultivators. The availability of lac host plant was observed maximum (9.1 millions) in Jharkhand while Madhya Pradesh was second with 1.9 million host plant and Uttar Pradesh was third with 1.7 million host plant of lac. Two strains of the lac insect are generally recognized in India as 'Rangeeni' and 'Kusumi'. There are two crops in each strain in a year. The strain 'Kusumi' produces crop *Aghni* in the month of January - February and crop *Jethwi* in June-July. The *Rangeeni* strain produces *Katki* crop in the month of October-November and *Baisakhi* crop in June-July. The supply of the lac crop from 2000-2001 to 2009-10 revealed that *Baisakhi* crop produced better among all crop but declining productivity was observed over the years. On export front it was observed that it was maximum during 2000-2001 and it showed a declining trend up to 2006-07 and again it increased during 2007-08 and 2008-09 and the declined in 2009-10. Thailand is main competitor of India in lac export. During 2001-02 the share of lac export of India was 76.71 per cent while Thailand was exporting only 23.29 per cent but during 2009-10, the lac export of India was declined up to 49.75 per cent while Thailand increased the lac export by 50.25 per cent. It was mainly due to less attention paid by the governments on this exportable commodities. The technological, financial and socio-economic constraints were observed as the main cause of low production and productivity of lac in Jharkhand. It is suggested that central as well as state government should provide financial and technological assistance to tribals and economically weaker sections, those are involved in the lac cultivation. The better and remunerative marketing facilities would go a long way in improving the better income and employment to lac cultivators as well as the better foreign currency through export to the government.

Keywords: Empirical appraisal, export potentialities, *Rangeeni*, *Kusumi*

Introduction

Lac cultivation virtually holds a monopolistic position in its production and trade in the world till 1970s and accounts for nearly 80 per cent in both the fronts. Lac is formed as secretion of tiny insect called *Kerrialacca*. The Insect thrives on the sap of certain species of trees known as Lac hosts. The common Lac hosts in India are Ber, Palas and Kusum Trees. The Insect secretion forms a thick encrustation of the shoots or host trees and on maturity these encrustation are scrapped. This scrapped Lac is called as stick lac and is ready for marketing as a main crop output. The crop in India is mainly grown by nearly six million Tribal and economically weaker cultivators, spread over the major forest area of Jamtara and Dumka in Jharkhand and Purulia and Bankura districts of West Bengal, Bhandara and Chandrapur districts of Maharashtra and parts of Uttar Pradesh and Madhya Pradesh as well as Koenjhar, Mayurbhanj and Sundergarh districts of Orissa. Two strains of the Lac insect are generally recognized in India as 'Rangeeni' and 'Kusumi'. There are two crops in each strain in a year.

The strain 'Kusumi' produces crop *Aghani* in the month of January-February and crop *Jethwi* in June-july. The *Rangeeni* strain produces *Katki* crop in the month of Oct-Nov, and *Baisakhi* crop in June-July. The estimated availability of Lac host Trees in the state of Jharkhand stood first in the availability of the Lac host trees in the country. The estimated number is about 8.69 millions, Madhya Pradesh is the second largest state having about 1.9 million host trees followed by Uttar Pradesh 1.86 millions and other states. At the national level the estimated number of host trees is about 14.10 millions.

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The extent of Lac host cultivations as revealed very low, except for the state of Jharkhand where about 64.75 per cent of the available host are cultivated is. In the other states, the extent of cultivation remained below 20 per cent.

The lac cultivation in India is very extensive and spread out in the large parts of the forest areas. The existing number of Brood lac farms find it difficult to cater the total requirement of brood lac of all cultivation in India. The second main problem faced by cultivators is related with the marketing of stick Lac. They are generally deprived of the remunerative price of the crop output as the major sales are confined to the village and nearby town or Market where the middleman purchases output at the lowest prices in this direction, cooperative marketing societies are established whose main function is to ensure payment of fair prices to the cultivators and to avoid districts sales by creating healthy competition in the local markets.

The Government at the centre has recently announced a number of economic measures including new export policy. The shellac trade till now depends mostly on export. Shellac is a commodity of different nature and it has to be nourished in a specialized manner. More so because, it is grown by tribal and economically weaker section of rural population and provides a good source of subsidiary income from them.

