*Agricultural Economics Research Review*
Vol. 22 January-June 2009 pp 139-143

# Impact of Scientific Lac Cultivation Training on Lac Economy – A Study in Jharkhand

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**Abstract**

The study has reported the impact of training on lac growers in terms of host utilization, livelihood conditions and income and employment generation. The study is based on the data collected from randomly selected 500 lac growers (trained and untrained) in the Ranchi and West Singhbhum districts of Jharkhand in the years 2003-04 and 2004-05. The host utilization has been found to increase significantly after training of lac growers in comparison to untrained lac-growers for all the three hosts, viz. *palas* (*Butea monosperma*), *ber* (*Zizyphus mauritiana*) and *kusum* (*Schleichera oleosa*). A significant shift from lower production group to higher production group has been observed by trained lac-growers. The share of lac income in total income has increased in the case of trained lac-growers from 18.5 per cent to 24.0 per cent. More employment generation and increase in net returns have been found in lac cultivation on all the three hosts for trained lac-growers. Higher level of broodlac (seed) production has resulted in self-sufficiency in broodlac and more utilization of host trees for lac cultivation. Higher BC ratio and reduction in cost of production of broodlac and sticklac have been found in trained than untrained lac-growers for lac cultivation on all the three hosts. The study has emphasized on the need of strengthening and widening the extension activity to empower the lac growers with scientific knowledge on lac cultivation for increasing their income level.

## Introduction

Lac is a natural resin secreted by an insect known as *Kerria lacca* (Kerr.) which thrives on the tender twigs of specific host trees, viz. *palas* (*Butea monosperma*), *ber* (*Zizyphus mauritiana*), *kusum* (*Schleichera oleosa*), *Ficus sp.*, etc. In India, lac cultivation is widely practised in the states of Jharkhand, West Bengal, Chhattisgarh, Madhya Pradesh, Orissa, Maharashtra and parts of Uttar Pradesh, Andhra Pradesh, Gujarat and NEH region. It forms an additional earning support to the tribals of these regions. The country's production of lac was 23,229 tonnes in 2006-07 (Pal *et al*., 2007).

Human resource development equips the individuals with the needed knowledge, attitude and skills. Training on 'scientific methods of lac cultivation' increases their capacity and knowledge level on lac cultivation, leading to improvement in productivity of lac and stability in their income. Lac growers are characterized by high proportion of tribal population, living below poverty line (BPL) and low literacy percentage; therefore, importance of training is much more in lac cultivation. However, information available on the impact of scientific lac cultivation training is meager. Keeping these facts in view, a need was felt to find the impact of training on lac growers in terms of their host utilization, livelihood conditions, and income and employment generation.

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The paper has been drawn from the project 'Economics of Lac Cultivation in Jharkhand' conducted at I.I.N.R.G., Ranchi, Jharkhand.

## Methodology and Data Collection

The study is based on the primary data collected from two major lac-growing districts of Jharkhand, namely Ranchi and West Singhbhum, for the years 2003-04 and 2004-05. A total of 500 lac growers were selected and surveyed. Three-stage stratified random sampling technique was adopted for the selection of blocks, villages and farmers. Four blocks from each district and five villages from each selected block were identified. Then, ten lac-growers from each selected village were selected randomly. Thus, the total number of selected untrained lac-growers was 400. For a comparative analysis of traditional and modern method of lac cultivation, 100 lac-growers were selected randomly who had received training at the Indian Lac Research Institute, Ranchi. Primary data were collected from the respondents using a well-structured and pre-tested interview schedule. Tabular analysis was carried out to compare the different values of farm economy and other aspects of farm business and weighted average was used for average analysis. Fisher's t-test was applied for testing the significance of comparative analysis of trained and untrained lac-growers and chi-square test was used for testing the significance of adoption of improved techniques (Chandel, 1995).

## Results and Discussion

The lac host trees, namely *palas* (*Butea monosperma*), *ber* (*Zizyphus mauritiana*) and *kusum* (*Schleichera oleosa*), are commercially exploited for lac cultivation. The data in Table 1 indicate the host tree utilization by trained and untrained lac-growers. It is evident from Table 1 that among different hosts, utilization was in the order: *Ber* >*Palas* >*Kusum* >Others for both trained and untrained lac-growers. Also, the host utilization increased significantly for all the hosts after training of lac-growers. It had increased significantly for *palas* and *ber* for the same lac growers after receiving training. The low level of *kusum* host utilization was due to high cost of broodlac, shortage of funds for purchase of broodlac (seed), distance of host trees from residence, difficulty in cultivating operation due to height, and theft of lac.

Data pertaining to scale of lac production are given in Table 2. For it, the lac growers were divided into three groups as per their scale of production, viz. <100 kg, 100-200 kg and >200 kg. A significant increase has been observed in the production of lac by the growers after training. An increase has also been observed in the percentage of lac growers in higher production groups. In the production group

**Table 1. Host utilization by trained and untrained lac-growers**

(in per cent)

| Particulars | *Palas* | *Ber* | *Kusum* | Others |
|---|---|---|---|---|
| Untrained lac-growers | 28.7 | 53.8 | 17.2 | 7.4 |
| Trained lac-growers before training | 26.1 | 55.7 | 19.3 | - |
| Trained lac-growers after training | 39.8* | 69.3* | 26.0 | 17.1* |

*Note:* *Significant increase in host utilization at 5 per cent probability level.