Materials and Methods

Non-parametric technique of ordinal measurement, i.e., ranking is adopted to find out the constraints responsible for lower crop production. The sample cultivators were asked to indicate rank to each constraints depending upon the magnitude of individual constraint. The lowest rank i.e. R¹ was awarded to the most serious constraint and so on. The survey data of constraint analysis carried out in the Operational Research project NAIP area of Jamtara and Dumka district was used for the analysis.

Statistical tools

The Kendall coefficient of concordance ‘w’ is used to explain the degree of association between the rank score of different categories of cultivators.

$$w = \frac{S}{1/12k^2(N^3 - N)}$$

Where,

S = Sum of squares of observed deviation from mean rank (R_j)

K = 3

$$\sum (R_j - \frac{R_j}{N})^2$$

N=12

K = Number of sets of ranking, i.e., categories of cultivators

N = number of constraints ranked

Sperman rank correlation coefficient: (r_{s.av}) examined to study the degree of relationship among different categories of cultivators in ranking the individual strain.

$$r_{s.av} = \frac{kw - 1}{k - 1}$$

Test of significance of: ‘w’ When ‘N’ is greater than 7, the chi-square test is applied to find out significance of ‘w’.

$$K^2 = \frac{s}{1/12 kn (N+1)}$$

The probability associated with the occurrence under Ho (Hull hypothesis) of any value as large as observed value of ‘w’ may be determined by calculating the value of chi-square (λ²).

Results and Discussion

Lac cultivators

The estimated number of cultivators of Lac is presented in Table -1. West Bengal have maximum number of cultivators 2.814 million while Jharkhand state have 2.647 million cultivators in Madhya Pradesh ranked as third with 0.16147 million cultivators and Maharashtra state have 0.11036 million cultivators of Lac. Uttar Pradesh have only 0.0987 million cultivators engaged in Lac cultivation in the country.

Table 1: Estimate of Lac cultivators in India

States	Estimated number of cultivators
Jharkhand	2647000
W. Bengal	2814000
Madhya Pradesh	161470
Maharashtra	110360
Uttar Pradesh	98700

Availability of lac host

The estimated availability of lac host trees is shown in Table-2. The State of Jharkhand stood first in the availability of lac host trees in the country. The estimated number is about 9.1 millions. Madhya Pradesh is the second largest state having about 1.9 million host trees, followed by Uttar Pradesh 1.76 million and other states. At the national level the estimated number of host trees is about 14.10 millions.

The extent of lac host cultivation as revealed by the table-2 is very low, except for the state of Jharkhand where about 64.75 per cent of the available hosts are cultivated in other states the extent of cultivation remained below 20 per cent.

Table 2: Estimates of lac hosts: Available/cultivated

S. No.	States	Available Hosts (In ‘000)	Cultivated Hosts (‘000)	Extent of Cultivation (Per Cent)
1	Jharkhand	9176.41	5941.60	64.75
2	West bengal	986.11	96.41	9.78
3	Madhya Pradesh	1976.00	392.51	19.86
4	Uttar Pradesh	1761.23	53.21	3.02
5	Maharashtra	93.61	10.14	10.83
6	Others	112.46	19.27	17.13
	All India	14105.81	6313.14	46.76

Source: Compiled from different volume of Indian shellac

Production of lac

Two strains of the lac insect are generally recognized in India as ‘Rangeeni’ and ‘Kusumi’. There are two crops in each strain in a year. The strain ‘Kusumi’ produces crop *Aghni* in the month of January - February and crop *Jethwi* in June-July. The *Rangeeni* strain produces *Katki* crop in the month of October-November and *Baisakhi* crop in June-July.

The crop supply according to strain is given in Table-3. The study of the table reveals that major output of the crop is obtained in *Ragneeni* strain i.e. crop *Bysacky* contributes nearly 65 per cent and crop *Katki* about 25 percent. The rest

of the production is shared by the crops of *Kusumi* strain i.e. *jethwi* and *Aghni* together which about 10 percent of the total output.