**Table 2. Annual lac production by trained and untrained lac-growers in different production groups**

(in kg)

| Particulars | <100 kg* | 100-200 kg* | >200 kg* |
|---|---|---|---|
| Untrained lac-growers | 57.5 (52.5) | 31.0 (148.7) | 11.5 (240.5) |
| Trained lac-growers before training | 66.0 (44.0) | 27.0 (136.5) | 7.0 (310.0) |
| Trained lac-growers after training | 23.0 (74.0) | 54.0 (173.5) | 23.0 (298.0) |

*Notes:* * Significant difference at 5 per cent probability level.

Figures within the parentheses show the average annual production of lac in respective groups.

**Table 3. Sources of farm and off-farm income of untrained and trained lac-growers**

(in per cent)

| Particulars | Untrained lac-growers | Trained lac-growers |
|---|---|---|
| **Farm income** | | |
| Foodgrains | 29.0 | 28.0 |
| Vegetables | 11.0 | 10.5 |
| Livestock | 11.5 | 12.5 |
| Lac | 18.5 | 24.0 |
| Sub-Total | 70.0 | 75.0 |
| **Off-farm income** | | |
| Salary job | 3.5 | 5.0 |
| Business /Shop | 4.5 | 3.0 |
| Forest produce | 3.0 | 1.0 |
| Labour | 16.0 | 10.0 |
| Others | 3.0 | 6.0 |
| Sub-Total | 30.0 | 25.0 |
| Total | 100.0 | 100.0 |

100-200 kg, the percentage of lac growers increased from 27.0 per cent before training to 54.0 per cent after training. Similarly, in the production group of >200 kg, the increase was from 7.0 per cent to 23.0 per cent. Consequently, there was a reduction in the percentage of lac growers in the production group of <100 kg from 66.0 per cent to 23.0 per cent.

The data in Table 3 indicate the source of farm and off-farm incomes of trained and untrained lac-growers. It is evident from the table that the share of farm income in total income had increased in the case of trained lac-growers to 75.0 per cent from 70.0 per cent of untrained lac-growers. The average annual income from lac was around Rs 7,000 per family in the case of untrained lac-growers and it was more than double in trained lac-growers. The share of labour income in total income had decreased from 16.0 per cent to 10.0 per cent. It was due to more employment generation in scientific method of lac cultivation.

The physical input and output used in lac cultivation on different hosts by trained and untrained lac-growers have been presented in Table 4. All calculations regarding cost of cultivation are based on the lac cultivation on 50 host trees in the case of *palas* and *ber* and 10 host trees for *kusum*. It has been found that the amount of broodlac (seed) and other inputs used in lac cultivation had increased for trained lac-growers on all the three hosts. Employment generation in lac cultivation had also increased; it was more by about 28.0 per cent on *palas*, 47.0 per cent on *ber* and 21.0 per cent on *kusum* for trained lac-growers. More than 60.0 per cent of the human labour used in lac cultivation was the family labour in all the three cases. A majority

**Table 4. Physical input and output used in lac cultivation on different hosts by trained and untrained lac-growers**

| Name of hosts | Input / Output | Particulars | Untrained lac-growers | Trained lac-growers |
|---|---|---|---|---|
| *Palas* (50 hosts) | Input | Human labour | 24.8 mandays | 34.2 mandays |
| | | Broodlac | 28.3 kg | 36.4 kg |
| | | Pesticide /sutli / net | Rs 22.0 | Rs 80.0 |
| | Output | Sticklac | 42.4 kg | 69.3 kg |
| | | Broodlac | 97.4 kg | 152.8 kg |
| *Ber* (50 hosts) | Input | Human labour | 47.2 mandays | 69.5 mandays |
| | | Broodlac | 50.7 kg | 92.7 kg |
| | | Pesticide /sutli / net | Rs 41.0 | Rs 105.0 |
| | Output | Sticklac | 224.5 kg | 435.0 kg |
| | | Broodlac | 9.5 kg | 45.5 kg |
| *Kusum* (10 hosts) | Input | Human labour | 41.2 mandays | 50.0 mandays |
| | | Broodlac | 38.0 kg | 64.5 kg |
| | | Pesticide /sutli / net | Rs 41.0 | Rs 220.0 |
| | Output | Sticklac | 168.3 kg | 140.5 kg |
| | | Broodlac | 55.2 kg | 237.1 kg |