Table 3: Supply of crop in the different season (average production in the year block period from 2000-2010), (Quantity in metric tonnes)

S. no.	Block of years	crop seasons					Percentage Reduction Over Previous Blocks
		Baisakhi	Katki	Jethwi	Aghni	Total	
1.	2000-2001	27144(61.17)	13251(29.86)	1172(2.64)	2811(6.33)	44378(100.00)	-
2.	2002-2003	26432(71.36)	7381(19.93)	978(2.04)	2247(6.07)	37038(100.00)	16.5
3.	2004-2005	18783(61.02)	5987(17.45)	1543(5.61)	4465(14.51)	30778(100.00)	30.6
4.	2006-2007	15767(52.43)	5429(18.05)	7081(23.00)	1790(5.95)	30067(100.00)	32.2
5.	2008-2009	14056(73.02)	3439(17.87)	761(3.95)	993(5.16)	19249(100.00)	56.6
6.	2009-2010	11367(67.47)	2964(17.60)	881(5.23)	1633(9.69)	16845(100.00)	62.0
7.	2006-2007-2009-2010 (4 year)	9893(51.94)	5171(27.15)	1264(6.64)	2718(14.27)	19046(100.00)	13.10

In parenthesis percentage share of each season to be the total crop output

Source: Data compiled from Indian shellac.

The above table clearly reveals that there a considerable shortfall in total crop production during the period of 2000-2010. The percentage shortfall over the first block of 2000-2001 (average), in the successive block period was increasing i.e. in the second block period the percentage shortfall was about 16.5, followed by 30.6 per cent in the third block period and 32.2 per cent in 4th block period and 56.6 and 62.0 per cent in 5th and 6th block period respectively. This rapidly reduction in the successive block period clearly indicates that the total crop production has significantly reduced during the period of study. The factors such as self-infection should be avoided as far as possible particularly in October-November, So as to offset the emergence of larvae of the predators, who hibernate for a long period during winter months, whose emergence coincides with the development of the new crop.

Under or over infection should also be avoided. The over-infection for summer crop only accentuates the mortality of lac larvae, which is always high in summer. Under infection on the other hand reduces the output of the lac-larvae.

There is another constraint which hinders crop production. It is about the effect of immature collection of brood. A big portion of *Baisakhi* crop from Palas (Ari) host is out in April-May. As a result the cultivators get only half the quantity of stick lac that could otherwise have been obtained if the insects were allowed to develop to fully maturity. The premature harvesting of the *Baisakhi* crop leads to shortage of brood lac to infect the subsidiary crop *Katki*. Asi cutting can be either due to ignorance or compulsion to earn some money before the actual crop is marketed.

Table 4: Average crop production

Period	Stick lac	Shellac/seed lac	Export Av.
2000-2001	13190	23664	30141
2001-2002	20130	16114	18132
2002-2003	21430	11322	8719
2004-2005	14260	7116	7115
2005-2006	12270	5919	5912
2006-2007	13670	6566	5287
2007-2008	19625	4314	5726
2008-2009	21620	11712	7023
2009-2010	15660	7420	5171

The average stick lac production in India is shown in Table-4 stick lac production on average was about 13190 metric tonnes and of shellac was 23664 metric tonnes during the

year 2000-2001. The production level of stick lac was showing the increasing trend up to 2002-03 while shellac having decreasing trend up to 2005-06. Again the stick lac was showing decline in production up to 2004-05 and 2005-06 and then showing an increasing trend up to 2006-07 to 2008-09 and then declined during 2009-10. The shellac production was increased only 2006-07 and again declined in 2007-08 and 2009-10 while it showed an enhancement in production during 2008-09.

Constraint to higher lac production

To evaluate the factors which hindered the higher production of stick lac, a survey of sampled cultivation was conducted in the main lac growing areas of Jamtara and Dumka district.

The main constraints were identified and classified into three categories viz. Technological, Financial and socio-economic. The farmers were grouped into small, medium and large categories.

The rank analysis based on cultivators perception of various constraints was done. The results are shown in Table-5 the results indicated that non-availability of brood lac stood first in terms and severity of its magnitude followed by dearth of cash money, adverse climatic conditions, lack of credit facilities in raising the higher production of stick lac.

As per the methodology adopted, the calculated value of ‘w’ was 0.91, this implies a high degree of association among three categories of cultivators in ranking various constraints. In other words the whole lac cultivating population faces identical constraints.

The calculated value for ‘R’ was 0.86. This also reveals a high degree of correlation among different categories of cultivators. Thus, both the tests gave similar results. However, the analysis based on chi-square test reveals that ranking given by three categories of cultivators are unrelated.

Table 5: Rank table

Farmers	constraints rank											
	R	R	R	R	R	R	R	R	R	R	R	R
Marginal	1	2	3	4	5	6	7	8	9	10	11	12
Small	4	9	11	3	12	2	5	10	6	7	1	8
Big	3	8	11	4	12	2	10	9	5	6	1	7
Rj	2	8	10	5	12	3	11	7	4	6	1	9
	9	25	32	12	36	7	26	26	15	19	3	24

Trade of lac

Shellac trade in India, mostly depends upon export. The domestic consumption is only about 15 per cent of the total production. The internal trade eagerly carried out through open market channels mostly by private traders and co-operative marketing societies, which have been established to protect the economic interest of poor lac growers. In this direction Large Area Multipurpose Societies (LAMPS) and Bihar State Cooperative, Lac Marketing Federation Ltd. (BISCOLAMP) are operating in the entire lac growing areas of the state, through their marketing centers. The main aim of these societies is to ensure fair and healthy competition in the local market.

The External trade of shellac is promoted by the Ministry of Commerce and Shellac Export Promotion Council. The SEPC since it was founded in June 1967, has endeavored to be an efficient instrument for this outlet. The shellac trade believes in competition through (a) stabilization in prices (b) stabilization of supply and it desires to be strong in competition for proposed quality. Export trade of Lac in India, which was once supposed to be pioneer in the world, has been adversely affected over the successive years (see

table-3). The study of quantum of export reveals that the annual average export was of about 30141 metric tonnes in the 2000-2001 has gradually reduced to about 5287 metric tonnes in 2006-2007, 2007-08 and 2008-09 it increased 7023 metric tones as compared to 2006-07, but again declined up to 5171 metric tonnes during 2009-10.

The market analysis in the- year 2008-2009 would show that market in the developing countries of Asia and Africa now consume, about 45 per cent of India's total and industrial countries like Federal Republic of Germany, USA and U.K. and now Russia account for nearly 36 per cent of Indian lac exports. It may be noted that four decades back the above four developed countries accounted for 76 per cent of Indian total exports. The emergence of developing countries as important buyers of Indian lac is a significant development while pollution consciousness and urge for natural resin should help us to regain the markets of industrialized countries too.

The study of direction of exports (table-6) further revealed that exports should be made to retain the breakaway markets of USSR and other East European countries.

Table 6: Extent of lac export from India to some traditional consumer countries

Countries	2004-05		2005-06		2006-07		2007-08		2008-09		2009-10	
	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value	Qty.	Value
1. U.S.R.	13.15	14.71	6.33	6.33	10.14	9.17	6.47	6.21	13.17	11.24	-	-
2. East Europeans countries	4.11	4.87	3.27	3.88	10.21	11.32	6.11	6.81	3.13	3.93	2.16	2.83
3. U.S.A.	12.90	15.11	14.87	1243	11.16	10.24	19.13	16.21	9.24	15.18	12.17	11.19
4. U.K.	7.61	7.34	7.37	7.37	7.13	11.16	7.31	11.36	3.61	3.18	4.61	4.83
5. F.R.C.	21.13	19.81	20.11.	20.11.	13.24	13.81	13.71	12.14	13.16	16.24	21.26	21.19
6. ARE (EGYIPT)	10.81	9.12	14.20	14.20	11.31	9.17	11.12	10.18	9.33	9.62	15.21	21.16
7. Iraq	-	-	2.84	2.91	1.00	0.13	7.71	10.14	3.12	3.84	-	-
8. Indonesia	9.21	9.33	10.71	1044	15.30	14.36	12.43	12.23	19.16	17.24	30.13	26.11
Total	78.92	80.29	79.70	77.67	79.49	79.36	83.99	85.28	73.92	80.47	85.54	87.31

Indonesia has emerged out as a potential buyer of Indian shellac and the quantity of export is steadily improving over the years, similar momentum in the trade needs to be maintained in the years to come.