**Table 5. Returns in lac cultivation on different hosts by trained and untrained lac-growers**

| Name of hosts | Particulars | Untrained lac-growers (Rs) | Trained lac-growers (Rs) | Increase by trained lac-growers (per cent) |
|---|---|---|---|---|
| *Palas* (50 hosts) | Cost of cultivation | 2,566 | 3533 | 38 |
| | Net return | 4,886 | 8169 | 67 |
| | Input-output ratio | 2.90 | 3.31 | 14 |
| | Family labour income | 5,633 | 8925 | 58 |
| | Farm business income | 5,665 | 9009 | 59 |
| *Ber* (50 hosts) | Cost of cultivation | 4,674 | 7961 | 70 |
| | Net return | 9,771 | 20914 | 114 |
| | Input-output ratio | 3.09 | 3.63 | 17 |
| | Family labour income | 11,250 | 22909 | 104 |
| | Farm business income | 11,281 | 22993 | 104 |
| *Kusum* (10 hosts) | Cost of cultivation | 6,881 | 11042 | 60 |
| | Net return | 16,284 | 33128 | 103 |
| | Input-output ratio | 3.37 | 4.0 | 19 |
| | Family labour income | 17,552 | 34388 | 96 |
| | Farm business income | 17,583 | 34472 | 96 |

of lac growers had used their own broodlac for the next crop. *Ber* was mainly used for sticklac production, while *palas* and *kusum* were used for production of both sticklac and broodlac. Trained lac-growers gave more emphasis on production of broodlac than sticklac. Higher level of its production resulted in self-sufficiency in broodlac and more utilization of host trees for lac cultivation.

The returns in lac cultivation on different hosts by trained and untrained lac-growers have been depicted in Table 5. Both cost of cultivation and net returns increased in the case of trained lac-growers but increase in net return was higher than cost of cultivation on all the three hosts. Increased cost of cultivation was due to utilization of more labour and broodlac. The cost of cultivation had increased by 38.0 per cent in *palas*, 70.0 per cent in *ber* and 60.0 per cent in *kusum*, while the increase in net return was by 67.0 per cent, 114.0 per cent and 103.0 per cent, respectively. The BC ratio was found higher in the case of trained than untrained lac-growers on all the three hosts. Regarding lac cultivation on different hosts, highest BC ratio was found in both the cases, i.e. trained and untrained lac-growers for lac cultivation on *kusum*, followed by *ber* and *palas*.

The data (Table 6) on cost of production of broodlac and sticklac on different hosts reveals that it had reduced due to use of scientific method of lac cultivation in all the three hosts. This reduction was due to higher returns for trained lac-growers in all the three hosts. For trained lac-growers, the costs of production of sticklac as well as broodlac were highest in *kusum*, followed by *palas* and *ber*.

A significant increase has been found regarding adoption of improved lac cultivation techniques by

**Table 6. Cost of production of broodlac and sticklac on different hosts by trained and untrained lac-growers**

(Rs /kg)

| Type of lac | *Palas* | | *Ber* | | *Kusum* | |
|---|---|---|---|---|---|---|
| | Untrained | Trained | Untrained | Trained | Untrained | Trained |
| Sticklac | 18.90 | 16.60 | 19.40 | 16.50 | 28.20 | 23.70 |
| Broodlac | 17.20 | 15.10 | 16.20 | 13.80 | 38.60 | 32.50 |

trained lac-growers. The adoption percentage of improved techniques by trained lac-growers was 76.0 per cent for coupe system, 92.0 per cent for pruning of lac hosts, 86.0 per cent for selection of good quality broodlac, 84.0 per cent for bundling of broodlac and tagging on plant, 100.0 per cent for *phunki* (used up broodlac) removal, 54.0 per cent for spraying of insecticide, 38.0 per cent for use of synthetic net and 18.0 per cent for spray of fungicide. A low adoption percentage was observed in the case of spraying of insecticides and fungicides and use of synthetic net due to non-availability of these inputs in the local and nearby markets (data not presented).

## Constraints

The shortage of funds for purchase of inputs (specially broodlac), non-availability of inputs in local and nearby markets (pesticides and synthetic net bag), theft of lac, shortage of broodlac, insect death due to climatic change, lack of information on current price of lac, lack of scientific knowledge on lac cultivation, difficulty in cultivation operations due to host height, long distance of market, and lack of grading facility in the market were the major constraints faced by more than 50 per cent untrained lac-growers in lac cultivation. Uncertainty in production, shortage of broodlac, lack of scientific knowledge on lac cultivation, lack of demonstration on farmers' field, high cost of broodlac and difficulty in management of large-scale hosts were the constraints which decreased significantly for lac growers after obtaining training on scientific method of lac cultivation.

## Conclusions

The host utilization has been found to increase significantly in the case of trained than untrained lac-growers. The average annual lac production has been recorded more than double for trained than untrained lac-growers. Higher returns and employment generation have also been shown by trained lac-growers. It has been revealed that trained lac-growers accord more emphasis to broodlac production over sticklac production. The BC ratio for lac cultivation and adoption level of scientific techniques have been found higher for trained than untrained lac-growers. The cost of production of both broodlac and sticklac has been reduced by using scientific method of lac cultivation. There is a need for strengthening and widening the extension activity to empower the lac growers with scientific knowledge on lac cultivation so as to increase income and employment generation at the farm level. Improvement in marketing system will certainly be of great help to the lac growers. There is also a need to strengthen the co-operative marketing societies for input as well output marketing.

## Acknowledgement

The author is thankful to the anonymous referee for his constructive suggestions.

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