Main competitor in the export trade

Thailand has emerged out as a main competitor of India in the export trade of lac. Thailand is mainly confined to stick seed lac, about 72 per cent of the total production of stick lac/seedless is being exported in the recent years. Whereas India is exporting manly shellac production in the world market, the other items of lac trade are DE waxed lac and seed lac.

The relative performance of these two trading countries in the export trade is shown in the table-7. This is evident that relative export. Performance is in the favor of Thailand in the recent years. India and Thailand contributing almost fifty per cent each in the world trade.

Export of lac from Thailand is exclusively in the shape of seed lac while India exporting shellac flakes, Thailand is exporting seed lac at comparatively lower prices than India, the importing countries cling on Thailand for seed lac for their industries manufacturing bleached or DE waxed and decolorized shellac. India will have to concentrate on the manufacture and export of DE waxed, decolorized shellac, bleached lac, shellac and other forms of lac based productions as India is already exporting DE waxed lac, shellac and other forms of lac (See table-8) but much more

effort is required to work out a new strategy based on concentration in the manufacture and export of product mix.

Table 7: Extent of lac export in India and Thailand

Years of Exports	Relative share of export of two countries (Per Qnt.)		
	India	Thailand	
2001-2002	76.71	23.29	100
2002-03	74.37	25.63	100
2003-04	47.81	52.19	100
2004-05	44	56.00	100
2005-06	53.41	46.59	100
2006-07	53.72	46.28	100
2008-09	50.27	49.73	100
2009-10	49.75	50.25	100

Data Source: Indian Shellac

Table 8: Grade wise export of lac from India

Grade of lac	Years							
	2006-07		2007-08		2008-09		2009-10	
	Qty	Value	Qty	Value	Qty	Value	Qty	Value
1. Shellac	77.20	78.14	95.11	89.71	81.02	82.50	87.00	83.26
2. Dewaxed	1.70	5.37	1.14	6.32	2.27	3.23	2.06	6.21
3. Seed lac	20.10	16.31	3.23	2.62	16.00	12.16	10.11	8.36
4. Other lac	1.00	0.18	0.52	1.34	0.71	2.11	0.83	2.16
5. total	100	100	100	100	100	100	100	100

Data Source: Indian Shellac

Policy reforms

The government at the center has recently announced a number of economic measures including new export policy. The shellac trade till now depends mostly on exports. Any who are associated with lac in some form or other? Shellac is a commodity of different nature and it has to be nourished in a specialized manner. More so because, it is grown by tribal and economically weaker sections of rural population and provides a good source of subsidiary income for them. The production of stick lac has unfortunately declined over the years. The export earnings from lac is negligible as compared to other items of export like Gems Jewelry, Jute, Tea and Leather products etc. It is important as it has a social responsibility towards million of poor growers and others who drew wage employment in lac industry. Therefore, a special treatment is expected from the government and other associated agencies for the improvement of lac in India. In this direction a number of steps have been taken by the government to promote cultivation, manufacture and trade of lac in India, The government at center has provided financial assistance to the state government for implementation of various schemes related to the development and promotion of lac.

Conclusion

The production of stick lac can be increased by enlarging the base of production i.e. bringing more and more unexploited lac hosts into lac cultivation. The second main bottleneck that hinders higher production is the quality and availability of brood lac. Since the existing brood lac are not sufficient to cater the brood lac requirements, therefore, more brood farms need to be established and the brood lac can be met by adopting scientific methods of cultivation. In this direction coupe-system of cultivation, where some hosts are given rest in one crop season and used for brood, can solve the problem of brood lac to the large extent. Therefore, coupe system of cultivation needs to be popularized among lac cultivators so as ensure the regular supply of brood lac. In India the lac is processed by both small and big producers. The small scale producers carry out all the processing operations manually and provide large employment opportunities. These units fall in the category of village/cottage industries.

Since the existence of these units has been threatened by the big producers small producers need special protective measures such as liberal credit and quota in export trade etc. Further the measures to stop the substitution of lac by synthetics, steps to popularize both in India and abroad should be taken. Researchers relating to product development would fall unless we are able to create confidence about stable supply of lac and reduce violent fluctuations in prices.

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